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United Utilities

Final Water Resources Management Plan 2024 Strategic Environmental Assessment

Environmental Report

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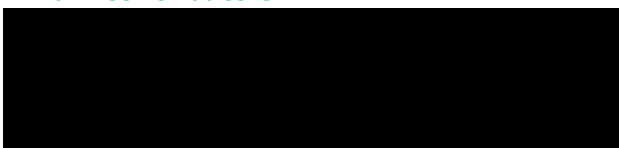


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Management systems

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Document revisions

No.	Details	Date
1	Draft	August 2022
2	Revised	September 2022
3	RevisedV2	December 2022
4	Revised V3	June 2023
5	Revised V4	February 2024
6	Revised V5	May 2024
7	Final	November 2024

Two Page Synopsis

WRMPs must comply with international, UK and national legislation related to the environment, as well as associated guidance on the development of WRMPs¹. This includes *The Environmental Assessment of Plans and Programmes Regulations 2004* (the 'Strategic Environmental Assessment (SEA) Regulations'). The SEA Regulations require an assessment of the likely significant environmental effects of the plans and the identification of ways in which adverse effects can be avoided, minimised or mitigated and how any positive effects can be enhanced. In doing so, the SEA is used to inform the development and selection of the water resource management options that will comprise the WRMP24.

Reflecting the integrated approach to the development of the Regional Plan and WRMPs and working with WRW member water companies, U UW developed, consulted upon, revised and applied a common, compliant and regionally consistent SEA methodology.

The SEA has then considered a total of 179 revised feasible options to inform the development of the draft WRMP24. This total is made up of 100 revised feasible supply options and 79 revised feasible demand management options (comprising 24 water efficiency options, 13 metering options and 42 leakage reduction options) across the Strategic, Carlisle and North Eden WRZs. As part of the post Revised Draft WRMP24 work, and reflecting the ongoing development of Strategic Resource Options (SRO), further variants were developed around a limited number of revised feasible options.

Each option has been assessed to identify the likely significant environmental effects during both construction/implementation and operation. The options were assessed based on the nature of the effect, its timing and geographic scale, the sensitivity of the human or environmental receptor that could be affected, and how long any effect might last.

SEA findings of the revised feasible options and variants have been used to support decision making on the selection of the best value combination of efficiency, leakage, metering and supply-side options:

SEA outputs were used in the detailed screening of options, leading to some options not being taken forward on environmental grounds e.g. adverse and unavoidable effects on international biodiversity sites, significant INNS transfer risks, significant effects on designated landscapes and cultural heritage.

The SEA methodology has also ensured assessment outputs have been used to support the quantification of the four environmental metrics used within ValueStream1, U UW's best value decision making tool. This has helped ensure decision making has been evidence based, consistent and considers environmental effects. Broadly, proposed options that seek to minimise demand, increase efficiencies and decrease leakages are less intrusive and have fewer adverse environmental effects. As reflected in ValueStream1, these environmental metric 'scores' have then informed the preferential best value selection of 33 demand management, leakage and efficiency options and

¹ EA, Ofwat and NRW (2023) *Water Resource Planning Guideline* (WRPG) [online]. Available at: <https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline>. [Accessed May 2023].

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one supply option, along with the UUW Drought Plan 2022 drought permit options following regulator requests, in order to maintain supplies to customers in the north-west over the lifetime of the plan, enhance operational resilience and provide the additional source capacity.

The environmental effects of the preferred options and preferred programme have then been identified, described and assessed. This has included consideration of the cumulative, secondary and synergistic effects.

Overall, the Final WRMP24 is expected to generate significant positive effects across several of the SEA objectives including climate change (SEA Objective 10), economy (SEA Objective 11), health and well-being (SEA Objective 13) and water resources (SEA Objective 14) as the provision of 25 MI/d of additional water capacity from the new supply option and 291 MI/d from the demand management, efficiency and leakage measures will improve resilience and adaptability to the effects of climate change, support population and economic growth, contribute towards maintaining health and aid sustainable water resource provision.

The preferred supply option (WR076 – River Bollin) in the Final WRMP24 forms part of the North West Transfer (NWT) Strategic Resource Option (SRO). The environmental compliance assessments, and the supporting investigations, are ongoing with the outcomes available to inform the RAPID Gate 3 submission in 2026. In consequence, these findings have not been available in time for the final plan. The supply option has residual WFD uncertainties until the NWT SRO Gate 3 investigations conclude, and whilst it is considered likely that the option will be compliant following further assessment, on a precautionary basis the WFD assessment has identified potential non-compliance. This is reflected in a moderate negative effects (with uncertainty) for water quantity (SEA Objective 5) and water quality (SEA Objective 6).

The HRA has concluded that the preferred option (WR076 – River Bollin) will have no adverse effects, alone or in combination, on the integrity of any European sites. The HRA included specific assessment of the downstream designated sites, notably the Mersey Estuary SPA / Mersey Estuary Ramsar. No significant effects on biodiversity (SEA Objective 1) have therefore been identified.

Where negative effects have been identified, generally, these are expected to be either minor or moderate only, although uncertainties remain. The exception to this is in respect of air quality (SEA Objective 8), climate change (SEA Objective 9) and resource use (SEA Objective 15) where significant negative effects have been identified during construction. However, these effects reflect the emissions to air, energy and resource use associated with the implementation of the water management measures which is to a large extent unavoidable (although effects may be reduced at the project stage through, for example, the use of renewable energy and sustainably sourced construction materials).

Detailed mitigation and enhancement measures have been identified to help avoid, minimise, reduce or mitigate effects where identified.

Recognising that there are residual WFD uncertainties associated with the preferred supply option, and in compliance with the revised WRPG requirements, UUW has identified alternatives that provide greater certainty of WFD compliance. Given that the options are broadly of similar scale and providing similar benefit, these quantified effects are comparable with the preferred supply option. Two areas of difference are noted in regard of the quantum of effects as the reasonable alternative options will result in a slightly lower water capacity, and contain lower amounts of embodied carbon and materials when compared to the preferred plan.

Non-Technical Summary

Introduction

United Utilities Water (Uuw) is preparing its next Water Resources Management Plan (WRMP24). The WRMP 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 most recent being published in 2019.

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'). The SEA Regulations require an assessment of the likely significant 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. In doing so, the SEA will be used to inform the development and selection of the water resource management options that will comprise the WRMP24.

This Non-Technical Summary (NTS) provides an overview of the Environmental Report produced as part of the SEA of the Final WRMP24. This Environmental Report represents the fourth output of the SEA of the WRMP24 following a Scoping Report which was issued to SEA consultation bodies in April 2021, the Environmental Report completed to accompany the consultation on the Draft WRMP24 in December 2022 and the one prepared for the Revised Draft WRMP24 in June 2023.

This Environmental Report presents the findings of the SEA and is being issued alongside the Final WRMP24. The following sections of this NTS:

- provide an overview of the WRW Regional Plan and the Water Resource Management Plans (WRMPs);
- describe the SEA process together with how it is to be applied to the Final WRMP24;
- present the key issues relevant to the SEA of the Final WRMP24;
- summarise the approach to undertaking the assessment of the Final WRMP24;
- summarise the findings of the SEA of the Final WRMP24 and any reasonable alternatives;
- outline the proposed mitigation and enhancement measures identified;
- summarise the conclusions; and
- set out the next steps in the SEA of the Final WRMP24.

² UEA, Ofwat and NRW (2023) *Water Resource Planning Guideline (WRPG)* [online]. Available at: <https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline>. [Accessed May 2023].

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Water Resource Planning

Consistent with the National Framework³, water resources management planning is being undertaken regionally and by all water companies in England and Wales in order to ensure reliable, resilient water supplies over the long-term planning horizon.

Water Resources West (WRW) Regional Plan

Water Resources West (WRW) Regional Plan covers the management of water resources in the North West of England, the West Midlands and the cross-border catchments with Wales. It includes all or part of the operational areas of Dŵr Cymru Welsh Water (DCWW), Hafren Dyfrdwy⁴, Severn Trent Water (STW), South Staffordshire Water (SSW) and U UW. These five companies, like all water companies in England and Wales, are required⁵ to prepare, maintain and publish a Water Resource Management Plan (WRMP).

The WRW Regional Plan covers the period 2025 to 2085 and addresses long-term regional and inter-regional, multi-sectoral water resources management pressures and draws on water resource options from the member water companies' WRMP24s, as well as the Strategic Resource Options⁶ (SROs) being taken forward by the companies.

WRW published its Emerging Regional Plan⁷ in January 2022. This identified that 215 MI/d of new water would be needed to meet public supply demand by 2031 and that an additional 63 MI/d would be needed by 2050, for non-public water supply sectors. On 14th November 2022, WRW published its Draft Regional Plan⁸ for consultation. The Draft Regional Plan identified that by 2050, the WRW region would need an additional 221 MI/d to meet public water supply needs and 97 MI/d to meet the needs of other sectors.

WRW has taking an integrated approach to preparing the Regional Plan and the WRMPs. WRW member water companies have used a regionally consistent set of methodologies to reflect local, regional and national needs into the development of the plans.

U UW's Water Resource Management Plan 2024

U UW's Final WRMP24 sets out the proposals to ensure continued delivery of a secure and reliable supply of water from 2025 to 2050, looking beyond out to the year 2100. For the five-year period

³ Environment Agency (2020) Meeting our future water needs: a national framework for water resources. Available from: <https://www.gov.uk/government/publications/meeting-our-future-water-needs-a-national-framework-for-water-resources>

⁴ AT 1st July 2018, Hafren Dyfrdwy combined the water service area of Dee Valley Water and Severn Trent lying in Wales.

⁵ Section 37 and 37A of Water Industry Act 1991, as amended by the Water Act 2003 and the Water Act 2014.

⁶ 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).

⁷ WRW (2022) Emerging Regional Plan, January 2022. Available from: <https://static1.squarespace.com/static/5e67889204d86850e1fdcece/t/61e5a4e237970d62de92fa10/1642439906757/WRW+Emerging+Regional+Plan+Executive+Summary.pdf>

⁸ WRW (2022) Draft Regional Plan. Available from <https://static1.squarespace.com/static/5e67889204d86850e1fdcece/t/6374bcc4bc2d9e543adfc90a/1668594894637/Draft+Regional+Plan+v1.1.pdf> [Accessed May 2023].

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(2025 to 2030) the WRMP24 aligns with UUW's Business Plan proposals prepared for the Ofwat Price Review 2024.

UUW's proposed best value plan is focussed on delivering three strategic choices:

- achieve government targets to halve leakage and reduce customer consumption to 110 litres per person per day by 2050;
- support national planning by developing large-scale water transfers that are adaptable and flexible to the changing needs of other regions;
- improve the level of service for temporary use bans (TUBs), halving the expected frequency of occurrence to 1 in 40 years (5% annual chance) and improving the frequency of implementing drought orders and drought permits to 1 in 50 years (2% annual chance).

UUW's demand forecast shows a very small increase of around 0.7% across the 25-year planning horizon, excluding the impacts of demand management programmes, and so the leakage reduction and water efficiency measures and TUBs measures will increase resilience in the supply.

UUW's Final WRMP24 includes 33 demand management, leakage and efficiency options, one supply option and the UUW Drought Plan 2022 drought permit options to maintain supplies to customers in the north-west over the lifetime of the plan, enhance operational resilience and provide the additional source capacity.

The Final WRMP24 also assumes delivery of an environmental destination scenario by 2050.

What is Strategic Environmental Assessment (SEA)?

SEA became a statutory requirement following the adoption⁹ of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment. In England, this was transposed into legislation on 20th July 2004 as Statutory Instrument 2004 No.1633 - The Environmental Assessment of Plans and Programmes Regulations 2004.

SEA is a systematic decision support process, aiming to ensure that the likely significant environmental effects of plans and programmes are identified, described to avoid, manage or mitigate any significant adverse effects and to enhance any beneficial effects. In this context, the purpose of SEA is to encourage relevant plan authors to integrate environmental considerations into the development of any plan or programme. Generally, a SEA is therefore conducted before an Environmental Impact Assessment (EIA) is undertaken.

In this context, the purpose of the SEA of the WRMP24 has been to:

- identify the potentially significant environmental effects of the WRMP24 in terms of the measures being considered by UUW for water resource management;

⁹ EU law has ceased to apply in the UK under the terms of the Withdrawal Agreement and EU Treaties. The European Union (Withdrawal) Act 2018 (EUWA) has established a new body of domestic law known as retained EU law. Any references to EU Directives in this Technical Note should be read as references to the domestic legislation that implemented the Directive (including that domestic legislation as it is revised or replaced from time to time).

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- help identify appropriate measures to avoid, reduce or manage adverse effects and to enhance beneficial effects associated with the implementation of the WRMP24 wherever possible;
- give the statutory SEA bodies, stakeholders and the wider public the ability to see and comment upon the effects that the Draft WRMP24 may have on them, their communities and their interests, and encourage them to make responses and suggest improvements for inclusion in the Revised Draft WRMP24; and
- inform UUW's selection of measures to be taken forward into the final WRMP24.

SEA comprises five key stages:

- **Stage A:** Scoping;
- **Stage B:** Develop and Refine Alternatives and Assess Effects;
- **Stage C:** Prepare Environmental Report;
- **Stage D:** Consult on the Draft Plan and Environmental Report and Prepare the Post Adoption (SEA) Statement; and
- **Stage E:** Monitor Environmental Effects.

Stage A of the SEA of the WRMP24 led to the production of the WRW Regional Plan and WRMP24 SEA Scoping Report¹⁰ (as the work was undertaken as part of the development of the consistent suite of assessment methodologies to be applied to water resource plan within the WRW region). The scoping stage itself comprised five tasks that are listed below:

- i. Review of other relevant policies, plans, programmes and strategies (hereafter referred to as 'plans and programmes').
- ii. Collation and analysis of baseline information.
- iii. Identification of key sustainability issues.
- iv. Development of an assessment framework.
- v. Consultation on the scope of the SEA (this Scoping Report).

Information collected and analysed (as part of tasks i and ii) covers England and Wales reflecting UUW's operational area. The Scoping Report set out the proposed framework for assessing the likely significant environmental effects of the WRMP24 (as well as the WRW Regional Plan). It was issued for scoping consultation for 5 weeks from the 8th April and the 13th May 2021. The representations received and how they have been taken into account are presented in **Appendix B**.

Following scoping consultation and amendment as appropriate, the framework has been used to assess the likely significant environmental effects (including cumulative effects) of the water

¹⁰ Wood and Ricardo (2021) Water Resources West and Water Resources Management Plan 2024 Strategic Environmental Assessment Scoping Report, Water Resources West, Dŵr Cymru Welsh Water, Hafren Dyfrdwy, Severn Trent, South Staffordshire Water, United Utilities

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resource options contained in the Draft (and Revised Draft) WRMP24 and any reasonable alternatives (**Stage B**).

These assessments were presented in an Environmental Report (in a form to meet the requirements of Schedule 2 of the SEA Regulations) completed to accompany the Draft WRMP24 (**Stage C**).

The Draft WRMP24 and accompanying documents including the Environmental Report were submitted to the Secretary of State for Environment, Food and Rural Affairs, for a request for publication. Following direction, U UW published the documents for consultation from 7th December 2022 to 15th March 2023 (**Stage D**).

Following consultation, U UW prepared a Statement of Response to the representations received. It also completed further work reflecting regional reconciliation which has led to amendments to the Draft WRMP24. A Revised Draft WRMP24 was completed and given the changes was also subject to further environmental assessment. The Revised Draft WRMP24 was submitted to the Secretary of State for the Department for Environment, Food and Rural Affairs (Defra) for review and approval in June 2023. The Secretary of State subsequently requested further information on the Revised Draft WRMP (December 2023), which was provided by U UW alongside updated environmental assessment reports (February 2024). Following receipt of the direction to publish, the Final WRMP24 has now been produced. Given the changes in the Final WRMP24, this has been subject to further environmental assessment. The findings are presented in this Environmental Report. In conjunction with publishing the Final WRMP24, a Post Adoption Statement will also be issued (to meet the requirements of SEA regulation 16 (4)). This will set out the results of the consultation and SEA processes and the extent to which the findings of the SEA have been accommodated in the final plan.

The SEA requires monitoring of any resulting environmental effects of the WRMP24 (**Stage E**).

Section 1.4 of the Environment Report describes in further detail the requirement for SEA of the WRMP24 and the SEA process including its relationship with the preparation of the U UW's Draft, Revised Draft and Final WRMP24.

What are the Key Issues for the WRW Regional Plan and WRMPs?

As part of the SEA process, a review has been undertaken to identify the key economic, social and environmental issues which are relevant to the assessment of the WRMP24. These issues have been identified from a variety of sources, including a review of baseline data and other relevant plans and programmes. A summary of the issues identified as being most relevant to the assessment of the Final WRMP24 are shown in **Table NTS.1**.

Table NTS.1 Key Issues Relevant to the Final WRMP24

Topic Area	Key Environmental, Social and Economic Issues Relevant to the WRMP24
Biodiversity, Flora and Fauna	<ul style="list-style-type: none"> • Key pressures and risks in respect of biodiversity and nature conservation that are relevant include, inter-alia: <ul style="list-style-type: none"> ○ population growth; ○ habitat loss and fragmentation by development; ○ agricultural intensification and changes in agricultural management practices; ○ water abstraction, drainage or inappropriate river management;

Topic Area	Key Environmental, Social and Economic Issues Relevant to the WRMP24
	<ul style="list-style-type: none"> ○ lack of appropriate habitat management; ○ atmospheric pollution (acid precipitation, nitrogen deposition); ○ water pollution from both point and wider (diffuse) agricultural sources; ○ climate change and sea level rise; ○ recreational pressure and human disturbance; and ○ invasive and non-native species. <ul style="list-style-type: none"> • The need to protect, maintain or enhance biodiversity, ecological functions and biodiversity connectivity within United Utilities' supply and source areas, particularly protected sites designated for nature conservation. • The need to promote the resilience of ecosystems. • The need to continue to increase and improve the condition of priority habitats and habitats of priority species, and restore populations of these species and other specially protected species. • The need to avoid, and mitigate against where necessary, activities likely to cause irreversible damage to natural heritage. • The need to take opportunities to improve connectivity between fragmented habitats to create functioning habitat corridors. • The need to control the spread of Invasive Non-Native Species (INNS) and eradicate where already present. • 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.
Soils, Land Use and Geology	<ul style="list-style-type: none"> • The need to protect and avoid damage to geodiversity and conserve and enhance sites designated for geological interest (including geological SSSIs). • The need to manage impacts on soil resources, including control of pollution and remediation of contaminated land, and minimise the loss of the best and most versatile agricultural land. • The need to conserve and enhance soil quality and function (including peatlands and carbon sequestration); • The need to sustainably manage and/or improve the quality of agricultural land in the region; • The need to influence how land is managed, promoting sustainable patterns of land use including the use of previously developed land and minimising the requirements for best and most versatile land. • 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).
Water	<ul style="list-style-type: none"> • The need to further improve the quality of the region's river, estuarine and coastal waters taking into account WFD/RBMP objectives. • The need to maintain and improve the quantity and quality of groundwater resources taking into account WFD/RBMP objectives • The need to improve the resilience, flexibility and sustainability of water resources in the UUW region, particularly in light of potential climate change impacts on surface water and groundwater. • The need to address increased pressures on the public water supply. • 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. • The need to reduce flood risk.

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Topic Area	Key Environmental, Social and Economic Issues Relevant to the WRMP24
	<ul style="list-style-type: none"> The need to ensure the continued risk of flooding is managed and mitigated effectively.
Air Quality	<ul style="list-style-type: none"> The need to minimise emissions of pollutant gases and particulates and enhance air quality arising from the implementation of UUW's WRMP. The need to reduce the need to travel and promote sustainable modes of transport.
Climatic Factors	<ul style="list-style-type: none"> The need to reduce greenhouse gas emissions arising from implementation of UUW's WRMP. The need to take into account, and where possible adapt to, the potential effects of climate change through, sustainable water resource management, water use efficiencies, specific aspects of natural ecosystems (e.g. connectivity), as well as accommodating potential opportunities afforded by climate change. The need to increase environmental resilience to the effects of climate change.
Population and Human Health	<ul style="list-style-type: none"> The need to ensure that the WRMP has a positive economic impact. The need to ensure that the water requirements of people, visitors and other users such as energy and agriculture can be met at all times, in a sustainable way, including in the seasonal peaks associated with tourism. The need to ensure that water supplies remain affordable, in particular for deprived or vulnerable communities. The need to accommodate an increase in population, households, dwellings and development associated with other uses that might impact on demand for water whilst ensuring the continued provision of essential services including water supply. Health inequalities exist in many communities. This is due to a number of factors (and the interplay between them) including housing quality, economic wellbeing, employment, lifestyle, heredity factors, cultural and environmental factors. Sustained exposure to elevated air pollution levels (including exposure to elevated concentrations of particulate matter, oxides of nitrogen and sulphur) contributes to respiratory illness. The need to ensure continuing safe, reliable and resilient provision of water services to maintain health and wellbeing of the population. The need to ensure that UUW's WRMP measures do not adversely affect the health and wellbeing of any member of the community. The need to ensure that UUW's WRMP minimise impacts on the ability of people to access facilities for sport, recreation and leisure purposes. The need to ensure that 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.
Material Assets and Resource Use	<ul style="list-style-type: none"> The need to minimise current and future demand for water resources through water efficiency measures (including metering). The need to continue to actively control leakage to optimise the water available. The need to reduce energy consumption. The need to ensure the sustainable and efficient use of resources such as construction materials. The need to minimise waste arisings, promote reuse, recovery and recycling and minimise the impact of wastes on the environment and communities.
Cultural Heritage	<ul style="list-style-type: none"> The need to conserve and enhance the historic significance of buildings, monuments, features, sites, places, areas of archaeological and cultural heritage interest, and their settings. The need to conserve and enhance the World Heritage Sites within the WRMP area.

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Topic Area	Key Environmental, Social and Economic Issues Relevant to the WRMP24
	<ul style="list-style-type: none"> The need to promote access to heritage sites within UUU's ownership where possible and safe to do so; and The need to avoid damage to important wetland areas with potential for paleoenvironmental deposits.
Landscape	<ul style="list-style-type: none"> The need to ensure the special qualities of designated landscapes including National Park and AONBs are protected. The need to minimise any adverse impacts upon landscape and seascape that may result from UUU's WRMP24, having regard to NCA profiles and the potential for effects on designated landscapes and their settings. The need to conserve and enhance landscape and seascape character and distinctiveness, taking into account the effects of climate change and recommendations for managing change in the profile of relevant NCAs.

The key issues listed in **Table NTS.1** above have informed the proposed framework that has been used to assess the effects of the Final WRMP24.

Section 2 of the Environmental Report summarises the review of plans and programmes relevant to the Final WRMP24 and SEA that is contained at Appendix C.

Section 3 presents an overview of the baseline analysis of social, economic and environmental characteristics, and identification of the key issues and their relevance to the assessment. The detailed baseline information is presented in Appendix D.

How have the Effects of the Final WRMP and any Reasonable Alternatives been Assessed?

An assessment framework was developed to assess the economic, social and environmental effects of the WRMP24, and revised to reflect scoping consultation comments. This framework sets out a number of assessment objectives relating to the key issues identified in **Table NTS.1**. For each objective, guide questions are also provided. The assessment framework that has been used to assess the Final WRMP24 is shown in **Table NTS.2**.

Table NTS.2 Assessment Framework for the Final WRMP24

Topic	Assessment Objective
Biodiversity, Flora and Fauna	1. To protect, restore and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species, enhance ecosystem resilience and habitat connectivity and deliver a net biodiversity gain.
	2. To protect and enhance sustainable natural resources and the ecosystem services they provide.
	3. To avoid and, minimise the risk of spread of, and, where required, manage invasive and non-native species (INNS).
Soils, Land Use and Geology	4. To protect and enhance soil quantity, quality and functionality and geodiversity and ensure the appropriate and efficient use of land.
Water – Quantity	5. To protect and enhance surface and ground water levels and flows.
Water –Quality	6. To protect and enhance the quality of surface and groundwater resources.

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Topic	Assessment Objective
Water – Flood Risk	7. To reduce or manage flood risk.
Air	8. To minimise emissions of pollutant gases and particulates and enhance air quality.
Climatic Factors	9. To reduce greenhouse gas emissions. 10. To adapt and improve resilience to the threats of climate change.
Population	11. To promote a sustainable economy and maintain and enhance the economic and social well-being of local communities. 12. To maintain and enhance tourism and recreation.
Human Health	13. To protect and enhance human health and well-being.
Material Assets - Water Resources	14. To promote and enhance the sustainable and efficient use of resilient water resources.
Material Assets – Waste and Resource Use	15. To minimise waste, promote resource efficiency and move towards a circular economy.
Cultural Heritage	16. To conserve and enhance the historic environment including the significance of heritage assets and their settings and archaeological important sites.
Landscape	17. To conserve, protect and enhance landscape and townscape character and visual amenity.

The effects of the Final WRMP24 have been assessed in a staged process, complementary to the development of the plans, and reflecting the decision-making requirements, as follows:

- Revised feasible option assessment:** a high-level assessment of all revised feasible options (including supply and demand management options) and revised feasible option variants developed post Revised Draft WRMP24 work, and reflecting the ongoing development of Strategic Resource Options (SRO). This section presents the findings of these revised feasible options and revised feasible option variants against the 17 SEA assessment objectives detailed in **Table NTS.2** with findings used to inform the plan decision making.
- Preferred option assessment:** for those options selected, a more detailed assessment has been undertaken of the preferred plan options against the 17 SEA assessment objectives detailed in **Table NTS.2**.
- Preferred programme assessment:** the cumulative effects of the preferred programme of options have been completed, to ensure that the effects of the Final WRP24 have been identified, described and evaluated. This has included consideration of the cumulative effects of any other relevant plans, programmes or major projects.
- Reasonable alternative plan assessments:** the cumulative effects of any reasonable alternative plans have been identified, described and evaluated for consideration along with the preferred plan.

The Final WRMP24 options have been assessed based on the nature of the effect, its timing and geographic scale, the sensitivity of the human or environmental receptor that could be affected, and how long any effect might last. Assessment matrices have been used to capture the assessment of each measure in a consistent manner.

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Specific guidance has been developed for what constitutes a significant effect, a minor effect or a neutral effect for each of the SEA objectives. These 'definitions of significance' help to ensure a consistent approach to interpreting the significance of effects and will help the reader understand the decisions made by the assessor.

Section 4 of the Environmental Report provides further information in relation to the approach to the assessment of the WRMP24.

What are the Likely Significant Effects of the revised Feasible Options?

Overview

In support of the development of the WRMP24, the SEA has considered a total of 100 feasible supply options and 79 feasible demand management options (comprising 24 water efficiency options, 13 metering options and 42 leakage reduction options) across the Strategic, Carlisle and North Eden WRZs. In total, 179 feasible options were identified. A further three revised feasible option variants developed post Revised Draft WRMP24 work, and reflect the ongoing development of SRO.

Each option was assessed against the SEA objectives to identify the likely environmental effects during both construction/implementation and operation. The options were assessed based on the nature of the effect, its timing and geographic scale, the sensitivity of the human or environmental receptor that could be affected, and how long any effect might last. Where quantified information was available for the option from UUW, the assessment was also informed by reference to threshold values set out in definitions of significance (see **Appendix E** to the Environmental Report).

The findings of the assessments are summarised below by option type. **Section 5** of the Environmental Report presents the detailed results of the feasible options assessment by WRZ, whilst the individual feasible option assessment matrices are presented in **Appendix F** to the Environmental Report.

Supply Options

The majority of feasible options were assessed as having a negative effect on biodiversity (**SEA Objective 1**) during construction, due to the potential for construction works associated with the options to result in the loss of/disturbance to habitats and species as a result of, for example, land take, emissions to air and noise. Across the Strategic and Carlisle Resource Zones, a total of 7 feasible options were assessed as having significant negative effects on SEA Objective 1 during construction due to the potential for works to affect internationally and/or nationally designated conservation sites. A total of two options in the Strategic Resource Zone, meanwhile, were assessed as having significant negative effects on this objective during operation (this was due to the possible impacts of increased reservoir levels on designated sites). 12 options across all three zones were assessed as having a significant negative uncertain effect during operation, due to potential significant and adverse impacts on designated sites associated with increased abstraction, which could not be excluded without additional analysis and/or identification of acceptable mitigation measures.

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A total of ten options across the Strategic and Carlisle Resource Zones were assessed as having a significant negative effect on sustainable natural resources (**SEA Objective 2**) due to the fact that they would result in the loss of high value/irreplaceable habitats. During operation however, the majority of options were assessed as having a positive effect on SEA Objective 2 due to the assumption that there would be operational biodiversity net gain which would be greater than the net loss during construction.

None of the feasible supply options were assessed as having any effect on INNS (**SEA Objective 3**) during construction as it is not anticipated that construction activities would have any effect on INNS risk. During operation however, a total of six options (in the Strategic Resource Zone) were assessed as having a significant negative effect on SEA Objective 3, due to the potential for INNS transfer associated with raw water transfers between different WFD surface waterbodies.

A total of 72 options were assessed as having a negative effect on Soils, Geodiversity and Land Use (**SEA Objective 4**) during construction, which principally reflects the loss of greenfield land including that which is 'best and most versatile' (land classified as 'best and most versatile land' is generally defined as agricultural land which falls into Grades 1, 2 and 3a). One option in the Strategic Resource Zone was assessed as having a significant negative effect on this objective due to the significant scale of works, which would take place mainly within Grade 3 agricultural land and partially within Grade 2 land. Just over a third of the feasible supply options were assessed as having a minor positive effect (either exclusively, or in combination with a negative effect associated with additional land take) on this objective during construction as new infrastructure associated with these schemes would be located at existing sites, making best use of existing sites and/or not requiring new land.

The majority of feasible supply options were assessed as having a negative effect against water quantity (**SEA Objective 5**) and water quality (**SEA Objective 6**) during operation due to associated reductions in surface and groundwater levels and potential impacts on the WFD status of waterbodies. Two options in the Strategic Resource Zone were assessed as having a significant negative effect on both objectives.

Many of the feasible supply options would involve the development of infrastructure and/or pipeline works within Flood Zones 2 and 3 and therefore construction activity, and in some cases new above ground infrastructure, may be vulnerable to flooding and hence these options were assessed as having a negative effect on flood risk (**SEA Objective 7**). Given the scale of works/proportion of works that would be situated within an area at risk of flooding, six feasible options in the Strategic Resource Zone were assessed as having a significant negative effect on SEA Objective 7 during construction. Eight options in the Strategic Resource Zone were assessed as having a positive effect on this objective during operation as they would provide additional catchment capacity/upstream retention through reservoir raising.

The majority of those options assessed as having a negative effect on flood risk during construction were also assessed as having a negative effect on climate resilience (**SEA Objective 10**) as construction works would be situated within an area at risk of flooding and therefore, may be at risk to the effects of climate change (flooding). During operation however, all feasible options were assessed as having a positive effect on SEA Objective 10, as they would help to ensure a

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continual supply of clean drinking water and increase resilience of supply, thereby increasing adaptability to the effects of climate change. A total of nine feasible options were assessed as having a significant positive effect on SEA Objective 10 as they would provide a significant benefit in this regard.

Construction activity would generate emissions to air associated with the use of plant and machinery as well as vehicle movements. Reflecting the volume of vehicle movements and potential for works to lead to traffic congestion, 14 options in the Strategic Resource Zone were assessed as having a significant negative effect on air quality (**SEA Objective 8**). A total of 15 options across the Strategic and Carlisle Resource Zones were also assessed as having a negative effect against SEA Objective 8 during operation due to the vehicle movements needed for maintenance and/or transportation of materials/chemicals.

All of the feasible options were assessed as having a negative effect on greenhouse gas emissions (**SEA Objective 9**) during construction, with a total of 52 options across all three WRZs having a significant negative effect on this objective, due to the significant scale of embodied carbon associated with construction materials and the scale of the schemes. The majority of the feasible options were also assessed as having a negative effect on SEA Objective 9 during operation as they would require energy and generate greenhouse gas emissions associated with abstraction and/or treatment and/or pumping of water, with a total of 39 options across the Strategic and Carlisle Resource Zones having a significant negative effect in this regard.

All of the feasible options across all three zones were assessed as having a positive effect against economy (**SEA Objective 11**) during construction resulting from capital expenditure arising from the options. This includes 55 options which were assessed as having a significant positive effect, as they would require a large capital investment (capital spend of \geq £25 million) that would be likely to generate a number of employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers. However, HGV movements and large scale pipeline works associated with many of the options are considered to have the potential to cause traffic disruption, generating a negative effect on SEA Objective 11 across many of the feasible options, leading to an overall mixed score against this objective.

The majority of the feasible options were assessed as having a negative effect on human health and well-being (**SEA Objective 13**) due to the potential for emissions to air from HGV movements and construction plant together with noise/vibration from construction activity to affect residential receptors in close proximity to development sites and along transport routes, however, no significant effects in this regard were identified.

During operation all options were assessed as having a positive effect against **SEA Objectives 11 and 13** as the capacity they would provide would help to ensure a continual supply of clean drinking water and increase resilience of supply to UU customers, supporting economic/population growth and generating a positive effect on human health. A total of 21 options in the Strategic Resource Zone were assessed as having a significant positive effect against SEA Objectives 11 and 13, as the yield benefit associated with these options would be \geq 25Ml/d or would support water trading.

None of the options were assessed as having significant effects on tourism and recreation (**SEA Objective 12**) during construction or operation. A total of 80 options across all three WRZs were assessed as having a negative effect due to construction works being proposed adjacent to or

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would cross cycling/walking paths, local public greenspaces and sports/recreational facilities, with the potential to affect users of such spaces/facilities. During operation, a total of 21 feasible options were assessed as having a potential negative effect on this objective due to their potential to impact upon recreational facilities/activities.

None of the feasible options were assessed as having any effect on water resource use (**SEA Objective 14**) during construction, however, during operation all feasible options were assessed as having a positive effect on this objective as they would increase the resilience of water resources within the UU supply area. A total of 12 options in the Strategic Resource Zone were assessed as having a significant positive effect on SEA Objective 14, either because of the significant yield they would provide and significant increase the resilience of water supply in the UU supply area or in the South East Region.

A total of 77 of the feasible options across all three WRZs were assessed as having a significant negative effect on waste and resource use (**SEA Objective 15**), as they would require significant quantities of construction materials and as such would be likely to generate more significant quantities of waste. The majority of options were also assessed as having a negative effect against this objective during operation, as they would require operational energy, the use of chemicals/materials for water treatment and vehicle movements (requiring the use of fossil fuels) during operation, including two options in the Strategic Resource Zone which were assessed as having a significant negative effect in this regard.

A total of 68 feasible options across all three WRZs were assessed as having a negative effect on cultural heritage (**SEA Objective 16**), due to potential impacts on the settings of cultural heritage assets such as listed buildings and scheduled monuments. Of this number, three in the Strategic Resource Zone were assessed as having significant negative effects on SEA Objective 16 due to potential direct and indirect impacts on high value designated cultural heritage assets (World Heritage Sites and Scheduled Monuments) during the construction stage. During operation, 23 feasible options across all three WRZs were assessed as having a negative effect on this objective, due to potential impacts on the settings of proximate heritage assets associated with new above ground infrastructure.

The majority of feasible options were assessed as having a negative effect on landscape (**SEA Objective 17**) during construction, due to the potential for development of water resources infrastructure including pipeline works to temporarily affect landscape character and/or visual amenity. A total of five options in the Strategic Resource Zone, we are assessed as having a significant effect as they would all of which would involve often extensive pipeline works within the Lake District National Park and World Heritage Site in addition to other designated landscapes such as the Northumberland National Park, the Forest of Bowland AONB, the Yorkshire Dales National Park, and the North Pennines AONB. A total of 62 options were assessed as having a negative effect against SEA Objective 17 during operation, due to the potential for new above ground infrastructure to have adverse landscape and visual amenity impacts.

Demand Management

Leakage

A total of nine options across the Strategic and Carlisle Resource Zones were assessed as having a significant positive effect on **SEA Objective 11** during the construction phase, reflecting the

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potential for capital investment to generate supply chain benefits and employment opportunities as well as increased spend in the local economy by contractors and workers. A total of six of the feasible leakage options in the Strategic Resource Zone were assessed as having a significant negative or significant negative uncertain on air quality (**SEA Objective 8**) effect due to the significant number of vehicle movements they would require during implementation.

For the majority of the feasible leakage reduction options, there would be carbon emissions arising from embodied carbon (in, for example, materials for pipeline repair) in addition to plant and vehicle movements throughout the investigative and construction period; resulting in a negative effect on greenhouse gas emissions (**SEA Objective 9**). This includes six options in the Strategic Resource Zone which were assessed as having a significant negative effect, due to the scale of the options, materials/vehicle movements required and associated carbon emissions/embodied carbon.

A total of nine feasible leakage options within the Strategic Resource Zone were assessed as having a significant negative effect on the economy (**SEA Objective 11**), due to the potential for vehicle movements and pipeline repairs to contribute to congestion and disruption to local transport infrastructure.

A total of 14 feasible leakage options in the Strategic Resource Zone were assessed as having a significant negative effect on waste and resource use (**SEA Objective 15**), due to the significant scale of the options and pipeline repairs/replacement and associated material requirements and potential for waste generation.

No other significant negative effects were identified during the assessment of the construction phase of the feasible leakage options, however, a range of minor and moderate negative uncertain effects were identified against **SEA Objectives 1** (biodiversity), **12** (tourism and recreation), **13** (human health), **16** (cultural heritage) and **17** (landscape), reflecting the potential for options to affect sensitive receptors/sites given their scale and potential significant scale of works, of which the precise locations are unknown.

Following the implementation phase, the feasible leakage options would be unlikely to have any significant adverse environmental effects. They would, however, help to reduce overall water use in the United Utilities supply area which is expected to have a positive effect on a number of SEA objectives.

A total of 19 options in the Strategic Resource Zone, which were assessed as having a significant positive effect on water quantity (**SEA Objective 5**), due to the associated reduction in water use/demand in the United Utilities supply area that they would provide.

A total of 14 feasible leakage options in the Strategic Resource Zone were assessed as having a significant positive effect on greenhouse gas emissions (**SEA Objective 9**), as their operation would result in significant carbon emission reductions, associated with reduced electricity production for the abstraction, treatment and distribution of water.

A number of the feasible metering options were assessed as having a positive effect both economy (**SEA Objective 11**) and human health and wellbeing (**SEA Objective 13**) as the extra capacity provided by the options would also help to ensure a continual supply of clean drinking water and increase resilience of supply to UU customers, supporting economic growth, which could result in a

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positive effect on the local economy and wellbeing. A small number of these options in the Strategic Resource Zone were assessed as having a significant positive effect in this regard.

The majority of the feasible leakage options were assessed as having a positive effect on water resource use (**SEA Objective 14**) as they would result in a reduction in demand for water, thereby increasing the resilience of supply in the United Utilities supply area. A total of 19 of the feasible leakage options in the Strategic Resource Zone were assessed as having a significant positive effect in this regard.

Metering

The feasible metering options would be predominantly implemented within properties, such that environmental effects are anticipated to be more limited than feasible supply and leakage options. As such, neutral effects were assessed against **SEA Objectives 1** (biodiversity), **2** (sustainable natural resources), **3** (INNS), **4** (soils, geodiversity and land use), **6** (water quality), **7** (flood risk), **10** (climate resilience), **12** (tourism and recreation) **16** (cultural heritage) and **17** (landscape) during both the construction/implementation period and the operational period.

All seven of the feasible metering options assessed for the Strategic WRZ, which were assessed as having a significant positive effect on **SEA Objective 11** during the construction phase, reflecting the potential for capital investment to generate supply chain benefits and employment opportunities as well as increased spend in the local economy by contractors and workers.

All of the feasible metering options would require material use for the production of meters and materials required for installation of meters, which may lead to the generation of limited quantities of waste and as such each of the options was assessed as having a negative effect on waste and resource use (**SEA Objective 15**) during the construction phase, however, the effects in this regard were not considered to be significant for any of the feasible metering options. A total of five of the feasible metering options in the Strategic Resource Zone were assessed as having a negative effect on greenhouse gas emissions (**SEA Objective 9**) as materials used during construction and associated construction/implementation vehicle movements would result in carbon emissions/would contain embodied carbon and assessed as exceeding the threshold for an effect.

A total of nine of five of the feasible options in the Strategic Resource Zone were assessed as having a potentially significant negative effect on air quality (**SEA Objective 8**), due to the significant number of vehicle movements they would require during implementation.

Following the implementation phase, the feasible metering options would be unlikely to have any significant adverse environmental effects. They would, however, help to reduce overall water use in the United Utilities supply area which is expected to have a positive effect on a number of SEA objectives.

A total of seven of the options in the Strategic Resource Zone, were assessed as having a significant positive effect on water quantity (**SEA Objective 5**), due to the associated reduction in water use/demand in the United Utilities supply area that they would provide in operation.

A total of five of the feasible metering options in the Strategic Resource Zone were assessed as having a significant positive effect on greenhouse gas emissions (**SEA Objective 9**), as their operation would result in significant carbon emission reductions, associated with reduced electricity production for the abstraction, treatment and distribution of water.

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Four feasible metering options in the Strategic Resource Zone were assessed as having a significant positive effect both economy (**SEA Objective 11**) and human health and wellbeing (**SEA Objective 13**) during operation, as the significant extra capacity provided by the options would help to ensure a continual supply of clean drinking water and increase resilience of supply to UU customers, supporting economic growth, which could result in a positive effect on the local economy and wellbeing.

All of the feasible metering options were assessed as having a positive effect on water resource use (**SEA Objective 14**) during operation, as they would result in a reduction in demand for water, thereby increasing the resilience of supply in the United Utilities supply area. All seven of the feasible metering options in the Strategic Resource Zone were assessed as having a significant positive effect against this objective, as they would result in more significant reductions in demand/water resource use.

Water Efficiency

In a similar way to the feasible metering options, the feasible water efficiency options would be predominantly implemented within properties, such that environmental effects are anticipated to be more limited than feasible supply and leakage options. As such, neutral effects were assessed against **SEA Objectives 1** (biodiversity), **2** (sustainable natural resources), **3** (INNS), **4** (soils, geodiversity and land use), **6** (water quality), **7** (flood risk), **10** (climate resilience), **12** (tourism and recreation) **16** (cultural heritage) and **17** (landscape) during both the construction/implementation period and the operational period.

A significant effect was only assessed against one of the feasible water efficiency options in the Strategic Resource Zone (WR685c), which was assessed as having a significant negative effect on greenhouse gas emissions (**SEA Objective 9**), as materials used during construction would contain embodied carbon and associated construction/implementation vehicle movements would result in significant carbon emissions.

No other significant effects were recorded in relation to the construction/implementation period of the water efficiency options, however, minor and moderate effects were assessed against a limited number of objectives, with negative effects being recorded against air quality (**SEA Objective 8**) for three options in the Strategic Resource Zone and one option in the Carlisle Resource Zone due to the potential for vehicle movements to affect local air quality, whilst nine options across the Strategic and Carlisle Resource Zones were assessed as having a negative effect waste and material use (**SEA Objective 15**) as options would require material use for the production of water efficiency devices and materials required for installation of devices, which may lead to the generation of limited quantities of waste. Two options in the Strategic Resource Zone were also assessed as having a moderate positive effect and one option in the Carlisle Resource Zone was assessed as having a minor positive effect on the economy (**SEA Objective 11**), reflecting the potential for capital investment to generate supply chain benefits and employment opportunities as well as increased spend in the local economy by contractors and workers.

As with the feasible metering options, following the implementation phase, the feasible water efficiency options would be unlikely to have any significant adverse environmental effects. They would, however, help to reduce overall water use in the United Utilities supply area which is expected to have a positive effect on a number of SEA objectives.

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A total of two options in the Strategic Resource Zone, which were assessed as having a significant positive effect on water quantity (**SEA Objective 5**) during operation, due to the associated reduction in water use/demand in the United Utilities supply area that they would provide.

A total two options in the Strategic Resource Zone were assessed as having a significant positive effect on greenhouse gas emissions (**SEA Objective 9**), as their operation would result in significant carbon emission reductions, associated with reduced electricity production for the abstraction, treatment and distribution of water.

A total of two options in the Strategic Resource Zone were assessed as having a significant positive effect on both the economy (**SEA Objective 11**) and human health and wellbeing (**SEA Objective 13**) during operation, due to the significant water savings/yield that they would provide.

A total of two of the feasible water efficiency options in the Strategic Resource Zone were assessed as having a significant positive effect on water resource use (**SEA Objective 14**) during operation, as they would result in significant reductions in demand/water resource use, thereby increasing the resilience of supply in the United Utilities supply area.

Post Revised Draft WRMP24 Revised Feasible Option Variants

For the construction stage, all three of the revised feasible option variants would require a large capital investment (capital spend of \geq £25 million) that would be likely to generate a number of employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers. This was assessed as having a significant positive effect on the economy (**SEA Objective 11**). No other significant positive effects were identified in the assessment of the revised feasible option variants.

All three of the revised feasible option variants however, were assessed as having minor uncertain positive effects on waste and resource use (**SEA Objective 15**), and options WR049e and WR102f have both been assessed as having minor positive effects on soils, geodiversity and land use (**SEA Objective 4**). No other positive effects were identified for the revised feasible option variants during the construction phase.

All three of the revised feasible option variants were assessed as having significant negative effects on greenhouse gas emissions (**SEA Objective 9**) and waste and resource use (**SEA Objective 15**). This is reflective of the scale of the options, and the potential for construction to produce significant amounts of waste material, including concrete, steel, and plastic. With this comes significant amounts of embodied carbon associated with the construction materials and their production, as well as further emissions through vehicle movements and the operation of machinery during the construction period.

No other significant negative effects were identified for the construction phase of the revised feasible option variants, though a range of minor and moderate negative effects have been identified.

During the operational phase, all three of the revised feasible option variants were assessed as having significant positive effects on water resource use (**SEA Objective 14**). Although these options are not leakage or water efficiency options, the options would increase the resilience of water resources within the UU supply area, through the provision of additional deployable output, assessed as being of a significant magnitude.

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Two options were assessed as having significant positive effects on climate resilience (**SEA Objective 10**), the economy (**SEA Objective 11**), and human health and well-being (**SEA Objective 13**) as these options would help to ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing adaptability to the effects of climate change. The capacity they would provide would help to ensure a continual supply of clean drinking water and increase resilience of supply to UU customers, supporting economic/population growth and generating a positive effect on human health. Due to the scale of these options and the additional output they would provide, impacts have been assessed as being significant.

No other significant positive effects have been identified during the operational phase of the revised feasible option variants, however all three options have been assessed as having moderate positive impacts on sustainable natural resources (**SEA Objective 2**). No other positive effects were identified for the revised feasible option variants during the operational phase.

Two options were assessed as having significant negative effects on greenhouse gas emissions (**SEA Objective 9**). This is reflective of the scale of the options, the operational power and vehicle movements they will require and the quantity of greenhouse gas emissions expected to be produced. The remaining option was assessed as having a minor negative effect against this objective, during operation. No other significant negative effects were identified for the operational phase of the revised feasible option variants, though a range of minor and moderate negative effects have been identified.

Section 5 of the Environmental Report provides further information on the findings of the assessment of the revised feasible options and revised feasible option variants. The detailed option assessments are presented in Appendix F.

What are the Likely Significant Effects of the Final WRMP and any Reasonable Alternatives?

As set out above, the Final WRMP24 is focussed on delivering three strategic choices:

- achieving the government targets to halve leakage and reduce customer consumption to 110 litres per person per day by 2050;
- support national planning by developing large-scale water transfers that are adaptable and flexible to the changing needs of other regions; and
- improve the level of service for temporary use bans (TUBs), halving the expected frequency of occurrence to 1 in 40 years (5% annual chance) and improving the frequency of implementing drought orders and drought permits to 1 in 50 years (2% annual chance).

UUW's Final WRMP24 includes 33 demand management, leakage and efficiency options, one supply options and the UUW Drought Plan 2022 drought permit options to maintain supplies to customers in the north-west over the lifetime of the plan, enhance operational resilience and provide the additional source capacity (across the three identified water resource zones within UU's WRMP24 operational area).

Table NTS.4 to NTS.7 lists the preferred options and summarises their findings. **Table NTS.3** presents a key to the meaning of the symbols in the assessment summary tables.

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Table NTS.3 Qualitative Scoring System

Score	Description	Symbol
Major/Significant Positive Effect	Significant positive effect of the water resource option on this objective	+++
Moderate Positive Effect	Moderate positive effect of the water resource option on this objective	++
Minor Positive Effect	Minor positive effect of the water resource option on this objective	+
Neutral	Neutral effect of the water resource option on this objective	0
Minor Negative Effect	Negative effect of the water resource option on this objective	-
Moderate Negative Effect	Moderate effect of the water resource option on this objective	--
Major/Significant Negative Effect	Significant negative effect of the water resource option on this objective	---
Uncertain	The water resource option has an uncertain relationship to the objective or the relationship is dependent on the way in which the aspect is managed. In addition, insufficient information may be available to enable an assessment to be made.	?

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Table NTS.4 Assessment of the Final WRMP24 Preferred Supply Option

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR076	Construction (negative)	-	--	0	--	0	0	--/?	--	---	-	--	-	--	0	---	-	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0
SWN_RIVER BOLLIN	Operation (negative)	-/?	0	0	0	--/?	--/?	--	0	--	0	0	0	0	0	--	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0

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Table NTS.5 Assessment the Final WRMP24 Preferred Demand Management, Distribution/Leakage and Production Efficiency Options – Strategic Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR502c	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	--	0	0
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	0	0	0
LEA-SRZ5_Permanent network sensors	Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation (positive)	0	0	0	0	+++	0	0	0	++	++	++	0	++	+++	0	0	0
WR510	Construction (negative)	-/?	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	++	0	0	0	0	0	0
LEA-SRZ15_In-pipe repairs and lining technologies	Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR511g	Construction (negative)	0	0	0	0	0	0	0	-/?	0	0	0	0	0	0	-	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
LEA-SRZ5_Pressure management	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR516h1	Construction (negative)	-/?	0	0	0	0	0	0	--	---	0	-/?	-/?	-/?	0	---	-/?	-/?
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	++	+++	0	+++	+++	0	0	0
WR516h2	Construction (negative)	-/?	0	0	0	0	0	0	--	---	0	-/?	-/?	-/?	0	---	-/?	-/?
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	++	+++	0	+++	+++	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR520c LEA-SRZ5_DMA optimisation	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	0	+	+	+	0	+	+	0	0
WR524d LEA-SRZ10_Ups stream tile optimisation	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	++	0	0	0	0	++	++	++	0	++	++	0	0
WR603e EMT-SRZ15_Enhanced metering of	Construction (negative)	0	0	0	0	0	0	0	---/?	--	0	0	0	0	0	--/?	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
households on single supplies (smart meters)	Operation (positive)	0	0	0	0	+++	0	0	0	+++	++	+++	0	+++	+++	0	0	0
WR615c	Construction (negative)	0	0	0	0	0	0	0	---	-/?	0	0	0	0	0	--	0	0
EMT-SRZ5_Replacement existing non-household meters with smart meters	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	++	++	0	++	+++	0	0	0
	Construction (negative)	0	0	0	0	0	0	0	-/?	0	0	-	0	0	0	--	0	0
EMT-SRZ10_Replacement existing household meters with smart meters	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	++	++	0	++	+++	0	0	0
	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	--	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
Free water efficiency devices (inside/internal) in SRZ (10 year)	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR659c WER-SRZ15_Free water efficiency devices (outside/external)	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR661c WUA-SRZ15_Free water efficiency audits (households)	Construction (negative)	0	0	0	0	0	0	0	---	-	0	0	0	0	0	-/?	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	++	++	0	++	+++	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR677c	Construction (negative)	0	0	0	0	0	0	0	-	0	0	0	0	0	0	-/?	0	0
WUA-SRZ5_Non-household water efficiency programme	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+	++	++	0	++	+++	0	0	0
	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSA-SRZ15_Government intervention (water labelling, standards)	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	++	+++	0	+++	+++	0	0	0
	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Table NTS.6 Assessment the Final WRMP24 Preferred Demand Management, Distribution/Leakage and Production Efficiency Options–
Carlisle Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR502a LEA-CRZ10_Permanent network sensors	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR511a LEA-CRZ5_Pressure management	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0
WR516a1	Construction (negative)	-/?	0	0	0	0	0	0	0	--	0	-/?	-/?	-/?	0	--	-/?	-/?

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
LEA-CRZ15_Mains rehabilitation/replacement	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR520a LEA-CRZ5_DMA optimisation	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR603a EMT-CRZ5_Enhanced metering of households on single supplies	Construction (negative)	0	0	0	0	0	0	0	-/?	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	0	0	0	+	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
(smart meters)																		
WR615a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
EMT-CRZ5_Replacement existing non-household meters with smart meters	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR619a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
EMT-CRZ10_Upgrade existing household meters to smart	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR658a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WSD-CRZ10_Fre e water efficiency devices (inside/internal)	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR659a WER-CRZ15_Fre e water efficiency devices (outside/external)	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR661a WUA-CRZ15_Fre e water efficiency audits (households)	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR669b ISD- CRZ15_Flow regulators	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR677a WUA- CRZ15_No n- household water efficiency programme	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	0	0	0	+	0	0	0
WR685a WER- CRZ5_Rain water harvesting and water	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
reuse (new builds)	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0
WR694d	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSA-CRZ15_Government intervention (water labelling, standards)	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0

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Table NTS.7 Assessment the Final WRMP24 Preferred Demand Management, Distribution/Leakage and Production Efficiency Options – North Eden Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR603b EMT- NERZ5_Enhanced metering of households on single supplies (smart meters)	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR615b EMT- NERZ5_Replace existing non- household meters with smart meters	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR619b EMT- NERZ10_Replace existing household	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
meters with smart meters	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR694e	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSA- NERZ15 Governme nt intervention (water labelling, standards)	Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0

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Construction

Capital investment associated with the preferred programme would generate supply chain benefits, employment opportunities and increased spend in the local economy by contractors and construction workers. In combination, the scale of investment associated with the preferred options would be substantial and in consequence, the preferred plan has been assessed as having an overall significant positive effect on the economy (**SEA Objective 11**). However, HGV movements, pipeline/tunnel works and the provision of above ground infrastructure would be likely to cause some temporary traffic disruption and other potential impacts, generating a negative effect on this objective also.

No further significant positive effects from construction have been identified during the assessment of the preferred programme of options.

Construction of the preferred programme of options would generate emissions to air which could affect local air quality, principally associated with vehicle movements. Vehicle emissions could affect sensitive receptors along transport corridors and effects are likely to be more pronounced where development is located within/in close proximity to AQMAs, of which, 12 options are likely to have an effect in this regard. Overall, it is concluded that the preferred programme of options will likely have a significant negative effect on air quality (**SEA Objective 8**) during the construction phase.

For the majority of options that comprise the preferred plan, there would be carbon emissions arising from embodied carbon (in, for example, construction materials) in addition to plant operation and vehicle movements. In total, the construction of the preferred supply side will require materials with 20,457 tCO₂e embodied carbon. The preferred demand management options would also require materials with significant cumulative embodied carbon, in particular, options WR516h1 and WR516h2 would require materials (related to mains pipeline renewal) with 32,375tCO₂e and 79,952.3tCO₂e embodied carbon respectively. The combined total embodied carbon of all preferred demand management options is estimated to be almost 120,000tCO₂e. Construction would also generate a substantial volume of vehicle movements which, together with the operation of plant and machinery, would additionally contribute to carbon emissions. Overall, the preferred programme of options has therefore been assessed as having an overall significant negative effect on greenhouse gas emissions (**SEA Objective 9**). Implementation of the preferred programme of options would also require raw materials, fuel for vehicles and plant and would generate waste. Given the concrete, steel and plastics that will be required to construct the preferred supply side option there is likely to be a significant amount of waste generated (although there is some potential for re-use of materials the presence and extent is uncertain) which has been assessed as having a significant negative effect on waste and resource use (**SEA Objective 15**). The preferred programme of demand management options would also require significant material resources, (for example in the production of meters and materials for pipeline/mains renewal).

No further significant negative effects have been identified during the assessment of the construction phase of the preferred programme of options. A range of minor and moderate negative effects have been identified in respect of biodiversity (**SEA Objective 1**), sustainable natural resources (**SEA Objective 2**), soils, geodiversity and land use (**SEA Objective 4**), climate

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resilience (**SEA Objective 10**), tourism and recreation (**SEA Objective 12**), human health (**SEA Objective 13**), cultural heritage (**SEA Objective 16**) and landscape (**SEA Objective 17**). This reflects construction-related impacts including land take, emissions to air and noise, location of construction works within areas at risk of flooding, as well as the introduction of plant and machinery into landscapes and views.

Operation

The demand management options in the Strategic Resource Zone would result in a reduction for water demand of 285.9 MI/d which has been cumulatively assessed as a significant positive effect on water quantity (**SEA Objective 5**).

The supply side option has been assessed as having a moderate negative effect on water quantity (SEA Objective 5) as abstraction has the potential to affect either (i) deterioration of WFD status and/or (ii) the ability of a waterbody to attain its target status. The WFD assessment identifies potential non-compliance due to the potential deterioration of WFD status or prevention of achievement of WFD target status of a water body on a precautionary basis awaiting the outcome of North West Transfer (NWT) Gate 3 assessment. The confidence assigned in the WFD assessment to this conclusion is low. This recognises the risks to compliance that are subject to ongoing assessment through the NWT programme of work. However, it is considered likely that the option will be concluded to be compliant following further investigation and assessment. Demand management options in the Carlisle and North Eden resource zones would also result in more minor reductions in demand.

Four of the preferred demand management options (in the Strategic Resource Zone) were assessed as having a significant positive effect on greenhouse gas emissions (**SEA Objective 9**) as they would each individually result in significant reduction in carbon linked to reduced demand for water. The cumulative reduction in carbon emissions linked to the demand management options is equivalent to approximately 8,100tCO₂e per annum.

Cumulatively the preferred programme of options would increase the capacity by supply of 25M/d and demand management reduction of some 291 MI/d which would make a significant contribution towards securing a continual supply of clean drinking water and increase resilience of this supply, thereby increasing resilience and adaptability to the effects of climate change (**SEA Objective 10**). Furthermore, the delivery of 25 MI/d of additional water capacity from the preferred supply option, in addition to the approximate 291 MI/d reduction in the amount of water used associated with the preferred demand management options, will, in-turn, support population and economic growth and human health and wellbeing, which would also support achievement of a cumulative significant positive effect against **SEA Objectives 11** (economy) and **13** (human health).

The preferred programme of options will help to support the resilience of water resources in the UUW area. The preferred programme of options will cumulatively support increased water efficiency (approx. 75 MI/d), leakage reduction (135 MI/d), and metering (approx. 82 MI/d) and support the provision of 25MI/d of deployable output, which assessed as having a significant positive effect on water resource use (**SEA Objective 14**).

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No further significant positive or negative effects have been identified during the assessment of the operational phase of the preferred programme of options. However, a range of minor and moderate positive and negative effects were identified against **SEA Objectives 1** (biodiversity), **2** (sustainable natural resources), **6** (water quality), **15** (waste and resource use), **16** (cultural heritage) and **17** (landscape).

Reasonable Alternative

The four reasonable alternative supply side options are, quantifiably, relatively similar to the preferred supply option, with a cumulative yield of 22 MI/d. They have been proposed as they have greater certainty of WFD and HRA compliance than the preferred supply options, although their best value performance overall is less than that of the selected preferred supply options.

When considering the effects of the reasonable alternative plan identified against the 17 SEA objectives, significant negative effects during construction are similar to those identified for the preferred supply option. Both are assessed as having a significant negative effect against and waste and resource use (**SEA Objective 15**). However, against sustainable natural resources (**SEA Objective 2**), Option WR065b has been assessed as also having a significant negative effect. In contrast, the preferred supply option has not been identified as having a significant negative effect against **SEA Objective 2**.

Significant positive effects have been identified for construction from the reasonable alternative plan options against economy (**SEA Objective 11**), associated with Option WR026c.

Effects from the reasonable alternative plan options are broadly similar to those of the preferred plan. However, Option WR065b would have a significant positive effect on sustainable natural resources (**SEA Objective 2**) during its operation, and Option WR185 would have a significant positive effect on water resource use (**SEA Objective 14**), during its operation.

The following quantified effects will be seen through construction and operation of the reasonable alternative plan supply options:

- **SEA Objective 9.** In total, the construction of the reasonable alternative plan supply side options would require materials with 6,134tCO₂e embodied carbon. Construction would also generate 11,455 vehicle movements, which, together with the operation of plant and machinery, will additionally contribute to carbon emissions. In the operational phase, the alternative options would generate 96tCO₂e per annum.
- **SEA Objectives 10, 11, 13 and 14.** In the operational phase, the reasonable alternative plan supply side options would support the delivery of 22MI/d of clean drinking water which would improve resilience and adaptability to the effects of climate change, support population and economic growth, contribute towards maintaining health and aid sustainable water resource provision.
- **SEA Objective 15.** In total, the reasonable alternative plan supply side options would have cumulative material resource requirements for construction estimated as 52,159 tonnes of concrete, 1,045 tonnes of steel and 15 tonnes of plastics. Such quantities would be likely to be associated with a significant amount of waste generated.

Given that the options are broadly of similar scale and providing similar benefit, these quantified effects are comparable with the preferred supply options. Three areas of difference are noted:

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- **SEA Objective 9.** Construction of the reasonable alternative plan would require materials with a total embodied carbon of 6,134tCO₂e, less than the 20,457 tCO₂e required for the preferred supply option.
- **SEA Objective 11.** In the operational phase, the preferred supply option would deliver 25MI/d additional water capacity which would improve resilience and adaptability of supplies. This is higher than the reasonable alternative plan which would support the delivery of 22MI/d.
- **SEA Objective 13.** In the operational phase the preferred supply option would deliver 25MI/d additional water capacity ensuring a continual supply of clean water. This is higher than the reasonable alternative plan which would support the delivery of 22MI/d.

In summary, the reasonable alternative plan supply options and preferred supply options are broadly similar in scale and effect, although differences are noted against sustainable natural resources (**SEA Objective 2**), greenhouse gases (**SEA Objective 9**), economy (**SEA Objective 11**), health (**SEA Objective 13**), and waste and materials (**SEA Objective 15**). Given the greater confidence of WFD compliance at this stage, the reasonable alternative supply options are assessed as having minor negative operational effects against the water quantity (**SEA Objective 5**) and water quality (**SEA Objective 6**), in contrast to the preferred supply options which are assessed as moderate negative uncertain against the same objectives overall.

The detailed assessment of the preferred options and the preferred programme of options are contained in Section 6.2 and 6.3 of the Environmental Report respectively, whilst the assessment of the reasonable alternative plan is contained in Section 6.4. The assessment of the cumulative effects of alternative plans and scenarios are presented respectively in Section 6.5 and 6.6. The assessment of the cumulative effects of the Final WRMP in-combination with other plans and programmes are reviewed in Section 6.7. As United Utilities operates in Wales, Section 6.8 considers the contribution that the Final WRMP will make to the well-being goals for Wales contained in the Well-being of Future Generations (Wales) Act 2015 and the objective for the sustainable management of natural resources established in Environment (Wales) Act 2016. The detailed option assessments are presented in Appendix G.

What are the Proposed Mitigation and Enhancement Measures?

As noted above, in some cases, there is an opportunity to reduce some of the potential negative effects identified during the assessment of the Final WRMP24 and to enhance positive effects. The detail of this mitigation needs to be considered during the planning phases of each of the individual component schemes if taken forward.

Potential mitigation measures are included where relevant within the preferred option assessment matrices in Appendix G of the Environmental Report. A summary is contained in Section 6.9.

How will the effects of the WRMP be monitored?

Once the WRMP is implemented, its effects on the environment and people will need to be monitored. Monitoring the significant effects of the WRMP can help to answer questions such as:

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

Section 7 of the Environmental Report identifies a number of potential indicators that could be used for monitoring the effects of the WRMP's implementation. Monitoring proposals will be considered further and a final monitoring framework that satisfies the requirements of the SEA Directive will be presented in the Post Adoption Statement.

What are the Conclusions?

The Final WRMP24 is focussed on delivering three strategic choices:

- achieving the government targets to halve leakage and reduce customer consumption to 110 litres per person per day by 2050;
- support national planning by developing large-scale water transfers that are adaptable and flexible to the changing needs of other regions;
- improve the level of service for temporary use bans (TUBs), halving the expected frequency of occurrence to 1 in 40 years (5% annual chance) and improving the frequency of implementing drought orders and drought permits to 1 in 50 years (2% annual chance).

The Final WRMP24 encompasses a combination of preferred demand management, metering and leakage options and a resilience option designed to achieve the three strategic choices .

Overall, the Final WRMP24 is expected to generate significant positive effects across several of the SEA objectives including climate change (SEA Objective 10), economy (SEA Objective 11), health and well-being (SEA Objective 13) and water resources (SEA Objective 14) as the provision of 25 MI/d of water capacity from the new supply option and 291 MI/d from the demand management, efficiency and leakage measures will improve resilience and adaptability to the effects of climate change, support population and economic growth, contribute towards maintaining health and aid sustainable water resource provision.

The preferred supply option (WR076 – River Bollin) in the Final WRMP24 forms part of the North West Transfer (NWT) Strategic Resource Option (SRO). The environmental compliance assessments, and the supporting investigations, are ongoing with the outcomes available to inform the RAPID Gate 3 submission in 2026. In consequence, these findings have not been available in time for the final plan. The supply option has residual WFD uncertainties until the NWT SRO Gate 3 investigations conclude, and whilst it is considered likely that the option will be concluded to be compliant following further assessment, on a precautionary basis the WFD assessment has identified potential non-compliance reflected in a moderate negative effect (with uncertainty) for water quantity (SEA Objective 5) and water quality (SEA Objective 6).

The HRA has concluded that the preferred option (WR076 – River Bollin) will have no adverse effects, alone or in combination, on the integrity of any European sites. The HRA included specific

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assessment of the downstream designated sites, notably the Mersey Estuary SPA / Mersey Estuary Ramsar. No significant effects on biodiversity (SEA Objective 1) have therefore been identified.

Where negative effects have been identified, generally, these are expected to be either minor or moderate only, although uncertainties remain. The exception to this is in respect of air quality (SEA Objective 8), climate change (SEA Objective 9) and resource use (SEA Objective 15) where significant negative effects have been identified during construction. However, these effects reflect the emissions to air, energy and resource use associated with the implementation of the water management measures which is to a large extent unavoidable (although effects may be reduced at the project stage through, for example, the use of renewable energy and sustainably sourced construction materials).

Detailed mitigation and enhancement measures have been identified to help avoid, minimise, reduce or mitigate effects where identified.

Recognising that there are residual WFD uncertainties associated with the preferred supply option, and in compliance with the revised WRPG requirements, U UW has identified alternatives that provide greater certainty of WFD compliance. Given that the options are broadly of similar scale and providing similar benefit, these quantified effects are comparable with the preferred supply options. Two areas of difference are noted in regard of the quantum of effects as the reasonable alternative options contain smaller amounts of embodied carbon (6,134tCO₂e compared to 20,457tCO₂e) and provide lower additional water capacity (22MI/d compared to 25MI/d) when compared to the preferred plan.

What are the Next Steps in the SEA Process?

U UW is publishing the Final WRMP24 following Defra's direction to U UW to publish. This Environmental Report has been prepared to update the environmental assessment of the WRMP24 following changes made to the preferred options since the Revised Draft WRMP24. Following publication, U UW will implement the Final WRMP24 accordingly.

In conjunction with publishing the Final WRMP24, a Post Adoption Statement will also be issued (to meet the requirements of SEA regulation 16 (4)). This will set out the results of the consultation and SEA processes and the extent to which the findings of the SEA have been accommodated in the final plan.

Once the Final WRMP24 has been published, the selected schemes for water resource management will need to be implemented through specific projects. As part of this process, each project may be subject to further assessment to understand and manage its potential environmental and social impacts. These assessments, which may include HRA and EIA, will take account of the issues discussed in this report but will also be informed by the greater detail available as the work progresses about construction techniques, building materials, and agreed locations and routes.

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1. Introduction

1.1 Overview

- 1.1.1 United Utilities Water (Uuw) is currently finalising its Water Resources Management Plan 2024 (WRMP24). Once approved, the WRMP24 will set out a long-term, best value and sustainable plan for water supplies in the North West. The WRMP24 plans for an adequate supply to meet demand from 2025 to 2050 and beyond, and a supply system that is resilient to drought. WRMPs are reviewed on a rolling five-year basis, with Uuw's most recent plan being published in 2019¹¹.
- 1.1.2 As part of the preparation of WRMP24, Uuw published its Draft Water Resources Management Plan 2024 (Draft WRMP24) for consultation between the 7th December 2022 and 15th March 2023, following submission to Defra. The Draft WRMP24 set out Uuw's proposals to ensure continued delivery of a secure and reliable supply of water from 2025 to 2050, looking beyond out to the year 2100.
- 1.1.3 In developing the Draft WRMP24, Uuw undertook a comprehensive assessment of future available water supplies and the demand for water, extensive stakeholder engagement and a rigorous process of options identification and appraisal. WRMPs must also comply with international, UK and national legislation pertaining to the environment, as well as associated guidance on the development of WRMPs¹². This includes The Environmental Assessment of Plans and Programmes Regulations 2004 (the 'Strategic Environmental Assessment (SEA) Regulations'). The SEA Regulations require an assessment of the likely significant environmental effects of the plans and identification of the ways in which adverse effects can be avoided, minimised or mitigated and how any positive effects can be enhanced.
- 1.1.4 In this context, WSP Environment & Infrastructure Solutions UK Limited (WSP, formerly Wood) was commissioned by Uuw to undertake the SEA of the Draft WRMP24, the findings of which were presented in an Environmental Report¹³ that was published alongside the draft plan for consultation in December 2022 (hereafter referred to as the 'Draft WRMP24 Environmental Report'). The SEA has been used to inform the development and selection of the water resource management options that comprise the preferred plan for WRMP24. Following consultation, Uuw prepared a Statement of Response to the representations received.

¹¹ Uuw (2019) *Final Water Resource Management Plan 2019*, August 2019. Available at: <https://www.unitedutilities.com/corporate/about-us/our-future-plans/water-resources/water-resources-management-plan/>. [Accessed August 2022]

¹² EA, Ofwat and NRW (2023) *Water Resource Planning Guideline (WRPG)* [online]. Available at: <https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline>. [Accessed May 2023].

¹³ Wood (2022) *Water Resources Management Plan 2024 Strategic Environmental Assessment: Environmental Report*. Available at https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/wrmp24-drafts/uu-draft-wrmp24-sea_redacted.pdf

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1.1.5 Taking into account the responses received to the consultation on the Draft WRMP24 from regulators, stakeholders and the public, further engagement and environmental assessment, and further work reflecting regional reconciliation led to amendments to the Draft WRMP24. A Revised Draft WRMP24 was completed and given the changes was also subject to further environmental assessment. The Revised Draft WRMP24 was submitted to the Secretary of State for the Department for Environment, Food and Rural Affairs (Defra) for review and approval in June 2023. The Secretary of State subsequently requested further information on the Revised Draft WRMP (December 2023), which was provided by UuW alongside updated environmental assessment reports (February 2024). Following receipt of the direction to publish, the Final WRMP24 has now been produced. Given the changes in the Final WRMP24, this has been subject to further environmental assessment. The findings are presented in this Environmental Report.

1.2 Purpose of the Environmental Report

1.2.1 This Environmental Report presents the findings of the SEA of the Final WRMP24. The purposes of the SEA and this Environmental Report are

- to ensure that the likely significant environmental and socio-economic effects of the Final WRMP24 and any reasonable alternatives are identified, characterised and assessed;
- to help identify appropriate measures to avoid, reduce or mitigate adverse effects and to enhance beneficial effects associated with the implementation of the Final WRMP24 wherever possible;
- to provide a framework for monitoring the potential significant effects arising from the implementation of the Final WRMP24;
- to inform UuW's decisions on the Final WRMP24; and
- to demonstrate that the Final WRMP24 has been developed in a manner consistent with the requirements of the SEA Regulations.

1.3 Water Resource Planning

1.3.1 Water resources management planning is being undertaken regionally and by all water companies in England and Wales in order to ensure reliable, resilient water supplies over the long-term planning horizon.

1.3.2 Water resources management planning includes forecasting how much water customers will need over the planning period (assessing demand) and how best to provide it (assessing options to reduce or constrain demand growth and/or augment reliable supplies of water) in an efficient, timely manner (programme appraisal). Companies (individually, and in collaboration across a region) identify the preferred, 'best value' programme of demand management and water supply options to develop an overall strategy to maintain a balance between reliable supply and demand.

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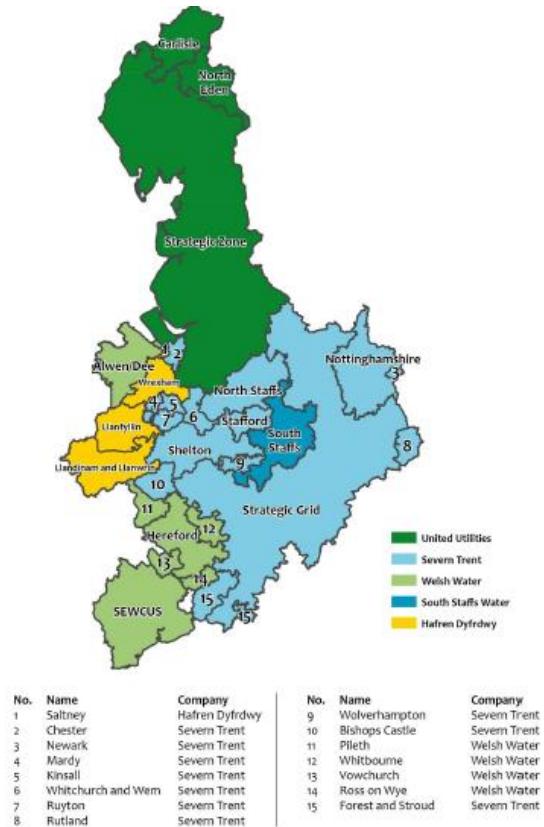
- 1.3.3 Water companies in England and Wales have a statutory requirement to prepare a WRMP every five years; U UW is developing its WRMP24 within the context of Water Resources West Regional Plan.

Water Resources West Regional Plan

- 1.3.4 The Water Resources West (WRW) Regional Plan covers the management of water resources in the North West of England, the West Midlands and the cross-border catchments with Wales. It includes all or part of the operational areas of Dŵr Cymru Welsh Water (DCWW), Hafren Dyfrdwy¹⁴, Severn Trent Water (STW), South Staffordshire Water (SSW) and U UW (see opposite).

- 1.3.5 These five companies, like all water companies in England and Wales, are required¹⁵ to prepare, maintain and publish a WRMP. **Figure 1.1** presents U UW's WRMP24 operational area within the WRW regional plan area.

- 1.3.6 WRW is taking an integrated approach to preparing the Regional Plan and the WRMPs to provide a Regional Plan that is multi-sector and takes account of the water supply needs of non-public water supply (non-PWS) abstractors as well as public water supplies. WRW member water companies have used a regionally consistent set of methodologies to reflect local, regional and national needs into the development of the plans.

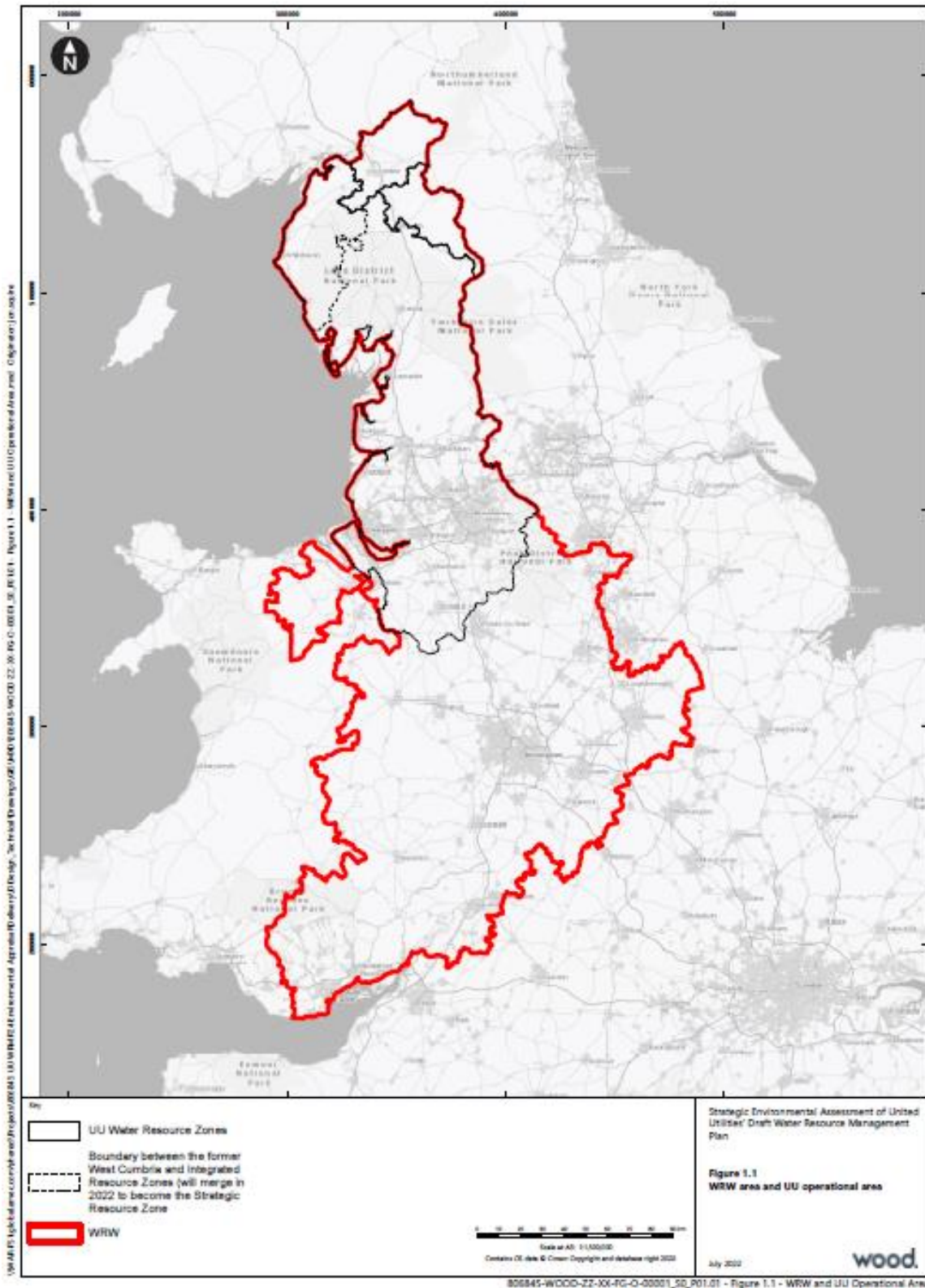


¹⁴ AT 1st July 2018, Hafren Dyfrdwy combined the water service area of Dee Valley Water and Severn Trent lying in Wales.

¹⁵ Section 37 and 37A of Water Industry Act 1991, as amended by the Water Act 2003 and the Water Act 2014.

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Figure 1.1 WRW and UUW's Operational Area



1.3.7 Each water company is leading development of the WRMP and relevant aspects of the regional plan in the parts of their area included with WRW as a single piece of work. This

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has necessitated a high degree of integration and fostered greater collaboration between companies and stakeholders.

- 1.3.8 The WRW Regional Plan covers the period 2025 to 2085 and addresses long-term regional and inter-regional, multi-sectoral water resources management pressures and draws on water resource options from the member water companies' WRMP24s, as well as the Strategic Resource Options¹⁶ (SROs) being taken forward by the companies.
- 1.3.9 In March 2020, WRW published its Initial Resource Position¹⁷. This identified that by 2050, an estimated 166 million litres per day of additional water would be needed for public water supplies, and in the region of an additional 41 million litres per day needed for other abstractors. In an update¹⁸ (published in February 2021) to its resource position, WRW noted that the need maybe greater than previously estimated. WRW published its Emerging Regional Plan¹⁹ in January 2022. This updated the forecast, taking into account a commitment to achieve a 50% reduction in leakage from the public water supply network by 2050 and a per capita consumption reduction to 110 litres/person/day. The updated WRW forecast identified that 215 MI/d of new water would be needed to meet public supply demand by 2031 and that an additional 63 MI/d would be needed by 2050, for non-public water supply sectors.
- 1.3.10 On 14th November 2022, WRW published its Draft Regional Plan²⁰ for consultation which closed on 20th February 2023. The Draft Regional Plan identified that by 2050, the WRW region would need an additional 221 MI/d to meet public water supply needs and 97 MI/d to meet the needs of other sectors. To meet this demand, whilst also reflecting the needs of other regions, WRW's draft best value plan included:
- action to reduce daily water demand by over 900 million litres across the whole region. This included the Government introducing water labelling to save 280 MI/d;
 - STW delivering a large number of supply options to offset abstraction reduction for environmental improvement;

¹⁶ 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).

¹⁷ WRW (2020) *Initial Resource Position, March 2020*. Available from <https://waterresourceswest.co.uk/s/WRW-Initial-Resource-Position.pdf> [Accessed August 2022].

¹⁸ WRW (2021) *Update on our Resource Position, February 2021*. Available from <https://waterresourceswest.co.uk/s/WRW-Update-on-Resource-Position-February-2021-web.pdf> [Accessed March 2022].

¹⁹ WRW (2022) *Emerging Regional Plan, January 2022*. Available from: <https://static1.squarespace.com/static/5e67889204d86850e1fdcece/t/61e5a4e237970d62de92fa10/1642439906757/WRW+Emerging+Regional+Plan+Executive+Summary.pdf> [Accessed March 2022].

²⁰ WRW (2022) *Draft Regional Plan*. Available from <https://static1.squarespace.com/static/5e67889204d86850e1fdcece/t/6374bcc4bc2d9e543adfc90a/1668594894637/Draft+Regional+Plan+v1.1.pdf> [Accessed May 2023].

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- UUW developing new water resources in the North West to support water transfers and provide benefit to customers in the North West, by reducing the frequency of temporary use bans (hosepipe bans);
- DCWW upgrading the network in South-East Wales and recovering losses from a water treatment works; and
- a range of options to take water resources towards WRW's environmental destination. This includes improving water quality and improving habitats.

1.3.11 Following the close of consultation on the Draft Regional Plan in February 2023, WRW has in conjunction with other regional groups completed a further round of supply demand reconciliation, reflecting post consultation changes and is now producing its Final Regional Plan for publication in Autumn 2023. Further information relating to the Regional Plan is contained in **Section 6**.

Water Resource Management Plans

- 1.3.12 Each water company's WRMP 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.
- 1.3.13 For each Water Resource Zone²¹ (WRZ) in the WRMP area, a supply demand balance is generated for public water supply (PWS). A set of non-PWS water availability assessments are also generated. Each supply-demand balance is structured around a consistent "central" set of planning assumptions used to identify WRZs in deficit over the plan period.
- 1.3.14 The plan process initially reviews as many potential solutions as possible (the 'unconstrained list' of options) to identify 'feasible' options for each WRZ which will contribute to meeting the supply demand deficit in one or more zones. Types of options considered to provide additional water resources to meet any forecast deficit in a WRZ can include:
- **demand management options**, which include measures to manage the demand for water such as smart meters, rainwater harvesting, greywater recycling or household visits to install water efficiency measures;
 - **distribution and leakage options**, which include measures to optimise the efficiency of water networks, reduce leakage and minimise any unscheduled resource losses;
 - **production efficiency options**, which include measures to increase the efficiency and effectiveness of treatment processes;
 - **supply options**, which include measures to increase supply such as greater peak output at existing groundwater sources, reservoir or surface water supply and which will include SROs; this also includes catchment management options, for example nature-based solutions; and

²¹ Section 4.4. of the WRPG defines a water resource zone as "an area within which the sources of water and distribution of water to meet demand, is largely self-contained (apart from any agreed bulk transfers)".

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- **non-PWS options**, which include any options which increase water resource availability or reduce the need for abstraction outside of that needed for public water supplies.

1.3.15 Examples of these options are show in **Table 1.1**. Note, that this illustrative and not intended to be an exhaustive list.

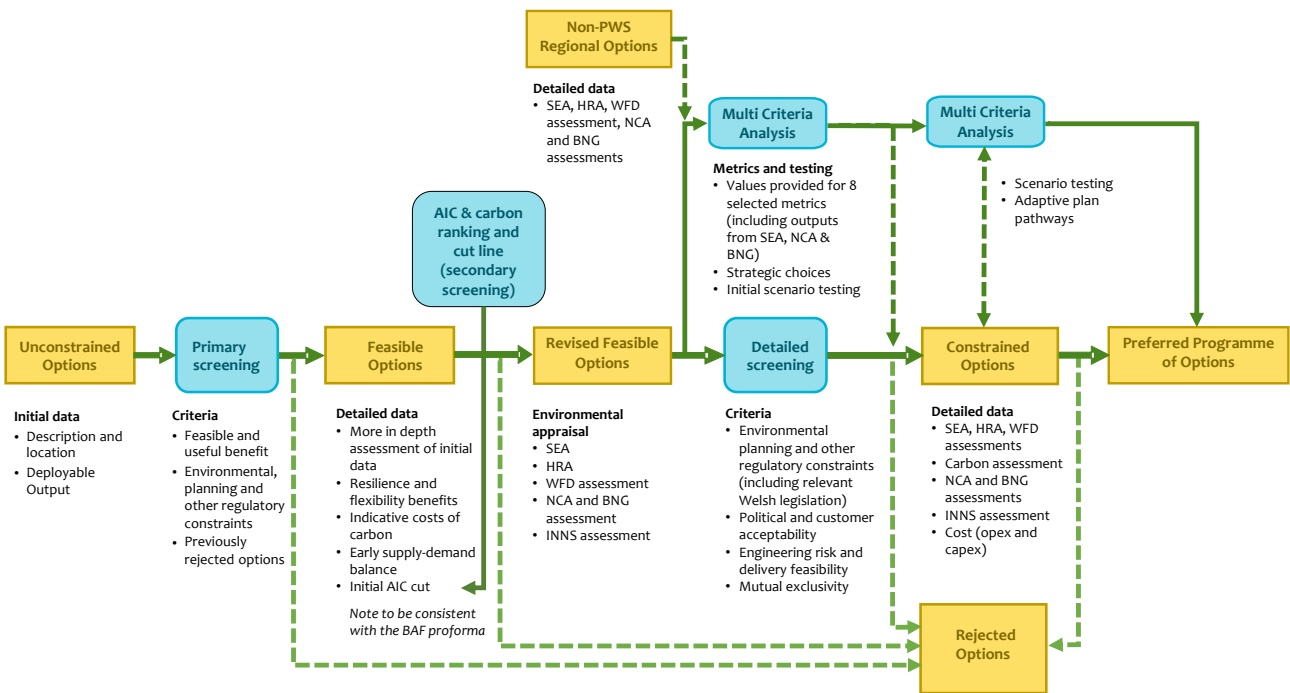
Table 1.1 Example Feasible Option Types

Demand Management Options	Distribution and Leakage Options	Production Efficiency Options	Supply Options
Change in levels of service	Active leakage management	Outage reduction	Aquifer Recharge
Household water audit	External potable bulk supply/transfer	Water Treatment Works capacity increase	Catchment management
Household water recycling	Internal potable transfer	Water Treatment Works loss recovery	Conjunctive Use
Metering change of occupancy	Mains replacement (not trunk mains)		Desalination
Metering compulsory	Other leakage control		Drought permits/orders, Temporary Use bans or non-essential use bans
Metering optants	Pressure management		Effluent Reuse
Metering other selective	Trunk mains renewal		External raw water bulk supply/transfer
Non-household water audit			Groundwater enhancement
Other water efficiency			Internal raw water transfer
Rainwater harvesting			Internal raw water transfer
Retrofitting indoor water efficiency devices			Licence Trading
Supply pipe repairs / replacement			New groundwater
Tariff			New Reservoir
Water efficiency customer education / awareness			New surface water
Drought - water use restrictions			New water treatment works
			Reduction of raw water losses
			Reservoir enlargement
			Surface water enhancement

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- 1.3.16 Options tend to be generated from the company responsible for the WRMP but can also be joint²² (where more than one company is working in partnership), provided by third parties or be multi-sector.
- 1.3.17 All zones with deficits are subject to a “decision making” process using a Multi-Criteria Analysis (MCA) and option screening to identify a preferred plan (comprising of selected options) to address the supply demand deficit. The MCA is used consistently to supplement the traditional Economics of Balancing Supply and Demand (EBS D) approach and further zonal specific decision methods can also be used appropriate to the complexity of the zone. The decision-making method factors in multiple costs and benefits and considers the interaction between zones to establish a best value plan for the company (and for the region as whole).
- 1.3.18 Scenarios are used to test the preferred and any identified alternative plans. They explore what would happen if one of these plans was adopted and the future was different to that assumed in the “central” planning assumptions. The scenarios could be used to make the preferred plan an adaptive plan (in which different options could be taken forward after key decision points, if circumstances changed).
- 1.3.19 The process, and key decision points as they have been applied to the development of the WRW Regional Plan and constituent WRMPs, are illustrated in **Figure 1.2**.

Figure 1.2 Environmental assessments into option and plan development



- 1.3.20 Environmental assessment information (derived from the SEA and other regulatory assessments) has been provided for the following key decision points:

²² There are five Strategic Resource Options (SROs) being taken forward by the companies (the Severn Thames Transfer, Grand Union Canal transfer, Minworth Effluent Reuse, Severn Trent Sources and the North West Transfer (formerly Vyrnwy Reservoir Source and United Utilities Sources)). The Severn to Thames transfer is an example of partnership between STW, UUW and Thames Water.

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- **MCA**, undertaken in advance of the selection of options. UUW, as part of WRW developed a best value optimisation tool, ValueStream1, to provide equivalent monetised costs for best value metric scores, enabling option comparison.
- **detailed screening** of the revised feasible options, using screening criteria developed by UUW in conjunction with WRW, the other core member companies and with regulator feedback;
- **scenario testing** of the constrained options; and
- **selection of the preferred programme of options.**

UUW's Water Resources Management Plan 2024

Draft Water Resources Management Plan 2024

- 1.3.21 In preparing its Draft WRMP24, UUW aimed to meet the following key objectives:
- Maintain a resilient, safe and clean supply of water for its customers;
 - Ensure that its future water resources strategy is in line with government aspirations, particularly in relation to targets/ambitions for reducing leakage and customer water use;
 - Develop a plan which represents best value for customers, both in the near future and in the longer term;
 - Ensure that its plan is flexible and can adapt to possible alternative future scenarios;
 - Develop a plan to support national drought resilience through water transfer and which is in line with its water transfer principles;
 - Ensure that its plan aligns with the relevant regional plan;
 - Ensure that it adopts the latest methods and comply with regulatory guidelines in preparing its plan;
 - Ensure that its plan enables it to meet its long-term environmental destination;
 - Ensure that its plan takes into account customer and stakeholder preferences where it is feasible to do so; and
 - Ensure that its plan delivers environmental benefits, taking into account sustainability and natural capital effects.
- 1.3.22 The Draft WRMP24 set out UUW's proposals to ensure continued delivery of a secure and reliable supply of water from 2025 to 2050, looking beyond out to the year 2100. For the five-year period (2025 to 2030), the WRMP24 aligns with UUW's Business Plan proposals prepared for the Ofwat Price Review 2024.
- 1.3.23 UUW's proposed best value plan (also referred to as the 'preferred plan' in this report) focussed on delivering three strategic choices:

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- Achieve Government targets to halve leakage and reduce customer consumption to 110 litres per person per day by 2050.
- Support national planning by developing large-scale water transfers that are adaptable and flexible to the changing needs of other regions.
- In line with customer preferences, improve the level of service for temporary use bans (TUBs), halving the expected frequency of occurrence to 1 in 40 years (5% annual chance). Concurrently, U UW will improve the frequency of implementing drought orders and drought permits to 1 in 50 years (2% annual chance).

1.3.24 U UW's demand forecast showed a very small increase of around 0.7% across the 25-year planning horizon, excluding the impacts of demand management programmes, and so the leakage reduction and water efficiency measures and TUBs measures will increase resilience in the supply.

1.3.25 U UW's Draft WRMP24 included provision [REDACTED] from the Vyrnwy system to support wider regional needs. This is based on:

- a reliable sustainable yield of Lake Vyrnwy [REDACTED]
- an additional 25 MI/d via a connection [REDACTED] to Shrewsbury to offset River Severn abstraction;
- an assumed average of 15% utilisation, reflecting flows in the River Severn; and
- 167MI/d of additional source capacity to offset traded water and maintain and enhance operational resilience.

1.3.26 The Draft WRMP24 proposed the following options across the three identified water resource zones within U UW's Draft WRMP24 operational area:

- seven supply options to provide 167MI/d of additional source by 2060;
- enabling works on the Vyrnwy Aqueduct to allow treated water from regional UU sources to be transferred by pumping into the Vyrnwy Aqueduct to maintain customer supplies (for transfer volumes greater than 50 MI/d); and
- 29 demand management, distribution/leakage and production efficiency options to provide some 282 MI/d.

1.3.27 The Draft WRMP24 also assumed delivery of an environmental destination scenario by 2050. This scenario will continue to take shape over time.

1.3.28 One reasonable alternative plan was also considered. This included two additional supply options, making nine in total that ensures full alignment with the North West Transfer (NWT) SRO Full Solution whilst increasing resilience in supply to the North West.

1.3.29 U UW also developed and applied fourteen scenarios relating to alternative futures covering some key uncertainties, including the impacts of climate change, alternative phasing, changes to environmental destination and the pace of technological change. U UW then developed alternative scheme portfolios, with differing phasing and pathways to provide responses to each scenario, demonstrating resilience and robustness in the plan making process; however, given the numerous uncertainties that underpin the work,

and the diversity of portfolios that could then be considered, for the purpose of this SEA they were not considered reasonable alternatives to the preferred plan.

Revised Draft Water Resources Management Plan 2024

- 1.3.30 The Revised Draft WRMP24 sought to deliver the same objectives and same three strategic choices as the Draft WRMP24:
- Achieve Government targets to halve leakage and reduce customer consumption to 110 litres per person per day by 2050.
 - Support national planning by developing large-scale water transfers that are adaptable and flexible to the changing needs of other regions.
 - In line with customer preferences, improve the level of service for temporary use bans (TUBs), halving the expected frequency of occurrence to 1 in 40 years (5% annual chance). Concurrently, U UW will improve the frequency of implementing drought orders and drought permits to 1 in 50 years (2% annual chance).
- 1.3.31 Following consultation on the Draft WRMP24, U UW reviewed its best value plan for WRMP24 and as a result, the preferred plan contained in the Draft WRMP24 was modified.
- 1.3.32 There has been a decrease in the water trading requirements following the final regional planning reconciliation round. This resulted in a decrease in the number of supply options required. In consequence, the preferred plan at Revised Draft WRMP24 stage contained three supply options (all groundwater) for the Strategic Resource Zone, all to be implemented by 2030.
- 1.3.33 Further to comments received from regulators on the Draft WRMP24, the preferred plan also included drought permit options taken from U UW's Drought Plan²³.
- 1.3.34 The three supply options in the preferred plan at Revised Draft WRMP24 stage formed part of the NWT SRO. The NWT SRO is currently being assessed as part of RAPID's gated process for SROs; this includes environmental compliance. The environmental compliance assessments, and the supporting investigations, are ongoing with the outcomes not available until the RAPID Gate 3 submission in 2026. In consequence, the findings were not available in time for the Revised Draft WRMP24 (and its assessment).
- 1.3.35 As a result, these options all had residual uncertainties until investigations associated with NWT SRO Gate 3 conclude. Recognising this uncertainty, and consistent with the WRPG requirements²⁴ and taking into account feedback from several environmental stakeholders including the Environment Agency (EA), Natural England (NE), Natural Resources Wales (NRW) and Mersey Rivers Trust, U UW identified four alternative, 'WFD / Habitats Regulations compliant', WRMP options. With a combined output of 21.3 Ml/d, they

²³ United Utilities (2022) *Final Drought Plan 2022*. Available from https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/final-drought-plan-2022/final-drought-plan-2022.pdf [Accessed May 2023].

²⁴ Section 9.4.3 of the of the WRPG sets out that where due to uncertainty, "Alternatives are included in the plan at company and/or regional level where the avoidance of an adverse effect on integrity of European sites is certain, and these are available, feasible and deliverable"

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provide sufficient capacity to completely replace the three selected supply options in the preferred plan in the event that they are required (the supply capacity requirement is 20.4 MI/d).

Final Water Resources Management Plan 2024

- 1.3.36 The Revised Draft WRMP24 was submitted to the Secretary of State for the Department for Environment, Food and Rural Affairs (Defra) for review and approval in June 2023. The Secretary of State subsequently requested further information on the Revised Draft WRMP24 (December 2023), which was provided by U UW alongside updated environmental assessment reports (February 2024). U UW continued to work with the regulators through 2024 to resolve outstanding issues. Modelling of the supply options in the Revised Draft WRMP24 demonstrated issues with WFD compliance. U UW received direction to publish its final WRMP24 from Defra in a letter dated 6 September 2024. This indicated that the preferred supply side options at Revised Draft WRMP24 stage should be removed from the Final WRMP24. The Final WRMP24 therefore replaces those options with one surface water supply option.
- 1.3.37 The supply option in the Final WRMP24 forms part of the NWT SRO. As noted above, the completed outcomes will not be available until the RAPID Gate 3 submission in 2026. In consequence, the findings have not been available in time for the Final WRMP24 (and its assessment). As a result, the preferred option, and other NWT options, all have residual uncertainties until investigations associated with NWT SRO Gate 3 conclude. Recognising this uncertainty, the alternative WFD and HRA compliant options identified at Revised Draft WRMP24 stage are retained.
- 1.3.38 Further detail in respect of the revised preferred plan and its component options is contained in **Section 6** of this report. Detailed information in relation to the development of the preferred plan is contained in the Final WRMP24.

1.4 Strategic Environmental Assessment

Overview

- 1.4.1 SEA is required under Statutory Instrument 2004 No.1633 - The Environmental Assessment of Plans and Programmes Regulations 2004. Throughout the course of the development of the plan, policy or programme, the aim of SEA is to identify the potential impact of options proposed in the plan in terms of their environmental, economic and social effects. If any adverse effects are identified, these options can then be avoided or proposals modified to manage or mitigate adverse effects.
- 1.4.2 The SEA Regulations transposed the requirements of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment. Following the UK's exit of the EU and the end of the transition period (31st December 2020), the SEA Directive no longer applies to the UK.

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Applying SEA to the WRMPs and Regional Plan

- 1.4.3 The SEA Regulation 5 requires “an environmental assessment ... of certain plans and programmes which are likely to have significant effects on the environment”. Plans and programmes are defined as those:
- “which are subject to preparation and/or adoption by an authority at national, regional or local level or which are prepared by an authority for adoption, through a legislative procedure by Parliament or Government; and
 - which are required by legislative, regulatory or administrative provisions” (Regulation 2 (1)).
- 1.4.4 Guidance produced by the European Commission (EC)²⁵ indicates that in preparing plans for ensuring water resources, privatised utilities companies can be considered an authority because they are providing services that would be carried out by public authorities in a non-privatised regime. The preparation of a WRMP is a statutory requirement and therefore meets the requirements of Regulation 2.
- 1.4.5 Plans and programmes that may have significant effects on the environment are identified as those:
- “which are prepared for... water management... and which set the framework for future development consent of projects listed in Annexes I and II to Directive 85/337/EEC [the Environmental Impact Assessment Directive]; or
 - which, in view of the likely effect on sites, have been determined to require an assessment pursuant to Article 6 or 7 of Directive 92/43/EEC [the Habitats Directive]” (Regulation 5 (2)).
- 1.4.6 Broadly, this includes plans that may include development of infrastructure to source, store, transfer or manage water, or may affect sites that have European designations (Special Areas of Conservation (SACs), Special Protection Areas (SPAs), and Ramsar sites)).
- 1.4.7 Government²⁶, regulator²⁷ and industry²⁸ guidance indicates that there is a requirement for water companies, as responsible authorities, to determine if their WRMPs fall within the scope of the SEA Regulations and whether a SEA must be undertaken. The Welsh Government’s guidance²⁹ on WRMPs, meanwhile, identifies environmental legislation

²⁵ EC (2003) *Implementation of Directive 2001/42 on the Assessment of the Effects of Certain Plans and Programmes on the Environment*. Available online: http://ec.europa.eu/environment/archives/eia/pdf/030923_sea_guidance.pdf

²⁶ Office of the Deputy Prime Minister (ODPM), Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland (2005) *A Practical Guide to the SEA Directive and European Commission (2001) Assessment of plans and projects significantly affecting Natura 2000 sites* and Welsh Government (2015) *Strategic Environmental Assessment (SEA) in Wales*

²⁷ EA, OfWAT and NRW (2023) *Water Resource Planning Guideline [online]*. Available at: <https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline>

²⁸ UKWIR (2021) *Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans*. Report Ref. No. 21/WR/02/15

²⁹ Welsh Government (2022) *The Welsh Government Guiding Principles for Developing Water Resources Management Plans (WRMPs) 2022*. Available at: <https://gov.wales/sites/default/files/publications/2021-12/water-resources-management-plan-guidance-2022.pdf>

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relevant to the WRMP. As it is possible that the Final WRMP24 could affect England and Wales, the UK SEA Regulations, as opposed to the Welsh SEA Regulations,³⁰ apply.

Applying SEA to United Utilities' Water Resources Management Plan 24

- 1.4.8 UUW's WRMP24 is subject to SEA. SEA is required based on the scope of the potential effects that could arise, particularly given the number and area covered by European designated conservation sites in the operational area covered by the WRMP. In this context, the purpose of the SEA of WRMP24 is to:
- identify the potentially significant environmental effects of the plan in terms of the water resource management options being considered;
 - help identify appropriate measures to avoid, reduce or manage adverse effects and to enhance beneficial effects associated with the implementation of the plan wherever possible;
 - give the statutory SEA bodies, stakeholders and the wider public the ability to see and comment upon the effects that the plan may have on them, and encourage them to make responses and suggest improvements to the plan; and
 - inform the selection of water resource management options to be taken forward into the final version of the WRMP24.
- 1.4.9 The SEA has sought to identify, describe and assess the likely significant effects arising from the following aspects of WRMP24:
- the feasible water resource options;
 - the preferred water resources options;
 - the preferred programme of options selected to comprise the preferred plan to address the supply demand deficit;
 - any alternative plans proposed to address the supply demand deficit;
 - any cumulative, secondary and/or synergistic effects of implementing WRMP24.
- 1.4.10 Where relevant, any assessment work that has already been completed e.g., as part of the RAPID³¹ gated submission process for the SROs, has been to inform the assessments of the options as they are presented.

Stages of Strategic Environmental Assessment

- 1.4.11 SEA comprises five key stages:
- **Stage A:** Scoping;

³⁰ Statutory Instrument 2004 No. 1656 The Environmental Assessment of Plans and Programmes (Wales) Regulations 2004

³¹ Regulators Alliance for Progressing Infrastructure Development (RAPID) was established in 2019 to "help accelerate the development of new water infrastructure and design future regulatory frameworks. The joint team is made up of the 3 water regulators Ofwat, Environment Agency and Drinking Water Inspectorate". Available online <https://www.ofwat.gov.uk/regulated-companies/rapid/3/> [Accessed July 2022]

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- **Stage B:** Develop and Refine Alternatives and Assess Effects;
- **Stage C:** Prepare Environmental Report;
- **Stage D:** Consult on the Draft Plan and Environmental Report and Prepare the Post Adoption (SEA) Statement; and
- **Stage E:** Monitor Environmental Effects.

1.4.12 **Stage A** of the SEA of the WRMP24 led to the production of the WRW Regional Plan and WRMP24 SEA Scoping Report³² (as the work was undertaken as part of the development of the consistent suite of assessment methodologies to be applied to water resource plans within the WRW region). The scoping stage itself comprised five tasks that are listed below:

- i. Review of other relevant policies, plans, programmes and strategies (hereafter referred to as 'plans and programmes').
- ii. Collation and analysis of baseline information.
- iii. Identification of key sustainability issues.
- iv. Development of the assessment framework.
- v. Consultation on the scope of the SEA.

1.4.13 Information collected and analysed (as part of tasks i and ii) covered England and Wales, reflecting the U UW operational area. The Scoping Report set out the proposed framework for assessing the likely significant environmental effects of the WRMP24 (as well as the WRW Regional Plan). It was issued for scoping consultation for 5 weeks from the 8th April to the 13th May 2021 and the assessment framework was subsequently amended to take into account the feedback received. The representations received on the Scoping Report and how they have been taken into account in the subsequent assessment and Environmental Report are presented in **Appendix B**.

1.4.14 The Draft WRMP24 was subject to assessment using the amended assessment framework (**Stage B**). This comprised an assessment of all feasible (constrained) water management options. An assessment of the preferred plan (including the constituent preferred options) was then undertaken. The findings of the assessment were presented in the Draft WRMP24 Environmental Report (in a form to meet the requirements of Schedule 2 of the SEA Regulations) (**Stage C**) that was published for consultation in December 2022 alongside the Draft WRMP24 itself (**Stage D**). A Statement of Response has been prepared that details the comments received on the Draft WRMP24 and the accompanying environmental assessments, including the SEA, and U UW's response. This is available separately. A schedule of responses to the Environmental Report with detail on how the comments have been taken into account is contained at **Appendix B**.

³² Wood and Ricardo (2021) Water Resources West and Water Resources Management Plan 2024 Strategic Environmental Assessment Scoping Report, Water Resources West, Dŵr Cymru Welsh Water, Hafren Dyfrdwy, Severn Trent, South Staffordshire Water, United Utilities

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- 1.4.15 Following consultation, U UW has prepared a Statement of Response to the representations received. It also completed further work reflecting regional reconciliation which has led to amendments to the Draft WRMP24. A Revised Draft WRMP24 was completed and given the changes was also subject to further environmental assessment. The Revised Draft WRMP24 was submitted to the Secretary of State for the Department for Environment, Food and Rural Affairs (Defra) for review and approval in June 2023. The Secretary of State subsequently requested further information on the Revised Draft WRMP (December 2023), which was provided by U UW alongside updated environmental reports (February 2024). Following receipt of the direction to publish, the Final WRMP24 has now been produced. Given the changes in the Final WRMP24 this has been subject to further environmental assessment. The findings are presented in this Environmental Report.
- 1.4.16 In conjunction with publishing the Final WRMP24, a Post Adoption Statement will also be issued (to meet the requirements of SEA regulation 16 (4)). This will set out the results of the consultation and SEA processes and the extent to which the findings of the SEA have been accommodated in the final plan.
- 1.4.17 During the period of the WRMP, U UW will monitor the implementation and environmental effects of the plan (**Stage E**).

1.5 Habitats Regulations Assessment

- 1.5.1 Regulations 63 and 64 of The Conservation of Habitats and Species Regulations (2017) (the 'Habitats Regulations') transpose the provisions of Articles 6(3) and 6(4) of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive') as they relate to plans or projects in England and Wales. Regulation 63 states that if a plan or project is "*(a) is likely to have a significant effect on a European site³³ or a European offshore marine site³⁴ (either alone or in combination with other plans or projects); and (b) is not directly connected with or necessary to the management of the site*" then the competent authority must "*...make an appropriate assessment of the implications for the site in view of that site's conservation objectives*" before the giving consent or authorisation (etc.).
- 1.5.2 The plan or project can only be given effect if it can be concluded (following an 'appropriate assessment') that it "*...will not adversely affect the integrity*" of a site, unless the provisions of Regulation 64 are met.
- 1.5.3 The process by which Regulation 63 (and, if applicable, Regulation 64) is met is known as Habitats Regulations Assessment (HRA)³⁵. An HRA determines whether there will be any

³³ Strictly, 'European sites' are: any Special Area of Conservation (SAC) from the point at which the European Commission and the UK Government agreed the site as a 'Site of Community Importance' (SCI) (if this was before 31 Jan 2020); any classified Special Protection Area (SPA); and any candidate SAC (cSAC). However, the term is also commonly used when referring to potential SPAs (pSPAs), to which the provisions of Article 4(4) of Directive 2009/147/EC (the 'new wild birds directive') apply; and to possible SACs (pSACs) and listed Ramsar Sites. "European site" is therefore used in this proposal in its broadest sense, as an umbrella term for all of the above designated sites.

³⁴ 'European offshore marine sites' are defined by Regulation 18 of *The Conservation of Offshore Marine Habitats and Species Regulations 2017*; these regulations cover waters (and hence sites) over 12 nautical miles from the coast.

³⁵ The term 'Appropriate Assessment' has been historically used to describe the process of assessment; however, the process is now more accurately termed 'HRA', with the term 'Appropriate Assessment' limited to the specific stage within the process.

'likely significant effects' on any European site as a result of a plan's implementation (either on its own or 'in combination' with other plans or projects)³⁶ and, if so, whether there will be any 'adverse effects on site integrity'³⁷.

- 1.5.4 Water resource plans (whether WRMPs or Regional Plans) are not explicitly included within this legislation, although the regulator guidance³⁸ requires that it should extend to the WRMP if the preferred plan "*would be likely to have a significant effect on a European site (either alone or in combination with other plans or projects)*". The Habitats Regulations require every Competent Authority, in the exercise of any of its functions, to have regard to the requirements of the Habitats Directive. The water companies have a statutory duty to prepare WRMP24 and are therefore the Competent Authority for an HRA.
- 1.5.5 A HRA³⁹ was undertaken for the Draft WRMP24, Revised Draft WRMP24 and this has been updated for the Final WRMP24 to ensure that the preferred plan has been assessed in accordance with Regulation 63 of the Habitats Regulations. Whilst the HRA has been undertaken and reported separately from the SEA, its findings have been used as appropriate to inform the findings of this SEA, notably against the biodiversity, fauna and flora topic.

1.6 Water Framework Directive Assessment

- 1.6.1 The Water Framework Directive⁴⁰ (WFD) has been enacted into UK legislation as the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 in England and Wales.
- 1.6.2 The WFD sets a default objective for all rivers, lakes, estuaries, groundwater and coastal water bodies to achieve 'good' status or potential by 2027 at the latest. The current (baseline) status (e.g., 2015 classification), and the measures required to achieve the 2027 status objective, are set out for each water body in the relevant River Basin Management Plans (RBMPs), prepared by the EA and NRW every six years. The current, updated RBMPs were published in October 2022.
- 1.6.3 UUW (for the WRMP24) must be able to demonstrate that the plan will not cause a deterioration in respect of these baseline conditions. Furthermore, for those water bodies that are not currently attaining good status, UUW must be able to confirm that WRMP24 would not preclude the delivery of measures to facilitate the improvements needed to attain good status.

³⁶ Also referred to as the 'test of significance'.

³⁷ Also referred to as the 'integrity test'.

³⁸ EA, OfWAT and NRW (2023) *Water Resources Planning Guideline*

³⁹ Wood (2022) Habitats Regulations Assessment of the Water Resources Management Plan 2024. Available at https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/wrmp24-drafts/uu-draft-wrmp24-hra_redacted.pdf [Accessed May 2023] and then subsequently updated.

⁴⁰ European Union (2000) Directive 2000/60/EC of the European Parliament and of the Council. Following the UK's exit from the European Union on 31.12.20, the Directive no longer applies to the UK.

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- 1.6.4 A separate WFD Assessment⁴¹ was undertaken for the Draft WRMP24 to provide the evidence base to respond to these requirements. The WFD Assessment was updated for the Revised Draft WRMP24 and the Final WRMP24 and, where appropriate, the findings have been used to inform this SEA, notably against the water quality topic.

1.7 Biodiversity Net Gain and Natural Capital

- 1.7.1 Biodiversity Net Gain (BNG) is an approach to the development of land and marine management that aims to leave biodiversity in a measurably better condition than prior to development. BNG seeks to provide a means of quantifying losses or gains in biodiversity value brought about by changes in land use; when designed and delivered well, BNG can secure benefits for nature, people and places, and for the economy⁴².
- 1.7.2 Natural Capital (NC) studies key components of nature which are essential for the long-term provision of benefits on which society relies. These components can have a direct or indirect value to people.
- 1.7.3 The Water Resources Planning Guideline (WRPG)⁴³ states that water companies are required to ensure their WRMP delivers net biodiversity gain where appropriate and uses a proportionate natural capital approach. Additionally, the EA and NRW have published separate supplementary guidance on Environment and Society in decision-making^{44,45}, which provides more detail about the expectation for NCA or ecosystem resilience in England and Wales respectively, and how a Natural Capital Assessment (NCA) and ecosystem resilience can support decision-making.
- 1.7.4 A separate BNG and NCA⁴⁶ was undertaken of the Draft WRMP24 to address these requirements. Both the BNG and NCA have been updated to reflect UUW's Final WRMP24 preferred plan and, where appropriate, the findings have been used to inform this SEA, notably against the biodiversity, flora and fauna topic and specifically an assessment objective concerning sustainable natural resources.

⁴¹ Wood (2022) *Water Resources Management Plan: Water Framework Directive Compliance Assessment*. Available at https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/wrmp24-drafts/uu-draft-wrmp24-wfd_redacted.pdf [Accessed May 2023] and then subsequently updated.

⁴² Natural England (2021) *Biodiversity Net Gain – more than just a number*. Available online: <https://naturalengland.blog.gov.uk/2021/09/21/biodiversity-net-gain-more-than-just-a-number/>

⁴³ EA, Ofwat and NRW (2023) *Water Resources Planning Guideline*

⁴⁴ EA (2021) *WRPG 2024 supplementary guidance – Environment and society in decision-making*. Published 24/03/2021

⁴⁵ NRW (2021) *WRPG 2024 supplementary guidance – Environment and Society in decision-making* (Wales). Published 07/04/2021

⁴⁶ Wood (2022) *Water Resources Management Plan: Biodiversity Net Gain and Natural Capital Assessment*. Available at https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/wrmp24-drafts/uu-draft-wrmp24-bng-nca_redacted.pdf [Accessed May 2023] and then subsequently updated.

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1.8 Welsh Legislation

The Well-being of Future Generations (Wales) Act 2015

- 1.8.1 Section 3 of The Well-being of Future Generations (Wales) Act 2015 (WFGA) places a duty on Welsh public bodies to carry out sustainable development. This includes setting out objectives that are designed to maximise contributions to achieving the seven well-being goals for Wales, and taking all reasonable steps (in exercising its functions) to meet those objectives. These requirements apply to many of the public bodies in Wales, and to those functions delivered in Wales by a public body located outside Wales.
- 1.8.2 Water companies are not a public body; however, the WFGA, as noted in section 6(3), can apply to other parties “*who exercise functions of a public nature*”. Preparing long-term plans for ensuring water resources in line with the statutory requirements⁴⁷ is considered to be within this definition. In this context, the WRPG⁴⁸ sets out that water companies “*should consider how your plan could contribute to the Well-being of Future Generations (Wales) Act 2015, if you supply customers in Wales or your plan affects sites in Wales*”.
- 1.8.3 The requirements of the WFGA (in the context of WRMPs) can be met through either a standalone assessment, or as part of an integrated approach with other assessments, such as SEA. An integrated assessment was completed and included in the Environmental Report that accompanied the Draft WRMP24. That assessment has been updated and is presented in **Section 6** of this report.

The Environment (Wales) Act 2016

- 1.8.4 The Environment (Wales) Act 2016 introduced a new legislative approach for the sustainable management of natural resources (SMNR). The Act seeks to maintain and enhance the resilience of Wales’ ecosystems and the services and benefits they provide, in so doing, meeting the needs of the present generation without compromising the ability of future generations to meet their needs. Section 3(1) of the Environment (Wales) Act 2016 defines SMNR as:

“-using natural resources in a way and at a rate that promotes achievement of the SMNR objective;

-taking other action that promotes achievement of that objective; and

-not taking action that hinders achievement of that objective.”

- 1.8.5 The objective for SMNR referred to above is “*to maintain and enhance the resilience of ecosystems and the benefits they provide and, in so doing—*

(a) meet the needs of present generations of people without compromising the ability of future generations to meet their needs, and

⁴⁷ Water Industry Act 1991, as amended by the Water Act 2003 and the Water Act 2014

⁴⁸ EA, OfWAT and NRW (2023) *Water Resources Planning Guideline*, 5th bullet point after heading ‘Wales’ in paragraph 4.1.1.

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(b) contribute to the achievement of the well-being goals in section 4 of the Well-being of Future Generations (Wales) Act 2015”.

1.8.6 Section 6 of the Act places a duty on public authorities to “seek to maintain and enhance biodiversity” so far as it is consistent with the proper exercise of those functions. In so doing, public authorities must also seek to “promote the resilience of ecosystems”.

1.8.7 In line with the legislation, consideration has been given to the effects on Wales in the assessment undertaken and reported in this Environmental Report.

1.9 Environmental Report Structure

1.1.1 The remainder of this Environmental Report is structured as follows:

- **Section 2: Review of Plans and Programmes** - Provides an overview of the review of those plans and programmes relevant to WRMP24 and the SEA that is contained at **Appendix C**;
- **Section 3: Baseline Analysis** - Presents an overview of the baseline analysis and identifies the key issues relevant to WRMP24 and the SEA with the detailed social, economic and environmental characteristics presented in **Appendix D**;
- **Section 4: Approach to the Assessment** - Outlines the approach to the SEA of the Final WRMP24 including the assessment framework comprising assessment objectives and guide questions, categorisation of effects, matrices and definitions of significance/thresholds (**Appendix E**);
- **Section 5: Assessment of the Revised Feasible Options** - Presents the findings of the assessment of the likely significant effects of the revised feasible options and revised feasible option variants developed post Revised Draft WRMP24 work, and reflecting the ongoing development of Strategic Resource Options (SRO), considered during the preparation of the Final WRMP24 (detailed assessment matrices are presented in **Appendix F**);
- **Section 6: Assessment of the Final WRMP24** - Presents the findings of the assessment of the preferred options and preferred programme of options that comprise the Final WRMP24 and any reasonable alternatives, including consideration of cumulative effects and mitigation (with detailed assessment matrices for options presented in **Appendix G**);
- **Section 7: Next Steps** - Details the next steps in the SEA process and presents views on how the environmental effects of the WRMP will be monitored.

1.1.2 The report also contains the following appendices:

- **Appendix A: Quality Assurance Checklist.**
- **Appendix B: Schedule of Consultation Responses.**
- **Appendix C: Review of Plans and Programmes.**
- **Appendix D: Baseline Analysis.**

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- **Appendix E: Definitions of Significance.**
- **Appendix E: Revised Feasible Options Assessment**
- **Appendix G: Preferred Options Assessment.**

2. Review of Plans and Programmes

2.1 Overview

- 2.1.1 The SEA Regulations require a report containing “an outline of the contents, main objectives of the plan or programme and relationship with other relevant plans and programmes” (Schedule 2(1)) as well as “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” (Schedule 2(5)).
- 2.1.2 One of the first steps in undertaking the SEA of the UUW WRMP24 is therefore to identify and review other relevant plans and programmes which could influence the plan. These may be plans and programmes at an international/European, national, regional, or sub-regional level, commensurate with the scope of the WRMP24. The review aims to identify the relationships between the draft plans and these other documents i.e., how the WRMP24 could be affected by the other plans’ and programmes’ aims, objectives and/or targets, or how it could contribute to the achievement of their environmental and sustainability objectives. It is also a valuable source of information to support the completion of baseline analysis and to determine the key issues for the draft plans and SEA (see **Section 3** and **Appendix D**).
- 2.1.3 The completed review of plans and programmes is used to provide the policy context for the subsequent assessment process and helps to inform the development of objectives that comprise the assessment framework (see **Section 4**).

2.2 Summary of the Review of Plans and Programmes

- 2.2.1 Over 100 international/European, national, regional/sub-regional and local level plans and programmes have been reviewed in preparing this Environmental Report.
- 2.2.2 Those that are relevant to the WRMP24 are listed in **Table 2.1**. These are summarised in **Appendix C**.

Table 2.1 List of Plans and Programmes relevant to the WRMP24

International
Conservation of Migratory Species (CMS) (1979) The Bonn Convention on the Conservation of Migratory Species of Wild Animals
Council of Europe (1979) The Convention on the Conservation of European Wildlife and Natural Habitats (The Bern Convention)
Council of Europe (1985) The Granada Convention for the Protection of the Architectural Heritage of Europe
Council of Europe (1992) Convention on the Protection of Archaeological Heritage (The Valetta Convention)
Council of Europe (2000), European Landscape Convention (The Florence Convention) (became binding March 2007)
Council of Europe (2003) European Soils Charter

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European Commission (1991) The Nitrates Directive 91/676/EEC

European Commission (1991) Urban Waste Water Treatment Directive 1991/271/EEC

European Commission (1992) The Habitats Directive 1992/43/EEC

European Commission (1998) Drinking Water Directive 1998/83/EC

European Commission (2000) The Water Framework Directive 2000/60/EC

European Commission (2001) Directive on the Assessment of the Effects of Certain Plans and Programmes on the Environment (The SEA Directive) 2001/42/EC

European Commission (2002) Directive on the Energy Performance of Buildings 2002/91/EC

European Commission (2002) The Environment Noise Directive 2002/49/EC

European Commission (2004) Environmental Liability Directive 2004/35/EC

European Commission (2005) Thematic Strategy on Air Pollution

European Commission (2006) The Bathing Waters Directive 2006/7/EC

European Commission (2006) Directive on animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals 2006/88/EC

European Commission (2006) Directive on the protection of groundwater against pollution and deterioration 2006/118EC

European Commission (2006) Fresh Water Fish Directive 2006/44/EC

European Commission (2006) Mining Waste Directive 2006/21/EC

European Commission (2006) Thematic Strategy for Soil Protection

European Commission (2007) The Eel Directive 2007/1100/EC

European Commission (2007) Floods Directive 2007/60/EC

European Commission (2008) Ambient Air Quality and Cleaner Air for Europe Directive 2008/50/EC and Air Quality Framework Fourth Daughter Directive 2004/107/EC and previous directives (96/62/EC; 99/30/EC; 2000/69/EC & 2002/3/EC)

European Commission (2008) Directive on Waste (Directive 75/442/EEC, 2006/12/EC 2008/98/EC as amended)

European Commission (2008) Environmental Quality Standards Directive 2008/105/EC

European Commission (2008) Marine Strategy Framework Directive 2008/56/EC

European Commission (2009) Directive on the Conservation of Wild Birds 2009/147/EC (codified version of Council Directive 79/409/EEC as amended)

European Commission (2009) Promotion of the use of energy from renewable sources Directive 2009/28/EC

European Commission (2010) Industrial Emissions Directive (integrated pollution prevention and control) 2010/75/EU

European Commission (2011) Directives on Environmental Impact Assessment (Codified Directive 2011/92/EU and Revised Directive 2014/52/EU)

European Commission (2011) A Roadmap for Moving to a Competitive Low Carbon Economy in 2050

European Commission (2012) A Blueprint to Safeguard Europe's Water Resources

European Commission (2012) Energy Efficiency Directive 2012/27/EU as amended by Directive (EU) 2018/2002

European Commission (2014) The EU Regulation on invasive alien (non-native) species 1143/2014/EU

European Commission (2014) A Policy Framework for Climate and Energy in the Period from 2020 to 2030

European Commission (2015) 'Closing the loop - An EU Action Plan for the Circular Economy' policy package

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European Commission (2016) National Emissions reduction Commitments (NEC) Directive 2016/2284/EU
European Commission (2020) Biodiversity strategy for 2030
European Commission (2022) Eighth Environmental Action Programme
European Commission (2021) EU strategy on adaptation to climate change
ICOMOS (2011) Guidance on Heritage Impact Assessments for Cultural World Heritage Properties
IUCN (2013) World Heritage Advice Note: Environmental Assessment
UNEP (1973) Convention on International Trade in Endangered Species of Wild Fauna and Flora
UNESCO (1971) Ramsar Convention on Wetlands of International Importance
UNESCO (1972) Convention Concerning the Protection of the World Cultural and Natural Heritage.
UNESCO (2001) Convention on the Protection of Underwater Cultural Heritage
United Nations (1992) Convention on Biological Diversity (The Rio Convention)
United Nations (1997) The Kyoto Protocol to the UN Framework Convention on Climate Change
United Nations Economic Commission for Europe (1998), Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (The Aarhus Convention)
United Nations (2002) The World Summit on Sustainable Development
United Nations (2016) The Paris Agreement
United Nations Framework Convention on Climate Change (UNFCCC) (2011) The Cancun Agreements
World Commission on Environment and Development (1987) Our Common Future (The Brundtland Report)
World Health Organisation (2004) Children's Environment and Health Action Plan for Europe

National

BEIS (2011) National Policy Statements for Energy Infrastructure
BEIS (2013) UK Renewable Energy Roadmap
BEIS (2015) Future Electricity Networks
BEIS (2021) Heat and buildings strategy
BEIS (2021) Net Zero Strategy: Build Back Greener
Canal & River Trust (2015) Living Waterways Transform Places & Enrich Lives: Our 10 Year Strategy
Canal and River Trust (2015) Water Resources Strategy 2015 – 2020
Centre for Environment Fisheries and Aquaculture Science and Natural Resources Wales (2021) Assessment of Salmon Stocks and Fisheries in England and Wales 2020
Climate Change Committee (2020) The path to Net Zero and progress on reducing emissions in Wales
Department for Culture, Media and Sport (DCMS) (2001) The Historic Environment – A Force for the Future
DCMS and Welsh Government (2007) Heritage Protection for the 21st Century
DCMS (2013) Scheduled Monuments & Nationally Important but Non-Scheduled Monuments
DCMS (2016) The Culture White Paper
Defra (2004) Rural Strategy

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Defra (2005) Making space for water: taking forward a new government strategy for flood and coastal erosion risk management in England

Defra (2006) Shoreline Management Plan Guidance

Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

Defra (2009) Safeguarding our Soils – A Strategy for England

Defra, Department of the Environment (NI), Scottish Government and Welsh Assembly Government (2010) Air Pollution: Action in a Changing Climate

Defra (2010) Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network

Defra (2011) UK National Ecosystem Assessment and Defra (2014), UK National Ecosystems Assessment Follow on, Synthesis of Key Findings

Defra (2011) Water for Life - Water White Paper

Defra (2011) Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services

Defra (2011) Mainstreaming Sustainable Development

Defra (2011) The Natural Choice: Securing the Value of Nature

Defra (2011) Natural Environment White Paper

Defra (2012) National Policy Statement for Waste Water

Defra (2013) The National Adaptation Programme – Making the Country Resilient to a Changing Climate

Defra (2013) What nature can do for you

Defra (2015) The government's response to the Natural Capital Committee's Third State of Natural Capital report

Defra (2015) The Great Britain Invasive Non-native Species Strategy

Defra (2016) Guiding principles for water resources planning for water companies operating wholly or mainly in England

Defra (2017) Air Quality Plan for Nitrogen Dioxide (NO₂) in UK

Defra (2018) The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting

Defra (2020) Drought Plan Direction 2020

Defra (2020) National food strategy for England

Defra (2020) Natural Capital Committee's Seventh Annual Report

Defra (2020) The Path to Sustainable Farming: An Agricultural Transition Plan 2021 to 2024

Defra (2020) Water abstraction plan: Environment

Defra (2021) Waste Management Plan for England

Defra and the Environment Agency (2018) Resources and Waste Strategy for England

Defra, Environment Agency, Natural England, Forestry Commission England (2016) Creating a great place for living

Defra and the Law Commission (2018) Draft National Policy Statement for Water Resources Infrastructure

Defra, Scottish Government, Welsh Government (2015) The Great Britain Invasive Non-native Species Strategy

Defra and Welsh Government (2014), River Basin Planning Guidance

Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2014) National Planning Policy for Waste

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Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2015) Renewable and Low Carbon Energy

Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2015) Strategic environmental assessment and sustainability appraisal

Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local (2021) National Planning Policy Framework 2021

Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local (various) Planning Practice Guidance

Department for Transport (2022) UK Electric Vehicle Infrastructure Strategy

Environment Agency (2004) Catchment Flood Management Plans: Guidelines – Volume 1 Policy

Environment Agency (2007) Soil: A Precious Resource

Environment Agency (2008) Better Sea Trout and Salmon Fisheries: Our Strategy for 2008-2021

Environment Agency (2009) Water for People and the Environment - Water Resources Strategy for England and Wales

Environment Agency (2010) Water Resources Action Plan for England and Wales

Environment Agency (2013) Areas of Water Stress: Final Classification

Environment Agency (2013) Climate Change Approaches in Water Resources Planning: New Methods

Environment Agency (2013) Managing Water Abstraction

Environment Agency (2017) Drought response: our framework for England

Environment Agency (2017) Groundwater Protection Technical Guidance

Environment Agency (2018) The Environment Agency's Approach to Groundwater Protection

Environment Agency (2020) EA2025 creating a better place

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

Environment Agency (2020) National Flood and Coastal Erosion Risk Management Strategy for England

Environment Agency (2020) Water Company Drought Plan guideline

Environment Agency (2022) Water resources planning guideline supplementary guidance – Environment and society in decision-making

Environment Agency (undated) Hydroecology: Integration for modern regulation

Environment Agency (undated) Restoring Sustainable Abstraction Programme

Environment Agency (undated) WFD River Basin Characterisation Project: Technical Assessment Method - River abstraction and flow regulation.

Environment Agency, Natural Resources Wales and The Water Services Regulation Authority (2021) Water Resources Planning Guideline

English Heritage (2008) Climate Change and the Historic Environment

English Heritage (2010) Heritage at Risk

Historic England (2015) The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning 3

Historic England (2016) Historic England Advice Note 8: Sustainability Appraisal and Strategic Environmental Assessment

The Historic Environment Group (2018) Historic Environment and Climate Change Sector Adaption Plan

HM Government (1975) Salmon and Freshwater Fisheries Act, 1975

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HM Government (1975) Reservoirs Act

HM Government (1979) Ancient Monuments and Archaeological Areas Act 1979

HM Government (1981) Wildlife and Countryside Act, 1981

HM Government (1990) Environmental Protection Act

HM Government (1990) Planning (Listed Buildings and Conservation Areas) Act 1990

HM Government (1990) Town and Country Planning Act 1990

HM Government (1991 and 1994) Land Drainage Act

HM Government (1991) Water Industry Act 1991 (as amended by the Flood and Water Management Act 2010)

HM Government (1991) Water Resources Act 1991

HM Government (1994) The Conservation (Natural Habitats, &c.) Regulations 1994

HM Government (1994) UK Biodiversity Action Plan

HM Government (1994) Urban Waste Water Treatment (England and Wales) Regulations 1994

HM Government (1995) Environment Act 1995

HM Government (2000) The Countryside and Rights of Way (CROW) Act 2000

HM Government (2002) The National Heritage Act 2002

HM Government (2003) The Water Act 2003

HM Government (2004) The Environmental Assessment of Plans and Programmes Regulations 2004

HM Government (2005) Securing the Future; Delivering UK Sustainable Development Strategy

HM Government (2006) Climate Change and Sustainable Energy Act 2006

HM Government (2006) Natural Environment and Rural Communities Act 2006

HM Government (2007) Water Resources Management Plan Regulations 2007

HM Government (2008) The Climate Change Act 2008 and The Climate Change Act 2008 (2050 Target Amendment) Order 2019

HM Government (2008) The Energy Act 2008

HM Government (2008) Planning Act 2008

HM Government (2009) The Eels (England and Wales) Regulations 2009 (as amended 2011)

HM Government (2009) The Groundwater (England and Wales) Regulations 2009

HM Government (2009) Marine and Coastal Access Act 2009

HM Government (2009) Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 SI 3104

HM Government (2009) The UK Renewable Energy Strategy

HM Government (2010) Flood and Water Management Act 2010

HM Government (2011) Localism Act 2011

HM Government (2011) UK Marine Policy Statement

HM Government (2011) Water for Life: White Paper

HM Government (2013) The Energy Act 2013

HM Government (2014) Water Act 2014

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HM Government (2015) The Environmental Damage (Prevention and Remediation) (England) Regulations 2015

HM Government (2015) Infrastructure Act 2015

HM Government (2015) The Nitrate Pollution Prevention Regulations 2015

HM Government (2015) Ozone-Depleting Substances Regulations 2015

HM Government (2016) Environmental Permitting (England and Wales) Regulations 2016 (as amended 2018)

HM Government (2017) Conservation of Habitats and Species Regulations 2017 (and the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019)

HM Government (2017) The Water Environment (WFD) (England and Wales) Regulations 2017

HM Government (2017, updated 2019) UK Clean Growth Strategy: Leading the way to a low carbon future

HM Government (2018) A Green Future: Our 25 Year Plan to Improve the Environment

HM Government (2018) The Water Supply (Water Quality) Regulations 2018

HM Government (2019) the Invasive Alien species (Enforcement and Permitting) Order 2019

HM Government (2020) The Agriculture Act 2020

HM Government (2020) Energy White Paper: Powering our Net Zero Future

HM Government (2021) The Environment Act

HM Government (2022) UK Climate Change Risk Assessment 2022

HM Treasury (2016) National Infrastructure Delivery Plan

JNCC and Defra (2012) UK Post-2010 Biodiversity Framework

National Assembly for Wales (2015) Well-being of Future Generations Act (2015)

National Assembly for Wales (2016) Environment (Wales) Act 2016

National Infrastructure Commission (2018) Preparing for a Drier Future, England's Water Infrastructure Needs

Natural England (2011) UK Geodiversity Action Plan

Natural England (2016) A narrative for conserving freshwater and wetland habitats in England

Natural England (2016) Conservation 21: Natural England's conservation strategy for the 21st century

Natural England and the Environment Agency (2014) Protected Species and Development: Advice for Local Planning Authorities

Natural Resources Wales (2020) The State of Natural Resources Report (SoNaRR) for Wales 2020

Ofwat (2016) Water 2020

Ofwat (2017) Resilience in the Round

UKCIP (2018) UK Climate Projections UKCP18

UKTAG: Phase 3 Review of Environmental Standards

Waterwise (2017) Water Efficiency Strategy for the UK

Water UK (2016) Water Resources Long-term Planning Framework (2015 – 2065)

Welsh Government (2017) Technical Advice Note 24 the Historic Environment

Welsh Government (2018) Priorities for the Historic Environment of Wales

Welsh Government (2020) Historic Environment and Climate Change in Wales

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Welsh Government (2024) Planning Policy Wales (Edition 12)
Regional

Canal & Rivers Trust (2015) North West Waterway Fisheries & Angling Action Plan

Environment Agency (2011) North West of England and North Wales Shoreline Management Plan SMP2

English Heritage, now known as Historic England, Heritage at Risk Register: North West (2021) and Midlands (2021) Natural Resources Wales (2017) Drought Plan

Transport for the North (2019) Strategic Transport Plan

United Utilities Final Drought Plan 2018

United Utilities (2019) Final Water Resources Management Plan 2019

United Utilities (2020) Revised Business Plan 2020-2025

Water Company (various) Drought Plans:

- **Hafren Dyfrdwy Draft Drought Plan 2019**
- **Dwr Cymru Welsh Water Draft Drought Plan 2020**
- **Severn Trent Draft Drought Plan 2019-2024**
- **Yorkshire Water Draft Drought Plan 2019**
- **Northumbrian Water Final Drought Plan 2019**

Water Company (various) Water Resources Management Plans (published and draft):

- **Hafren Dyfrdwy Final Water Resources Management Plan 2019**
- **Dwr Cymru Welsh Water Final Water Resources Management Plan 2019**
- **Severn Trent Final Water Resources Management Plan 2019**
- **Yorkshire Water Revised Draft Water Resources Management Plan 2019**
- **Northumbrian Water Final Water Resources Management Plan 2019**

Welsh Government (2018) Castles and Town Walls of King Edward in Gwynedd World Heritage Site: World Heritage Site Management Plan 2018 – 28

Wrexham County Borough Council British Waterways and the Royal Commission on the Ancient and Historical Monuments of Wales (2012) Pontcysyllte Aqueduct and Canal World Heritage Site – Management Plan

Torfaen County Borough Council (2011) Blaenavon Industrial Landscape World Heritage Site Management Plan

Sub-Regional/Local

Area of Outstanding Natural Beauty (AONB) Management Units (various) AONB Management Plans

Cheshire and Warrington Enterprise Partnership (2017) Cheshire and Warrington Matters, A Strategic and Economic Plan for Cheshire and Warrington

Cumbria Strategic Partnership, Sustainable Cumbria - A sub-regional strategy for Cumbria (2004)

Defra (2010), Eel Management Plans (various)

Environment Agency (various) Catchment Flood Management Plans

Environment Agency and Natural Resources Wales (various) Salmon Action Plans

Environment Agency (2013) Abstraction Licensing Strategies (CAMS process)

Environment Agency and Scottish Environment Protection Agency (2021) Draft River Basin Management Plans: 2021 (Various)

Environment Agency, Defra, Natural Resources Wales and Natural Scotland (2015) River Basin Management Plans (various):

- **North West River Basin Management Plan**
- **Solway Tweed River Basin Management Plan**
- **Dee River Basin Management Plan**

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Environment Agency, Natural Resources Wales and SEPA (2016) Flood Risk Management Plans (various)

- North West Flood Risk Management Plan
- Solway Tweed Flood Risk Management Plan

- Dee Flood Risk Management Plan

Greater Manchester Combined Authority (2017), Our People Our Place: Greater Manchester Strategy
Hadrian's Wall Partnership Board (2015), Hadrian's Wall Management Plan 2015-2019
Lake District National Park Authority (2006) A Vision for 2030
Lake District National Park Authority (2008) Landscape Character Assessment and Guidelines
Lake District National Park Authority (2021) Local Plan
Lake District National Park Authority –Partnership's Management Plan 2020-2025
Local Biodiversity Action Plans (BAPs) (various)
Local Planning Authority (various) Land Use Plans
Local Geodiversity Action Plans (LGAPs)
Local Planning Authority (various) Local Plans/Local Development Plans
Local Wildlife Trust Strategies (various)
National Park Management Plans (various):

- Lake District National Park Authority – Partnership's Management Plan 2020-2025 Peak District National Park Management Plan 2018-2023
- Snowdonia National Park Partnership Plan 2020
- Yorkshire Dales National Park Management Plan 2019-2024

Natural England, Site Improvement Plans (SIPs) for Natura 2000 Sites (various)
Natural England National Character Area (NCA) Profiles (various)
Natural England and Environment Agency (various) River Restoration and Water Level Management Plans
Outline Water Cycle Studies
Public Rights of Way Improvement Plans (ROWIPs)
West Lancashire Partnership

2.3 Policy Objectives Relevant to the Plan Assessment

2.3.1 The review of plans and programmes presented in **Appendix C** has identified a number of objectives and policy messages relevant to the WRMP24. Reflecting the topics identified in Schedule 2 of the SEA regulations, these objectives and messages are set out for the following topic areas:

- Biodiversity, Flora and Fauna;
- Geology Land use and Soils;
- Water (including flood risk);
- Air Quality;
- Climatic Factors;

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- Population and Human Health;
- Material Assets and Resource Use;
- Cultural Heritage; and
- Landscape.

2.3.2 The policy objectives and messages identified from the review of other plans and programmes are summarised in **Table 2.2**. It is important that the assessment takes these into account as this will help to highlight any areas where the Final WRMP24 will help or hinder the achievement of the objectives of the other plans. Only the key sources are included; however, it is acknowledged that many other plans and programmes could also be included. The relevance of the key objectives and policy measures to the assessment of the WRMP24 is also indicated in **Table 2.2**.

Table 2.2 Key Policy Objectives Identified in Other Plans and Programmes relevant to the Assessment of the WRMP24

Key Policy Objectives and Policy Messages	Key Sources	Relevant to the SEA of the WRMP?	Relevant SEA Objectives
Biodiversity, Flora and Fauna			
Conservation and enhancement of the levels and variety of biodiversity, including designated sites, priority species and habitats	Bern Convention; Bonn Convention; Habitats Directive; Invasive Alien Species Regulation; Ramsar Convention on Wetlands; Birds Directive; EU Biodiversity Strategy to 2030; Marine Strategy Framework Directive; Biodiversity 2020; UK post 2010 Biodiversity Framework; Eel Regulations: Wildlife and Countryside Act; The Natural Environment and Rural Communities Act; UK Biodiversity Action Plan; Marine and Coastal Access Act; Conservation of Habitats & Species Regulations; Better Sea Trout and Salmon Fisheries; The Great Britain Invasive Non-native Species Strategy; A Green Future: Our 25 Year Plan to Improve the Environment; UK Marine Policy Statement; Countryside and Rights of Way Act; National Planning Policy Framework; The State of Natural Resources Report (SoNaRR; Natural England’s Conservation strategy for the 21 st Century; Protected Species and Development; Local Biodiversity Action Plans (BAP) including Species and Habitats Action Plans (various); Local Planning Authority Local Plans (various); AONB Management Plans; National Park Management Plans (various).	Yes	The policy objectives listed influenced the development of SEA objectives 1, 2 and 3, as seen in Table 4.2. The SEA objectives reflect the key policy objectives and messages that seek to protect, restore and enhance biodiversity, including designated sites (SEA Objective 1), to protect and enhance natural resources (SEA Objective 2), and with regards to avoiding and minimising the spread of invasive species and non-native species (SEA Objective 3).
Soils, Land Use and Geology			

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Key Policy Objectives and Policy Messages	Key Sources	Relevant to the SEA of the WRMP?	Relevant SEA Objectives
Protection and enhancement of soil quality, promoting sustainable patterns of land use and protecting designated geological features	Thematic Strategy for Soil Protection; National Planning Policy Framework; Soil: A Precious Resource; Local Planning Authority Local Plans (various); AONB Management Plans; National Park Management Plans (various).	Yes	<p>The policy objectives listed influenced the development of SEA Objective 4, as seen in Table 4.2.</p> <p>SEA Objective 4 explicitly reflects the key policy objectives and messages that seek to protect and enhance soil quantity, quality and functionality and geodiversity (with the objective's associated guide questions specifically referencing sites designated for their geological importance) whilst also seeking to achieve efficient use of land.</p>
Water (including flood risk)			
Protection and enhancement of all water supplies and resources	Blueprint to Safeguard Europe's Water Resources; Bathing Waters Directives; Drinking Water Directive; Nitrates Directive; Urban Waste Water Directive; Water Framework Directive; Environmental Quality Standards Directive; Habitats Directive; the Wildlife & Countryside Act; the Conservation of Habitats & Species Regulations; Water Supply (Water Quality) Regulations; Restoring Sustainable Abstraction Programme; Climate Change Approaches in Water Resources Planning; Drought Response: Our Framework for England; Water Resources Planning guideline; Future Water; Meeting our future water needs: a national framework for water resources; A Green Future: Our 25 Year Plan to Improve the Environment; National Planning Policy Framework; Water Resources Long-Term Planning Framework; River Basin Management Plans (various); Draft River Basin Management Plans (Various); Water Company Drought Plans (various); Water Company Water Resource Management Plans (various); Abstraction Licensing Strategies (various); Local Planning Authority Local Plans (various).	Yes	<p>The policy objectives listed influenced the development of SEA objectives 5 and 6, as seen in Table 4.2.</p> <p>SEA Objective 5 explicitly reflects the key policy objectives and messages by seeking to protect ground and surface water levels and flows with guide questions referencing minimising the demand for water resources and the River Basin Management Plans objectives. SEA Objective 6 specifically seeks to protect and enhance the quality of surface and groundwaters reflecting the key policy objectives. The requirements of the WFD are explicitly referenced under the objective's associated guide questions.</p>
Promoting the sustainable and efficient use of water	Blueprint to Safeguard Europe's Water Resources; Water Framework Directive; The Water Environment (WFD) (England and Wales) Regulations; Water for People and the Environment; Restoring Sustainable Abstraction Programme; Environment Agency's Approach to Groundwater Protection; Meeting our future water needs: a national framework for water resources; Water Act; A Green Future: Our 25 Year	Yes	<p>The policy objectives listed influenced the development of SEA objective 5 and 6, as seen in Table 4.2.</p> <p>SEA Objective 5 explicitly reflects the key policy objectives and messages by seeking to protect ground and surface water levels and flows with guide questions referencing minimising the demand for water</p>

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Key Policy Objectives and Policy Messages	Key Sources	Relevant to the SEA of the WRMP?	Relevant SEA Objectives
	<p>Plan to Improve the Environment; National Planning Policy Framework;</p> <p>River Basin Management Plans (various); Draft River Basin Management Plans (Various); Water Company Drought Plans (various); Water Company Water Resource Management Plans (various); Abstraction Licensing Strategies (various); Local Planning Authority Local Plans (various).</p>		<p>resources and the River Basin Management Plans objectives. SEA Objective 6 specifically seeks to protect and enhance the quality of surface and groundwaters reflecting the key policy objectives. The requirements of the WFD are explicitly referenced under the objective's associated guide questions.</p>
Minimising flood risk and improving flood control infrastructure	<p>Floods Directive; Water Framework Directive; Flood and Water Management Act; Shoreline Management Plan Guidance; National Flood and Coastal Erosion Risk Management Strategy for England; Flood and Water Management Act; National Planning Policy Framework; Shoreline Management Plans (various); Catchment Flood Management Plans (various); River Basin Management Plans (various); Draft River Basin Management Plans (Various); Catchment Flood Management Plans (various); Local Planning Authority Local Plans (various).</p>	<p>Yes</p>	<p>The policy objectives listed influenced the development of SEA Objective 7, as seen in Table 4.2.</p> <p>SEA Objective 7, which covers flood risk, reflects the key policy objectives and messages by explicitly seeking to reduce or manage flood risk.</p>
Air			
Ensuring air quality is maintained or enhanced and that emissions of air pollutants are kept to a minimum	<p>Ambient Air Quality and Cleaner Air for Europe; Industrial Emissions Directive; Air Quality Strategy for England, Scotland, Wales and Northern Ireland; Air Quality Plan for Nitrogen Dioxide (NO₂) in UK; National Planning Policy Framework; Local Planning Authority Local Plans (various).</p>	<p>Yes</p>	<p>The policy objectives listed influenced the development of SEA Objective 8, as seen in Table 4.2.</p> <p>The key policy objectives related to minimising emissions to air and enhancing air quality are explicitly reflected in the wording of SEA Objective 8, which covers the air quality topic.</p>
Climatic Factors			
Minimising emissions of greenhouse gases that cause climate change	<p>Kyoto Protocol; Paris Agreement; Climate Change Act; Renewable Energy Roadmap; UK Sustainable Development Strategy; UK Renewable Energy Strategy; Energy White Paper; UK Clean Growth Strategy; UK Climate Change Risk Assessment; Local Planning Authority Local Plans (various).</p>	<p>Yes</p>	<p>The policy objectives listed influenced the development of SEA Objective 9, as seen in Table 4.2.</p> <p>The reduction in greenhouse gas emissions sought by these sources is explicitly referenced in the wording of SEA Objective 9.</p>
Minimising the effects of climate change on natural resources,	<p>The Environment Act; Strategy on Adaptation to Climate Change; UK Sustainable Development Strategy; National Flood and Coastal Erosion Risk</p>	<p>Yes</p>	<p>The policy objectives listed influenced the development of SEA Objective 10, as seen in Table 4.2.</p>

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Key Policy Objectives and Policy Messages	Key Sources	Relevant to the SEA of the WRMP?	Relevant SEA Objectives
inhabitants and the economy	Management Strategy for England; National Planning Policy Framework; The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting; Water Resources Management Plans (various); River Basin Management Plans (various); Draft River Basin Management Plans (Various); Shoreline Management Plans (various); Catchment Flood Management Plans (various); Local Planning Authority Local Plans (various).		SEA Objective 10 seeks to improve adaptation and resilience to the threats of climate change, which reflects the key policy objectives.
Population and Human Health			
Addressing deprivation and reducing inequality	World Summit on Sustainable Development; Europe 2020; Sustainable Development Strategy; National Planning Policy Framework; Planning Policy Wales Edition 12; Local Planning Authority Local Plans (various).	Yes	<p>The policy objectives listed influenced the development of SEA objectives 11 and 13, as seen in Table 4.2.</p> <p>SEA Objective 11 specifically seeks to maintain and enhance the economic and social wellbeing of local communities reflecting the key objectives related to deprivation and reducing inequality. SEA Objective 13 seeks to protect and enhance human health and wellbeing with associated guide questions related to community cohesion and health deprivation. The key objectives of these sources are reflected in the SEA objectives.</p>
Promoting improvements to health and well-being	Aarhus Convention; Sustainable Development Strategy; World Summit on Sustainable Development; Eighth Environmental Action Programme; National Planning Policy Framework; Local Planning Authority Local Plans (various).	Yes	<p>The policy objectives listed influenced the development of SEA Objective 13, as seen in Table 4.2.</p> <p>SEA Objective 13 seeks to protect and enhance human health and wellbeing which specifically reflects the key objectives of these sources.</p>
Providing high quality services, community facilities and social infrastructure that is accessible to all	National Planning Policy Framework; Planning Policy Wales Edition 12; Local Planning Authority Local Plans (various).	No	<p>The policy objectives listed influenced the development of SEA Objective 11, as seen in Table 4.2.</p> <p>SEA Objective 11 specifically seeks to maintain and enhance the economic and social wellbeing of local communities reflecting the key objectives of these sources, whilst the associated guide questions seek to ensure sufficient water resources infrastructure is in place and to</p>

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Key Policy Objectives and Policy Messages	Key Sources	Relevant to the SEA of the WRMP?	Relevant SEA Objectives
			avoid negative effects on existing infrastructure.
Achieving sustainable economic growth and promoting key sectors in the local economy	World Summit on Sustainable Development; UK Marine Policy Statement; Sustainable Development Strategy; National Planning Policy Framework; Local Planning Authority Local Plans (various).	Yes	The policy objectives listed influenced the development of SEA Objective 11, as seen in Table 4.2. SEA Objective 11 specifically seeks to maintain and enhance the economic wellbeing of local communities reflecting the key objectives of these sources, whilst the associated guide questions seek a contribution to the local and regional economy and to meet local employment needs.
Improving and expanding the tourism economy	National Planning Policy Framework; Local Planning Authority Local Plans (various); AONB Management Plans (various); National Park Management Plans (various). Local Planning Authority Local Plans (various).	Yes	The policy objectives listed influenced the development of SEA Objective 12, as seen in Table 4.2. SEA Objective 12 reflects the key policy objectives by explicitly seeking to maintain and enhance tourism and recreation.
Maximising job opportunities for all and enhancing the quality of employment opportunities	National Planning Policy Framework; Local Planning Authority Local Plans (various).	Yes	The policy objectives listed influenced the development of SEA Objective 11, as seen in Table 4.2. SEA Objective 11 specifically seeks to maintain and enhance the economic wellbeing of local communities reflecting the key objectives of these sources, whilst the associated guide questions seek a contribution to the local and regional economy and to meet local employment needs.
Minimising noise pollution	Environment Noise Directive; National Planning Policy Framework; Local Planning Authority Local Plans (various).	Yes	The policy objectives listed influenced the development of SEA Objective 13, as seen in Table 4.2. SEA Objective 13 seeks to protect and enhance human health and wellbeing with an associated guide question specifically related to promotion of healthy communities and avoidance of risks to health, including from noise.

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Key Policy Objectives and Policy Messages	Key Sources	Relevant to the SEA of the WRMP?	Relevant SEA Objectives
Promoting sustainable transport	Sustainable Development Strategy; A Roadmap for Moving to a Competitive Low Carbon Economy in 2050; National Planning Policy Framework; Local Planning Authority Local Plans (various).	No	The policy objectives listed influenced the development of SEA Objective 11, as seen in Table 4.2. SEA Objective 11 specifically seeks to maintain and enhance the economic and social wellbeing of local communities, with associated guide questions related to avoiding disruption to the transport network and negative effects on transport infrastructure.
Material Assets and Resource Use			
Minimising waste production, promoting re-use and recycling	Waste Framework Directive; Landfill of Waste Directive; Waste Management Plan for England; National Planning Policy for Waste; Local Planning Authority Local Plans (various).	Yes	The policy objectives listed influenced the development of SEA Objective 15, as seen in Table 4.2. SEA Objective 15 specifically reflects the key policy objectives, as it seeks to minimise waste, promote resource efficiency and support a move towards a circular economy.
Promoting the most effective and efficient use of natural resources	World Summit on Sustainable Development; Eighth Environmental Action Programme; UK Sustainable Development Strategy; National Planning Policy for Waste; Local Planning Authority Local Plans (various).	Yes	The policy objectives listed influenced the development of SEA objectives 14 and 15, as seen in Table 4.2. SEA Objective 14 seeks to promote and enhance the sustainable and efficient use of resilient water resources, specifically reflecting the key objectives, whilst SEA Objective 15 promotes resource efficiency and to minimise waste.
Promoting the use of sustainable/renewable energy	Eighth Environmental Action Programme; A Roadmap for Moving to a Competitive Low Carbon Economy in 2050; Renewable Energy Strategy; Sustainable Development Strategy; UK Clean Growth Strategy; Climate Change Act; UK Renewable Energy Strategy; UK Renewable Energy Roadmap; UK Sustainable Development Strategy; Net Zero Strategy; Resources and Waste Strategy; Renewable and Low Carbon Energy; National Planning Policy Framework; Future Electricity Networks; Energy White Paper; Local Planning Authority Local Plans (various).	Yes	The policy objectives listed influenced the development of SEA objectives 9, 14 and 15, as seen in Table 4.2. SEA Objective 9 seeks to reduce greenhouse gas emissions with an associated guide question related to the use of renewable energy whilst SEA Objective 14 seeks efficient use of water resources and SEA Objective 15 promotes resource efficiency.

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Key Policy Objectives and Policy Messages	Key Sources	Relevant to the SEA of the WRMP?	Relevant SEA Objectives
Promoting the use of sustainable design and construction and encouraging energy efficiency	Energy Efficiency Directive; A Roadmap for Moving to a Competitive Low Carbon Economy in 2050; Heat and Buildings Strategy; Renewable Energy Strategy; UK Sustainable Development Strategy; National Planning Policy Framework; Local Planning Authority Local Plans (various).	Yes	<p>The policy objectives listed influenced the development of SEA objectives 9 and 15, as seen in Table 4.2.</p> <p>SEA Objective 9 seeks to reduce greenhouse gas emissions with an associated guide question related to provision of energy efficient infrastructure. SEA Objective 15 reflects the key policy objectives, as it seeks to promote resource efficiency with an associated guide question that specifically encourages sustainable design.</p>
Cultural Heritage			
Protecting and enhancing cultural heritage and archaeological sites	Ancient Monuments and Archaeological Areas Act; Planning (Listed Buildings and Conservation Areas) Act; National Planning Policy Framework Planning Policy Wales Edition 12; Technical Advice Note 24 the historic Environment; the Setting of Heritage Assets; Historic England Advice Note 8; Priorities for the Historic Environment of Wales; Historic Environment and Climate Change in Wales; Local Planning Authority Local Plans (various).	Yes	<p>The policy objectives listed influenced the development of SEA Objective 16, as seen in Table 4.2.</p> <p>SEA Objective 16 explicitly reflects the key objectives of these sources by seeking to conserve and enhance the historic environment including the significance of heritage assets and their settings and archaeologically important sites.</p>
Landscape			
Protecting and enhancing the quality and distinctiveness of natural landscapes and environmental resources	European Landscape Convention; National Planning Policy Framework; Planning Policy Wales Edition 12; AONB Management Plans (various); Local Planning Authority Local Plans (various); National Park Management Plans (various).	Yes	<p>The policy objectives listed influenced the development of SEA Objective 17, as seen in Table 4.2.</p> <p>SEA Objective 17 seeks to protect, conserve and enhance landscape character reflecting the key policy objectives and messages. Associated guide questions for SEA Objective 17 include seeking to avoid adverse effects on and, where possible, enhance designated landscapes and seeking to protect and enhance local distinctiveness.</p>

3. Baseline Analysis

3.1 Introduction

3.1.1 Schedule 2 of the SEA Regulations require the completion of an Environmental Report that contains:

"The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme" (Schedule 2(2));

"The environmental characteristics of areas likely to be significantly affected" (Schedule 2(3)); and

"Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Council Directive 79/409/EEC on the conservation of wild birds(1) and the Habitats Directive", (Schedule 2(4)).

3.1.2 **Appendix D** of this Environmental Report identifies and characterises current environmental baseline conditions, along with their likely evolution. Only with a knowledge of existing conditions, and a consideration of their likely evolution, can the effects of the Final WRMP24 be identified, described and assessed and its subsequent success or otherwise be monitored. This is also useful in determining the key issues for each topic that should be taken forward in the SEA, through the SEA objectives and guide questions.

3.1.3 The analysis of baseline information is presented for the following topics:

- Biodiversity, Flora and Fauna;
- Geology Land use and Soils;
- Water (including flood risk);
- Air Quality;
- Climatic Factors;
- Population and Human Health;
- Material Assets and Resource Use;
- Cultural Heritage; and
- Landscape.

3.1.4 Each topic includes further sub-topics with information structured according to the following:

- Baseline Characteristics;
- Likely Evolution of the Baseline without the Plan;

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- Key Issues Relevant to the Assessment of the Plan.

3.1.5 The data has been drawn from a variety of sources, such as the water companies themselves, the Office for National Statistics (ONS), government departments (such as BEIS, Defra and MHCLG (formerly DLUHC)), regulators (such as NRW, NE and the EA) and a number of the plans and programmes reviewed as part of the SEA process (see **Section 2** of this report and **Appendix E**).

3.2 Summary of the Key Issues

3.2.1 The key issues arising from the review of baseline conditions are summarised for each topic in **Table 3.1**.

Table 3.1 Summary of the Key Issues

Topic	Summary of Key Issues	SEA Objectives link (see Section 4)
Biodiversity Flora and Fauna	<p><u>Relevance</u></p> <ul style="list-style-type: none"> • The construction of water resources infrastructure can affect biodiversity and ecosystem resilience. Impacts may be direct (for example, the loss of, or damage to, habitats and species) or indirect (for example, disturbance due to noise and emissions to air associated with construction works). • The operation of water resources infrastructure can have a range of positive and negative impacts on habitats and species and wider ecosystem resilience due to, for example, changes in hydrology, changes in water chemistry and the spread of invasive non-native species. Water infrastructure can contribute positively to biodiversity, introducing new features that can provide opportunities for nature and wildlife in the medium to long term. • Discharges associated with the construction and operation of water resources infrastructure e.g., desalination can adversely affect marine habitats. <p><u>Key Issues</u></p> <ul style="list-style-type: none"> • Key pressures and risks in respect of biodiversity and nature conservation that are relevant include, inter-alia: <ol style="list-style-type: none"> a. population growth; b. habitat loss and fragmentation by development; c. agricultural intensification and changes in agricultural management practices; d. water abstraction, drainage or inappropriate river management; e. lack of appropriate habitat management; f. atmospheric pollution (acid precipitation, nitrogen deposition); g. water pollution from both point and wider (diffuse) agricultural sources; h. climate change and sea level rise; i. recreational pressure and human disturbance; and j. invasive and non-native species. 	<p>Objective 1: Biodiversity</p> <p>Objective 4: Soils, Land Use and Geology</p> <p>Objective 5: Water Quality</p> <p>Objective 6: Water Quantity</p> <p>Objective 7: Flood Risk</p> <p>Objective 10: Climatic Factors</p>

Topic	Summary of Key Issues	SEA Objectives link (see Section 4)
	<ul style="list-style-type: none"> • The need to protect, maintain or enhance biodiversity, ecological functions and biodiversity connectivity within UUW' supply and source areas, particularly protected sites designated for nature conservation. • The need to promote the resilience of ecosystems. • The need to continue to increase and improve the condition of priority habitats and habitats of priority species, and restore populations of these species and other specially protected species. • The need to avoid, and mitigate against where necessary, activities likely to cause irreversible damage to natural heritage. • The need to take opportunities to improve connectivity between fragmented habitats to create functioning habitat corridors. • The need to control the spread of Invasive Non-Native Species (INNS) and eradicate where already present. • 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. 	
Soils, Land Use and Geology	<p><u>Relevance</u></p> <ul style="list-style-type: none"> • Soils are a non-renewable resource vulnerable to changes in both hydrology and land use. • Hydrogeology will affect the distribution and movement of groundwater and surface water and is a key consideration for water resources planning. • The construction of water resources infrastructure can affect land use and soil. Impacts may be direct (for example, the loss of, or damage to, land and soil from new development) or indirect (for example, the location of new infrastructure affecting adjacent land uses). The appropriate management and control of soils and sediments that are excavated, moved and/or stored during construction is key to their long-term sustainability. <p><u>Key Issues</u></p> <ul style="list-style-type: none"> • The need to protect and avoid damage to geodiversity and conserve and enhance sites designated for geological interest (including geological SSSIs). • The need to manage impacts on soil resources, including control of pollution and remediation of contaminated land, and minimise the loss of the best and most versatile agricultural land. • The need to conserve and enhance soil quality and function (including peatlands and carbon sequestration); • The need to sustainably manage and/or improve the quality of agricultural land in the region; • The need to influence how land is managed, promoting sustainable patterns of land use including the use of previously developed land and minimising the requirements for best and most versatile land. • 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>Objective 1: Biodiversity</p> <p>Objective 4: Soil, Land Use and Geology</p> <p>Objective 5: Water Quality</p> <p>Objective 6: Water Quantity</p>
Water - Quantity	<p><u>Relevance</u></p>	<p>Objective 1: Biodiversity</p>

Topic	Summary of Key Issues	SEA Objectives link (see Section 4)
	<ul style="list-style-type: none"> • There is growing pressure on water resources in parts of the UK, particularly the south east and east of England with proposals to meet the demand from other parts of the country including WRW. • The construction of water resources infrastructure would be expected to increase the volume and resilience of the water supply. • The volume and flow of water significantly affects ecological functioning and the broader environment and can be affected (potentially positively or negatively) by water resources infrastructure through, for example, changes in supply and abstraction. <p><u>Key Issues</u></p> <ul style="list-style-type: none"> • The need to improve the resilience, flexibility and sustainability of water resources in the UUV region, particularly in light of potential climate change impacts on surface water and groundwater. • The need to address increased pressures on the public water supply. • 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. 	<p>Objective 4: Soils, Land Use and Geology</p> <p>Objective 5: Water Quality</p> <p>Objective 6: Water Quantity</p> <p>Objective 11: Economy</p> <p>Objective 13: Human Health</p>
Water - Quality	<p><u>Relevance</u></p> <ul style="list-style-type: none"> • Reliable access to water of good quality is an essential aspect of water resources planning. • The construction of water resources infrastructure would be expected to help ensure a robust future supply of good quality water in a changing climate. • The construction and operation of water resources infrastructure can have adverse impacts on water quality due to, for example, pollution. • The operation of water resources infrastructure can have both positive and negative impacts on water quality associated with, in particular, changes to water levels as a result of abstraction or discharge. This in-turn can affect the resilience of ecosystems. • The historic pollution of groundwater and nitrate concentrations present an issue for water resources infrastructure and ensuring drinking water standards are met. <p><u>Key Issues</u></p> <ul style="list-style-type: none"> • The need to further improve the quality of the region's river, estuarine and coastal waters taking into account WFD/RBMP objectives. • The need to maintain and improve the quantity and quality of groundwater resources taking into account WFD/RBMP objectives. 	<p>Objective 1: Biodiversity</p> <p>Objective 4: Soils, Land Use and Geology</p> <p>Objective 5: Water Quality</p> <p>Objective 6: Water Quantity</p> <p>Objective 11: Economy</p> <p>Objective 13: Human Health</p>
Water - Flood Risk	<p><u>Relevance</u></p> <ul style="list-style-type: none"> • Flood risk presents a significant planning issue in the development of major infrastructure projects, both in terms of the infrastructure itself being flooded during its construction and operational phases and the changes to flood risk resulting from the infrastructure, such as increased run-off raising the flood risk in downstream areas. • The operation of water resources infrastructure (e.g., reservoirs) may provide an opportunity to address flood risk issues (for example, by providing extra space for flood water storage). 	<p>Objective 5: Water Quality</p> <p>Objective 6: Water Quantity</p> <p>Objective 7: Flood Risk</p> <p>Objective 10: Climatic Factors</p> <p>Objective 11: Economy</p>

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Topic	Summary of Key Issues	SEA Objectives link (see Section 4)
	<p><u>Key Issues</u></p> <ul style="list-style-type: none"> The need to reduce flood risk. The need to ensure the continued risk of flooding is managed and mitigated effectively. 	Objective 13: Human Health
Air Quality	<p><u>Relevance</u></p> <ul style="list-style-type: none"> Air quality is sensitive to changes in traffic volume and emissions from other sources such as construction plant and machinery. Increases in transport movements and works associated with the construction and operation of nationally significant water resources infrastructure could affect air quality, particularly in areas with existing air quality issues. For example, construction traffic can lead to increased nitrate deposition in sensitive habitats. <p><u>Key Issues</u></p> <ul style="list-style-type: none"> The need to minimise emissions of pollutant gases and particulates and enhance air quality arising from the implementation of UUW's WRMP. The need to reduce the need to travel and promote sustainable modes of transport. 	Objective 1: Biodiversity Objective 4: Soil, Land Use and Geology and Soils Objective 5: Water Quality Objective 6: Water Quantity Objective 8: Air Quality Objective 13: Human Health
Climatic Factors	<p><u>Relevance</u></p> <ul style="list-style-type: none"> The availability of additional water supplies can increase the resilience of the existing water network and broader environment and support adaptation to the effects of climate change such as drought. The construction and operation of water resources infrastructure is likely to result in a net increase in energy use and greenhouse gas emissions, noting however that new infrastructure may replace older, less energy efficient infrastructure with higher emissions. The energy requirements associated with different types of water resources infrastructure will vary with the scope for the use of renewable energy greater for certain infrastructure types than for others. Water resources infrastructure may be vulnerable to the effects of climate change such as flood risk and coastal change. <p><u>Key Issues</u></p> <ul style="list-style-type: none"> The need to reduce greenhouse gas emissions arising from implementation of UUW's WRMP. The need to take into account, and where possible adapt to, the potential effects of climate change through, sustainable water resource management, water use efficiencies, specific aspects of natural ecosystems (e.g. connectivity), as well as accommodating potential opportunities afforded by climate change. The need to increase environmental resilience to the effects of climate change. 	Objective 1: Biodiversity Objective 5: Water Quality Objective 6: Water Quantity Objective 7: Flood Risk Objective 9: Greenhouse Gases Objective 10: Climatic Factors Objective 13: Human Health
Population	<p><u>Relevance</u></p> <ul style="list-style-type: none"> The growing population within the WRW area and Wales will increase the demand for water resources. Long-term growth of the economy would be expected to lead to an increase in demand for water for commercial and industrial purposes. In turn, the risk of drought or interruptions to accessing water may pose a risk to economic productivity. 	Objective 11. Economy Objective 12. Tourism and Recreation Objective 13. Human Health

Topic	Summary of Key Issues	SEA Objectives link (see Section 4)
	<ul style="list-style-type: none"> The construction of large-scale water resources infrastructure can represent a significant capital investment with the potential to create employment opportunities, deliver supply chain benefits and contribute to skills development in the working population. The operation of water resources infrastructure can support long term socio-economic growth by ensuring sufficient supplies of water are made available to meet demand. The affordability of water, protection of vulnerable customers and delivering best value for money is a key consideration in water company investment decisions. The construction and operation of water resources infrastructure can adversely affect businesses and communities, principally due to disruption. Consumer preference and consumer behaviour can have a strong influence on the demand for water resources. 	<p>Objective 14. Water Resources</p> <p>Objective 15. Waste and Resource Use</p>
	<p><u>Key Issues</u></p> <ul style="list-style-type: none"> The need to ensure that the WRMP has a positive economic impact. The need to ensure that the water requirements of people, visitors and other users such as energy and agriculture can be met at all times, in a sustainable way, including in the seasonal peaks associated with tourism. The need to ensure that water supplies remain affordable, in particular for deprived or vulnerable communities. The need to accommodate an increase in population, households, dwellings and development associated with other uses that might impact on demand for water whilst ensuring the continued provision of essential services including water supply. 	
Human Health	<p><u>Relevance</u></p> <ul style="list-style-type: none"> A reliable source of clean water is required for basic sanitation and to ensure human health. The increase in the severity of drought, particularly in the south and east of England, poses a risk to health. The detection and removal of chemicals in the drinking water supply, or in treated waste water returned to the environment, is an important aspect of maintaining a wholesome water supply. Certain aspects of water resources infrastructure, such as reservoirs, can provide valuable recreational opportunities, both for water sports and for users of the associated land such as walkers and cyclists. The construction and operation of water resources infrastructure can have adverse effects on human health for example, due to noise disturbance or loss of open space. <p><u>Key Issues</u></p> <ul style="list-style-type: none"> Health inequalities exist in many communities. This is due to a number of factors (and the interplay between them) including housing quality, economic wellbeing, employment, lifestyle, heredity factors, cultural and environmental factors. Sustained exposure to elevated air pollution levels (including exposure to elevated concentrations of particulate matter, oxides of nitrogen and sulphur) contributes to respiratory illness. The need to ensure continuing safe, reliable and resilient provision of water services to maintain health and wellbeing of the population. 	<p>Objective 11. Economy</p> <p>Objective 12. Tourism and Recreation</p> <p>Objective 13. Human Health</p>

Topic	Summary of Key Issues	SEA Objectives link (see Section 4)
	<ul style="list-style-type: none"> The need to ensure that UUW's WRMP measures do not adversely affect the health and well-being of any member of the community. The need to ensure that UUW's WRMP minimise impacts on the ability of people to access facilities for sport, recreation and leisure purposes. The need to ensure that 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. 	
Material Assets	<p><u>Relevance</u></p> <ul style="list-style-type: none"> Large scale infrastructure projects have the potential to generate very high volumes of waste during both construction and operation. This waste should be managed in accordance with the waste hierarchy. Large scale water resources infrastructure may require both short-term (i.e. during construction) and long-term (i.e. during operation) use of materials that are non-renewable or are imported. In doing, so schemes may have an environmental impact that extends outside the water company operational area. <p><u>Key Issues</u></p> <ul style="list-style-type: none"> The need to minimise current and future demand for water resources through water efficiency measures (including metering). The need to continue to actively control leakage to optimise the water available. The need to reduce energy consumption. The need to ensure the sustainable and efficient use of resources such as construction materials. The need to minimise waste arisings, promote reuse, recovery and recycling and minimise the impact of wastes on the environment and communities. 	<p>Objective 1: Biodiversity</p> <p>Objective 4: Soils, Land Use and Geology</p> <p>Objective 5: Water Quality</p> <p>Objective 6: Water Quantity</p> <p>Objective 9: Greenhouse Gases</p> <p>Objective 10: Climatic Factors</p> <p>Objective 11. Economy</p> <p>Objective 14. Water Resources</p> <p>Objective 15. Waste and Resource Use</p>
Cultural Heritage	<p><u>Relevance</u></p> <ul style="list-style-type: none"> Wetlands are fragile and vulnerable to subtle changes arising from development that can affect paleoenvironmental deposits and archaeological assets. Other aspects of the wider historic environment that could be affected include disruption to historically important water sources, the flooding or drying of deep archaeological sites and assets such as mills and bridges which can be affected by local water levels. The construction and operation of large-scale water resources infrastructure can have adverse impacts on the significance of heritage assets and archaeological remains both directly (through the loss of, or damage to, assets) or indirectly (through effects on setting). Cultural landscape is a function of the interaction between human traditions, landscape and the environment and is a highly valued feature of some areas such as National Parks. Existing water resources infrastructure including, for example, pumping stations and reservoirs can be historically important in their own right. <p><u>Key Issues</u></p> <ul style="list-style-type: none"> The need to conserve and enhance the historic significance of buildings, monuments, features, sites, places, areas of archaeological and cultural heritage interest, and their settings. 	<p>Objective 4: Soils, Land Use and Geology</p> <p>Objective 11. Economy</p> <p>Objective 12. Tourism and Recreation</p> <p>Objective 13. Human Health</p> <p>Objective 16: Cultural Heritage</p> <p>Objective 17: Landscape</p>

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Topic	Summary of Key Issues	SEA Objectives link (see Section 4)
	<ul style="list-style-type: none"> The need to conserve and enhance the World Heritage Sites within the WRMP area. The need to promote access to heritage sites within UJW's ownership where possible and safe to do so; and The need to avoid damage to important wetland areas with potential for paleoenvironmental deposits. 	
Landscape	<p><u>Relevance</u></p> <ul style="list-style-type: none"> The construction and operation of water resources infrastructure can have adverse impacts on landscape character, visual amenity and tranquillity. Where works are located in areas of high landscape value (for example, National Parks), these effects could be significant. Water infrastructure can also contribute positively to landscapes, introducing new features that can provide opportunities for nature and wildlife in the medium to long term. <p><u>Key Issues</u></p> <ul style="list-style-type: none"> The need to ensure the special qualities of designated landscapes including National Park and AONBs are protected. The need to minimise any adverse impacts upon landscape and seascape that may result from UJW's WRMP24, having regard to NCA profiles and the potential for effects on designated landscapes and their settings. The need to conserve and enhance landscape and seascape character and distinctiveness, taking into account the effects of climate change and recommendations for managing change in the profile of relevant NCAs. 	<p>Objective 1: Biodiversity</p> <p>Objective 4: Soils, Land Use and Geology</p> <p>Objective 11. Economy</p> <p>Objective 12. Tourism and Recreation</p> <p>Objective 13. Human Health</p> <p>Objective 16: Cultural Heritage</p> <p>Objective 17: Landscape and Townscape</p>

3.3 Limitations of the Data and Assumptions Made

- 3.3.1 The information used has been sourced, so far as is possible, from recent datasets utilising a wide range of authoritative and official sources. It is important to acknowledge that there are variable time lags between raw data collection and its publication. Consequently, at the time of this Environmental Report's publication, the baseline or predicted future trends may have varied from those described above.

4. Approach to the Assessment

4.1 Introduction

4.1.1 This section describes the approach to the assessment of the Final WRMP24. It draws on the information contained in **Sections 2 and 3**, as well as the more detailed information contained in **Appendices C and D**, to define the scope of the assessment (in terms of the environmental and socio-economic issues to be considered) and sets out the SEA objectives and guide questions that comprise the assessment framework. The section then outlines how this assessment framework has been used to assess the options contained in the Final WRMP24.

4.2 The Scope of the Assessment

Topics

- 4.2.1 The aim of SEA is to identify, describe and evaluate the likely significant effects of implementing the Final WRMP24 on the environment. Schedule 2 of the SEA Regulations require that the assessment includes information on the *"likely significant effects on the environment, including on issues such as: biodiversity; population; human health; fauna; flora; soil; water; air; climatic factors; material assets; cultural heritage, including architectural and archaeological heritage; landscape; and the inter-relationship between the issues referred to"*.
- 4.2.2 The key policy objectives identified from the review of other plans and programmes relevant to the assessment of the Final WRMP24 (**Section 2**) and the key economic, social and environmental issues arising from the analysis of the baseline (**Section 3**), together with the characteristics of the water resource management options, have been used to define the scope of the assessment in terms of the topics set out in Schedule 2 of the SEA Regulations.
- 4.2.3 **In this instance, all SEA topics identified by Schedule 2 of the SEA Regulations have been scoped in for assessment to provide a comprehensive basis to identify, describe and evaluate the likely significant effects arising from the construction and operation of the water resource management options.**

Geographic Scope

- 4.2.4 The geographic extent of the SEA reflects the operational area covered by the Final WRMP24. It includes all WRZs, as each is forecast to be in deficit over the lifetime of the plan. The SEA will focus on the effects associated with the water resource management options being proposed to address the deficit.
- 4.2.5 In considering the adverse operational effects on European sites, and reflecting the approach taken in the HRA, a precautionary study area extending at least 20km of any operational facilities or new infrastructure required to deliver each option (including

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temporary infrastructure) has been used. This is an intentionally large buffer that can also reliably capture the vast majority of possible interactions with 'mobile species' in terrestrial environments. This could also extend outside the boundary of the Final WRMP24. When considering hydrological connectivity and the potential effects of an individual option, a distance beyond 20km has also on occasion been required. The 20km distance used goes beyond that outlined in the revised UKWIR guidance⁴⁹.

- 4.2.6 Where water resource options include transfers and potential water trading options between companies, where appropriate further consideration has been given to the effects outside the operational area of the Final WRMP24. This also extends to the assessment of cumulative effects, where consideration of plans or programmes that cover areas that either overlap or are adjacent to the plan being assessed have also been taken into account.

Timescales

- 4.2.7 When considering the timing of potential effects of the Final WRMP24, the assessment has classified effects as 'short,' 'medium' or 'long-term.' This reflects an intention to capture the differences that could arise at different timescales, consistent with the requirements of Schedule 1 (2)(a) of the SEA Regulations where the assessment of the effects should have regard to "*the probability, duration, frequency and reversibility of the effects*".
- 4.2.8 **Table 4.1** below summarises the timescales applied in the SEA informed by the 5-year cycle of review of the plan. For the purposes of this assessment, short-term is considered as up to 1 year, medium-term (from 1 year to 5 years (to the end of the plan review cycle)) and long-term is for the period beyond 5 years (beyond the plan review cycle).

Table 4.1 Duration of Short, Medium and Long Term

Estimated Length (years)	Duration
0-1 years	Short
>1-5 years	Medium
Over 5 years	Long

4.3 Assessment Framework

- 4.3.1 Establishing appropriate SEA objectives and guide questions is central to assessing the effects of the Final WRMP24 on the environment. Each of the revised feasible water resource management options and preferred options has been assessed against the SEA objectives to determine the scale and significance of the effect. Guide questions focus the assessment on specific aspects of the objective that reflect issues identified from the review of baseline and contextual information relating to UUW's WRMP24 area.

⁴⁹ UKWIR (2021) *Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans*. Report Ref. No. 21/WR/02/15]

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- 4.3.2 The SEA objectives and guide questions used in the assessment of the Final WRMP24 reflect the topics contained in Schedule 2 (6) of the SEA regulations and have been informed by:
- the previous SEA assessment frameworks used to complete the SEA of DCWW, SSW, STW and U UW's WRMP19s;
 - the suggested core set of objectives in the All Company Working Group (ACWG) 2020 report 'Strategic Environmental Assessment: Core Objective Identification';
 - the review of relevant plans and programmes and the associated key policy objectives and messages (**Section 2** and **Appendices C**);
 - the baseline information and key issues contained in **Section 3** and **Appendix D**;
 - the draft assessment framework presented in the WRW and draft WRMPs SEA Scoping Report, issued for scoping consultation in April 2021 (noting that an integrated approach to assessment has been undertaken, and this report set out the aligned approach to assessment that has then been employed for the SEA of WRW draft Regional Plan and the draft WRMP24s for DCWW, HD, SSW, STW and U UW);
 - scoping consultation responses received from (**Appendix B**).
- 4.3.3 The assessment framework is presented in **Table 4.2**. It contains 17 assessment objectives, and so extends from 12 the number of SEA objectives previously used for WRMP19 by U UW. It has been revised to reflect the scoping consultations responses and has been used to complete of the assessment of U UW's Draft WRMP24, Revised Draft WRMP24 and Final WRMP24.

Table 4.2 Revised Assessment Framework

Topic	Assessment Objective	Guide Questions
Biodiversity, Flora and Fauna	1. To protect, restore and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species, enhance ecosystem resilience and habitat connectivity and deliver a net biodiversity gain.	<ul style="list-style-type: none"> • Will it protect, restore and enhance where possible, the most important sites for nature conservation (e.g., internationally or nationally designated conservation sites such as SACs, SPAs, Ramsar and SSSIs)? • Will it protect, restore and enhance non-designated sites and local biodiversity? • Will it provide opportunities for new terrestrial and aquatic habitat creation or restoration and/or link existing habitats as part of the development process? • Will it provide opportunities to deliver biodiversity net gain? • Will it lead to a change in the ecological quality of habitats? • Will it protect, restore and enhance where appropriate, coastal and marine habitats and species? • Will it alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems? • Will it maintain and enhance the green infrastructure network and the biodiversity it supports?
	2. To protect and enhance sustainable natural resources and the ecosystem services they provide.	<ul style="list-style-type: none"> • Will it protect or enhance natural capital and ecosystem services? • Will it maintain and enhance ecosystem resilience? • Will it contribute to the sustainable management of natural habitats and ecosystems, i.e., within their limits and capacities taking into account climate change adaptability?

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Topic	Assessment Objective	Guide Questions
		<ul style="list-style-type: none"> Will it provide opportunities for climate adaptation and protect the climate resilience of vulnerable and priority sites?
	3. To avoid and minimise the spread of, and, where required, manage invasive and non-native species (INNS).	<ul style="list-style-type: none"> Will it prevent or minimise the risk of spread/introduction of invasive non-native species? Will it contribute to the eradication of invasive and non-native species, where they are already present and it is technically and economically feasible to do so?
Soils, Land Use and Geology	4. To protect and enhance soil quantity, quality and functionality and geodiversity and ensure the appropriate and efficient use of land.	<ul style="list-style-type: none"> Will additional land be required for the development or implementation of the option or will the option require below ground works leading to land sterilisation? Will it avoid damage to, protect and enhance where possible protected sites designated for their geological interest (GCR sites, SSSI and RIGS) and features of wider geodiversity interest? Will it minimise the loss of best and most versatile agricultural land? Will it avoid adverse effects on other land uses (such as forestry)? Will it minimise land contamination? Will it ensure efficient use of land (e.g., make use of previously developed land)? Will it contribute towards a catchment-wide approach to land management?
Water – Quantity	5. To protect and enhance surface and ground water levels and flows.	<ul style="list-style-type: none"> Will it minimise the demand for water resources? Will it result in changes to river flows, channel morphologies, wetted width or river levels? Will it result in changes to groundwater levels? Will it support the achievement of relevant environmental objectives set out in River Basin Management Plans? Will it alter the flow regime of surface waters?
Water –Quality	6. To protect and enhance the quality of surface and groundwater resources.	<ul style="list-style-type: none"> Will it prevent pollution and protect and improve surface, groundwater, estuarine and coastal water quality? Will it prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)? Will it support the achievement of WFD protected area objectives? Will it ensure a new activity or new physical modification does not prevent the future achievement of good status for a water body? Will it support the achievement of relevant environmental objectives set out in River Basin Management Plans? Will the option prevent nutrient loading in water bodies?
Water – Flood Risk	7. To reduce or manage flood risk.	<ul style="list-style-type: none"> Will the option be at risk of flooding now or in the future? Will it have the potential to cause or exacerbate flooding in the catchment area including the risks to people and property, now or in the future? Will it have the potential to help alleviate or mitigate flooding in the catchment area including to people and property now or in the future? E.g., will it avoid reducing flood plain storage, or provide opportunities to improve flood risk management? Will it promote the use of sustainable drainage systems? Will it promote opportunities for collaborative working with other risk management authorities?
Air	8. To minimise emissions of pollutant gases and particulates and enhance air quality.	<ul style="list-style-type: none"> Will it maintain or enhance ambient air quality, keeping pollution below Local Air Quality Management thresholds (e.g., in Air Quality Management Areas or sensitive habitats)?
Climatic Factors	9. To reduce greenhouse gas emissions.	<ul style="list-style-type: none"> Will it reduce or minimise greenhouse gas emissions? Will it have a low level of embodied carbon? Will it provide new infrastructure that is energy efficient and/or minimizes the use of energy? Will it provide new infrastructure that could contribute or make use of renewable energy sources?

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Topic	Assessment Objective	Guide Questions
		<ul style="list-style-type: none"> Will the option affect carbon sequestration?
	10. To adapt and improve resilience to the threats of climate change.	<ul style="list-style-type: none"> Will it improve resilience and/or adaptability to the likely effects of climate change, e.g., by increasing resilience of water supplies or catchments? Will it increase environmental resilience to the effects of climate change including to impacts on flood risk and water quality? Will coastal erosion have consequences on the operation of this option now or in the future, taking account of expected climate change sea level rise?
Population	11. To promote a sustainable economy and maintain and enhance the economic and social well-being of local communities.	<ul style="list-style-type: none"> Will it ensure that sufficient water resources infrastructure is in place to support predicted population increases? Will it ensure sufficient infrastructure is in place to sustain a seasonal influx of tourists? Will it help to meet the employment needs of local people? Will it ensure that an affordable supply of water is maintained, and vulnerable customers protected? Will it contribute to sustaining and growing the local and regional economy? Will it avoid disruption through effects on the transport network? Will it avoid negative effects on built assets/ existing infrastructure including transport?
	12. To maintain and enhance tourism and recreation.	<ul style="list-style-type: none"> Will it protect and enhance public access to, and enjoyment of, green and blue infrastructure, open space/recreational facilities and the natural and historic environment, and in doing so help promote healthy lifestyles including mental well-being?
Human Health	13. To protect and enhance human health and well-being.	<ul style="list-style-type: none"> Will it ensure the continuity of a safe and secure drinking water supply? Will it help to protect or improve drinking water quality? Will it maintain surface water and bathing water quality within statutory standards? Will it help to promote healthy communities and avoid risks to health and wellbeing (for example, due to noise resulting from construction traffic or disruption to safe and reliable water/sewerage services)? Will it raise awareness of the importance and value of the water environment for health and well-being? Will it be located in an area considered to be significantly more health deprived than others in the region? Will it improve opportunities for social interaction and community cohesion?
Material Assets – Water Resources	14. To promote and enhance the sustainable and efficient use of resilient water resources.	<ul style="list-style-type: none"> Will it lead to reduced leakage from the supply network? Will it improve efficiency in water consumption? Will it ensure sustainable abstractions, taking account of water resource availability? Will it enable efficient water resource management to help maintain a supply-demand balance? Will it increase the resilience of water resources, now and into the future? Will it contribute towards improving the awareness of water sustainability?
Material Assets – Waste and Resource Use	15. To minimise waste, promote resource efficiency and move towards a circular economy.	<ul style="list-style-type: none"> Will it make use of existing infrastructure? Will it promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill? Will it help to encourage sustainable design or use of sustainable materials (e.g., supplied from local resources)?

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Topic	Assessment Objective	Guide Questions
Cultural Heritage	16. To conserve and enhance the historic environment including the significance of heritage assets and their settings and archaeological important sites.	<ul style="list-style-type: none"> • Will it avoid damage to, conserve or enhance the historic environment, including heritage assets and their settings such as historic buildings, conservation areas, features, places and spaces, that enhance local distinctiveness? • Will it avoid or minimise damage to archaeologically important sites? • Will the hydrological setting of water-dependent assets be altered, such as important wetland areas with potential for paleo-environmental deposits? • Will it avoid damage to important wetland areas with potential for paleoenvironmental deposits? • Will it improve access, value, understanding or enjoyment of heritage assets and culturally/historically important assets in the region? • Will it protect or enhance (where relevant) Welsh language and culture?
Landscape	17. To conserve, protect and enhance landscape and townscape character and visual amenity.	<ul style="list-style-type: none"> • Will it avoid adverse effects to, and enhance where possible, protected/designated landscapes and the settings of designated landscapes (including woodlands) such as National Parks or AONBs? • Will it help to protect and improve non-designated areas of natural beauty and distinctiveness (e.g., woodlands) and avoid the loss of landscape features and local distinctiveness? • Will it protect and enhance landscape character, townscape, seascape and green infrastructure? • Will it minimise adverse visual impacts?

4.4 Assessment Methodology

4.4.1 The effects of the Draft WRMP24 and the Final WRMP24 have been assessed in a staged process, complementary to the development of the plan, and reflecting the decision-making requirements, as follows:

- **Revised feasible option assessment:** a high-level assessment of all revised feasible options (including resource management and demand management options) and revised feasible option variants against the 17 SEA assessment objectives detailed in **Table 4.2** with findings used to inform the MCA (for plan decision making) and detailed screening of options (for the WRMP24).
- **Preferred option assessment:** for those options selected, a more detailed assessment has been undertaken of the preferred plan options against the 17 SEA assessment objectives detailed in **Table 4.2**.
- **Preferred programme assessment:** an assessment of the cumulative effects of the preferred programme of options to ensure that the effects of the WRMP24 have been identified, described and evaluated.
- **Reasonable alternative plan assessments:** an assessment of the cumulative effects of any reasonable alternative plans for consideration along with the preferred plan.
- **Alternative plan and scenario assessment:** an assessment of the cumulative effects of the options that comprise alternatives and plan scenarios for completeness and to inform future decision making.

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4.4.2 The approach to these stages of assessment is described in more detail below.

Revised Feasible Options

4.4.3 Both the construction and operational effects of each revised feasible option and revised feasible option variants have been assessed against all of the SEA objectives that comprise the assessment framework. To support this, designated sites and features within 10km of each option have been identified and GIS mapped and proximities identified. Using the assessment framework, GIS mapping and taking account the nature, extent and duration of proposed option works and subsequent operation ensures a comprehensive consideration of any likely effects. It also recognises that the environmental effects are likely to be different in their nature, scale and significance during construction as opposed to their operation. For those options that would not require construction works *per se* and may be ongoing in nature (for example, the installation of water efficient devices, audits and educational programmes), construction in the context of the SEA refers to any enabling/installation works or option implementation.

4.4.4 The assessment of effects has included consideration of the following:

- the nature of the potential effect (what is expected to happen);
- the timing and duration of the potential effect (e.g., short, medium or long term);
- the geographic scale of the potential effect (e.g., local, regional, national);
- the location of the potential effect (e.g., whether it affects rural or urban communities, or those in particular parts of a water company area); and
- the potential effect on vulnerable communities or sensitive sites.

4.4.5 Reflecting the bespoke nature of the individual option assessments and taking into account the type of option to be assessed (whether it would be demand management, distribution and leakage, production efficiency, supply or non-PWS) not all of the above considerations are reflected in the assessment against each SEA objectives, as it may not be relevant to do so, or because there are certain limitations in the available option information (commensurate with the strategic scale of the plan). For example, given that carbon emissions (both embodied carbon in construction materials and operational emissions related to energy/material use) are not location-specific, the assessment against SEA Objective 9 does not provide any consideration of location.

4.4.6 Where relevant, other information and assessments including the HRA and WFD Assessment have been referenced as appropriate. Where the assessment is of a revised WRMP19 option, the assessment has taken into account, where appropriate, the previous assessment findings and any regulator and stakeholder feedback already received.

4.4.7 A matrix similar to that shown in **Table 4.3** has been used to capture the assessment of each revised feasible water resource management option in a consistent manner; a key to the meaning of the symbols is presented in **Table 4.4**.

Table 4.3 Example Revised Feasible Options Assessment Matrix

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
Option Name	Construction (negative)	--/?	--	0	--/?	-	-	--	0	--/?	--	-/?	-/?	-/?	-	--/?	-	--
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++/?	0	+	0	+/?	0	0
	Operation (negative)	--/?	-	0	0	--	--/?	--	-	--	--	0	0	0	-	0	0	0
	Operation (positive)	+	+	0	0	+	+	+	0	+	+	++	+	++	+	+	0	0

Construction

Objective 1: Minor/Moderate/Major negative uncertain effect - due to...

Objective 1: Minor/Moderate/Major positive uncertain effect - due to...

Objective 2: Minor/Moderate/Major negative uncertain effect - due to...

Objective 2: Minor/Moderate/Major positive uncertain effect - due to...

Objective 3: Minor/Moderate/Major negative uncertain effect - due to...

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Operation

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Objective 16: Minor/Moderate/Major negative uncertain effect - due to...

Objective 16: Minor/Moderate/Major positive uncertain effect - due to...

Objective 17: Minor/Moderate/Major negative uncertain effect - due to...

Objective 17: Minor/Moderate/Major positive uncertain effect - due to...

Table 4.4 Qualitative Scoring System

Score	Description	Symbol
Major/Significant Positive Effect	Significant positive effect of the water resource option on this objective	+++
Moderate Positive Effect	Moderate positive effect of the water resource option on this objective	++
Minor Positive Effect	Minor positive effect of the water resource option on this objective	+
Neutral	Neutral effect of the water resource option on this objective	0
Minor Negative Effect	Negative effect of the water resource option on this objective	-

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Score	Description	Symbol
Moderate Negative Effect	Moderate effect of the water resource option on this objective	--
Major/Significant Negative Effect	Significant negative effect of the water resource option on this objective	---
Uncertain	The water resource option has an uncertain relationship to the objective or the relationship is dependent on the way in which the aspect is managed. In addition, insufficient information may be available to enable an assessment to be made.	?

Preferred Options

- 4.4.8 The individual preferred options that comprise the preferred plan for the Final WRMP24 have been subject to further, detailed assessment against the 17 SEA assessment objectives with the results recorded in a matrix similar to that shown in **Table 4.3**. This has taken account of updated option information such as scheme design, incorporated mitigation measures, stakeholder and regulator views. Where relevant, the commentary section of the matrices includes justification for how the assessment has been reached including those factors previously outlined in paragraph 4.4.4 above, as well as:
- any assumptions used;
 - the reasons for any uncertainty, where this is identified; and
 - any further mitigation measures with the potential to avoid, minimise, reduce, mitigate or compensate for the identified effect(s) with evidence (where available).
- 4.4.9 The preferred plan now includes the drought permit options from the UUW Drought Plan. These drought permit options were subject to assessment as part of the SEA of the UUW Drought Plan and the findings of that assessment reported in the Drought Plan Environmental Report⁵⁰. To ensure consistency and avoid unnecessary duplication, these previous assessments have been used as the basis for the identification, description and evaluation of the likely significant effects associated with these options in this report. In consequence, appraisal matrices have not been completed for the individual drought permit options but their effects on the 17 SEA assessment objectives are presented in **Tables 6.10** and **6.11**.
- ## Preferred Programme Assessment
- 4.4.10 In addition to the consideration of the effects of the individual preferred options, the cumulative effects of the preferred programme of options (for each WRZ in deficit) has been assessed. These programmes have then been combined and assessed cumulatively, to ensure that the strategic effects of the Final WRMP24 have been identified, described and evaluated.

⁵⁰ Ricardo (2021) *Strategic Environmental Assessment of United Utilities' Revised Draft Drought Plan 2022*. Available at https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/water-resources/uu-revised-draft-dp-sea-er_300721v3.pdf [Accessed May 2023].

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- 4.4.11 SEA Regulation 12(2) requires the identification, description and evaluation of “*the likely significant effects on the environment of implementing the plan or programme, and reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme*”. The EC guidance⁵¹ on the SEA Directive discusses possible interpretations of handling ‘reasonable alternatives’. It states that “*The alternatives chosen should be realistic. Part of the reason for studying alternatives is to find ways of reducing or avoiding the significant adverse effects of the proposed plan or programme. Part of the reason for studying alternatives is to find ways of reducing or avoiding the significant adverse effects of the proposed plan or programme*”. Echoing this, Government guidance⁵² of the SEA states “*Only reasonable, realistic and relevant alternatives need to be put forward. It is helpful if they are sufficiently distinct to enable meaningful comparisons to be made of the environmental implications of each*”. It is an area of plan making that has received considerable scrutiny and challenge.
- 4.4.12 For the purposes of this SEA, the revised feasible options have been considered as reasonable alternatives to the preferred options (that comprise the preferred plan). In addition, reasonable alternatives that operate at the plan level have also been considered. The cumulative effects have been identified, described and evaluated for each reasonable alternative plan, for consideration along with the preferred plan.

Assessment of Plan Alternatives

- 4.4.13 UUW has developed a number of plan alternatives as part of the process for developing its overall ‘best value’ plan. The alternatives considered in this manner have been the ‘least cost plan’ and ‘best for the environment and society plan’. The alternative plans have been used to provide comparisons during the MCA process.
- 4.4.14 However, as discrete programmes of water resource options, neither the ‘least cost plan’ or the ‘best for the environment and society plan’ meet the core objective of providing a best value plan as their development is aimed to achieve different objectives and outcomes. In consequence, taking into account the requirements of SEA Regulation 12(2), guidance and case law, for the purposes of SEA, they are not considered equivalent to reasonable alternatives as they do not meet the same objectives as UUW’s best value plan. However, for completeness and in response to consultee requests, the potential cumulative effects of the options that comprise the two alternative plans are considered in **Section 6.5**.

Scenarios

- 4.4.15 UUW has developed a number of scenarios relating to alternative futures covering some key uncertainties, including the impacts of climate change, variations in future demand forecasts, alternative delivery phasing of the demand management programme,

⁵¹ EC (2003) *Implementation of Directive 2001/42 on the Assessment of the Effects of Certain Plans and Programmes on the Environment*.

⁵² Office of the Deputy Prime Minister et al (2005) *A Practical Guide to the Strategic Environmental Assessment Directive*. Available from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7657/practicalguidesea.pdf [Accessed June 2019]

alternative requirements of water trading, changes to environmental destination and the pace of technological change e.g., smart meters. UUW has developed alternative scheme portfolios with branching decision points to provide adaptive plan pathways in response to each scenario. This demonstrates resilience and robustness in the plan making process; however, given the numerous uncertainties that underpin the work, and the diversity of portfolios that could then be considered, for the purpose of this SEA they are not considered reasonable alternatives to the preferred plan and have not been assessed on this basis. The final regional planning reconciliation round confirmed three scenarios (including the preferred plan). For completeness and to inform future decision making, the potential cumulative effects of the options that comprise the scenarios are considered in **Section 6.6**.

Assessment of Secondary, Cumulative and Synergistic Effects

- 4.4.16 The SEA Regulations require that the cumulative effects of the Final WRMP24 are assessed. In addition to the assessments of the preferred programme of options (at the WRZ level) and plan level assessments (and alternatives) described above, this has included the cumulative effects of the Final WRMP24 in-combination with other plans and programmes. This includes:
- effects of the Final WRMP24 with other (same) water company plans – an assessment of the effects of the Final WRMP24 with UUW’s Drought Plan and Drainage and Wastewater Management Plan (DWMPs);
 - effects of the Final WRMP24 with adjacent water company plans and projects (SROs);
 - effects of the Final WRMP24 as part of the WRW draft Regional Plan;
 - effects of the Final WRMP24 with other plans e.g., Local Plans, National Policy Statements (NPSs);
 - effects of the Final WRMP24 with other Nationally Significant Infrastructure Projects (NSIPs).
- 4.4.17 When considering the above, the assessment has been qualitative.
- 4.4.18 There are areas where the Final WRMP24 preparation has considered some of the other plans and programmes. For example, UUW’s Drought Plan measures have been included in the Final WRMP24 and the Local Plan growth and population projections have already been included within the demand projections.
- 4.4.19 In terms of other water company and sector plans, some will have completed assessments in the public domain e.g. DWMPs and which have been used to inform this assessment, where appropriate.
- 4.4.20 In terms of the NPSs, the majority are not location specific, with two of the three exceptions (aviation, wastewater) making provision for growth outside the UUW WRMP24 area. At this stage, only the NPS for Nuclear Power (EN-6) is considered relevant (and those sites that would have a bearing on the WRMP24 being Heysham, and Sellafield). Further NSIP projects that would be associated with intensive water use have been identified drawing on the NSIP information from the NIP regional project database site

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<https://infrastructure.planninginspectorate.gov.uk/> (focusing on those NSIPs where DCO consent has been granted by the SoS).

4.4.21 When considering the effects of SROs, the assessment has drawn on relevant information provided for the RAPID gated submission process.

Definitions and Thresholds of Significance

4.4.22 Specific guidance has been developed for what constitutes a significant (major) effect, a moderate effect, a minor effect or a neutral effect for each of the SEA objectives. These ‘definitions and thresholds of significance’ help to ensure a consistent approach to interpreting the significance of effects and helps the reader understand the decisions made by the assessor.

4.4.23 An example is provided for biodiversity in **Table 4.5** with the full suite of definitions presented in **Appendix E**.

4.4.24 In developing the definitions and thresholds of significant effects, information has been drawn from:

- the previous definitions and thresholds used in the SEAs of DCWW, SSW, STW and UUU’s WRMP19s;
- suggested definitions and thresholds for assessment scoring from the All Company Working Group (ACWG) for application to the SROs;
- suggested definitions and thresholds detailed in the Water Resource South East (WRSE) Scoping Report, for application to the SEA of the WRSE Regional Plan;
- an evaluation of the range of quantitative values (such as yield, capex, embodied carbon, operational carbon and material quantities) available for a selection of the DCWW, STW, SSW and UUU’s WRMP19 options for different option types (e.g., supply-side options such as reservoirs, transfers, boreholes, enhanced treatment);
- scoping consultation feedback; and
- practical revisions made when applying the thresholds to the revised feasible option assessment.

4.4.25 In some instances (for example in specifying the quantity of operational carbon that would qualify as a significant/major effect), the thresholds have changed between the SEA of UUU’s WRMP19, and for WRMP24. In consequence, in some instances, effects previously identified as significant may now be assessed as a moderate effect.

Table 4.5 Example Definitions of Significant Effects

Proposed SEA Objectives	Proposed Guide Questions	Score		Description
1. To protect, restore and enhance	<ul style="list-style-type: none"> • Will it protect, restore and enhance where possible, the 	+++	Major/Significant Positive	The option would result in a major enhancement on the quality of designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat quality and availability.

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Proposed SEA Objectives	Proposed Guide Questions	Score		Description
biodiversity, including designated sites of nature conservation interest and protected habitats and species, enhance ecosystem resilience and habitat connectivity and deliver a net biodiversity gain.	<ul style="list-style-type: none"> most important sites for nature conservation (e.g., internationally or nationally designated conservation sites such as SACs, SPAs, Ramsar and SSSIs)? Will it protect, restore and enhance non-designated sites and local biodiversity? Will it provide opportunities for new terrestrial and aquatic habitat creation or restoration and/or link existing habitats as part of the development process? Will it provide opportunities to deliver biodiversity net gain? Will it lead to a change in the ecological quality of habitats? Will it protect, restore and enhance where appropriate, coastal and marine habitats and species? Will it maintain and enhance the green infrastructure network and the biodiversity it supports? 			The option would result in a major increase in the population of, or habitats for, a priority species. Effects could be caused by beneficial changes in water flows/water quality, or large amounts of creation or enhancement of habitat, promoting a major increase in ecosystem structure and function.
		++	Moderate Positive	<p>The option would result in a moderate enhancement on the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat creation and enhancement measures.</p> <p>The option would result in a moderate increase in the population of, or habitats for, a priority species.</p> <p>Effects could be caused by beneficial changes in water flows/water quality, or moderate amounts of creation or enhancement of habitat, promoting a moderate increase in ecosystem structure and function.</p>
		+	Minor Positive	<p>The option would result in a minor enhancement of the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat creation and enhancement measures.</p> <p>The option would result in a minor increase in the population of, or habitats for, a priority species.</p> <p>Effects could be caused by beneficial changes in water flows/water quality, or small amounts of creation or enhancement of habitat, promoting a minor increase in ecosystem structure and function.</p>
		0	Neutral	The option would not result in any effects on designated or non-designated sites including habitats and/or species).
		-	Minor Negative	<p>The option would result in a minor negative effect on the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation.</p> <p>The option would result in a minor decrease in the population of, or habitats for, a priority species.</p> <p>Effects could be caused by detrimental changes in flows/water quality, or small losses or degradation of habitat leading to a minor loss of ecosystem structure and function.</p>
		--	Moderate Negative	<p>The option would result in a moderate negative effect on the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation.</p> <p>The option would result in a moderate decrease in the population of, or habitats for, a priority species.</p> <p>Effects could be caused by detrimental changes in flows/water quality, or moderate loss or degradation of habitat leading to a moderate loss of ecosystem structure and function.</p>

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Proposed SEA Objectives	Proposed Guide Questions	Score		Description
		---	Major/Significant Negative	<p>The option would result in a major negative effect on the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation.</p> <p>The option would result in a major decrease in the population of, or habitats for, a priority species. Effects could be caused by detrimental changes in flows/water quality, or large losses or degradation of habitat leading to a major loss of ecosystem structure and function.</p>
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain

4.5 Contribution to Wales' Well-being Goals and the Objective for the Sustainable Management of Natural Resources

4.5.1 A high-level analysis of the impact that the Final WRMP24 will have on the achievement of the seven well-being goals for Wales and the objective for SMNR has been undertaken, drawing the findings of the SEA of the preferred plan.

4.6 Difficulties Encountered in Undertaking the Assessment

4.6.1 The SEA Regulations requires the identification of any difficulties (such as technical deficiencies or lack of knowledge) encountered during the assessment process. The difficulties encountered in undertaking the SEA of the final WRMP24 are summarised below:

- Due to the scope of the WRMP24, and its nature in combining site-specific options into a plan for the whole of U UW's region, a balance needed to be struck between the information provided as an overview of the whole area and the detail of a specific location. Throughout the whole process, it was necessary to ensure the need for enough information to undertake a robust assessment, while retaining its strategic focus.
- Reflecting the strategic nature of the Final WRMP24 and SEA, for many supply options exact site locations and pipeline routes are approximated at this stage whilst the final design of new infrastructure is unknown. However, the assessments of feasible and preferred options have been based on the best available information provided by U UW and any assumptions used in the assessment (e.g. in respect of pipeline routes) have been highlighted where appropriate. For some option types (e.g. leakage reduction options), the location of works are not known at this stage and would (if taken forward) be subject to more detailed analysis during the implementation of the WRMP24. In consequence, effects on some objectives such as biodiversity are uncertain for these options. Where this is the case, the assessment has reflected this uncertainty.

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- Whilst the assessment of the cumulative effects of the implementation of the Final WRMP24 and other plans and programmes has been based on the most up to date information available at the time of writing, in many cases there is a lack of detailed information at this stage to make robust conclusions. This is a typical issue encountered during the assessment of WRMPs.
- As noted in **Section 1.3**, the supply option in the preferred plan forms part of the NWT SRO. The NWT SRO is currently being assessed as part of RAPID's gated process for SROs; this includes environmental compliance. The environmental compliance assessments, and the supporting investigations, are ongoing with the outcomes available to inform the RAPID Gate 3 submission in 2024. In consequence, the findings have not been available in time for the Final WRMP24 and associated assessments and in some instances are reflected in residual uncertainties at this stage. Recognising this uncertainty, UUW has identified four alternative, 'WFD / Habitats Regulations compliant', WRMP options.

5. Assessment of the Revised Feasible Options

5.1 Introduction

5.1.1 This section presents the findings of the assessment of the revised feasible options identified as part of the preparation of the draft WRMP24 for the Strategic Resource Zone (**Section 5.2**), the Carlisle Resource Zone (**Section 5.3**), and the North Eden Resource Zone (**Section 5.4**). The types of feasible options considered in the assessment can be broadly categorised as follows:

- **supply options** which include measures to increase supply such as greater peak output at existing groundwater sources, reservoir or surface water supply and which will include SROs; this also includes catchment management options, for example nature-based solutions;
- **distribution and leakage options** which include measures to optimise the efficiency of water networks, reduce leakage and minimise any unscheduled resource losses;
- **metering options** which include options to manage the demand for water using smart meters;
- **efficiency options** which include measures to manage the demand for water such as rainwater harvesting, greywater recycling or household visits to install water efficiency measures.

5.1.2 As part of the post Revised Draft WRMP24 work, and reflecting the ongoing SRO, further variants were developed around a limited number of revised feasible options. This section also presents the findings of these revised feasible option variants (which are all supply options).

5.2 Strategic Resource Zone

Supply Options

5.2.1 A total of 89 feasible supply options were assessed for the Strategic Resource Zone; these are listed in **Table 5.1**. A summary of the assessment of these options is presented in **Table 5.2** with commentary on the likely significant construction and operational effects provided below. Detailed assessments are contained at **Appendix F**.

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Table 5.1 Feasible Supply Options: Strategic Resource Zone

Option ID	Option Name	Yield	Description
STTA1	NWT_VYRNWY 1	75 (export)	
STTA2	NWT_VYRNWY 2	135 (export)	

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Option ID	Option Name	Yield	Description
STTA3	NWT_VYRNWY 3	180	[REDACTED]
STTA4	NWT_VYRNWY	180 (export)	[REDACTED]

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Option ID	Option Name	Yield	Description
STT019	ICT_WIRRAL	10	
STT022	IGA_CROASDALE	10	
STT029	SWN_RIVER LUNE	60	
STT034	RES_HOLLINGWORT H	10	

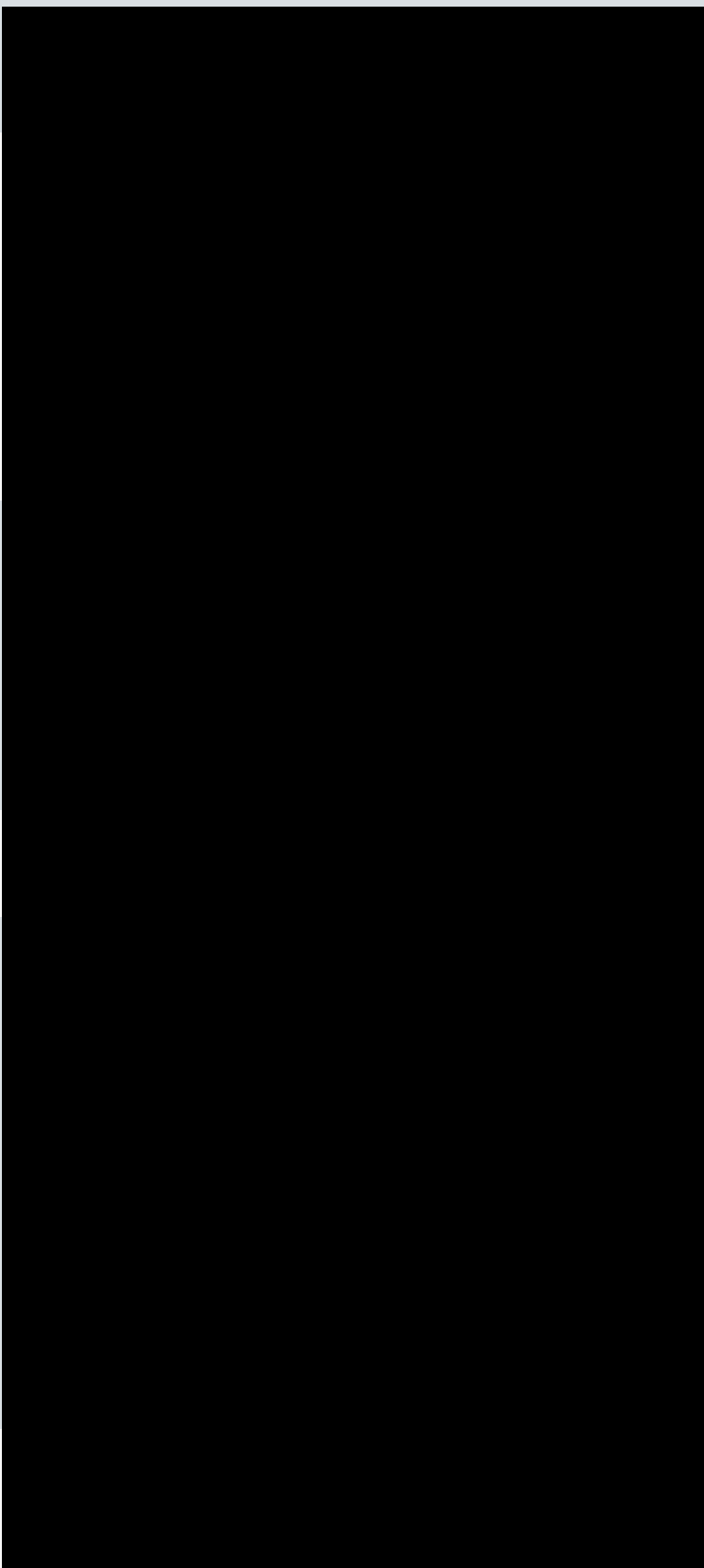
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Option ID	Option Name	Yield	Description
STT041	SWN_RIVER ROCH	18	[REDACTED]
STT041b	SWN_RIVER IRWELL_ROCH	58	
WR006	SWN_GLAZE BROOK	15	
WR010	SWN_RIVER GRETA	20	
WR015	SWN_RIVER IRWELL	40	
WR017	SWN_RIVER GOYT	5	

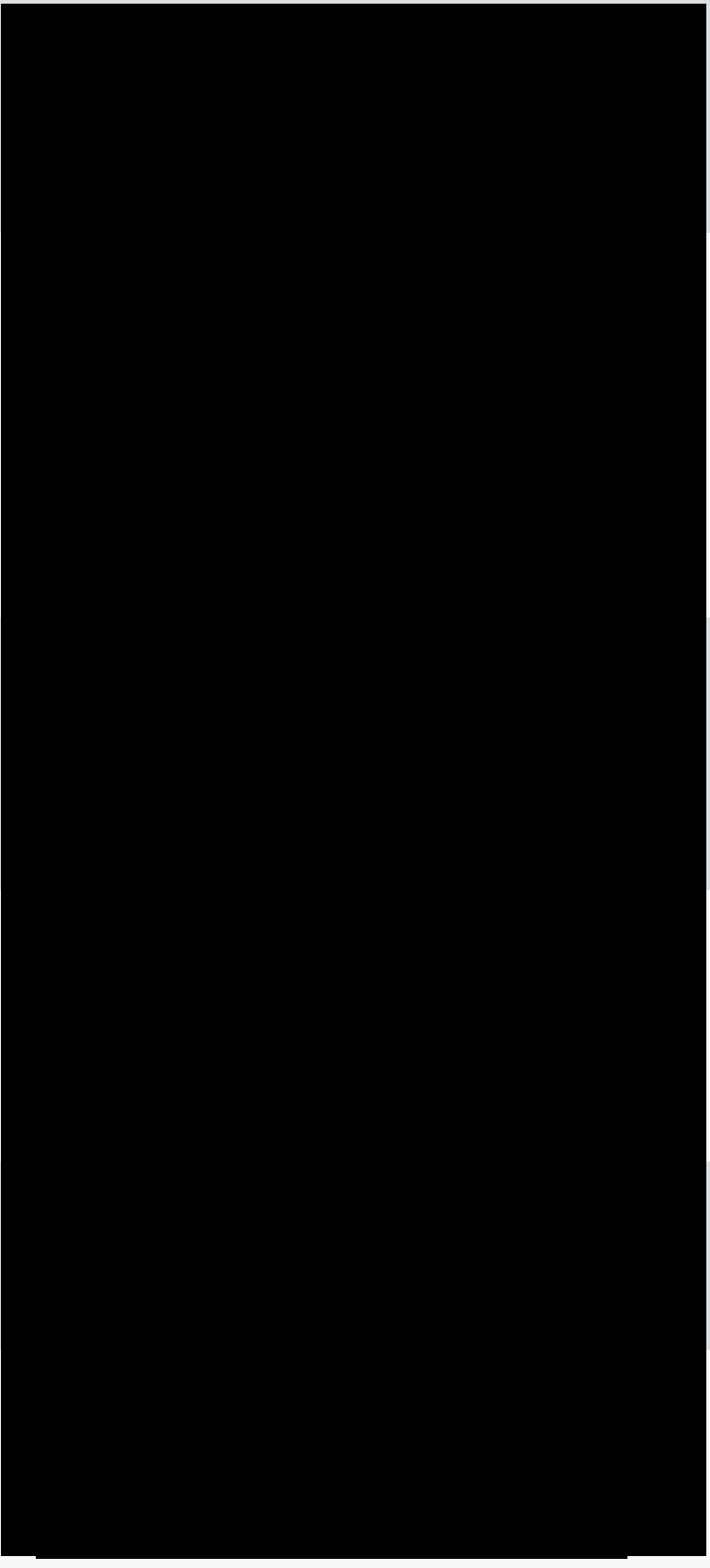
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Option ID	Option Name	Yield	Description
WR026a	SWN_RIVER RIBBLE 26a	10	
WR026b	SWN_RIVER RIBBLE 26b	6.5	
WR037a	RES_HAWESWATER a	10.7	
WR037b	RES_HAWESWATER b	21.4	
WR049a	SWN_RIVER RIBBLE 49a	30	
WR049b	SWN_RIVER RIBBLE 49b	30	
WR049c	SWN_RIVER RIBBLE 49c	40	

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Option ID	Option Name	Yield	Description
WR049d	SWN_RIVER RIBBLE 49d	40	
WR062a	RES_WORTHINGTON a	12	
WR062b	RES_WORTHINGTON b	12	
WR065a	RES_WATERGROVE	2	
WR065b	RES_WHITEHOLME	2.3	

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Option ID	Option Name	Yield	Description
WR074	SWN_RIVER DARWEN	10	
WR076	SWN_RIVER BOLLIN	25	
WR077a	RES_DOVESTONE	2	
WR077b	RES_ERRWOOD	2	
WR077c	RES_FERNILEE	2	
WR079a	RES_APPLETON a	3	

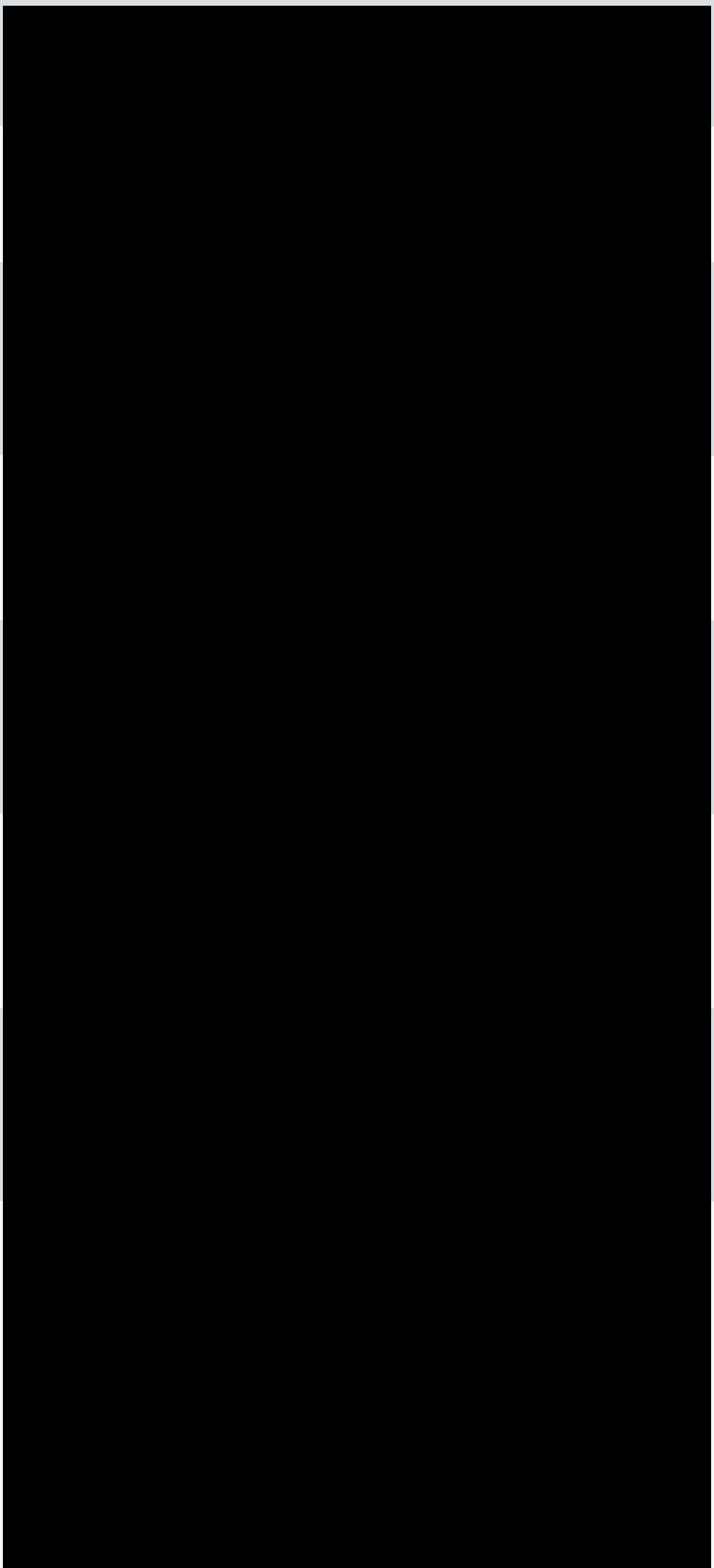
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Option ID	Option Name	Yield	Description
WR079b	RES_APPLETON b	6	
WR079c	RES_APPLETON c	9	
WR079d	RES_APPLETON d	12.5	
WR099a	GWE_BURNLEY a	4	
WR099b	GWE_BURNLEY b	4	
WR099c	GWE_BURNLEY c	4	

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Option ID	Option Name	Yield	Description
WR100	GWE_THORNCLIFFE	4.5	
WR101	GWE_FYLDE	30	
WR102b	GWE_WIDNES	17	
WR102e	GWE_BOLD HEATH	9	
WR105a1	GWE_LYMM a1	9.09	
WR105a2	GWE_LYMM a2	9.09	

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Option ID	Option Name	Yield	Description
WR105b1	GWE_LYMM b1	9.09	
WR105b2	GWE_LYMM b2	9.09	
WR106a	GWE_WALTON 1	8.45	
WR106b	GWE_WALTON 2	8.45	
WR107a1	GWE_AUGHTON PARK a1	10	
WR107a2	GWE_AUGHTON PARK a2	10	
WR107b	GWE_RANGLES BRIDGE	11	
WR111	GWE_WOODFORD	3	

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Option ID	Option Name	Yield	Description
WR113	GWE_TYThERINGTON	3	
WR120a	GWE_CROSS HILL 1	15	
WR120b	GWE_CROSS HILL 2	15	
WR121a	GWE_EATON a	6.7	
WR121b	GWE_EATON b	6.7	

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Option ID	Option Name	Yield	Description
WR122	GWE_NEWTON HOLLOWS	9	
WR125	GWE_NORTH SHROPSHIRE	6.36	
WR127	GWE_FAIRHILL	2	
WR140	EFR_HORWICH	5	

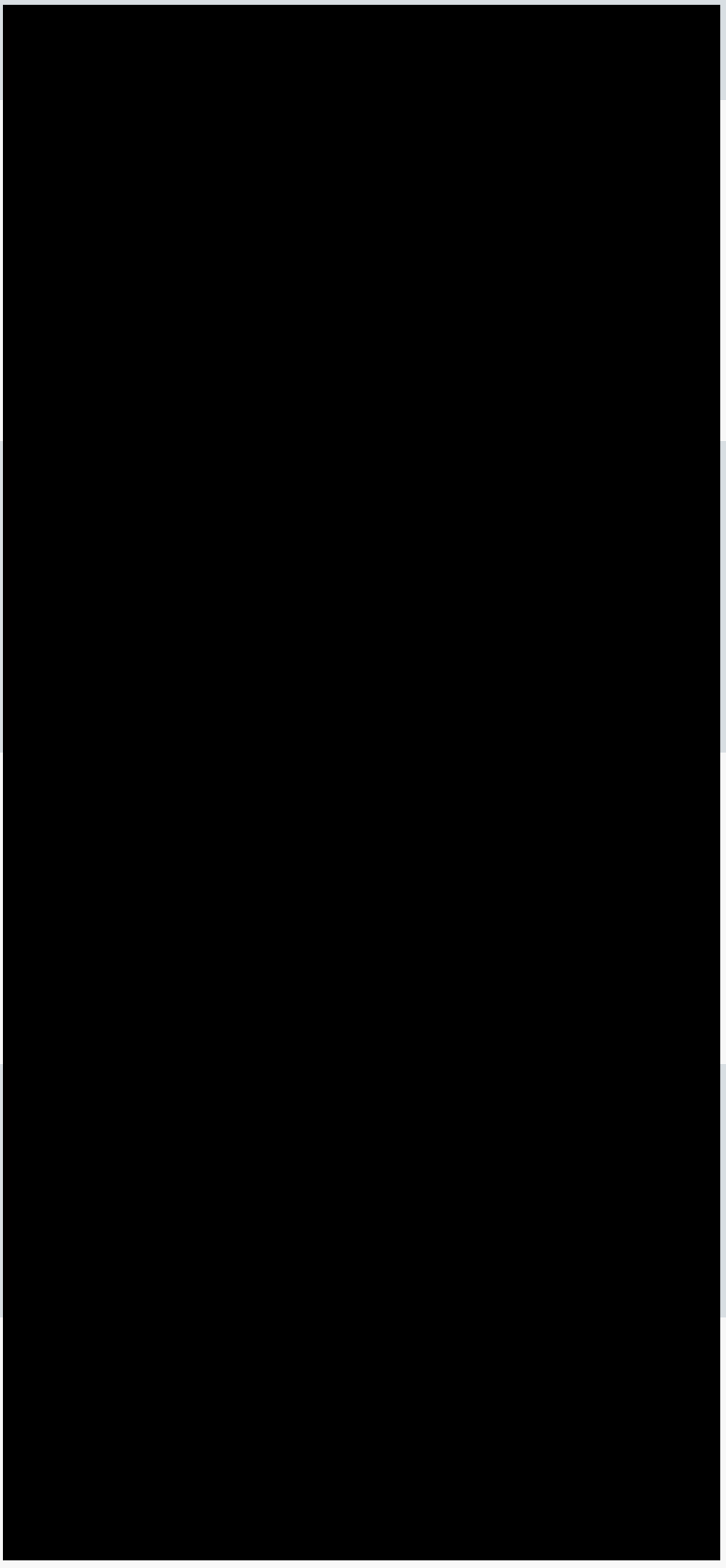
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Option ID	Option Name	Yield	Description
WR141	EFR_ROSENDALE	10	<p>It should be noted that, following the publication of the Draft WRMP24, Option WR149 was discounted by UUW due to concerns regarding water quality deterioration in the wider groundwater unit, difficult to treat water quality issues and limited water availability. In consequence, it is no longer considered by UUW to be a feasible option. Option WR149 was assessed as part of the Draft WRMP24 Environmental Report and, for completeness, the assessment is reproduced here.</p>
WR144	SWN_RIVER TAME	5	
WR149	ITC_WIGAN	13.8	

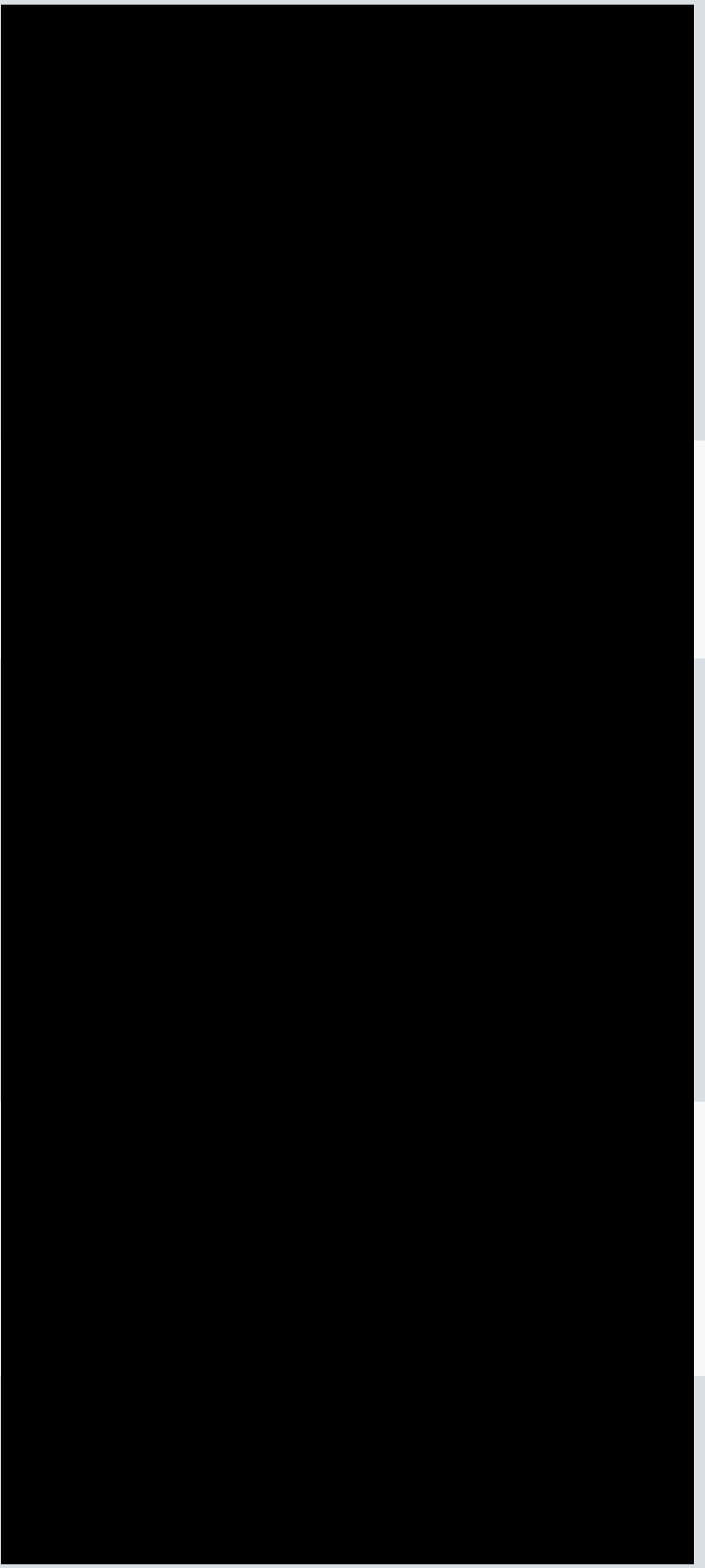
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Option ID	Option Name	Yield	Description
WR153	ITC_WEST CHESHIRE 1	11	
WR154	ITC_WEST CHESHIRE 2	10	
WR159	RWL_COMPENSATIO N GP 1&2	29	
WR185	SSO_STOCKPORT PH II	16.4	
WR186	SSO_STOCKPORT PH III	36.5	

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Option ID	Option Name	Yield	Description
WR187	SWE_DAMAS GILL	3.36	
WR188a1	NIT_THIRD PARTY_21a	5	
WR188a2	NIT_THIRD PARTY_21b	5	
WR188b1	NIT_THIRD PARTY_21c	2	
WR188b2	NIT_THIRD PARTY_21d	2	

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Option ID	Option Name	Yield	Description
WR191	PRO_NORTH LANCASHIRE	3.5	
WR800	NIT_THIRD PARTY_1	4.5	
WR810a	WIT_THIRD PARTY_4a	40	
WR810b	WIT_THIRD PARTY_4b	40	
WR812a	WIT_THIRD PARTY_6a	100	

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Option ID	Option Name	Yield	Description
WR812b	WIT_THIRD PARTY_6b	100	
WR812c	WIT_THIRD PARTY_6c	100	
WR813	WIT_THIRD PARTY_7	5	
WR814a	WIT_THIRD PARTY_8a	24	
WR814c	WIT_THIRD PARTY_8c	24	

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Option ID	Option Name	Yield	Description
WR815	NIT_THIRD PARTY_9	15	
WR817	NIT_THIRD PARTY_11	23	
WR820	NIT_THIRD PARTY_12	15.5	
WR821	NIT_THIRD PARTY_13	30	
WR825	NIT_THIRD PARTY_16	3	



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Table 5.2 Feasible Supply Options Assessment Summary: Strategic Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
STTA1	Construction (negative)	-/?	-	0	-/?	0	0	-/?	---	---	-	--	-/?	--	0	---	-/?	-/?
	Construction (positive)	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	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
STTA2	Construction (negative)	--/?	--	0	--	0	0	-	---	---	-	---	-	--	0	---	--/?	--/?
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
STTA3	Construction (negative)	--/?	--	0	--	0	0	-	---	---	-	---	-	--	0	---	--/?	--/?
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	0	0	0	0	0	0	0	--	---	0	0	0	0	0	--	0	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
STTA4	Construction (negative)	---/?	--	0	--	0	0	-	---	---	-	---	-	--	0	---	--/?	--/?
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
STT019	Construction (negative)	--/?	--	0	-	0	0	-	---	---	0	---	--	--	0	---	--	-
	Construction (positive)	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
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
STT022	Construction (negative)	-/?	--	0	-	0	0	-	-	--	-	-	-	-	0	---	-	-
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	++	0	0	0	+/?	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	-/?	0	0	0	--	--	0	0	--	0	0	0	0	0	-	0	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
STT029	Construction (negative)	-	-	0	-	0	0	--	--	---	-	--	-	-	0	---	-	--
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0
	Operation (negative)	--/?	0	0	0	--	--	-	--	---	0	--	0	--	0	--	-	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0
STT034	Construction (negative)	-	-	0	-	0	0	0	-	--	0	-	-	-	0	--	0	-
	Construction (positive)	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
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
STT041	Construction (negative)	-	-	0	-	0	0	--/?	--	---	-	--	--	--	0	---	-	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	-/?	0	0	0	--	--	-	0	--	0	0	0	0	0	-	-	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
STT041b	Construction (negative)	-	--	0	-	0	0	--/?	---	---	-	--	--	--	0	---	-	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0
	Operation (negative)	-	0	0	0	--	--	--	--	---	0	--	0	0	0	---	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0
WR006	Construction (negative)	-	--	0	-	0	0	--	--	---	-	--	-	-	0	---	-	-
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR010	Construction (negative)	-	--	0	-	0	0	--	--	---	-	--	-	-	0	---	-	--
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	-/?	0	---	0	--	--	--	0	---	0	0	0	0	0	-	0	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR015	Construction (negative)	--	--	0	-	0	0	-	---	---	-	--	--	--	0	---	-	-
	Construction (positive)	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	--	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0
WR017	Construction (negative)	-	--	0	-	0	0	--	-	--	-	-	-	-	0	--	-	-
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR026a	Construction (negative)	---/?	---	0	-	0	0	--	--	---	-	--	-	-	0	---	-	--
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0

FINAL

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	--/?	0	---	0	--	--	--	0	---	0	0	0	0	0	-	0	-
	Operation (positive)	0	+++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR026b	Construction (negative)	-	--	0	--	0	0	--	-	---	-	-	-/?	-	0	---	-	--
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR037a	Construction (negative)	---/?	--	0	-	0	-/?	---	--	---	-	0	-	-	0	---	-	--
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	++	0	0	++	++	0	++	+	0	0	0
WR037b	Construction (negative)	---/?	---	0	-	0	-/?	---	--	---	-	0	-	-	0	---	-	--
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	+++	0	0	0	+/?	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape	
	Operation (negative)	---	0	0	0	--	--	0	0	0	0	0	0	0	0	0	0	0	-
	Operation (positive)	0	+++	0	0	0	0	++	0	0	++	++	0	++	+	0	0	0	0
WR049a	Construction (negative)	--	--	0	--	0	0	--	---	---	-	--	-	-	0	---	-	-	-
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	+++	0	0	0	+/?	0	0	0
	Operation (negative)	--/?	0	-/?	0	-	-/?	-	---	---	0	-	-	0	0	--	0	0	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0	0
WR049b	Construction (negative)	--	--	0	--	0	0	--	--	---	-	--	-	-	0	---	-	-	-
	Construction (positive)	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
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0	0
WR049c	Construction (negative)	--	--	0	--	0	0	--	--	---	-	--	-	-	0	---	-	-	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	---/?	0	---	0	--	--	-	0	---	0	-/?	-	0	0	--	-	0
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0
WR049d	Construction (negative)	-	--	0	-	0	0	--	---	---	-	--	-	-	0	---	-	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0
	Operation (negative)	---/?	0	0	0	--	--/?	-	0	---	-/?	0	-	0	0	--	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0
WR062a	Construction (negative)	-/?	0	0	0	0	0	---	-	--	-	0	0	-/?	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+/?	++	0	++	++	0	0	0
WR062b	Construction (negative)	-/?	--	0	-	0	0	--/?	-	--	-	-	-/?	-/?	0	---	-	-/?
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	++	0	0	0	+/?	0	0

FINAL

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	-/?	0	--/?	0	0	0	-/?	0	--	0	0	-/?	0	0	-	0	0
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR065a	Construction (negative)	-	--	0	-	0	0	---	-	--	-	-	-	-	0	---	0	-
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	++	0	0	+	+	0	+	+	0	0	0
WR065b	Construction (negative)	-	---	0	0	0	0	0	-	-	0	0	-	-	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	+++	0	0	0	0	+	0	0	+	+	0	+	+	0	0	0
WR074	Construction (negative)	-	--	0	0	0	0	--	--	---	-	--	-	--	0	---	-	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	--/?	0	---	?	--	--	--	0	--	0	--	-/?	0	0	-	0	0
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR076	Construction (negative)	-	-	0	--	0	0	--	--	---	-	--	--	--	0	---	-	-
	Construction (positive)	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	--	-	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0
WR077a	Construction (negative)	-	--	0	-	0	0	0	-	--	0	-	-	-	0	---	0	--
	Construction (positive)	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
	Operation (positive)	0	++	0	0	0	0	+	0	0	++	+	0	+	+	0	0	0
WR077b	Construction (negative)	---	--	0	-	0	0	---	-	--	-	0	-	-	0	---	0	--
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	++	0	0	0	+/?	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape	
	Operation (negative)	-/?	0	0	0	--	--	0	0	0	0	0	0	0	0	0	0	0	-
	Operation (positive)	0	++	0	0	0	0	++	0	0	++	+	0	+	+	0	0	0	0
WR077c	Construction (negative)	-	--	0	-	0	0	---	-	--	-	-	-	-	0	---	0	--	-
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	++	0	0	++	+	0	+	+	0	0	0	0
WR079a	Construction (negative)	-	--	0	0	0	0	-	-	--	0	-	--	-	0	---	-	-	-
	Construction (positive)	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	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0	0
WR079b	Construction (negative)	-	--	0	0	0	0	-	-	--	0	-	--	-	0	---	-	-	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	-/?	0	0	0	--	--	0	0	--	0	0	-/?	0	0	--	0	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR079c	Construction (negative)	-	--	0	0	0	0	-	-	--	0	-	--	-	0	---	-	-
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR079d	Construction (negative)	-	--	0	0	0	0	-	-	--	-	-	--	-	0	---	-	-
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR099a	Construction (negative)	-/?	-	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	+	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	0	0	0	0	--	--	0	0	-	0	0	0	0	0	-	0	0
	Operation (positive)	0	+	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR099b	Construction (negative)	-/?	-	0	0	0	0	0	0	-	0	0	-/?	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	+	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR099c	Construction (negative)	-/?	0	0	0	0	0	0	0	-	0	0	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR100	Construction (negative)	-	-	0	0	0	0	0	-	--	0	-	-	--	0	--	0	-
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	++	0	0	0	+/?	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	--/?	0	0	0	--	0	0	0	--	0	0	0	0	0	--	0	0
	Operation (positive)	0	+	0	0	0	0	0	0	0	+	+	0	+	+/?	0	0	0
WR101	Construction (negative)	-/?	-	0	-	0	0	-	-	---	0	-	-	-	0	---	0	0
	Construction (positive)	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
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0
WR102b	Construction (negative)	-	--	0	-	0	0	--	--	--	-	-	-	-	0	---	0	-
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR102e	Construction (negative)	-	--	0	-	0	0	0	-	---	0	--	-	-	0	---	-	-
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	++	0	0	0	+/?	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	-/?	0	0	0	--	--	0	0	---	0	0	0	0	0	-	0	0
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR105a1	Construction (negative)	-	-	0	-	0	0	-	-	--	0	0	-	-	0	---	0	-
	Construction (positive)	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	-	-/?	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR105a2	Construction (negative)	-	-	0	-	0	0	-	-	--	0	0	-	-	0	---	0	-
	Construction (positive)	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	-	-/?	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR105b1	Construction (negative)	-	--	0	--	0	0	0	--	---	0	-	-	-	0	---	-/?	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	++	0	0	0	+/?	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	-/?	0	0	0	--	--	0	-/?	--	0	0	0	0	0	-/?	0	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR105b2	Construction (negative)	-	--	0	--	0	0	0	--	---	0	-	-	-	0	---	-/?	-
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR106a	Construction (negative)	-	--	0	-	0	0	0	-	---	0	-	-	-	0	---	-	-
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR106b	Construction (negative)	-	--	0	-	0	0	0	-	---	0	-	-	-	0	---	-	-
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	+++	0	0	0	0	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	-/?	0	0	0	--	--	0	0	--	0	0	0	0	0	--	0	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR107a1	Construction (negative)	-	-	0	0	0	0	0	-	--	0	-	0	-	0	---	0	0
	Construction (positive)	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
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR107a2	Construction (negative)	-	-	0	0	0	0	0	-	--	0	-	0	-	0	---	0	0
	Construction (positive)	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
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR107b	Construction (negative)	-	-	0	-	0	0	-	-	---	0	0	-	-	0	---	0	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	++	0	0	0	+/?	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	-/?	0	0	0	--	--	-	--	---	0	0	0	-	0	-/?	0	0
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR111	Construction (negative)	-/?	-	0	0	0	0	0	-	--	0	-	-	-/?	0	---	-/?	-
	Construction (positive)	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	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR113	Construction (negative)	-/?	--	0	0	0	0	0	-	--	0	-	0	-	0	--	-	-
	Construction (positive)	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
	Operation (positive)	0	+	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR120a	Construction (negative)	-	0	0	0	0	0	0	-	--	0	-	0	-	0	---	0	-
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	+++	0	0	0	+/?	0	0

FINAL

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	--/?	0	0	0	--/?	--/?	0	0	---	0	0	0	0	0	-	0	-
	Operation (positive)	0	0	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR120b	Construction (negative)	-	0	0	0	0	0	0	-	--	0	-	0	-	0	---	0	-
	Construction (positive)	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	-
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	++	0	++	+	0	0	0
WR121a	Construction (negative)	-	0	0	0	0	0	0	-	--	0	-	0	-	0	--	0	-
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR121b	Construction (negative)	-	0	0	0	0	0	0	-	--	0	-	0	-	0	--	0	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	++	0	0	0	+/?	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	--/?	0	0	0	--	--	0	0	---	0	0	0	0	0	--	0	-
	Operation (positive)	0	0	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR122	Construction (negative)	0	-	0	0	0	0	0	-	--	0	-	0	-	0	---	0	0
	Construction (positive)	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
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR125	Construction (negative)	-/?	0	0	-	0	0	--	-	--	-	-	-	-	0	--	-	-
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR127	Construction (negative)	-	--	0	-	0	0	-	-	--	0	-	-	-	0	--	-	-
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	++	0	0	0	+/?	0	0

FINAL

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	--/?	0	0	0	--	--	0	0	--	0	0	0	0	0	-	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR140	Construction (negative)	-	-	0	-	0	0	-	-	--	0	-	-	-	0	---	-	-
	Construction (positive)	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
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR141	Construction (negative)	-	--	0	-	0	0	--	-	---	-	-	-	-	0	---	-	-
	Construction (positive)	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
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR144	Construction (negative)	-	--	0	0	0	0	-	-	--	0	0	-/?	-	0	--	-	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	++	0	+	0	+/?	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	0	0	0	0	0	0	-	0	--	0	0	0	0	0	-	0	0
	Operation (positive)	0	++	0	0	0	0	0	0	0	+	++	0	++	+	0	0	0
WR149	Construction (negative)	-	--	0	0	0	0	--	--	---	-	--	-	-	0	---	0	-
	Construction (positive)	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
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	++	0	0
WR153	Construction (negative)	-	-	0	-	0	0	0	-	--	0	--	-	-	0	---	-	-
	Construction (positive)	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
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR154	Construction (negative)	-	--	0	0	0	0	0	-	--	0	0	0	-	0	---	0	-
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	++	0	0	0	+/?	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	---/?	0	0	0	--	--	0	-	---	0	0	0	-	0	--	0	0
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	+	0	0	0
WR159	Construction (negative)	-	0	0	0	0	0	--	0	-	-	0	0	0	0	--	-	-
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	+/?	0	0	++	+++	0	+++	+++	0	0	0
WR185	Construction (negative)	-	--	0	-	0	0	0	0	-	0	0	0	-	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	+++	0	0	0
WR186	Construction (negative)	-	-	0	-	0	0	0	0	-	0	0	-	-	0	--	0	0
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+	0	0	0	+/?	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	0	0	0	0	0	0	0	0	--	0	0	0	0	0	-	0	0
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	+++	0	+++	+++	0	0	0
WR187	Construction (negative)	-	-	0	-	0	0	0	0	-	0	0	0	-/?	0	--	-/?	-/?
	Construction (positive)	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
	Operation (positive)	0	+	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR188a1	Construction (negative)	-	--	0	-	0	0	-	-	---	-	-	-	--	0	---	--	-
	Construction (positive)	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	--	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	0	0	0	0
WR188a2	Construction (negative)	-	--	0	-	0	0	--	-	---	-	-	--	--	0	---	--	--
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	-	0	0	0	--/?	--/?	-	0	---	0	0	0	0	0	--	0	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR188b1	Construction (negative)	-	-	0	-	0	0	-	-	---	-	-	--	--	0	---	--	--
	Construction (positive)	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	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR188b2	Construction (negative)	-	--	0	--	0	0	-	-	---	-	-	--	--	0	---	-	-
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR191	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	--	0	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	++	0	0	0	+/?	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	--/?	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	-
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR800	Construction (negative)	-	--	0	-	0	0	-	-	--	-	-	-	-	0	--	-	-
	Construction (positive)	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
	Operation (positive)	0	++	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR810a	Construction (negative)	---	---	0	-	0	0	--	---	---	-	---	--	--	0	---	--	---
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0
	Operation (negative)	---/?	0	--	0	--/?	--/?	-	0	---	-	0	-	0	0	--	0	-
	Operation (positive)	0	+++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
WR810b	Construction (negative)	---	---	0	-	0	0	--	---	---	-	---	--	--	0	---	--	---
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0



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Option	Stage	Sustainability Indicators																
		1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	-/?	0	0	0	--/?	--/?	-	0	---	-	0	-	0	0	--	0	-
	Operation (positive)	0	+++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
WR812a	Construction (negative)	---	---	0	---	0	0	--	---	---	-	---	--	--	0	---	---	---
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0
	Operation (negative)	---/?	0	-/?	0	-/?	--/?	-	0	---	0	-/?	0	0	0	--	-	-
	Operation (positive)	0	+++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
WR812b	Construction (negative)	---	---	0	---/?	0	0	--	---	---	-	---	--	--	0	---	---	---
	Construction (positive)	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	---	-	-
	Operation (positive)	0	+++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
WR812c	Construction (negative)	---	---	0	---/?	0	0	--	---/?	---	--	---	--	--	0	---/?	---	---
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	-	0	0	0	-	-	-	--/?	---/?	0	-/?	0	0	0	---/?	-	-
	Operation (positive)	0	+++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
WR813	Construction (negative)	-	--	0	-	0	0	--	-	--	-	-	0	-	0	---	-	-
	Construction (positive)	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
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR814a	Construction (negative)	-	-	0	-	0	0	0	-	---	0	-	-	-	0	---	-	-
	Construction (positive)	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	--	-	-
	Operation (positive)	0	+	0	0	+	0	0	0	0	++	++	0	++	++	0	0	0
WR814c	Construction (negative)	---/?	--	0	-	0	0	-	---	---	-	--	-	-	0	---	--	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	---/?	0	-/?	0	--	--	0	0	---	0	0	0	0	0	--	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR815	Construction (negative)	-	--	0	-	0	0	-	-	---	-	--	-	-	0	---	0	-
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR817	Construction (negative)	-	--	0	-	0	0	--	-	---	-	-	-	-	0	---	-	-
	Construction (positive)	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	--	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR820	Construction (negative)	-	-	0	-	0	0	-	-	---	0	-	-	-	0	---	-	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0



FINAL

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	0	0	0	0	-	-	0	0	---	0	0	0	0	0	--	-/?	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR821	Construction (negative)	-	-	0	-	0	0	-	--	---	0	--	-	-	0	---	-	-
	Construction (positive)	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	--	-/?	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0
WR825	Construction (negative)	-	--	0	-	0	0	-	-	--	0	-	-	-	0	--	--	-
	Construction (positive)	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	-	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0

Construction Effects

- 5.2.2 A total of 49 of the feasible supply options for the Strategic Resource Zone would require a large capital investment (capital spend of \geq £25 million) that would be likely to generate a number of employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers. Where this is the case, the options were assessed as having a significant positive effect on the local economy (SEA Objective 11). The majority of the remaining options (33 options) were assessed as having a moderate positive effect on this objective (capital spend of between £5 million and <£25 million), whilst 7 options (WR099a, WR099b, WR099c, WR159, WR185, WR186, and WR187) were scored as having a minor positive effect (capital spend of between £1 million and <£5 million). HGV movements and large scale pipeline works associated with many of the options are considered to have the potential to cause traffic disruption, generating a minor or moderate negative effect (42 options and 20 options respectively) on SEA Objective 11 and leading to an overall mixed score against the objective. In the case of nine options (Options STTA2, STTA3, STTA4, STT019, WR810a, WR810b, WR812a, WR812b and WR812c), significant negative effects were identified in this regard given the extent of pipeline works, volume of associated vehicle movements and requirements for major road crossings.
- 5.2.3 No other significant positive effects were identified in the assessment of the feasible supply options for the Strategic Resource Zone. A total of 32 options were assessed as having a minor positive effect on soils, geodiversity and land use (SEA Objective 4) as new infrastructure associated with these schemes would be located at existing sites, making best use of existing sites and/or not requiring new land. However, of these options, a total of 18 also recorded a minor negative effect, whilst one recorded a moderate negative effect, as, whilst works would involve the use of existing sites, they would also result in the loss of greenfield land.
- 5.2.4 The majority of the feasible options (87 total) were assessed as having a negative effect on biodiversity (SEA Objective 1) during the construction phase. This reflects the potential for construction works associated with the option to result in the loss of/disturbance to habitats and species as a result of, for example, land take, emissions to air and noise. Of this total, six options (WR077b, WR810a, WR810b, WR812a, WR812b and WR812c) were assessed as having a significant negative effect, whilst five other options (STTA4, WR026a, WR037a, WR037b, and WR814c) were assessed as having a significant negative uncertain effect.
- 5.2.5 Option WR077b would involve the raising the embankment structure of an existing reservoir, thereby raising the water level of the [REDACTED] reservoir. The margins of the reservoir either side of the river inflow are immediately adjacent to the South Pennine Moors SAC/ Peak District Moors (South Pennine Moors Phase 1) SPA/Goyt Valley SSSI; therefore, raising the levels of the reservoir would directly impact upon these sites, resulting in potential loss of part of these sites. The option also has the potential to effect upland breeding birds in the Goyt SSSI.
- 5.2.6 Options WR810a and WR810b, meanwhile, would require the construction of abstraction and ancillary infrastructure, in addition to the laying of pipeline directly within Moors

House-Upper Teesdale SAC/NNR (which has also been declared as a 'Biosphere Reserve' by UNESCO), Upper Teesdale SSSI, Appleby Fells SSSI and the North Pennine Moors SPA. These overlapping conservation areas constitute an extensive upland area within the North Pennines containing a number of nationally rare habitats, associated plant and animal communities which are unlikely to be fully mitigated against risks resulting from excavation. Both options would also involve pipeline/aqueduct works which would cross the River Eden and Tributaries SAC/SSSI at multiple points, whilst WR810b would also involve pipeline works which would cross the River Kent SAC/River Kent and Tributaries SSSI and the Lake District Fells SAC and Shap Fells SSSI.

- 5.2.7 Options WR812a, WR812b and WR812c meanwhile, all involve the construction of a pipeline from an existing reservoir, to the U UW network; which, as proposed, is assumed to be a straight line across Kielder Forest, and hence the Border Mires, Kielder-Butterburn SAC, which would have significant and almost certainly adverse effects. All three options would also involve works across the North Pennine Dales Meadows SAC and the River Eden SAC, whilst options WR812b and WR812c would also intersect with the Lake District High Fells SAC and option WR812b would also cross the River Kent SAC, which could also give rise to further significant adverse effects on these sites. Furthermore, all three options would require pipeline crossings of the following SSSIs: Gowk Bank SSSI, Lampert Mosses SSSI, Kielder Mires SSSI, Thorneyburn Meadows SSSI, Spadeadam Mires SSSI and the River Eden and Tributaries SSSI; whilst WR812b and WR812c would also cross the River Kent and Tributaries SSSI and Shap Fells SSSI. All three options would also involve works that would cross the Gowk Bank NNR and works that would cross areas of Ancient Woodland. Pipeline crossings of these sites could leave to further significant negative effects.
- 5.2.8 A further five options (STTA4, WR026a, WR037a, WR037b, and WR814c) were assessed as having a significant negative uncertain effect on biodiversity due to possible effects on a range of European designated sites including (inter alia): Oak Mere SAC; Midland Meres and Mosses Phase 1 and Phase 2 Ramsar sites; North Pennines Dales Meadows SAC (Bell Sykes Meadow SSSI); Naddle Forest SAC (SSSI); River Eden SAC; River Dee and Bala Lake SAC (River Dee SSSI); and, Berwyn a Mynyddoedd de Clwyd/ Berwyn and South Clwyd Mountains SAC. However, in these cases HRA Screening has identified that potential effects on these sites could be avoided or mitigated by utilising scheme specific mitigation in conjunction with best practice and/or minor changes to option schemes, such as pipeline routing. Furthermore, it would be anticipated that scheme level investigations and appropriate assessment would be undertaken at the project stage should these options be taken forward.
- 5.2.9 Of the remaining options, four were assessed as having a moderate negative effect, three were assessed as having a moderate negative uncertain effect, 58 were assessed as having a minor effect, and, 11 were assessed as having a minor negative uncertain effect, on SEA Objective 1.
- 5.2.10 A total of 80 feasible options were assessed as having a negative effect on sustainable natural resources (Objective 2), associated with all, or part of the option being constructed on greenfield land, resulting in either temporary (e.g. related to the excavation of pipeline routes, where soil/land would be reinstated following completion) or permanent (e.g. where permanent above ground infrastructure would be constructed, such as water treatment works or pumping stations) loss of habitats (biodiversity net loss), as concluded

by the BNG assessment. Of this total, eight options were assessed as having a significant negative effect on this objective (WR026a, WR037b, WR065b, WR810a, WR810b, WR812a, WR812b, and, WR812c), due to the fact that they would result in the loss of high value habitats, including irreplaceable upland habitats with high distinctiveness (WR026a), blanket bog (WR810a, WR810b and WR812c), lowland acid grassland (WR810a and WR810b), woodland (WR812c) and others, and including parts of designated SPAs/SACs/SSSIs (WR037b, WR065b). Of the remaining 72 options assessed as having a negative effect on Objective 2, 24 were assessed as having a minor negative effect, whilst 48 were assessed as having a moderate negative effect.

- 5.2.11 A total of 64 feasible options were assessed as having a negative effect on soils, geodiversity and land use (Objective 4), which principally reflects the loss of greenfield land including that which is 'best and most versatile' (land classified as 'best and most versatile land' is generally defined as agricultural land which falls into Grades 1, 2 and 3a). Option WR812a was assessed as having a significant negative effect on Objective 4, due to the significant scale of works, which would take place mainly within Grade 3 agricultural land and partially within Grade 2 land. Options WR812b and WR812c assessed as having a significant negative uncertain effect, due to the significant scale of works, which would take place mainly within Grade 3 agricultural land and partially within Grade 2 land, with residual uncertainty over the location of certain new assets. Of the remaining 64 options, 49 were assessed as having a minor negative effect, one was assessed as having a minor negative uncertain effect and the remaining 14 options were assessed as having a moderate negative effect.
- 5.2.12 Construction activity associated with 61 of the feasible options would take place within or proximate to a Flood Zones 2/3 and works may therefore be vulnerable to flooding (depending on timing). A total of five options (Options WR037a, WR037b, WR062a, WR065a, WR077b and WR077c) were considered to be particularly vulnerable to flood risk given the scale of works that would take place in Flood Zone 3 ($\geq 40\%$ of the option site); in these cases, negative effects on flood risk (SEA Objective 7) were assessed as significant. Of the remaining options assessed with a negative effect against Objective 7, 26 were assessed as having a minor negative effect, one was assessed as having a minor negative uncertain effect, 25 were assessed as having a moderate negative effect, and, three were assessed as having a moderate negative uncertain effect.
- 5.2.13 Construction activity would generate emissions to air associated with the use of plant and machinery as well as vehicle movements. The majority of the feasible options (81 total) were therefore assessed as having negative effects on air quality (SEA Objective 8). Reflecting the likely volume of vehicle movements and potential for works to lead to traffic congestion, 14 options (STTA1, STTA2, STTA3, STTA4, STT019, STT041b, WR015, WR049a, WR049d, WR810a, WR810b, WR812a, WR812b, and, WR814c) were assessed as having a significant negative effect on this objective, whilst WR812c was assessed as having a significant negative uncertain effect. Of the remaining options, 50 were assessed as having a minor negative effect, whilst 16 were assessed as having a moderate negative effect on Objective 8.
- 5.2.14 All of the feasible options were assessed as having a negative effect on greenhouse gas emissions (Objective 9), associated with embodied carbon in construction materials and the requirement for vehicle movements to transport materials and equipment to site, in

addition to the operation of plant and machinery. A total of 45 options were assessed as having a significant negative effect on Objective 9, due to the significant scale of embodied carbon associated with construction materials and the scale of the schemes, whilst 34 were assessed as having a moderate negative effect and 9 were assessed as having a minor negative effect.

- 5.2.15 All of the feasible options were assessed as having a negative effect on waste and resource use (Objective 15) during construction, associated with the requirement for materials such as concrete, steel and plastic to undertake the construction works. A total of 67 of the options were assessed as having a significant negative effect on Objective 15, as they would require significant quantities of construction materials. One other option (WR812c) was assessed as having a significant negative uncertain effect on this objective, due to the scale of the option and required works, however, the exact material quantities required were unknown. 20 of the remaining options were assessed as having a moderate negative effect, whilst one option was assessed as having a minor negative effect on Objective 15. Whilst a negative effect was identified against all options for this objective, a minor positive uncertain effect was also identified against all options, due to the potential for waste building materials such as steel and plastic, to be re-used or recycled (however, the significance of this is unknown and as such there remains uncertainty).
- 5.2.16 Options WR812a, WR812b and WR812c were assessed as having significant negative effects on cultural heritage (SEA Objective 16), as pipeline works required for these options are expected to directly cross Hadrian's Wall World Heritage Site and Scheduled Monument and the Maiden Way Roman Road Scheduled Monument in addition to Hutton-In-The-Forest and Lowther Castle Registered Parks and Gardens. Additionally, a large section of the pipelines involved in these options would cross the Lake District National Park/World Heritage Site and a large number of other designated assets would be situated within very close proximity to works associated with the options. Due to potential impacts on the settings of cultural heritage assets such as listed buildings and scheduled monuments, of the remaining options, a further 41 were assessed as having a minor negative effect, five were assessed as having a minor negative uncertain effect, eight were assessed as having a moderate negative effect, and, three were assessed as having a moderate negative uncertain effect on SEA Objective 16 during construction.
- 5.2.17 The development of water resources infrastructure including pipeline works has the potential to temporarily affect landscape character and/or visual amenity. The majority of feasible options (78 total) were therefore assessed as having a negative effect on landscape (SEA Objective 17). Five options (WR810a, WR810b, WR812a, WR812b and WR812c) were assessed as having a significant negative effect on this objective, all of which would involve often extensive pipeline works within the Lake District National Park and World Heritage Site. Options WR812a, WR812b and WR812c would all involve considerable pipeline works, in addition to the construction of abstraction and pumping infrastructure, within the Northumberland National Park. WR812c would also involve considerable aqueduct works within the Forest of Bowland AONB and the Yorkshire Dales National Park. Both WR810a and WR810b would also involve significant pipeline works within the Yorkshire Dales National Park and would involve the construction of abstraction and pumping infrastructure as well as significant pipeline works within the North Pennines AONB. Of the remaining options, 56 were assessed as having a minor negative effect,

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three were assessed as having a minor negative uncertain effect, 11 were assessed as having a moderate effect, and three were assessed as having a moderate negative uncertain effect.

- 5.2.18 No further significant negative effects were identified during the construction phase, although minor and or moderate effects were noted.
- 5.2.19 A total of 46 options were assessed as having a minor negative effect and one option was assessed as having a moderate negative effect on climate resilience (SEA Objective 10) as construction works would be partially situated within Flood Zones 2 and/or 3 and therefore, construction works may be at risk to the effects of climate change (flooding).
- 5.2.20 A total of 72 options were assessed as having a negative effect on tourism and recreation (SEA Objective 12) as construction works would be situated adjacent to or would cross cycling/walking paths, local public greenspaces and sports/recreational facilities, with the potential to affect users of such spaces/facilities. In total 50 options were assessed as having a minor negative effect, five options were assessed as having a minor negative uncertain effect and 17 options were assessed as having a moderate negative effect against Objective 12.
- 5.2.21 The majority of feasible options (84 total) were assessed as having a negative effect on human health and well-being (SEA Objective 13) due to the potential for emissions to air from HGV movements and construction plant together with noise/vibration from construction activity to affect residential receptors in close proximity to development sites and along transport routes. However, any impacts would be temporary and are likely to be managed through the adoption of good construction practice. In total 20 options were assessed as having a moderate negative effect against Objective 13, whilst 60 were assessed as having a minor negative effect, and four options were assessed as having a minor negative uncertain effect.
- 5.2.22 All options were assessed as having a neutral effect on INNS (Objective 3), as it is not anticipated that construction would have any effect on INNS risk during the construction period. All options were also assessed as having a neutral effect in respect of water quantity (SEA Objective 5) and water quality (SEA Objective 6) and water resource use (SEA Objective 14) during the construction phase. Whilst a number of options would involve works in close proximity to/within watercourses, it is not expected that construction activity would affect water quality or water resources, provided good practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures).

Operational Effects

- 5.2.23 Options WR026a, WR037b, WR065b, WR810a, WR810b, WR812a, WR812b and WR812c were assessed as having a significant positive effect on sustainable natural resources (SEA Objective 2) due to the assumption that there would be operational biodiversity net gain which would be greater than the net loss in construction (described above). The majority of the remaining feasible options (72 total) were assessed as having a minor or moderate positive effect on sustainable natural resources (SEA Objective 2) consistent with this assumption.

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- 5.2.24 All options were assessed as having a positive effect on climate resilience (SEA Objective 10) during operation, as they would help to ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing adaptability to the effects of climate change. A total of nine feasible options (STTA1, STTA2, STTA3, STTA4, WR810a, WR810b, WR812a, WR812b, and, WR812c) were assessed as having a significant positive effect on Objective 10, due to the significant yield and associated resilience to climate change that they would provide. Options STTA1, STTA2, STTA3 and STTA4 would maintain water supplies to UU customers supplied directly from the Vyrnwy Aqueduct, in-turn supporting the Severn to Thames Transfer and helping to ensure the continuity and resilience of water supplies in the South East of England as well as UUs supply area. Of the remaining options, 19 were assessed as having a minor positive effect, one was assessed as having a minor positive uncertain effect, and 60 were assessed as having a moderate positive effect on Objective 10.
- 5.2.25 All options were assessed as having a positive effect on the economy (SEA Objective 11) and human health and well-being (SEA Objective 13), as the capacity they would provide would help to ensure a continual supply of clean drinking water and increase resilience of supply to UU customers, supporting economic/population growth and generating a positive effect on human health. A total of 20 options were assessed as having a significant positive effect against Objectives 11 and 13, as the yield benefit associated with these options would be $\geq 25\text{MI/d}$, which, consistent with the definitions of significance contained in **Appendix E**, is above the threshold for significant effect against these objectives. A further 48 options were assessed as having a moderate positive effect against both objectives (yield of between 5MI/d and $<25\text{MI/d}$), whilst 20 options were assessed as having a minor positive effect against both objectives (yield of between 1MI/d and $<5\text{MI/d}$).
- 5.2.26 All options were assessed as having a positive effect on water resource use (SEA Objective 14) as they would increase the resilience of water resources within the UU supply area. A total of 12 options (STTA1, STTA2, STTA3, STTA4, WR159, WR185, WR186, WR810a, WR810b, WR812a, WR812b, and, WR812c) were assessed as having a significant positive effect on SEA Objective 14. For options WR810a, WR810b, WR812a, WR812b, and, WR812c, this is because of the significant yield that they would provide, whilst options STTA1, STTA2, STTA3 and STTA4 would also provide a significant yield and would increase the resilience of water supply in both the South East of England and in the UU supply area. Option WR159 would provide 29MI/d in water savings by reducing 'over-compensation' from a number of reservoirs, by providing compensation control in line with licence requirements, whilst options WR185 and WR186 would provide additional capacity (16.4MI/d and 36.5MI/d respectively), by utilising 'spare' capacity in the Manchester supply network, through enhancements/modifications to pumping, without the need for additional abstraction. As such, in line with the thresholds contained in Appendix E (water efficiency options with a design capacity of $>10\text{MI/d}$), these options were assessed as having a significant positive effect. Of the remaining options, 52 were assessed as having a moderate positive effect, 24 were assessed as having a minor positive effect and one was assessed as having a minor positive uncertain effect.
- 5.2.27 No further significant positive operational effects were identified during the assessment.

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- 5.2.28 A total of 70 feasible options were assessed as having a negative or potentially negative effect on biodiversity (SEA Objective 1) during operation. Of this total, two options (WR037a and WR037b) were assessed as having a significant negative effect on SEA Objective 1 during operation, whilst an additional eight options (WR049c, WR049d, WR076, WR149, WR154, WR810a, WR812a, and WR814c) were assessed as having a significant negative uncertain effect. Options WR037a and WR037b were identified as having an unavoidable significant and potentially adverse effect on the Naddle Forest SAC, which is immediately adjacent to the reservoir and as such the options would result in a reduction in the size of the SAC associated with increased reservoir level, with the impact being more significant under option WR037b. Both options could also impact the River Eden SAC following changes to frequency of reservoir spill to Haweswater Beck.
- 5.2.29 Significant negative uncertain effects were identified in respect of options WR049c, WR049d, WR076, WR149, WR154, WR810a, WR812a, and WR814c, due to potential significant and adverse impacts, which could not be excluded without additional analysis (modelling etc) of scheme operation and/or identification of acceptable operational mitigation measures, on designated sites, including: the Ribble and Alt Estuaries SPA/Ramsar/SSSI (WR049c and WR049d); Red Scar and Tun Brook Woods SSSI (WR049c); Mersey Estuary SPA/Ramsar and Woolson Eyes SSSI (WR076); Manchester Moss SAC (Highfield Moss SSSI and Astley & Bedford Mosses SSSI), Holcroft Moss SAC (SSSI), and Risle Moss SAC (SSSI) (WR149); Oak Mere SAC (Midlands Meres and Mosses Phase 2 Ramsar) and Little Budworth Common SSSI (WR154); Teesmouth and Cleveland Coast SPA/Ramsar and North Pennines Dales Meadows SAC (WR810a); the River Eden SAC (WR810a and WR812a); and, the River Dee and Bala Lake SAC (WR814c).
- 5.2.30 Of the remaining options, 19 were assessed as having a moderate negative uncertain effect, seven were assessed as having a minor negative effect, and, 34 were assessed as having a minor negative uncertain effect on SEA Objective 1 during operation.
- 5.2.31 A total of 19 feasible options were assessed as having a negative or potentially negative effect on INNS (SEA Objective 3). Six of these options (WR010, WR026a, WR049b, WR049c, WR074, WR813) were assessed as having a significant negative effect, whilst one option (STT034) was assessed as having a significant negative uncertain effect on Objective 3. This is because these options would involve the abstraction and transfer raw water between waterbodies in different WFD surface water catchments, without full treatment prior to discharge. Options WR010, WR026a, WR074, WR049b and WR049c would involve the abstraction of raw water from rivers and transfer to impounding reservoirs, whilst option WR813 would involve the transfer of water from an impounding reservoir into a canal and option STT034 would involve the transfer of water from a reservoir to another reservoir. Of the remaining options, three were assessed as having a moderate negative effect, one was assessed as having a moderate negative uncertain effect, three were assessed as having a minor negative effect, and five were assessed as having a minor negative uncertain effect on SEA Objective 3.
- 5.2.32 A total of 75 feasible options were assessed as having a negative effect on water quantity (SEA Objective 5) during operation, whilst 72 options were assessed as having a negative effect on water quality (SEA Objective 6). Two options (WR149 and WR813) were assessed as having a significant negative effect across both SEA objectives. Option WR149, was assessed as having a significant negative effect against both objectives as the WFD

assessment concluded that increased groundwater abstraction could cause long term moderate decreases in groundwater levels, river flows and water quality (including exacerbation of issues of salinity (at one of the borehole) and Chloride concentration (at another one of the boreholes)), which could result in a deterioration of WFD classification. Meanwhile, option WR813 was assessed as having a significant negative effect against both objectives as it could reduce reservoir levels and result in changes in water quality in the Huddersfield Narrow Canal, as well as potential INNS transfer into the canal and introduction of new priority hazardous chemicals (PFOS) to the water environment within the canal, where they are not currently found. Of the remaining options, against SEA Objective 5, 54 options were assessed as having a moderate negative effect, 11 were assessed as having a moderate negative uncertain effect, six were assessed as having a minor negative effect, and two were assessed as having a minor negative uncertain effect. Whilst against SEA Objective 6, 51 options were assessed as having a moderate negative effect, 14 were assessed as having a moderate negative uncertain effect, four were assessed as having a minor negative effect, and one was assessed as having a minor negative uncertain effect. It is noted that the majority of options were assessed as having the same significance of effect against both objectives.

- 5.2.33 A total of 14 options were assessed as having a negative effect on air quality (SEA Objective 8) during operation, as they would require the use of vehicle movements for maintenance/repairs and operation of assets such as water treatment works, pumping stations and abstractions. Option WR049a was assessed as having a significant negative effect in this regard as the option would require a significant number of vehicle movements (>15,500 per year) during operation. The majority of the remaining options (8 total) were assessed as having a moderate negative effect in this regard, whilst two were assessed as having a minor effect and two were assessed as having a minor negative uncertain effect.
- 5.2.34 The majority of feasible options (79 total) were assessed as having a negative effect on greenhouse gas emissions (SEA Objective 9) as they would require energy and generate greenhouse gas emissions associated with abstraction and/or treatment and/or pumping of water. A total of 38 of these options were assessed as having a significant negative effect on SEA Objective 9 as they would involve operational carbon emissions of >2000 tonnes CO₂e per year. Option WR812c was assessed as having a significant negative uncertain effect against this objective due to the scale of the option and as such it is likely to require significant operational energy resulting in significant carbon emissions, however, as the exact operational energy requirements and carbon emissions were unknown, there remained some uncertainty. Of the remaining options, 35 were assessed as having a moderate negative effect, one option was assessed as having a moderate uncertain effect, whilst four options were assessed as having a minor negative effect on this objective.
- 5.2.35 The majority of options (80 total) were assessed as having a negative effect on waste and resource use (SEA Objective 15), as they would require operational energy, the use of chemicals/materials for water treatment and vehicle movements (requiring the use of fossil fuels). Of this number, two options (STT041b and WR812b) were assessed as having a significant negative effect as they would require significant ongoing operational energy, chemical use and/or vehicle movements (STT041b). Option WR812c was assessed as

having a significant negative uncertain effect on SEA Objective 15 during operation, as it is likely, due to the scale of the option, that it would require significant energy/chemical use and vehicle movements, however, as the exact requirements were unknown, there was uncertainty. Of the remaining options, 42 were assessed as having a moderate negative effect, 28 were assessed as having a minor negative effect, and six were assessed as having a minor negative uncertain effect on Objective 15 during operation.

- 5.2.36 No further significant negative effects associated with the operation of the feasible options were identified during the assessment.
- 5.2.37 A total of 40 options were assessed as having a negative effect on flood risk (SEA Objective 7) during operation (30 options were assessed as having a minor negative effect, one option was assessed as having a minor negative uncertain effect, and nine options were assessed as having a moderate negative effect) as the options would include above ground infrastructure that would be situated within Flood Zone 2 or 3 and therefore would be at risk of flooding during operation.
- 5.2.38 A total of eight options were assessed as having a negative effect on economy (SEA Objective 11) during operation. Options STT029 and STT041b, were assessed as having a moderate negative effect on SEA Objective 11 as they would require a moderate number of operational vehicle movements, which could contribute to congestion, causing disruption to local transport infrastructure. Similarly, option WR049a was assessed as having a minor negative effect due to the number of required vehicle movements during operation. Options WR049b and WR049c were assessed as having a minor negative uncertain effect as the EA had noted that there is the potential for the schemes to affect other abstractors, which would need to be investigated. Similarly options WR812a, WR812b and WR812c were assessed as having a minor negative uncertain effect, as whilst it is assumed that the options would be compatible with the existing reservoir's HEP operation, further consideration on the implications of abstraction during periods of low reservoir levels was required.
- 5.2.39 A total of 16 options were assessed as having a negative effect on tourism and recreation (SEA objective 12) due to their potential to impact upon recreational facilities/activities, for example water dependent activities such as angling, or kayaking/sailing on rivers or reservoirs, due to reduced water/flow levels associated with abstraction. Of these options a total of nine were assessed as having a minor negative effect, whilst 7 were assessed as having a minor negative uncertain effect.
- 5.2.40 A total of three options (STT029, WR107b and WR154) were assessed as having a negative effect on human health and well-being (SEA Objective 13), associated primarily with the potential for effects on air quality associated with the vehicle movements that these options would require during operation. Option STT029 was assessed as having a moderate negative effect on Objective 13 (whilst the other two options were assessed as having a minor negative effect) due to the potential for pumping activity associated with the option, to lead to further impacts on proximate residential receptors, in terms of noise. However, for all three options a positive effect was recorded, due to the provision of additional capacity (as described above), resulting in an overall mixed positive and negative effect.

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- 5.2.41 A total of 17 options were assessed as having minor negative effects, and four options were assessed as having minor negative uncertain effects on cultural heritage (SEA Objective 11) due to potential impacts on the settings of proximate heritage assets associated with new above ground infrastructure.
- 5.2.42 Similarly, a total of 55 options were assessed as having a minor negative effect on landscape (SEA Objective 17), due to the potential for new above ground infrastructure to have adverse landscape and visual amenity impacts, particularly where located on greenfield sites in rural settings or where development is adjacent to sensitive designated sites/receptors.
- 5.2.43 Operational effects on soils, geodiversity and land use (SEA Objective 4) were assessed as neutral; the one exception to this is Option WR074 which was assessed as having an uncertain effect on this objective as abstraction from the River Darwen under this option could affect the Darwen River Section SSSI, a significant site for geological study.

Leakage Options

- 5.2.44 A total of twenty-nine feasible leakage options were assessed for the Strategic WRZ; these are listed in **Table 5.3**. A summary of the assessment of these options is presented in **Table 5.4** with commentary on the likely significant construction and operational effects provided below. Detailed assessments are contained at **Appendix F**.

Table 5.3 Feasible Leakage Options: Strategic Resource Zone

Option ID	Option Name	Yield	Description
WR500	LEA-SRZ5_Find and fix	10	
WR502c	LEA-SRZ5_Permanent network sensors	19.7	<p>Option c forms part of a 20 year programme to install and maintain acoustic loggers across the region prioritised based on perceived benefit. It is assumed an estimated 70,000 loggers can be installed in a year, with a limit of approx. 100,000 per AMP +% based on options split into 10MI/d leakage saving.</p> <p>Loggers are assumed to be bought with airtime and battery replacement included for the first 5 years with a 10 year lifespan for the hardware. New loggers will need to be phased in from year under a similar agreement as the initial investment.</p>
WR502d	LEA-SRZ10_Permanent network sensors	40	Option d forms part of a 10 year programme to install and maintain loggers across the region prioritised based on perceived benefit. It is assumed 70k loggers can be installed in a year, with a limit of approx. 100k per AMP +% based on options split into 10MI/d leakage saving.
WR502e	LEA-SRZ12_Permanent network sensors	48	Option e forms part of a 15 year programme to install and maintain loggers across the region prioritised based on perceived benefit. It is assumed 70k loggers can be installed in a year, with a limit of approx. 100k per AMP +% based on options split into 10MI/d leakage saving.

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Option ID	Option Name	Yield	Description
WR502f	LEA-SRZ15_Permanent network sensors	53	Option f forms part of a 20 year programme to install and maintain loggers across the region prioritised based on perceived benefit. It is assumed 70k loggers can be installed in a year, with a limit of approx. 100k per AMP +% based on options split into 10Ml/d leakage saving.
WR510	LEA-SRZ15_In-pipe repairs and lining technologies	5	Use of pinpoint repairs, in pipe repairs or pipe lining technologies to resolve leakage issues, and reduce repair times. Assumes repairs to existing infrastructure requires relatively small quantities of resins/metals (assume non-recyclable sources). Some vehicle movements involved (minimal).
WR511g	LEA-SRZ5_Pressure management	1	<p>Option to deliver 1Ml/d of leakage savings for £9.316million over a 5 year period. Costs and benefits are based on equivalent PMV numbers required to meet target savings based on an average saving per scheme of 4.2m3/d.</p> <p>Deliver of pressure management schemes including but not limited to scheme types such as (new PMV, PMV Modulation, Pump modulation, Right sizing mains to reduce headloss, Pumps for high rise buildings, Single property boosters, Duel Feed PMV areas, etc).</p>
WR511h	LEA-SRZ5_Pressure management	2.5	<p>Option to deliver 2.5Ml/d of leakage savings for £23.290million over a 5 year period. Costs and benefits are based on equivalent PMV numbers required to meet target savings based on an average saving per scheme of 4.2m3/d.</p> <p>Option is based on cumulative costs and benefits identified within options WR511g, and acts as an option instead of rather than in addition too.</p>
WR511i	LEA-SRZ10_Pressure management	5	<p>Option to deliver 5Ml/d of leakage savings for £46.58million over a 10 year period. Costs and benefits are based on equivalent PMV numbers required to meet target savings based on an average saving per scheme of 4.2m3/d.</p> <p>Option is based on cumulative costs and benefits identified within options WR511g-h, and acts as an option instead of rather than in addition too.</p>
WR511j	LEA-SRZ15_Pressure management	10	<p>Option to deliver 10Ml/d of leakage savings for £93.160million over a 15 year period. Costs and benefits are based on equivalent PMV numbers required to meet target savings based on an average saving per scheme of 4.2m3/d.</p> <p>Option is based on cumulative costs and benefits identified within options WR511g-l, and acts as an option instead of rather than in addition too.</p>
WR516a	LEA-SRZ5_Mains rehabilitation/renewal/replacement	10	Undertake Mains renewal based on outputs of Pioneer Model to achieve 10Ml/d saving over a 5 year period. Renewal involves excavation to remove old pipe with new 25mm PE pipe (metre units). Excavations assumed to be in both urban and rural areas, but predominantly in densely lain urban areas.
WR516b	LEA-SRZ5_Mains rehabilitation/renewal/replacement	20	Undertake Mains renewal based on outputs of Pioneer Model to achieve 10Ml/d saving over a 5 year period - scaled to deliver 20Mld. Renewal involves excavation to remove old pipe with new 25mm PE pipe (metre units). Excavations assumed to be in both urban and rural areas, but predominantly in densely lain urban areas
WR516c	LEA-SRZ5_Mains rehabilitation/renewal/replacement	30	Undertake Mains renewal based on outputs of Pioneer Model to achieve 10Ml/d saving over a 5 year period - scaled to deliver 30Mld. Renewal involves excavation to remove old pipe with new 25mm PE pipe (metre units). Assume works relates to renewal/replacement of Large Diameter Trunk Mains. Excavations assumed to be in both urban and rural areas, but predominantly in densely lain urban areas

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Option ID	Option Name	Yield	Description
WR516d	LEA-SRZ5_Mains rehabilitation/renewal/replacement	40	Undertake Mains renewal based on outputs of Pioneer Model to achieve 10MI/d saving over a 5 year period - scaled to deliver 40MI/d. Renewal involves excavation to remove old pipe with new 25mm PE pipe (metre units). Excavations assumed to be in both urban and rural areas, but predominantly in densely lain urban areas
WR516e	LEA-SRZ5_Mains rehabilitation/renewal/replacement	50	Undertake Mains renewal based on outputs of Pioneer Model to achieve 10MI/d saving over a 5 year period - scaled to deliver 50MI/d. Renewal involves excavation to remove old pipe with new 25mm PE pipe (metre units). Excavations assumed to be in both urban and rural areas, but predominantly in densely lain urban areas
WR516f	LEA-SRZ5_Mains rehabilitation/renewal/replacement	60	Undertake Mains renewal based on outputs of Pioneer Model to achieve 10MI/d saving over a 5 year period - scaled to deliver 60MI/d. Renewal involves excavation to remove old pipe with new 25mm PE pipe (metre units). Excavations assumed to be in both urban and rural areas, but predominantly in densely lain urban areas
WR516g	LEA-SRZ10_Mains rehabilitation/renewal/replacement	80	Undertake Mains renewal based on outputs of Pioneer Model to achieve 10MI/d saving over a 5 year period - scaled to deliver 80MI/d over 10 years. Renewal involves excavation to remove old pipe with new 25mm PE pipe (metre units). Assume works relates to renewal/replacement of Large Diameter Trunk Mains. Excavations assumed to be in both urban and rural areas, but predominantly in densely lain urban areas
WR516h	LEA-SRZ10_Mains rehabilitation/renewal/replacement	100	Undertake Mains renewal based on outputs of Pioneer Model to achieve 10MI/d saving over a 5 year period - scaled to deliver 100MI/d over 10 years. Renewal involves excavation to remove old pipe with new 25mm PE pipe (metre units). Excavations assumed to be in both urban and rural areas, but predominantly in densely lain urban areas
WR516h1	LEA-SRZ10_Mains rehabilitation/renewal/replacement	46	Undertake Mains renewal based on outputs of Pioneer Model to achieve 46MI/d saving over a 10 year period by providing 490km of mains (assumed to be 25mm PE pipe). Excavations assumed to be in both urban and rural areas, but predominantly in densely lain urban areas
WR516h2	LEA-SRZ25_Mains rehabilitation/renewal/replacement	54	Undertake Mains renewal based on outputs of Pioneer Model to achieve 54MI/d saving over a 25 year period by providing 1,449km of mains (assumed to be 25mm PE pipe). Excavations assumed to be in both urban and rural areas, but predominantly in densely lain urban areas
WR516i	LEA-SRZ10_Mains rehabilitation/renewal/replacement	120	Undertake Mains renewal based on outputs of Pioneer Model to achieve 10MI/d saving over a 5 year period - scaled to deliver 120MI/d over 10 years. Renewal involves excavation to remove old pipe with new 25mm PE pipe (metre units). Excavations assumed to be in both urban and rural areas, but predominantly in densely lain urban areas
WR516j	LEA-SRZ10_Mains rehabilitation/renewal/replacement	140	Undertake Mains renewal based on outputs of Pioneer Model to achieve 10MI/d saving over a 5 year period - scaled to deliver 140MI/d over 10 years. Renewal involves excavation to remove old pipe with new 25mm PE pipe (metre units). Excavations assumed to be in both urban and rural areas, but predominantly in densely lain urban areas
WR516k	LEA-SRZ10_Mains rehabilitation/renewal/replacement	160	Undertake Mains renewal based on outputs of Pioneer Model to achieve 10MI/d saving over a 5 year period - scaled to deliver 160MI/d over 10 years. Renewal involves excavation to remove old pipe with new 25mm PE pipe (metre units). Excavations assumed to be in both urban and rural areas, but predominantly in densely lain urban areas

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Option ID	Option Name	Yield	Description
WR516l	LEA-SRZ15_Mains rehabilitation/renewal/replacement	180	Undertake Mains renewal based on outputs of Pioneer Model to achieve 10Ml/d saving over a 5 year period - scaled to deliver 180Mld over 10 years. Renewal involves excavation to remove old pipe with new 25mm PE pipe (metre units). Excavations assumed to be in both urban and rural areas, but predominantly in densely lain urban areas
WR516m	LEA-SRZ15_Mains rehabilitation/renewal/replacement	200	Undertake Mains renewal based on outputs of Pioneer Model to achieve 10Ml/d saving over a 5 year period - scaled to deliver 200Mld over 10 years. Renewal involves excavation to remove old pipe with new 25mm PE pipe (metre units). Excavations assumed to be in both urban and rural areas, but predominantly in densely lain urban areas
WR520c	LEA-SRZ5_DMA optimisation	2	Splitting large DMAs to help identify smaller outbreaks and leaks and improve targeting. 4 DMAs have been identified within North Eden WRZ to be of a non optimal size and may require up to 8 new meter installs or replacement to reduce the size of the DMA. The programme is part of a region wide programme of works to delivery DMA optimisations over a 15 year period, but is likely to be delivered in the first 5 years.
WR524c	LEA-SRZ5_Upstream tile optimisation	3.585	This option includes end to end verification of existing meters to enable repair, recalibration of promotion for replacement and assumes a new meter and chamber will be required. Meters within this option are predominantly large diameter EM meters (200mm or above in size). Improving upstream meter accuracy and coverage, helps to improve the validation of upstream leakage (Unaccounted For Water- UFW), and enables improved targeting to ensure flow balances are reporting accurately by resolving upstream UFW and leakage reduction can be targeted.
WR524d	LEA-SRZ10_Upstream tile optimisation	5.77	This Option includes end to end verification of existing meters to enable repair, recalibration of promotion for replacement but assumes a new meter and chamber will be required. Meters within this option are predominantly large diameter EM meters (200mm or above in size).
WR532	LEA-SRZ15_Dynamic Network Management	31	15 year programme to develop a dynamic network utilising monitoring and control technologies supported by improve analytics to spot leaks, and other network issues faster, to enable the network to manage itself or enable manual intervention through actionable insight based on more informed decisions.



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Table 5.4 Feasible Leakage Options Assessment Summary: Strategic Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR500	Construction (negative)	-/?	0	0	0	0	0	0	-	--/?	0	-/?	0	0	0	-/?	0	-/?
	Construction (positive)	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
	Operation (positive)	0	0	0	0	++	0	0	0	++/?	0	++	0	++	++	0	0	0
WR502c	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	0	0	0	0	+++	0	0	0
WR502d	Construction (negative)	0	0	0	0	0	0	0	-/?	-	0	0	0	0	0	--	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	0	+++	0	+++	+++	0	0	0
WR502e	Construction (negative)	0	0	0	0	0	0	0	-/?	-	0	0	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	+++	0	+++	+++	0	0	0
WR502f	Construction (negative)	0	0	0	0	0	0	0	-/?	-	0	0	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	+++	0	+++	+++	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR510	Construction (negative)	-/?	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	++	0	0	0	+	0	++	0	++	++	0	0	0
WR511g	Construction (negative)	0	0	0	0	0	0	0	-/?	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	+	0	+	+	0	0	0
WR511h	Construction (negative)	0	0	0	0	0	0	0	-/?	0	0	0	0	0	0	0	0	0
	Construction (positive)	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



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	+	0	+	+	0	0	0
WR511i	Construction (negative)	0	0	0	0	0	0	0	-/?	-	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	++	0	0	0	++	0	++	0	++	++	0	0	0
WR511j	Construction (negative)	0	0	0	0	0	0	0	-/?	-	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	++	0	0	0	++	0	++	0	++	++	0	0	0
WR516a	Construction (negative)	-/?	0	0	0	0	0	0	-/?	-	0	0	0	0	0	--	-/?	-/?
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation (positive)	0	0	0	0	+++	0	0	0	++	0	0	0	0	0	+++	0	0
WR516b	Construction (negative)	-/?	0	0	0	0	0	0	-/?	-	0	-	0	-/?	0	---	-/?	-/?
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	0	0	0	0	0	+++	0	0
WR516c	Construction (negative)	-/?	0	0	0	0	0	0	--/?	--	0	-	0	-/?	0	---	0	-/?
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	0	0	0	0	0	+++	0	0
WR516d	Construction (negative)	-/?	0	0	0	0	0	0	--/?	--	0	--	0	-/?	0	---	-/?	-/?



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	0	0	0	+++	0	0	0
WR516e	Construction (negative)	-/?	0	0	0	0	0	0	--/?	--	0	---	-/?	--/?	0	---	-/?	-/?
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	0	0	0	+++	0	0	0
WR516f	Construction (negative)	-/?	0	0	0	0	0	0	--/?	--	0	---	-/?	--/?	0	---	-/?	-/?
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	0	0	0	+++	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR516g	Construction (negative)	-/?	0	0	0	0	0	0	--/?	--	0	---	-/?	--/?	0	---	-/?	-/?
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	0	0	0	+++	0	0	0
WR516h	Construction (negative)	-/?	0	0	0	0	0	0	---/?	---	0	---	-/?	--/?	0	---	-/?	-/?
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	0	0	0	+++	0	0	0
WR516h1	Construction (negative)	-/?	0	0	0	0	0	0	-	--	0	-/?	-/?	-/?	0	---	-/?	-/?
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	0	0	0	+++	0	0	0
WR516h2	Construction (negative)	-/?	0	0	0	0	0	0	-	--	0	-/?	-/?	-/?	0	---	-/?	-/?
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	0	0	0	+++	0	0	0
WR516i	Construction (negative)	-/?	0	0	0	0	0	0	---/?	---	0	---	-/?	--/?	0	---	-/?	-/?
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	0	0	0	+++	0	0	0
WR516j	Construction (negative)	-/?	0	0	0	0	0	0	---/?	---	0	---	-/?	--/?	0	---	-/?	-/?
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	0	0	0	+++	0	0	0
WR516k	Construction (negative)	-/?	0	0	0	0	0	0	---/?	---	0	---	-/?	--/?	0	---	-/?	-/?
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	0	0	0	+++	0	0	0
WR516l	Construction (negative)	-/?	0	0	0	0	0	0	---	---	0	---	0	--	0	---	-/?	-/?
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	0	0	0	+++	0	0	0
WR516m	Construction (negative)	-/?	0	0	0	0	0	0	---	---	0	---	0	--	0	---	-/?	-/?



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	0	0	0	+++	0	0	0
WR520c	Construction (negative)	0	0	0	0	0	0	0	-	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	+	0	+	+	0	0	0
WR524c	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	+	0	+	+	0	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR524d	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	++	0	0	0	++	0	0	0	0	++	0	0	0
WR532	Construction (negative)	0	0	0	0	0	0	0	-	-	0	-	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	0	+++	0	+++	+++	0	0	0

Construction Effects

- 1.1.1 Of the twenty-nine feasible leakage options assessed for the Strategic WRZ, nine were assessed as having a significant positive effect on the economy (SEA Objective 11) during the construction phase, with the several others assessed as having a moderate effect. This reflects the potential for capital investment to generate supply chain benefits and employment opportunities as well as increased spend in the local economy by contractors and construction workers.
- 5.2.45 No further significant positive effects were assessed for the identified feasible leakage options identified for the Strategic WRZ during the construction phase. There were minor positive effects assessed for waste and resource use (SEA Objective 15) for Options WR516h1 and WR516h2. This is due to the potential to reuse/recycle construction materials including steel and plastic from the replacement of old pipes, however the significance of this is unknown.
- 5.2.46 In contrast to this, nine of the feasible leakage options were assessed as having a significant negative effect on the economy (SEA Objective 11) during their construction. This reflects the potential for logistical disruption caused by increased congestion associated with construction activity and the transportation of materials when renewing significant sections of pipeline.
- 5.2.47 Fourteen of the feasible leakage options were assessed as having a significant negative impact on waste and resource use (SEA Objective 15) during the construction phase, and six were assessed as having a significant negative impact on greenhouse gas emissions (SEA Objective 9), with many of the other options being assessed as having a minor/moderate effect against these objectives. This reflects the large scale of the options and the potential for construction to produce significant amounts of waste material, including concrete, steel, and plastic. With this comes significant amounts of embodied carbon associated with the construction materials and their production, as well as further emissions through vehicle movements and the operation of machinery.
- 5.2.48 The six options assessed as having a significant effect on greenhouse gas emissions (SEA Objective 9) were also assessed as having a significant/uncertain significant effect on air quality (SEA Objective 8) during construction. This reflects the significant number of vehicle movements and therefore miles travelled by vehicles associated with construction of the options, and the impacts that their emissions will have on air local quality.
- 5.2.49 No further significant effects were assessed for the feasible leakage options for the Strategic WRZ during the construction phase although there were a range of other minor and moderate effects identified against biodiversity (SEA Objective 1), tourism and recreation (SEA Objective 12), cultural heritage (SEA Objective 16) and landscape (SEA Objective 17) and the other objectives named above.

Operational Effects

- 5.2.50 Twenty of the twenty-nine feasible leakage options for the Strategic WRZ were assessed as having a significant positive effect on water quantity (SEA Objective 5) and water resource use (SEA Objective 14) as their operation would help to ensure the continuity of a

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safe and secure drinking water supply which may in-turn support economic and population growth.

- 5.2.51 Fourteen of the leakage options for the Strategic WRZ were assessed as having a significant positive effect on greenhouse gas emissions (SEA Objective 9) during their operation. This reflects the scale of the options and subsequent savings, showing the potential for emissions to be saved through reduced demand for energy to abstract, treat, and put water back into supply.
- 5.2.52 Five of the leakage options for the Strategic WRZ were assessed as having a significant effect on the economy (SEA Objective 11) during operation, and four options were assessed as having a significant effect on human health and wellbeing (SEA Objective 13). Extra design capacity provided by the options would also help to ensure a continual supply of clean drinking water and increase resilience of supply to UU customers, supporting economic growth which could result in a positive effect on the local economy and wellbeing. All the leakage options for the Strategic WRZ were assessed as having a range of minor and moderate positive effects against the objectives named above.
- 5.2.53 No significant, moderate, or minor negative effects were identified during assessment of the feasible leakage options for the Strategic WRZ. This reflects the limited resource required for the operation of identified feasible leakage options as disturbed ground will be restored, and operational emissions/waste production from loggers will be negligible. Once works have been completed, the feasible leakage reduction options are considered unlikely to have any adverse environmental effects.

Metering Options

- 5.2.54 A total of seven feasible metering options were assessed for the Strategic WRZ; these are listed in **Table 5.5**. A summary of the assessment of these options is presented in **Table 5.6** with commentary on the likely significant construction and operational effects provided below. Detailed assessments are contained at **Appendix F**.

Table 5.5 Feasible Metering Options: Strategic Resource Zone

Option ID	Option Name	Yield	Description
WR601c	EMT-SRZ10_Enhanced metering of households (smart meters)	33	<p>Proactive installation of flow meters on unmetered households including void properties. Option includes</p> <ul style="list-style-type: none"> • resolution of joint supplies or difficult meter installation • the continuation of FMO metering, for customers opting to be billed from a meter. • assumption that 5% of meters installs will be install into an existing meter box <p>Note that there is a choice between WR601c, WR601d, WR603c and WR603d to which goes into the final WRMP24 plan. Only 1 option can be promoted for metering within Strategic WRZ.</p>
WR601d	EMT-SRZ15_Enhanced metering of	58	<p>Proactive installation of flow meters on unmetered Households including void properties. Option includes</p> <ul style="list-style-type: none"> • resolution of joint supplies or difficult meter installation

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Option ID	Option Name	Yield	Description
	households (smart meters)		<ul style="list-style-type: none"> the continuation of FMO metering, for customers opting to be billed from a meter. assumption that 5% of meters installs will be install into an existing meter box <p>Note that there is a choice between WR601c, WR601d, WR603c and WR603d to which goes into the final WRMP24 plan. Only 1 option can be promoted for metering within Strategic WRZ.</p>
WR603c	EMT-SRZ5_Enhanced metering of households on single supplies (smart meters)	14	<p>Proactive installation of flow meters on unmetered Households including void properties. Option includes</p> <ul style="list-style-type: none"> resolution of joint supplies or difficult meter installation the continuation of FMO metering, for customers opting to be billed from a meter. assumption that 5% of meters installs will be install into an existing meter box <p>Note that there is a choice between WR601c, WR601d, WR603c and WR603d to which goes into the final WRMP24 plan. Only 1 option can be promoted for metering within Strategic WRZ.</p>
WR603d	EMT-SRZ10_Enhanced metering of households on single supplies (smart meters)	33	<p>Proactive installation of flow meters on unmetered Households including void properties. Option includes</p> <ul style="list-style-type: none"> resolution of joint supplies or difficult meter installation the continuation of FMO metering, for customers opting to be billed from a meter. assumption that 5% of meters installs will be install into an existing meter box <p>Note that there is a choice between WR601c, WR601d, WR603c and WR603d to which goes into the final WRMP24 plan. Only 1 option can be promoted for metering within Strategic WRZ.</p>
WR603e	EMT-SRZ15_Enhanced metering of households on single supplies (smart meters)	53	<p>Proactive installation of flow meters on unmetered Households including void properties. Option includes</p> <ul style="list-style-type: none"> resolution of joint supplies or difficult meter installation the continuation of FMO metering, for customers opting to be billed from a meter. assumption that 5% of meters installs will be install into an existing meter box <p>Note that there is a choice between WR601c, WR601d, WR603c and WR603d to which goes into the final WRMP24 plan. Only 1 option can be promoted for metering within Strategic WRZ.</p>
WR619c	EMT-SRZ10_Upgrade existing household meters to smart	11	<p>From 2030 it is planned to Swap from installing AMR meters to SMART meters as standard. This option looks at the additional benefits and cost based on the Switch of meter types from AMP9 onwards.</p> <p>This option is dependent on either option WR601d or WR603d being selected. It cannot be selected in isolation. Note that cost and benefits provided are based on being in addition to costs, Unit Rates and benefits to WR601c or Wr603c. This is reflected in the assessment.</p>

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Option ID	Option Name	Yield	Description
WR619d	EMT-SRZ15_Upgrade existing household meters to smart	16	<p>From 2030 it is planned to Swap from installing AMR meters to SMART meters as standard. This option looks at the additional benefits and cost based on the Switch of meter types from AMP9 onwards.</p> <p>This option is dependent on either option WR601d or WR603d being selected. It cannot be selected in isolation. Note that cost and benefits provided are based on being in addition to costs, Unit Rates and benefits to WR601d or Wr603d. This is reflected in the assessment.</p>



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Table 5.6 Feasible Metering Options Assessment Summary: Strategic Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR601c	Construction (negative)	0	0	0	0	0	0	0	---/?	--	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	+++	0	+++	+++	0	0	0
WR601d	Construction (negative)	0	0	0	0	0	0	0	---/?	--	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	+++	0	+++	+++	0	0	0
WR603c	Construction (negative)	0	0	0	0	0	0	0	---/?	--	0	0	0	0	0	-	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	++	0	++	+++	0	0	0
WR603d	Construction (negative)	0	0	0	0	0	0	0	---/?	--	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	+++	0	+++	+++	0	0	0
WR603e	Construction (negative)	0	0	0	0	0	0	0	---/?	--	0	0	0	0	0	--/?	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	+++	0	+++	+++	0	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR619c	Construction (negative)	0	0	0	0	0	0	0	-	?	0	-	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	0	++	0	++	+++	0	0	0
WR619d	Construction (negative)	0	0	0	0	0	0	0	-	?	0	-	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	0	++	0	++	+++	0	0	0

Construction Effects

- 5.2.55 All seven of the feasible metering options assessed for the Strategic WRZ were assessed as having a significant positive effect on the economy (SEA Objective 11) during the construction phase. This reflects the potential for capital investment to generate supply chain benefits and employment opportunities as well as increased spend in the local economy by contractors and construction workers. No other significant, moderate or minor positive effects were identified for the feasible metering options in the Strategic WRZ.
- 5.2.56 Construction of five of the seven options has been assessed as having a significant negative effect on air quality (SEA Objective 8) due to the potential for vehicle movements and the operation of plant to affect local air quality and generate noise/vibration disturbance. The remaining two options (WR619c and WR619d) were assessed as having a minor negative impact on air quality.
- 5.2.57 No other significant negative effects were identified for the construction phase of the feasible metering options for the Strategic WRZ however a range of minor and moderate effects were assessed against greenhouse gas emissions (SEA Objective 9) and waste and resource use (SEA Objective 15) due to the materials used during construction and associated vehicle movements for their transportation and construction.

Operational Effects

- 5.2.58 All seven of the feasible metering options identified for the Strategic WRZ were assessed as having a significant positive effect on water quantity (SEA Objective 5) and water resource use (SEA Objective 14) as their operation would help to ensure the continuity of a safe and secure drinking water supply which may in-turn support economic and population growth.
- 5.2.59 Significant positive effects were also assessed against the economy (SEA Objective 11) as well as human health and wellbeing (SEA Objective 13). Extra design capacity provided by the options would also help to ensure a continual supply of clean drinking water and increase resilience of supply to UU customers, supporting economic growth which could result in a positive effect on the local economy and wellbeing. Those that were not assessed as significant were assessed as having moderate effects on these objectives
- 5.2.60 Except for WR619c and WR619d that were assessed as moderate, all the options have also been assessed as having a significant positive effect on greenhouse gas emissions (SEA Objective 9). This reflects the emissions saved from reduced electricity production to abstract, treat, and put water back into supply due to the decrease in demand.
- 5.2.61 No further significant negative effects were identified during assessment of the feasibly supply options for the Strategic WRZ.
- 5.2.62 No negative effects were assessed for any of the feasible metering options within the Strategic WRZ during their operation. Once works have been completed, the feasible metering options are considered unlikely to have any adverse environmental effects.

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Efficiency Options

5.2.63 A total of eight feasible efficiency options were assessed for the Strategic WRZ; these are listed in **Table 5.7**. A summary of the assessment of these options is presented in **Table 5.8** with commentary on the likely significant construction and operational effects provided below. Detailed assessments are contained at **Appendix F**.

Table 5.7 Feasible Efficiency Options: Strategic Resource Zone

Option ID	Option Name	Yield	Description
WR658c	WSD-SRZ10_Free water efficiency devices (inside/internal)	5	<p>Provision of various water efficiency devices to be ordered via UU website, then posted to customers to fit themselves.</p> <p>Number of units and costs are based on average historic uptake of current offerings, whereas benefits have been based on an assessment of meter flow data for metered customers who have order devices, based on consumption data prior and post order of devices.</p>
WR659c	WER-SRZ15_Free water efficiency devices (outside/external)	4.4	Free supply of external household water efficiency devices to be ordered via the UU website then posted to customers to fit themselves.
WR661c	WUA-SRZ15_Free water efficiency audits (households)	4.855	Undertake Water Audits on metered customers (existing or newly metered) and provide free supply and fitting of water saving devices to customer, Fixing leaking toilets etc. (WUA).
WR669a	ISD-SRZ15_Flow regulators	2	<p>Undertake a control trial of both customer Flow restrictor and customer Service PRVs to understand benefits and cost to implement. Utilise the trial to identify how a programme of works could be developed with scalable costs and benefits.</p> <p>Flow restrictors will help with water efficiency by limiting peak flows, likely to be caused by customer side leakage or exception use. Service PRVs will help with water efficiency to reduce pressure to reasonable levels, therefore reducing the risk of a customer side leak, both external and internal, but also help reduce water demand throughout the day, however not every property would benefit from a service PRV.</p>
WR677c	WUA-SRZ5_Non-household water efficiency programme	7	Review and provide free Water Audits, provision and fitting of water efficiency devices on commercial properties. Targeting will be based on users with an abnormal demand for the commercial user type.
WR685c	WER-SRZ15_Rainwater harvesting and water reuse (new builds)	6	Work with a developer to trial rainwater harvesting and grey water systems within a select number of new build properties so to understand the true cost and benefits of such systems within new build properties on household demand. The trial needs to develop methods of how incentivise developers to build such system going forward.

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Option ID	Option Name	Yield	Description
WR694c	WSA-SRZ15_Government intervention (water labelling, standards)	97	Government water labelling campaign, involving the labelling of consumer devices to encourage the purchase and use/installation of water efficient devices.
WR694f	WSA-SRZ15_Government intervention (water labelling, standards)	36	Government water labelling campaign, involving the labelling of consumer devices to encourage the purchase and use/installation of water efficient devices



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Table 5.8 Feasible Efficiency Options Assessment Summary: Strategic Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape	
WR658c	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0	
	Construction (positive)	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	
	Operation (positive)	0	0	0	0	++	0	0	0	0	+	0	++	0	++	++	0	0	0
WR659c	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	0	++	0	+	0	+	+	0	0	0
WR661c	Construction (negative)	0	0	0	0	0	0	0	-/?	-	0	0	0	0	0	0	-	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	++	0	++	0	+	+	0	0	0
WR669a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-/?	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	+	0	+	+	0	0	0
WR677c	Construction (negative)	0	0	0	0	0	0	0	-/?	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	++	0	0	0	+	0	++	0	++	++	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR685c	Construction (negative)	0	0	0	0	0	0	0	--/?	---	0	0	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	++	0	0	0	0	++	0	++	0	++	++	0	0
WR694c	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	0	+++	0	+++	0	+++	+++	0	0
WR694f	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	+++	0	+++	+++	0	0	0

Construction Effects

- 5.2.64 No significant positive effects were identified during the assessment of the feasible efficiency options identified for the Strategic WRZ. Moderate effects were assessed against the economy (SEA Objective 11) for two options, reflecting the scale of investment associated with the options and how expenditure associated with the enabling works for these options would be relatively small and be unlikely to have a substantive impact in terms of supply chain benefits.
- 5.2.65 No other minor/moderate effects were assessed which reflects the small-scale nature of the options during the construction phase, with water efficiency devices being sent out to customers to fit themselves, and provision of other free water saving devices and efficiency audits requiring little resource to install.
- 5.2.66 No significant negative effects were identified during the assessment of the water efficiency options in for the Strategic WRZ. Embodied carbon associated with water efficiency/saving devices would be low and government schemes such as water labelling would utilise very little resource, requiring no construction/installation. A minor negative effect has been assessed against waste and resource use (SEA Objective 15), for of the eight, although uncertain for one, during the construction phase due to waste associated with water efficiency devices. Minor negative effects were also assessed against air quality (SEA Objective 8) and greenhouse gas emissions (SEA Objective 9) due to the potential for vehicle movements and their associated greenhouse gas emissions and the operation of plant to affect local air quality and generate noise/vibration disturbance.

Operational Effects

- 5.2.67 Options WR694c and WR694f have been assessed as having significant positive impacts on five SEA objectives during their operation; water quantity (SEA Objective 5), greenhouse gas emissions (SEA Objective 9), economy (SEA Objective 11), human health and wellbeing (SEA Objective 13) and water resource use (SEA Objective 14). This is due to the reduction in demand for water and associated carbon emissions from increased efficiency. Their operation would also help to ensure the continuity of a safe, and secure drinking water supply which may in-turn support economic and population growth. The other six efficiency options in the Strategic WRZ have been assessed as having a range of minor and moderate positive effects on these objectives, with no other positive effects identified during the operational phase.
- 5.2.68 No negative effects were assessed for any of the feasible efficiency options for the Strategic WRZ during their operation. Once works have been completed, the feasible efficiency options are considered unlikely to have any adverse environmental effects.

5.3 Carlisle Resource Zone

Supply Options

- 5.3.1 A total of nine feasible supply options were assessed for the Carlisle WRZ; these are listed in **Table 5.9**. A summary of the assessment of these options is presented in **Table 5.10**

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with commentary on the likely significant construction and operational effects provided below. Detailed assessments are contained at **Appendix F**.

Table 5.9 Feasible Supply Options: Carlisle Resource Zone

Option ID	Option Name	Yield	Description
WR041	SWN_RIVER IRTHING	6.5	[REDACTED]
WR042	SWN_RIVER ESK	6.5	
WR043	SWN_RIVER PETTERIL	6.5	
WR055	SWE_NORTH CUMBRIA	5	
WR095	GWE_ROUGHTON GILL	1.5	

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Option ID	Option Name	Yield	Description
WR128	GWE_TARN WOOD	1.7	
WR148	GWN_NORTH CUMBRIA	6.5	
WR811	WIT_THIRD PARTY_5	10	
WR824	NIT_THIRD PARTY_15	2.2	



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Table 5.10 Feasible Supply Options Assessment Summary: Carlisle Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR041	Construction (negative)	--/?	--	0	-	0	0	-	-	---	-	-	-	-	0	---	-	-
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR042	Construction (negative)	--	--	0	-	0	0	--	--	---	-	-	-	-	0	---	0	-
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR043	Construction (negative)	-	--	0	-	0	0	-	-	---	-	-	-	-	0	---	-	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	--/?	0	0	0	--	--	-	0	--	0	0	-	0	0	-	0	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR055	Construction (negative)	-	-	0	-	0	0	0	-	--	0	-	0	-	0	---	0	-
	Construction (positive)	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	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR095	Construction (negative)	-/?	--	0	0	0	0	-	-	--	-	-	-	-	0	--	-	-
	Construction (positive)	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	-	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR128	Construction (negative)	-	--	0	0	0	0	0	-	---	0	-	0	-	0	---	-	-
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	++	0	0	0	+/?	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	-/?	0	0	0	--	--	0	0	--	0	0	0	0	0	0	0	0
	Operation (positive)	0	++	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR148	Construction (negative)	-	--	0	0	0	0	0	-	--	0	-	0	-	0	---	0	-
	Construction (positive)	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
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR811	Construction (negative)	---	---	0	-	0	0	-	--	---	-	--	-	-	0	---	-	--
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+/?	0	0
	Operation (negative)	---/?	0	---/?	0	--	--	-	-	---	0	0	-	0	0	-	0	-
	Operation (positive)	0	+++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR824	Construction (negative)	---/?	---	0	-	0	0	-	-	--	-	-	-	-	0	---	-	--
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	++	0	0	0	+/?	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	-/?	0	0	0	--	--	-	0	--	0	0	0	0	0	0	0	0
	Operation (positive)	0	+++	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0

Construction Effects

- 5.3.2 Of the nine feasible supply options assessed for the Carlisle WRZ, five (WR041, WR042, WR043, WR055 and WR811) were assessed as having a significant positive effect on the economy (SEA Objective 11) during the construction phase, with the remaining four showing a moderate effect. This reflects the potential for capital investment to generate supply chain benefits and employment opportunities as well as increased spend in the local economy by contractors and construction workers.
- 5.3.3 No further significant positive effects associated with the construction phase were identified during the assessment, however, there were minor positive effects assessed for soils, geodiversity and land use (SEA Objective 4) for several options as well as waste and resource use (SEA Objective 15) for all options, although the effects on this objective were assessed as uncertain.
- 5.3.4 All the feasible supply options other than WR095 were assessed as having a significant negative impact on waste and resource use (SEA Objective 15) during the construction phase, and six were assessed as having a significant negative impact on greenhouse gas emissions (SEA Objective 9), with the remaining options being assessed as having a moderate negative effect against both objectives. This reflects the large scale of the options and the potential for construction to produce significant amounts of waste material, including concrete, steel, and plastic. With this comes significant amounts of embodied carbon associated with the construction materials and their production, as well as further emissions through vehicle movements and the operation of machinery.
- 5.3.5 Options WR811 and WR824 were both assessed as having a significant negative effect on biodiversity (SEA Objective 1) during the construction phase, although for option WR824 this has been assessed as uncertain. This reflects the potential for construction works to result in the loss of/disturbance to habitats and species due to, for example, land take, emissions to air and noise. Option WR811 would sit within four SAC's/SSSI's and would also require works on/near the River Eden and Tributaries SAC/SSSI which could indirectly introduce pollution/debris and affect interest features during construction. The proposed pipeline route would cross a number of other watercourses, posing a risk to the wider water system in the area and downstream. The proposed raw water main route for option WR824 would run within proximity to or directly traverse five SSSI's and cross the River Gelt, a component of the River Eden and Tributaries SAC/SSSI. The route poses a significant risk of environmental damage and disturbance/disruption of wildlife and their movement as well as the potential to indirectly introduce pollution/debris to designated sites. For both options, there is a risk of short-term disturbance to/loss of local habitats during construction as they are situated in rural/semi-rural greenfield settings. Site level mitigation measures are expected to prevent significant effects on local ecosystems, designated aquatic interest features, and downstream habitats and wildlife.
- 5.3.6 Options WR811 and WR824 have been assessed as having a significant negative effect on sustainable natural resources (SEA Objective 2) during the construction phase. This reflects the likelihood of temporary and permanent loss of habitats during construction of the options. Option WR811 includes a pipeline that passes through extensive areas of high value habitat and permanent loss of land due to construction of the WTW. Option

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WR824 would see temporary loss of land during construction of the pipeline and minor permanent loss of habitats due to construction of the abstraction infrastructure.

- 5.3.7 A range of minor and moderate negative effects during construction were also assessed against several SEA Objectives for the supply side options in the Carlisle WRZ.

Operational Effects

- 5.3.8 Options WR811 and WR824 were both assessed as having significant positive effects on sustainable natural resources (SEA Objective 2) during operation. This reflects the assumption that the operational biodiversity net gain during operation will be greater than the net loss during the construction phase, although this has not been quantified. The remaining seven options have been assessed as having a moderate effect against this objective.
- 5.3.9 No further significant positive effects were identified during the assessment of the feasible supply options in the Carlisle WRZ, however there were several minor and moderate positive effects assessed for climate resilience (SEA Objective 10), economy (SEA Objective 11), health and well-being (SEA Objective 13) and water resource use (SEA Objective 14), as their operation would help to ensure the continuity of a safe, sustainable and secure drinking water supply which may in-turn support economic and population growth as well as improve resilience to the impacts of climate change.
- 5.3.10 Three options (WR041, WR055 and WR811) were assessed as having significant, yet uncertain, negative effects on biodiversity (SEA Objective 1) during operation. Abstraction as part of WR041 is expected to have an adverse effect on in-river habitats and species and cause other effects such as fish entrainment. For options WR055 and WR811, it is unknown whether changes to abstraction rates will have an adverse effect on the respective waterbodies to support local flora and fauna, and Habitats Directive species in the case of WR055. Regarding WR055, there is also potential risk to downstream habitats and wildlife, including the Solway Firth SPA, SAC and Ramsar sites, although this is uncertain. The Teesmouth and Cleveland Coast SPA/Ramsar sites lie downstream of Option WR811 and there is potential for hydrological effects to reach them. As the scheme involves the transfer of raw water into the river there is additional risk of INNS transfer and water physiochemistry differences.
- 5.3.11 No further significant negative effects were identified during assessment of the feasible supply options in the Carlisle WRZ, although a range of minor and moderate negative effects resulting from operation were assessed against several SEA Objectives for the supply side options in the Carlisle WRZ.

Leakage Options

- 5.3.12 A total of seven leakage options were assessed for the Carlisle WRZ; these are listed in **Table 5.11** together with the related estimated total water saving. The results of the assessment of these options are presented in **Table 5.12** with commentary on the likely significant construction (i.e. enabling/installation/implementation) and operational effects identified provided below. Detailed assessments are contained at **Appendix F**.

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Table 5.11 Feasible Leakage Options: Carlisle Resource Zone

Option ID	Option Name	Yield	Description
WR502a	LEA-CRZ10Permanent network sensors	0.419	<p>Option forms part of a 20 year programme to install and maintain acoustic loggers across the region prioritised based on perceived benefit. It is assumed an estimated 70,000 loggers can be installed in a year, with a limit of approx. 100,000 per AMP +% based on options split into 10MI/d leakage saving.</p> <p>Loggers are assumed to be bought with airtime and battery replacement included for the first 5 years with a 10 year lifespan for the hardware. New loggers will need to be phased in from year under a similar agreement as the initial investment.</p>
WR511a	LEA-CRZ5_Pressure management	0.1	Option to deliver 0.1MI/d of leakage savings for £1.269million over a five year period. Costs and benefits are based on equivalent PMV numbers required to meet target savings based on an average saving per scheme of 3.1m3/d.
WR511b	LEA-CRZ10_Pressure management	0.25	Option to deliver 0.25MI/d of leakage savings for £3.173million over a ten year period. Costs and benefits are based on equivalent PMV numbers required to meet target savings based on an average saving per scheme of 3.1m3/d. Option is based on cumulative costs and benefits identified within options WR511a, and acts as an option instead of rather than in addition too.
WR511c	LEA-CRZ15_Pressure management	0.5	Option to deliver 0.5MI/d of leakage savings for £6.346million over a 15 year period. Costs and benefits are based on equivalent PMV numbers required to meet target savings based on an average saving per scheme of 3.1m3/d. Option is based on cumulative costs and benefits identified within options WR511a, and acts as an option instead of rather than in addition too.
WR516a1	LEA-CRZ15_Mains rehabilitation/renewal/replacement	1	Undertake mains renewal based on outputs of Pioneer Model to achieve 1MI/d saving over a 15 year period by providing 108km of mains (assumed to be 25mm PE pipe). Assume excavations will be in both urban and rural areas, but predominantly in densely lain urban areas.
WR520a	LEA-CRZ5_DMA optimisation	0.07	Splitting large DMAs to help identify smaller outbreaks and leaks and improve targeting. 4 DMAs have been identified within North Eden WRZ to be of a non-optimal size and may require up to 8 new meter installs or replacement to reduce the size of the DMA. The programme is part of a region wide programme of works to delivery DMA optimisations over a 15 year period, but is likely to be delivered in the first 5 years.
WR524a	LEA-CRZ5_Upstream tile optimisation	0.003	This option includes end to end verification of existing meters to enable repair, recalibration of promotion for replacement and assumes a new meter and chamber will be required. Meters within this option are predominantly large diameter EM meters (200mm or above in size). Improving upstream meter accuracy and coverage, helps to improve the validation of upstream leakage (Unaccounted For Water- UFW), and enables improved targeting to ensure flow balances are reporting accurately by resolving upstream UFW and leakage reduction can be targeted.



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Table 5.12 Feasible Leakage Options Assessment Summary: Carlisle Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR502a	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0
WR511a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0
WR511b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR511c	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR516a1	Construction (negative)	-/?	0	0	0	0	0	0	0	-	0	0	0	0	0	--	-/?	-/?
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	0	+	0	0	0	+	0	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR520a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0
WR524a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Construction Effects

- 5.3.13 The anticipated spend over the construction period for Option WR516a1 has been assessed as having a significant positive effect on the economy (SEA Objective 11). This reflects the potential for capital investment to generate supply chain benefits and employment opportunities as well as increased spend in the local economy by contractors and construction workers. Several other options were assessed as having minor and moderate positive effects against SEA Objective 11.
- 5.3.14 No further significant positive effects were assessed for the identified feasible leakage options identified for the Carlisle WRZ during the construction phase.,
- 5.3.15 No significant negative effects were identified during the assessment of the leakage options in for the Carlisle WRZ. Minor/moderate negative effects were assessed against greenhouse gas emissions (SEA Objective 9) and waste and resource use (SEA Objective 15) for options WR502a and WR516a1. This reflects the scale of the options and their potential to produce waste material, including concrete, steel, and plastic. Embodied carbon associated with the construction materials and their production will also be utilised, as well as further emissions through vehicle movements and the operation of machinery. However, a minor/uncertain positive effect was also identified with respect to SEA Objective 15 for Option WR516a1, due to the potential to reuse/recycle construction materials. Minor/uncertain effects on biodiversity (SEA Objective 1), cultural heritage (SEA Objective 16) and landscape (SEA Objective 17) were also assessed for WR516a1 due to its scale and potential to impact on designated sites, although the exact location of works is unknown.

Operational Effects

- 5.3.16 No significant positive or negative effects have been assessed for any of the feasible leakage options for the Carlisle WRZ, during their operation. This reflects the nature of the options aiming to reduce leakage being predominantly repairs/upgrades to existing infrastructure that will have little impact once operational, other than increased efficiency through leakage reduction.
- 5.3.17 Minor positive effects were assessed against greenhouse gas emissions (SEA Objective 9) and water resource use (SEA Objective 14) for several options, due to the reduction in demand for water and associated carbon emissions from increased efficiency. Option WR516a1 was also assessed as having a minor positive on water quantity (SEA Objective 5) through its reduction in demand for water.
- 5.3.18 No negative effects were assessed for any of the feasible leakage options within the Carlisle WRZ during their operation. This further reflects: the limited resources required for the operation of identified feasible leakage options; that disturbed ground will be restored following construction; and operational emissions/waste production will be negligible. Once construction works have been completed, the feasible leakage reduction options are considered unlikely to have any adverse environmental effects.
- 5.3.19 The level of leakage reduction associated with the feasible options in the Carlisle WRZ is unlikely to significantly increase continuity of water supply or support population and/or

economic growth (savings associated with the options would be below 1 MI/d, other than Option WR516a1). Consistent with the definitions of significance (see **Appendix E**), the options were therefore assessed as having neutral effects on health and wellbeing (SEA Objective 13).

Metering Options

5.3.20 A total of three metering options were assessed for the Carlisle WRZ; these are listed in **Table 5.13** together with the related estimated total water saving. The results of the assessment of these options are presented in **Table 5.14** with commentary on the likely significant construction (i.e. enabling/installation/implementation) and operational effects identified provided below. Detailed assessments are contained at **Appendix F**.

Table 5.13 Feasible Metering Options: Carlisle Resource Zone

Option ID	Option Name	Yield	Description
WR601a	EMT-CRZ10_Enhanced metering of households (smart meters)	1.305	Proactive installation of flow meters on unmetered households including void properties to be completed by 2040. Option includes: <ul style="list-style-type: none"> resolution of joint supplies or difficult meter installation the continuation of FMO metering, for customers opting to be billed from a meter assumption that 5% of meters installs will be install into an existing meter box.
WR603a	EMT-CRZ5_Enhanced metering of households on single supplies (smart meters)	1.110	Proactive installation of flow meters on unmetered households including void properties to be completed by 2040. Option includes: <ul style="list-style-type: none"> resolution of joint supplies or difficult meter installation the continuation of FMO metering, for customers opting to be billed from a meter assumption that 5% of meters installs will be install into an existing meter box. There is a choice between WR601a and WR603a, to which goes into the final WRMP24 plan. Both options cannot be included.
WR619a	EMT-CRZ10_Upgrade existing household meters to smart	0.246	From 2030 it is planned to Swap from installing AMR meters to SMART meters as standard. This option looks at the additional benefits and cost based on the Switch of meter types from AMP9 onwards. This option is dependent on either option WR601a or WR603a being selected. It cannot be selected in isolation. Cost and benefits are based on being in addition to costs, Unit Rates and benefits to WR601a or WR603a.

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Table 5.14 Feasible Metering Options Assessment Summary: Carlisle Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR601a	Construction (negative)	0	0	0	0	0	0	0	-/?	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	+	0	+	+	0	0	0
WR603a	Construction (negative)	0	0	0	0	0	0	0	-/?	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	+	0	+	+	0	0	0
WR619a	Construction (negative)	0	0	0	0	0	0	0	0	?	0	0	0	0	0	-	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0

Construction Effects

- 5.3.21 No significant positive effects were identified during the assessment of the feasible metering options identified for the Carlisle WRZ. Minor/moderate effects were assessed against the economy (SEA Objective 11), reflecting the scale of investment associated with the options and how expenditure associated with the enabling works for these options would be relatively small and be unlikely to have a substantive impact in terms of supply chain benefits.
- 5.3.22 The construction phase of the feasible metering options for the Carlisle WRZ was also assessed as having no significant negative effects on the SEA objectives. Minor negative effects were assessed against waste and resource use (SEA Objective 15) for all three options. This reflects the potential for the options to produce minor amounts of waste during production and installation of new flow meters, and likelihood for the materials used to not be completely sustainable. Greenhouse gas emissions associated with production and installation of meters are anticipated to be negligible and have therefore been assessed as having a neutral effect on SEA Objective 9 during the construction phase for all three options. Options WR601a and WR603a were both assessed as having a negative uncertain effect on air quality (SEA Objective 8). This reflects the anticipated number of vehicle movements required for their implementation and their likely effect on air quality over the construction phase if in a concentrated area, however, there remains some uncertainty, as the precise location of meter installations is unknown.

Operational Effects

- 5.3.23 No significant positive or negative effects have been assessed for any of the feasible metering options for the Carlisle WRZ, during their operation. This reflects the nature of the options, which would require little resources to operate and maintain. Minor positive effects were assessed for several options against water quantity (SEA Objective 5), greenhouse gas emissions (SEA Objective 9), water resource use (SEA Objective 14), economy (SEA Objective 11) and human health and wellbeing (SEA Objective 13) for options WR601a and WR603a. Option WR619a was assessed as having minor positive effects on greenhouse gas emissions (SEA Objective 9) and water resource use (SEA Objective 14). This is due to the reduction in demand for water and associated carbon emissions from increased efficiency. Their operation would also help to ensure the continuity of a safe, and secure drinking water supply which may in-turn support economic and population growth.
- 5.3.24 No negative effects were assessed for any of the feasible metering options within the Carlisle WRZ during their operation. Once construction works have been completed, the feasible metering options are considered unlikely to have any adverse environmental effects.

Efficiency Options

- 5.3.25 A total of eight water efficiency options were assessed for the Carlisle WRZ; these are listed in **Table 5.15** together with the related estimated total water saving. The results of the assessment of these options are presented in **Table 5.16** with commentary on the

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likely significant construction (i.e. enabling/installation/implementation) and operational effects identified provided below. Detailed assessments are contained at **Appendix F**.

Table 5.15 Feasible Efficiency Options: Carlisle Resource Zone

Option ID	Option Name	Yield	Description
WR658a	WSD-CRZ10_Free water efficiency devices (inside/internal)	0.012	<p>Provision of various water efficiency devices to be ordered via UU website, then posted to customers to fit themselves.</p> <p>Number of units and costs are based on average historic uptake of current offerings, whereas benefits have been based on an assessment of meter flow data for metered customers who have order devices, based on consumption data prior and post order of devices.</p>
WR659a	WER-CRZ15_Free water efficiency devices (outside/external)	0.08	This option provides free water efficiency devices to an estimated 6,610 households in the Carlisle WRZ by 2040 to provide 0.08MI/d.
WR661a	WUA-CRZ15_Free water efficiency audits (households)	0.092	Undertake Water Audits on metered customers (existing or newly metered) and provide free supply and fitting of water saving devices to customer, Fixing leaking toilets etc. (WUA).
WR669b	ISD-CRZ15_Flow regulators	0.12	Undertake a control trial of both customer flow restrictor and customer service PRVs to understand benefits and cost to implement. Utilise the trial to identify how a programme of works could be developed with scalable costs and benefits.
WR677a	WUA-CRZ15_Non-household water efficiency programme	1	Review and provide free Water Audits, provision and fitting of water efficiency devices on commercial properties. Targeting will be based on users with an abnormal demand for the commercial user type.
WR685a	WER-CRZ5_Rainwater harvesting and water reuse (new builds)	0.021	Work with a developer to trial rainwater harvesting and grey water systems within a select number of new build properties so to understand the true cost and benefits of such systems within new build properties on household demand. The trial needs to developer methods of how incentivise developers to build such system going forward.
WR694a	WSA-CRZ15_Government intervention (water labelling, standards)	2	Government water labelling campaign, involving the labelling of consumer devices to encourage the purchase and use/installation of water efficient devices in the Carlisle Resource Zone.
WR694d	WSA-CRZ15_Government intervention (water labelling, standards)	1	Government water labelling campaign, involving the labelling of consumer devices to encourage the purchase and use/installation of water efficient devices in the Carlisle Resource Zone.



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Table 5.16 Feasible Efficiency Options Assessment Summary: Carlisle Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR658a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR659a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0
WR661a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR669b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-/?	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR677a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	+	0	+	+	0	0	0
WR685a	Construction (negative)	0	0	0	0	0	0	0	-/?	-	0	0	0	0	0	-	0	0
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR694a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	+	0	+	+	0	0	0
WR694d	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	+	0	+	+	0	0	0

Construction Effects

- 5.3.26 No significant positive effects were identified during the assessment of the feasible water efficiency options identified for the Carlisle WRZ for the construction phase. This reflects the small-scale nature of the options, with water efficiency devices being sent out to customers to fit themselves, and provision of other free water saving devices and efficiency audits. Expenditure associated with the enabling works necessary for the water efficiency options would be relatively small and would therefore be unlikely to have a substantive impact in terms of supply chain benefits or the economy. However, a minor positive effect was identified against the economy (SEA Objective 11) in respect of option WR685a associated with the minor level of construction capital expenditure it would require.
- 5.3.27 No significant negative effects were identified during the assessment of the water efficiency options in for the Carlisle WRZ. Embodied carbon associated with water efficiency/saving devices would be low and government schemes such as water labelling would utilise very little resources, requiring no construction/installation. However, a minor negative effect on greenhouse gas emissions (SEA Objective 9) was identified against option WR685a due to the embodied/construction carbon associated with the production/installation of rainwater harvesting systems. A minor negative uncertain effect was also identified against air quality (SEA Objective 8) for option WR685a, as it is expected to require vehicle movements, with associated effects on air quality, for the installation rainwater harvesting systems, however, the exact number is uncertain. A minor negative effect has been assessed against waste and resource use (SEA Objective 15), for options WR659a, WR685a and WR669b (although it is uncertain for the latter), during the construction phase, due to waste associated with water efficiency devices.

Operational Effects

- 5.3.28 No significant positive or negative effects have been assessed for any of the feasible water efficiency options for the Carlisle WRZ, during their operation. Again, this reflects the nature of the options, which would require little resources to operate and maintain. Minor positive effects were assessed for several options against water quantity (SEA Objective 5), greenhouse gas emissions (SEA Objective 9), water resource use (SEA Objective 14), economy (SEA Objective 11) and human health and wellbeing (SEA Objective 13). This is due to the reduction in demand for water and associated carbon emissions from increased efficiency. Their operation would also help to ensure the continuity of a safe, and secure drinking water supply which may in-turn support economic and population growth.
- 5.3.29 No negative effects were assessed for any of the feasible water efficiency options within the Carlisle WRZ during their operation.

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5.4 North Eden Resource Zone

Supply Options

5.4.1 A total of two feasible supply options were assessed for the North Eden WRZ; these are listed in **Table 5.17**. A summary of the assessment of these options is presented in **Table 5.18** with commentary on the likely significant construction and operational effects provided below. Detailed assessments are contained at **Appendix F**.

Table 5.17 Feasible Supply Options: North Eden Resource Zone

Option ID	Option Name	Yield	Description
WR038	SWN_RIVER EAMONT	5	
WR084	ITC_CARLISLE	3	



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Table 5.18 Feasible Supply Options Assessment Summary: North Eden Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR084	Construction (negative)	-	--	0	-	0	0	-	-	---	-	-	-	-	0	---	---/?	-
	Construction (positive)	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
	Operation (positive)	0	++	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR038	Construction (negative)	---/?	--	0	-	0	0	-	-	---	-	-	-	-	0	---	-	-
	Construction (positive)	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	--	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0

Construction Effects

- 5.4.2 The anticipated spend over the construction period for Option WR038 has been assessed as having a significant positive effect on the economy (SEA Objective 11). This reflects the potential for capital investment to generate supply chain benefits and employment opportunities as well as increased spend in the local economy by contractors and construction workers. Option WR048, meanwhile, was assessed as having a moderate positive effect against SEA Objective 11.
- 5.4.3 No further significant positive effects were identified during the assessment of options WR038 and WR048, however there were several minor and moderate effects assessed, including those highlighted above and below and additionally with regard to soils, geodiversity and land use (SEA Objective 4).
- 5.4.4 Significant negative effects were assessed for both options against greenhouse gas emissions (SEA Objective 9) and waste and resource use (SEA Objective 15). This reflects the large scale of the options and their potential to produce significant amounts of waste material, including concrete, steel and plastic. With this comes significant amounts of embodied carbon associated with the construction materials and their production, as well as further emissions through vehicle movements and the operation of machinery. However, for both options a minor positive uncertain effect was also identified against SEA Objective 15, reflecting the potential for the re-use/recycling of construction waste materials, however, the significance of this is uncertain.
- 5.4.5 The construction of Option WR038 was assessed as having a significant but uncertain negative effect on biodiversity (SEA Objective 1). This reflects potential for construction works to result in the loss of/disturbance to habitats and species as a result of, for example, land take, emissions to air and noise. The option has been assessed as certainly impacting on the River Eden SAC, which covers the river where the proposed new abstraction would take place, and potentially impacting habitats and species reliant on other designated sites near to the option, as the surrounding area is largely rural/semi-rural.
- 5.4.6 Option WR084 has been assessed as having a significant but uncertain negative effect on cultural heritage (SEA Objective 16). This reflects the potential for construction to impact a registered park/garden as well as a number of scheduled monuments and listed buildings near the site. The proposed pipeline route passes within 100m of 3 Scheduled Monuments and 8 listed buildings. It is proposed to cross the site of the Old Penrith (Voreda) Plumpton Wall Scheduled Monument which would cause significant damage to the structure. If the pipeline route were to move, negative effects would still be expected due to its close proximity a number of designated monuments and buildings.
- 5.4.7 A range of minor and moderate negative effects during construction were also assessed against several SEA Objectives for both supply side options in the North Eden WRZ.

Operational Effects

- 5.4.8 No significant positive effects were identified with respect to the operation of the feasible supply options in the North Eden WRZ. Both of the feasible options were assessed as

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having a minor/moderate positive effects on sustainable natural resources (SEA Objective 2), climate resilience (SEA Objective 10), economy (SEA Objective 11), health and well-being (SEA Objective 13) and water resource use (SEA Objective 14), as their operation would help to ensure the continuity of a safe, sustainable and secure drinking water supply which may in-turn support economic and population growth as well as improve resilience to the impacts of climate change.

- 5.4.9 The operation of option WR038 has been assessed as having a significant negative yet uncertain effect on biodiversity (SEA Objective 1) as operation of the option could adversely impact nationally and internationally designated conservation sites within the area of the option. The abstraction of water from the river is likely to have a negative impact on the River Eden and Tributaries SAC and SSSI, which supports a range of aquatic Habitats Directive Species which could be vulnerable to changes in the hydrological regime of the river caused by operation of the option. Further impacts on non-designated sites in the area are expected, and there is potential for downstream receptors such as Solway Firth to see negative effects from changes in the hydrological regime, although this is uncertain.
- 5.4.10 A range of minor and moderate negative effects resulting from operation were also assessed against several SEA Objectives for both supply side options in the North Eden WRZ.

Leakage Options

- 5.4.11 A total of six leakage options were assessed for the North Eden WRZ; these are listed in **Table 5.19** together with the related estimated total water saving. The results of the assessment of these options is presented in **Table 5.20** with commentary on the likely significant construction (i.e. enabling/installation/implementation) and operational effects identified provided below. Detailed assessments are contained at **Appendix F**.

Table 5.19 Feasible Leakage Options: North Eden Resource Zone

Option ID	Option Name	Yield	Description
WR502b	LEA-NERZ10_Permanent network sensors	0.279	Option forms part of a 20 year programme to install and maintain acoustic loggers across the region prioritised based on perceived benefit. It is assumed an estimated 70,000 loggers can be installed in a year, with a limit of approx. 100,000 per AMP +% based on options split into 10MI/d leakage saving. Loggers are assumed to be bought with airtime and battery replacement included for the first 5 years with a 10 year lifespan for the hardware. New loggers will need to be phased in from year under a similar agreement as the initial investment.
WR511d	LEA-NERZ5_Pressure management	0.1	Option to deliver 0.1MI/d of leakage savings for £1.024million over a 5 year period. Costs and benefits are based on equivalent PMV numbers required to meet target savings based on an average saving per scheme of 3.9m3/d.

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Option ID	Option Name	Yield	Description
			Delivery of pressure management schemes including but not limited to scheme types such as (new PMV, PMV Modulation, pump modulation, right sizing mains to reduce headloss, pumps for high rise buildings, single property boosters, Duel Feed PMV areas, etc).
WR511e	LEA- NERZ10_Pressure management	0.25	<p>Option to deliver 0.25MI/d of leakage savings for £2.561million over a 10 year period. Costs and benefits are based on equivalent PMV numbers required to meet target savings based on an average saving per scheme of 3.9m3/d.</p> <p>Option is based on cumulative costs and benefits identified within options WR511d, and acts as an option instead of rather than in addition too.</p>
WR511f	LEA- NERZ15_Pressure management	0.5	<p>Option to deliver 0.5MI/d of leakage savings for £5.122million over a 15 year period. Costs and benefits are based on equivalent PMV numbers required to meet target savings based on an average saving per scheme of 3.9m3/d.</p> <p>Option is based on cumulative costs and benefits identified within options WR511d-e, and acts as an option instead of rather than in addition too.</p>
WR520b	LEA-NERZ5_DMA optimisation	0.042	<p>Splitting large DMAs to help identify smaller outbreaks and leaks and improve targeting. 4 DMAs have been identified within North Eden WRZ to be of a non-optimal size and may require up to 8 new meter installs or replacement to reduce the size of the DMA. The programme is part of a region wide programme of works to delivery DMA optimisations over a 15 year period, but is likely to be delivered in the first 5 years.</p>
WR524b	LEA- NERZ5_Upstream tile optimisation	0.02	<p>This option includes end to end verification of existing meters to enable repair, recalibration of promotion for replacement and assumes a new meter and chamber will be required. Meters within this option are predominantly large diameter EM meters (200mm or above in size). Improving upstream meter accuracy and coverage, helps to improve the validation of upstream leakage (Unaccounted For Water- UFW), and enables improved targeting to ensure flow balances are reporting accurately by resolving upstream UFW and leakage reduction can be targeted.</p>

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Table 5.20 Feasible Leakage Options Assessment Summary: North Eden Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR502b	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0
WR511d	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR511e	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR511f	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR520b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR524b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0

Construction Effects

- 5.4.12 No significant positive effects were identified during the assessment of the feasible leakage options identified for the North Eden WRZ. Minor/moderate effects were assessed against the economy (SEA Objective 11), reflecting the scale of investment associated with the options and how expenditure associated with the enabling works for these options would be relatively small and be unlikely to have a substantive impact in terms of supply chain benefits.
- 5.4.13 The construction phase of the feasible leakage options for the North Eden WRZ was also assessed as having no significant negative effects on any of the SEA objectives. A minor negative effect was assessed against greenhouse gas emissions (SEA Objective 9) for Option WR502b, however, with no other negative effects identified across any of the other options during the construction phase.
- 5.4.14 The lack of significant effects during the construction phase of the feasible leakage options identified for the North Eden WRZ is reflective of the nature of the options, with loggers, meters and PMV's requiring little installation and no new significant infrastructure.

Operational Effects

- 5.4.15 No significant positive or negative effects have been assessed for any of the feasible leakage options for the North Eden WRZ, during their operation. This reflects the nature of the options aiming to reduce leakage being predominantly repairs/upgrades to existing infrastructure, and installation of new meters/, loggers and PMV's, that will have little impact once operational, other than increased efficiency through leakage reduction.
- 5.4.16 Minor positive effects were assessed against greenhouse gas emissions (SEA Objective 9) and water resource use (SEA Objective 14) for several options during operation, due to the reduction in demand for water and associated carbon emissions from increased efficiency.
- 5.4.17 No negative effects were assessed for any of the feasible water efficiency options within the North Eden WRZ during their operation. This further reflects the limited resource requirements for the operation of identified feasible leakage options and as operational emissions/waste production will be negligible. Once construction works have been completed, the feasible leakage reduction options are considered unlikely to have any adverse environmental effects.
- 5.4.18 The level of leakage reduction associated with the feasible options in the North Eden WRZ is unlikely to significantly increase continuity of water supply or support population and/or economic growth (savings associated with the options would be below 1 MI/d). Consistent with the definitions of significance (see **Appendix E**), the options were therefore assessed as having neutral effects on health and wellbeing (SEA Objective 13).

Metering Options

- 5.4.19 A total of three metering options were assessed for the North Eden WRZ; these are listed in **Table 5.21** together with the related estimated total water saving. The results of the assessment of these options is presented in **Table 5.22** with commentary on the likely

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significant construction (i.e. enabling/installation/implementation) and operational effects identified provided below. Detailed assessments are contained at **Appendix F**.

Table 5.21 Feasible Metering Options: North Eden Resource Zone

Option ID	Option Name	Yield	Description
WR601b	EMT- NERZ10_Enhanced metering of households (smart meters)	0.144	<p>Proactive installation of flow meters on unmetered Households including void properties to be completed by 2040. It is expected that North Eden Meter programme will start in AMP9 and be completed within the same AMP.</p> <p>There is a choice between WR601b and WR603b, to which goes into the final WRMP24 plan. Both options cannot be included.</p>
WR603b	EMT- NERZ5_Enhanced metering of households on single supplies (smart meters)	0.122	<p>Proactive installation of flow meters on unmetered Households (excluding voids) to be completed by 2040. It is expected that North Eden Meter programme will start in AMP9 and be completed within the same AMP.</p> <p>There is a choice between WR601b and WR603b, to which goes into the final WRMP24 plan. Both options cannot be included.</p>
WR619b	EMT- NERZ10_Upgrade existing household meters to smart	0.027	<p>From 2030 it is planned to Swap from installing AMR meters to SMART meters as standard. This option looks at the additional benefits and cost based on the Switch of meter types from AMP9 onwards.</p> <p>This option is dependent on either option WR601b or WR603b being selected. It cannot be selected in isolation.</p>



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Table 5.22 Feasible Metering Options Assessment Summary: North Eden Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR601b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0
WR603b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR619b	Construction (negative)	0	0	0	0	0	0	0	0	?	0	0	0	0	0	-	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0

Construction Effects

- 5.4.20 No significant positive effects were identified during the assessment of the feasible metering options identified for the North Eden WRZ. Minor/moderate effects were assessed against the economy (SEA Objective 11), reflecting the scale of investment associated with the options and how expenditure associated with the enabling works for these options would be relatively small and be unlikely to have a substantive impact in terms of supply chain benefits.
- 5.4.21 The construction phase of the feasible metering options for the North Eden WRZ was also assessed as having no significant negative effects on any of the SEA objectives. Minor negative effects were assessed against waste and resource use (SEA Objective 15) for all three options. This reflects the potential for the options to produce minor amounts of waste during production and installation of new flow meters, and likelihood for the materials used to not be completely sustainable. Greenhouse gas emissions associated with production and installation of meters are anticipated negligible and have therefore been assessed as having a neutral effect on SEA Objective 9 during the construction phase for all three options.
- 5.4.22 The lack of significant effects during the construction phase of the feasible metering options identified for the North Eden WRZ is reflective of the nature of the options, with meters requiring little installation and no new significant infrastructure, and subsequent leakage identification taking place on existing infrastructure being unlikely to have any adverse impact on the environment.

Operational Effects

- 5.4.23 No significant positive or negative effects have been assessed for any of the feasible metering options for the North Eden WRZ, during their operation. This reflects the nature of the options requiring little resource to operate and maintain. Minor positive effects were assessed against greenhouse gas emissions (SEA Objective 9) and water resource use (SEA Objective 14) during operation, due to the reduction in demand for water and associated carbon emissions from increased efficiency.
- 5.4.24 No negative effects were assessed for any of the feasible metering options within the North Eden WRZ during their operation. Demand reduction associated with the feasible metering options in the North Eden WRZ is unlikely to significantly increase continuity of water supply or support population and/or economic growth (savings associated with the options would be below 1 Ml/d). Consistent with the definitions of significance (see **Appendix C**), the options were therefore assessed as having neutral effects on health and wellbeing (SEA Objective 13). Once works construction have been completed, the feasible metering options are considered unlikely to have any adverse environmental effects.

Efficiency Options

- 5.4.25 A total of eight efficiency options were assessed for the North Eden WRZ; these are listed in **Table 5.23** together with the related estimated total water saving. The results of the assessment of these options is presented in **Table 5.24** with commentary on the likely

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significant construction (i.e. enabling/installation/implementation) and operational effects identified provided below. Detailed assessments are contained at **Appendix F**.

Table 5.23 Feasible Efficiency Options: North Eden Resource Zone

Option ID	Option Name	Yield	Description
WR658b	WSD-NERZ10_Free water efficiency devices (inside/internal)	0.001	Provision of various water efficiency devices to be ordered via UU website, then posted to customers to fit themselves. Number of units and costs are based on average historic uptake of current offerings, whereas benefits have been based on an assessment of meter flow data for metered customers who have order devices, based on consumption data prior and post order of devices.
WR659b	WER-NERZ15_Free water efficiency devices (outside/external)	0	Free supply of external household water efficiency devices to be ordered via the UU website then posted to customers to fit themselves.
WR661b	WUA-NERZ15_Free water efficiency audits (households)	0.010	Undertake Water Audits on metered customers (existing or newly metered) and provide free supply and fitting of water saving devices to customer, Fixing leaking toilets etc. (WUA).
WR669c	ISD-NERZ15_Flow regulators	0.01	Undertake a control trial of both customer flow restrictor and customer service PRVs to understand benefits and cost to implement. Utilise the trial to identify how a programme of works could be developed with scalable costs and benefits.
WR677b	WUA-NERZ15_Non-household water efficiency programme	0.005	Review and provide free Water Audits, provision and fitting of water efficiency devices on commercial properties. Targeting will be based on users with an abnormal demand for the commercial user type.
WR685b	WER-NERZ15_Rainwater harvesting and water reuse (new builds)	0.01	Work with a developer to trial rainwater harvesting and grey water systems within a select number of new build properties so to understand the true cost and benefits of such systems within new build properties on household demand. The trial needs to developer methods of how incentivise developers to build such system going forward
WR694b	WSA-NERZ15_Government intervention (water labelling, standards)	0.17	Government water labelling campaign, involving the labelling of consumer devices to encourage the purchase and use/installation of water efficient devices in the North Eden Resource Zone, to provide 0.17ML/d by 2040
WR694e	WSA-NERZ15_Government intervention (water labelling, standards)	0.06	Government water labelling campaign, involving the labelling of consumer devices to encourage the purchase and use/installation of water efficient devices in the North Eden Resource Zone, to provide 0.06ML/d by 2040



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Table 5.24 Feasible Efficiency Options Assessment Summary: North Eden Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR658b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0
WR659b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-/?	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WR661b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR669c	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR677b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR685b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	+	0	0	0
WR694b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR694e	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0

Construction Effects

- 5.4.26 No significant, moderate or minor positive effects were identified during the assessment of the feasible water efficiency options identified for the North Eden WRZ for the construction phase. This reflects the small-scale nature of the options, with water efficiency devices being sent out to customers to fit themselves, and provision of other free water saving devices and efficiency audits. Expenditure associated with the enabling works necessary for the water efficiency options would be relatively small and would therefore be unlikely to have a substantive impact in terms of supply chain benefits or the economy.
- 5.4.27 No significant negative effects were identified during the assessment of the water efficiency options in for the North Eden WRZ. Embodied carbon associated with water efficiency/saving devices would be low and government schemes such as water labelling would utilise very little resources, requiring no construction/installation. A minor negative, uncertain effect has been assessed against waste and resource use (SEA Objective 15), for option WR659b, during the construction phase due to waste associated with the production of water efficiency devices.

Operational Effects

- 5.4.28 No significant positive or negative effects have been assessed for any of the feasible water efficiency options for the North Eden WRZ, during their operation. Again, this reflects the nature of the options which would require little resources to operate and maintain. Minor positive effects were assessed for several options against greenhouse gas emissions (SEA Objective 9) and water resource use (SEA Objective 14). This is due to the reduction in demand for water and associated carbon emissions from increased efficiency. Demand reduction associated with the feasible water efficiency options in the North Eden WRZ is unlikely to significantly increase continuity of water supply or support population and/or economic growth (savings associated with the options would be below 1 Ml/d). Consistent with the definitions of significance (see **Appendix E**), the options were therefore assessed as having neutral effects on health and wellbeing (SEA Objective 13). Once construction works have been completed, operation of the feasible water efficiency options are considered unlikely to have any adverse environmental effects.
- 5.4.29 No negative effects were assessed for any of the feasible water efficiency options within the North Eden WRZ during their operation. Once works have been completed, the feasible metering options are considered unlikely to have any adverse environmental effects as they will require little upkeep and produce very little emissions/waste.

5.5 Revised Feasible Option Variants

- 5.5.1 As part of the post Revised Draft WRMP24 work, and reflecting the ongoing SRO, further variants were developed around a limited number of revised feasible options. These options are set out in **Table 5.25**.

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Table 5.25 Revised Feasible Supply Options

Option ID	Option Name	Yield (MI/d)	Description
WR015a2	SWN_RIVER IRWELL a2	60	[REDACTED]
WR049e	SWN_RIVER RIBBLE 49e	60	
WR102f	GWE_WIDNES 2	11	

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Table 5.26 Revised Feasible Supply Options Assessment Summary

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR015a2	Construction (negative)	--/?	--	0	-	0	0	--	--	---	-	--	--	--	0	---	--	-
	Construction (positive)	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	--	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
WR049e	Construction (negative)	-	--	0	-	0	0	--	--	---	-	--	-	-	0	---	-	-
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	+++	0	0	0	+/?	0	0
	Operation (negative)	--/?	0	--/?	0	--/?	-/?	--	--	---	0	-/?	-	0	0	--	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
WR102f	Construction (negative)	-	--	0	-	0	0	--	-	---	-	-	-	-	0	---	-	-

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	+++	0	0	0

Construction Effects

- 5.5.2 All three of the revised feasible option variants would require a large capital investment (capital spend of \geq £25 million) that would be likely to generate a number of employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers. This has been assessed as having a significant positive effect on the economy (SEA Objective 11).
- 5.5.3 No other significant positive effects were identified in the assessment of the revised feasible option variants. All three of the revised feasible option variants however, were assessed as having minor uncertain positive effects on waste and resource use (SEA Objective 15), and options WR049e and WR102f have both been assessed as having minor positive effects on soils, geodiversity and land use (SEA Objective 4).
- 5.5.4 No other positive effects were identified for the revised feasible option variants during the construction phase.
- 5.5.5 All three of the revised feasible option variants were assessed as having significant negative effects on greenhouse gas emissions (SEA Objective 9) and waste and resource use (SEA Objective 15). This is reflective of the scale of the options, and the potential for construction to produce significant amounts of waste material, including concrete, steel, and plastic. With this comes significant amounts of embodied carbon associated with the construction materials and their production, as well as further emissions through vehicle movements and the operation of machinery during the construction period.
- 5.5.6 No other significant negative effects were identified for the construction phase of the revised feasible option variants, though a range of minor and moderate negative effects have been identified.

Operational Effects

- 5.5.7 During the operational phase, all three of the revised feasible option variants were assessed as having significant positive effects on water resource use (SEA Objective 14). Although these options are not leakage or water efficiency options, the options would increase the resilience of water resources within the UU supply area, through the provision of additional deployable output, assessed as being of a significant magnitude.
- 5.5.8 Options WR015a2 and WR049e have been assessed as having significant positive effects on climate resilience (SEA Objective 10), the economy (SEA Objective 11), and human health and well-being (SEA Objective 13). These options would help to ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing adaptability to the effects of climate change. The capacity they would provide would help to ensure a continual supply of clean drinking water and increase resilience of supply to UU customers, supporting economic/population growth and generating a positive effect on human health. Due to the scale of these options and the additional output they would provide, impacts have been assessed as being significant. Option WR102f however, was assessed as having a moderate positive impact on these objectives.

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- 5.5.9 No other significant positive effects were identified during the operational phase of the revised feasible option variants, however all three options have been assessed as having moderate positive impacts on sustainable natural resources (SEA Objective 2).
- 5.5.10 No other positive effects were identified for the revised feasible option variants during the operational phase.
- 5.5.11 Options WR015a2 and WR049e were assessed as having significant negative effects on greenhouse gas emissions (SEA Objective 9). This is reflective of the scale of the options, the operational power and vehicle movements they will require and the quantity of greenhouse gas emissions expected to be produced. Option WR102f was assessed as having a minor negative effect against this objective, during operation.
- 5.5.12 No other significant negative effects were identified for the operational phase of the revised feasible option variants, though a range of minor and moderate negative effects have been identified.

5.6 Using the Findings of the Revised feasible Options Assessment to inform Decision Making

- 5.6.1 U UW decision making processes for the Draft WRMP24 were set out in the Technical Reports, *Option Identification*⁵³ and *Deciding on future options*⁵⁴. This has included environmental considerations, with the SEA findings for the revised feasible options having been used as inputs into the following key decision points:
- **detailed screening** of the revised feasible options;
 - **MCA**, undertaken in advance of the selection of options;
 - **scenario testing** of the constrained options; and
 - **selection of the preferred programme of options.**

Screening

- 5.6.2 U UW has completed a process of option screening using screening criteria, developed in conjunction with WRW core member companies and stakeholders to inform option selection and development. These were applied at two stages of option development:
- high-level (or primary) screening of unconstrained options; and
 - a detailed screening of revised feasible options.

⁵³ U UW (2022) Draft WRMP24 Technical Report – Option Identification. Available online:

https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/wrmp24-drafts/draft-wrmp24-technical-report---options-identification.pdf

⁵⁴ U UW (2022) Draft WRMP24 Technical Report - Deciding on future options. Available online:

https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/wrmp24-drafts/draft-wrmp24-technical-report---deciding-on-future-options-reupload.pdf

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- 5.6.3 A Red-Amber-Green (RAG) approach was adopted for both stages of the screening process, which grades an option to a given criteria on a satisfactory to unsatisfactory basis (Green being satisfactory, Red being un-satisfactory).
- 5.6.4 The high-level screening included three criterion that reflected environmental considerations, under the 'Environmental, planning, and other regulatory constraints' category:
- Does the option cause unmitigable damage to a European designated site (SAC/SPA/Ramsar)?
 - Does the option cause unmitigable damage to Nationally designated site (SSSI/NNR/National Park/Ancient Woodland)?
 - Does the option cause unmitigable damage to site with significant heritage or visual amenity value (e.g. Scheduled Ancient Monument or AONB)?
- 5.6.5 The detailed screening included a criterion that explicitly used the findings of the SEA, in terms of outputs from the revised feasible option assessments:
- Does the option meet the social and environmental objectives of the relevant SEA?
- 5.6.6 The high-level screening led to 120 unconstrained options being screened out, with justifications including:
- Environmental risks being too great and/or deemed unmitigable.
 - Water bodies / groundwater bodies affected by option already being in Poor status or already under considerable stress.
 - Option is deemed far too politically or socio-economically unacceptable.
 - Not enough evidence or information given to support option and allow it to carry forward to the Secondary screening level.
- 5.6.7 The detailed screening of the revised feasible supply options led to:
- 9 options being screened in;
 - 78 options being identified as having a range of risks;
 - 8 options being screened out⁵⁵.
- 5.6.8 Options that were screened out at detailed screening stage on the basis of environmental risks identified by the SEA including the following justifications:
- Potentially significant negative impacts on biodiversity (SAC). The risk would be significant as effects are certain and adverse effects likely to be unavoidable.
 - Potential for deterioration in the context of the WFD. Mitigation or operational controls would be needed to avoid WFD impacts.

⁵⁵ Note five options were not subject to screening.

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- Potentially significant INNS transfer risk due to the transfer of raw water from the source in another WFD surface water catchment. Potential impacts would require mitigation.
- Significant constraints arising from effects on air quality from traffic congestion during the construction period
- Significant effects on designated landscapes (effects on Northumberland National Park in addition to the Lake District National Park and WHS) and cultural heritage (proximity of various scheduled monuments, listed buildings, conservation areas and a world heritage site) are identified.

5.6.9 The outputs of the detailed screening were used to validate the outputs of the MCA (ValueStream1) decision-making process allowing the refinement of the number of options to be considered.

MCA (ValueStream1)

5.6.10 With respect to the MCA and ValueStream1 (the best value optimisation tool), the SEA objectives were mapped onto the following decision-making metric (there are a further four which are not presented as they are outside the scope of the SEA):

- Flood risk (SEA Objective 7);
- Human and social wellbeing (SEA Objectives 8, 10, 11, 12, 13, 16, 17);
- Sustainable natural resources (SEA Objectives 1, 2, 3, 4 and 15); and
- Multi-abstractor benefits (SEA Objectives 5, 6 and 14).

5.6.11 The assessment of effects for each SEA Objective for each revised feasible option were converted into values (on a scale of 0 – 12). These were then used as input values into the identified four metrics used in the MCA (ValueStream1). The values were then normalised to -100 to +100 scale. ValueStream1 uses solving algorithms to minimise overall costs, including environmental and social costs, while generating a scheduled plan which meets UUW's supply-demand balance. Best-value scores have been multiplied by weightings taking into account customer preferences, and the resulting scores are used in the optimisation.

5.6.12 Broadly, proposed options that seek to minimise demand, increase efficiencies and decrease leakages are less intrusive and have fewer adverse environmental effects; however, are not of sufficient scale to meet future water resource demands, taking into account future challenges. Supply-side options that seek to maximise existing operational efficiencies tend also to be associated with few or minor adverse effects, although consequences from any reduced flows in rivers and water bodies need also to be considered. As the scale of infrastructure requirements increases, there are consequential increases in the magnitude and significance of positive and negative effects. As reflected in the MCA (ValueStream1) process, these has then led to the preferential selection of demand management, leakage and efficiency options with a limited number of supply side options as those representing best value options.

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Scenario Testing

5.6.13 ValueStream1 was run under different scenarios to test the selection of best value options, and confirm sensitivities and dependencies within the decision-making model. This led to the review of the treatment and scoring of operational flood risk (arising from increased catchment storage associated with reservoir raising and provision) as well as threshold values for water resources (when some schemes were providing benefits below 0.01MI/d). In both instances, this led to further revisions of the SEA findings, and use of the updated assessment within the reruns of ValueStream1.

Preferred Options

5.6.14 For those options taken forward for the inclusion in the Draft WRMP24s, further work was undertaken in discussion with U UW’s engineering teams, highlighting further opportunities for scheme refinement, taking into account potential mitigation measures identified at the revised feasible option stage. Workshops were held in March and June 2022 reviewing the options and advising of likely risks and changes. These were then reflected in the U UW’s change log (**Table 5.27**).

Table 5.27 U UW Preferred Option Change Log

Ref Nr	Option Name	Scope Item Changes
WR015	SWN_RIVER IRWELL	
WR049d	SWN_RIVER RIBBLE 49d	
WR076	SWN_RIVER BOLLIN	
WR102b	GWE_WIDNES	
WR107a2	GWE_AUGHTON PARK a2	

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Ref Nr	Option Name	Scope Item Changes
WR107b	GWE_RANDES BRIDGE	
WR111	GWE_WOODFORD	
WR113	GWE_TYTHERINGTON	
WR144	SWN_RIVER TAME	
WR149	ITC_WIGAN	

- 5.6.15 In addition, option STTA4 (through work undertaken separately by the NWT SRO) was subject to further refinement, identify the specific locations where works were to be undertaken, which had the effect of reducing the scale and scope of the activities to be considered at the preferred option stage.
- 5.6.16 The options, refined to reflect the changes above were then taken forward and subject to further assessment (individually and cumulatively) to ensure that the effects of U UW’s Draft WRMP24 were identified, described and evaluated.
- 5.6.17 Following consultation on the Draft WRMP24, U UW reviewed its best value plan for WRMP24 and as a result, the preferred plan contained in the Draft WRMP24 was modified. There was a decrease in the water trading requirements following the final regional planning reconciliation round. This resulted in a decrease in the number of supply options required. In consequence, the Preferred Plan at Revised Draft WRMP24 contained three supply options (WR107a2, WR111 and WR113) for the Strategic Resource Zone, all to be implemented by 2030. Further to comments received from regulators on the Draft WRMP24, the preferred plan at Revised Draft WRMP24 stage also included drought permit options taken from U UW’s Drought Plan⁵⁶.
- 5.6.18 The three supply options in the preferred plan at Revised Draft WRMP formed part of the NWT SRO. The NWT SRO is currently being assessed as part of RAPID’s gated process for SROs; this includes environmental compliance. In consequence, the findings were not available in time for the Revised Draft WRMP24 (and its assessment). As a result, these options all had residual uncertainties until investigations associated with NWT SRO Gate 3 conclude. Recognising this uncertainty, and consistent with the WRPG requirements and taking into account feedback from several environmental stakeholders, U UW reviewed the

⁵⁶ United Utilities (2022) *Final Drought Plan 2022*. Available from https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/final-drought-plan-2022/final-drought-plan-2022.pdf [Accessed May 2023].

outcome of the environmental assessments, notably the HRA and WFD assessment of the revised feasible options to identify alternative, 'WFD / Habitats Regulations compliant', WRMP options. One selected option (WR026b) underwent further refinement (in terms of a reduction in yield and associated engineering design changes) to provide further assurance of compliance, and which then become WR026c.

- 5.6.19 Following a review of the Statement of Response to the consultation on the Draft WRMP24 and the changes made in the Revised Draft WRMP24, Defra requested more information on the plan. UUW responded to this request in 2024 in the '*Further information in support of Statement of Response (WRMP24)*' document⁵⁷. UUW continued to work with Defra and regulators to resolve any remaining issues.
- 5.6.20 Following further consideration, the three preferred options contained in the Revised Draft WRMP24 (WR107a2, WR111 and WR113) were confirmed as being non-compliant with the WFD. The Secretary of State's direction to publish states that the three groundwater options should be removed from the preferred plan. The Final WRMP24 includes one supply option (River Bollin WR076). The option has been refined from that considered as part of the feasible options and the changes include provision of a WTW on the outskirts of Altrincham (rather than located near the site of abstraction). The River Bollin WR076 option has been taken forward in the final WRMP24 as it represents the 'best value' option, when compared to the alternative plan. However, as an NWT option, there remain residual uncertainties until investigations associated with NWT SRO Gate 3 conclude. Recognising this uncertainty, the alternative WFD and HRA compliant options identified at Revised Draft WRMP24 stage are retained as an alternative plan.

⁵⁷ UUW (2024) *Further information in support of Statement of Response (WRMP24)*. Available online: https://www.unitedutilities.com/globalassets/documents/corporate-documents/wrmp24_uu_further-information-in-support-of-statement-of-response_redacted.pdf

6. Assessment of the Final WRMP24

6.1 Introduction

6.1.1 This section describes the findings of the assessment of the Final WRMP24. It presents:

- **Section 6.2: Final WRMP24 Preferred Option Assessment** to identify, describe and evaluate the effects of the preferred options (one supply options and 33 demand management, leakage and efficiency options).
- **Section 6.3: Preferred Programme Assessment** to identify the likely significant effects of the preferred programme of options (considering the effects of all preferred options as a whole).
- **Section 6.4: Reasonable Alternative Plan Assessment** to identify, describe and evaluate the effects of the reasonable alternative plan identified by U UW.
- **Section 6.5: Alternative Plan Assessment** to identify, describe and evaluate the effects of other alternative plans identified by U UW.
- **Section 6.6: Review of Plan Scenarios** to consider the potential environmental effects of the plan scenarios identified by U UW.
- **Section 6.7: Secondary, Cumulative and Synergistic Effects Assessment** to identify, describe and evaluate the cumulative effects assessment of the preferred programme taking into account other relevant plans.
- **Section 6.8: Contribution of the Final WRMP24 to Wales' Well-being Goals and the Objective for SMNR.**
- **Section 6.9: Mitigation and Enhancement.**
- **Section 6.10: Conclusions.**

6.2 Final WRMP24 Preferred Option Assessment

Overview of Selected Options

- 6.2.1 Following consultation on the Draft WRMP24, U UW reviewed its best value plan for WRMP24 and as a result, the preferred plan contained in the Draft WRMP24 was modified. In particular, the number of supply options which made up the preferred plan for the Revised Draft WRMP24 was significantly reduced owing to, in particular, decreased water transfer needs (following the final regional planning reconciliation round).
- 6.2.2 The Draft WRMP24 included a total of 168 MI/d of exports to STW and WRSE from U UW's SRZ, starting with a 75 MI/d transfer in 2031. Seven supply options were included in preferred plan to support these transfers. Transfers to WRSE are no longer selected in the preferred plan, linked to WRSE companies lowering their demand projections following consultation feedback. As a consequence of these changes there were fewer supply

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options in the Revised Draft WRMP24 preferred plan. When combined with updates to the demand management measures, this also means that improving UUW's level of service for temporary use bans (TUBs) is no longer reliant on the dual-purposing of water transfer support options.

6.2.3 Further to detailed screening and selection of best value options by ValueStream (**Section 5.5**), a total of three supply options were identified by UUW as preferred options at Revised Draft WRMP24. Following further work with Defra and the regulators to resolve outstanding issues and the receipt of the direction to publish, the Final WRMP24 preferred plan does not include the three previously preferred supply options, which have been replaced due to WFD non-compliance. UUW has replaced them with one surface water supply option in the Final WRMP24, which has been chosen as it is the best value option. The preferred supply option is summarised in **Table 6.1**.

Table 6.1 Preferred Supply Option included in the Final WRMP24

Option ID	Option name	Yield (MI/d)	Description	Year selected
WR076	SWN_RIVER BOLLIN	25		2033

6.2.4 In addition, there have been 33 demand management, metering and leakage options identified and included as preferred options. Fifteen of these preferred demand management options are for the Strategic Resource Zone, fourteen are for the Carlisle Resource Zone and four are for the North Eden Resource Zone. These are presented summarised in **Table 6.2, 6.3 and 6.4**.

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Table 6.2 Preferred Demand Management, Metering and Leakage Options included in the Final WRMP24 for the Strategic Resource Zone

Ref	Option	Yield (MI/d)	Description
WR502c	LEA-SRZ5_Permanent network sensors	20.00	<p>Option c forms part of a 20 year programme to install and maintain acoustic loggers across the region prioritised based on perceived benefit. It is assumed an estimated 70,000 loggers can be installed in a year, with a limit of approx. 100,000 per AMP +% based on options split into 10MI/d leakage saving.</p> <p>Loggers are assumed to be bought with airtime and battery replacement included for the first 5 years with a 10 year lifespan for the hardware. New loggers will need to be phased in from year under a similar agreement as the initial investment.</p>
WR510	LEA-SRZ15_In-pipe repairs and lining technologies	4.47	Use of pinpoint repairs, in pipe repairs or pipe lining technologies to resolve leakage issues, and reduce repair times. Assumes repairs to existing infrastructure requires relatively small quantities of resins/metals (assume non-recyclable sources). Some vehicle movements involved (minimal).
WR511g	LEA-SRZ5_Pressure management	1.00	Option to deliver 1MI/d of leakage savings over a 5 year period. Costs and benefits are based on equivalent PMV numbers required to meet target savings based on an average saving per scheme of 4.2m3/d. Delivery of pressure management schemes including but not limited to scheme types such as (new PMV, PMV Modulation, Pump modulation, Right sizing mains to reduce head loss, Pumps for high rise buildings, Single property boosters, Duel Feed PMV areas, etc). As long as the solution delivers leakage savings through the optimisation of pressure.
WR516h1	LEA-SRZ10_Mains rehabilitation/renewal/replacement	49.12	Undertake mains renewal based on outputs of Pioneer Model to achieve 49.12MI/d saving over a 10 year period by providing 1,228km of mains (assumed to be 25mm PE pipe). Assume excavations will be in both urban and rural areas, but predominantly in densely lain urban areas.
WR516h2	LEA-SRZ25_Mains rehabilitation/renewal/replacement	50.80	Undertake mains renewal based on outputs of Pioneer Model to achieve 50.08MI/d saving over a 25 year period by providing 2,633km of mains (assumed to be 25mm PE pipe). Assume excavations will be in both urban and rural areas, but predominantly in densely lain urban areas. No specific locations given.
WR520c	LEA-SRZ5_DMA optimisation	2.00	Splitting large DMAs to help identify smaller outbreaks and leaks and improve targeting. Reducing the size of an area covered by a DMA meter or waste meter, enable improved efficiency to identify leakage outbreaks or burst with a smaller area, therefore improve identification and detection. Due to operability and the need to improve operability to replace meters or install meters for unmetered connections, savings are based on 75% reduction in benefit caused by miss reported leakage due to inoperability.
WR524d	LEA-SRZ10_Upstream tile optimisation	5.78	<p>There are still significant challenges around meter coverage and operability to continue reduction in upstream leakage (between the point of distribution input and the District Meter). Improving upstream meter accuracy and coverage, helps to improve the validation of Upstream leakage (Unaccounted For Water- UFW), and enables improved targeting to ensure flow balances are reporting accurately by resolving upstream UFW and leakage reduction can be targeted.</p> <p>This Option includes end to end verification of existing meters to enable repair, recalibration of promotion for replacement but assumes a new</p>

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Ref	Option	Yield (Ml/d)	Description
			meter and chamber will be required. Meters within this option are predominantly large diameter EM meters (200mm or above in size).
WR603e	EMT-SRZ15_Enhanced metering of households on single supplies (smart meters)	60.46	<p>Proactive installation of flow meters on unmetered Households (excluding voids) to be completed by 2040. Option assumes that 20% of unmetered properties are supplied by a joint supply or cannot have an external meter installed without additional works. These will be identified during the programme, but meters will not be installed. Options includes the continuation of FMO metering, for customers opting to be billed from a meter. Option includes assumption that 5% of meters installs will be install into an existing meter box</p> <p>Benefits are based on supply pipe leakage reduction based on ability to identify supply pipe leaks, therefore reduction identification times and overall runtime of a leak. Demand reduction benefits are included, based on people moving to being billed from a meter only. This will occur based on expected level of 10% uptake during metering install programme supported by a policy change to move all change in occupancy properties which are metered to be billed based on meter reads.</p>
WR615c	EMT-SRZ5_Replace existing non-household meters with smart meters	10.44	Replacement of existing basic meters with AMI meters
WR619c	EMT-SRZ10_Replace existing household meters with smart meters	10.24	<p>From 2030 it is planned to Swap from installing AMR meters to SMART meters as standard. This option looks at the additional benefits and cost based on the Switch of meter types from AMP9 onwards.</p> <p>This option is dependent on either option WR601c or WR603c being selected. It cannot be selected in isolation. Cost and benefits are based on being in addition to costs, Unit Rates and benefits to WR601c or WR603c.</p>
WR658c	Free water efficiency devices (inside/internal) in SRZ (10 year)	4.60	<p>Provision of various water efficiency devices to be ordered via UU website, then posted to customers to fit themselves.</p> <p>Number of units and costs are based on average historic uptake of current offerings, whereas benefits have been based on an assessment of meter flow data for metered customers who have order devices, based on consumption data prior and post order of devices.</p>
WR659c	WER-SRZ15_Free water efficiency devices (outside/external)	4.00	Free supply of external household water efficiency devices to be ordered via the UU website then posted to customers to fit themselves.
WR661c	WUA-SRZ15_Free water efficiency audits (households)	12.98	Undertake Water Audits on metered customers (existing or newly metered) and provide free supply and fitting of water saving devices to customer, Fixing leaking toilets etc. (WUA); the top 10% of household consumers will be targeted based on Continuous leak alarms or identified as high users based on a daily demand above an initial threshold (500l/d).
WR677c	WUA-SRZ5_Non-household water efficiency programme	12.94	Review and provide free Water Audits, provision and fitting of water efficiency devices on commercial properties. Targeting will be based on users with an abnormal demand for the commercial user type.

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Ref	Option	Yield (MI/d)	Description
WR694f	WSA-SRZ15_Government intervention (water labelling, standards)	36.26	Government water labelling campaign, involving the labelling of consumer devices to encourage the purchase and use/installation of water efficient devices in the Strategic Resource Zone, to provide 36.26MI/d by 2040

Table 6.3 Preferred Demand Management, Metering and Leakage Options included in the Revised Draft WRMP24 for the Carlisle Resource Zone

Ref	Option	Yield (MI/d)	Description
WR502a	LEA-CRZ10_Permanent network sensors	0.51	<p>Option a forms part of a 10 year programme to install and maintain acoustic loggers across the region prioritised based on perceived benefit. It is assumed an estimated 70,000 loggers can be installed in a year, with a limit of approx. 100,000 per AMP +% based on options split into 10MI/d leakage saving.</p> <p>Loggers are assumed to be bought with airtime and battery replacement included for the first 5 years with a 10 year lifespan for the hardware. New loggers will need to be phased in from year under a similar agreement as the initial investment.</p>
WR511a	LEA-CRZ5_Pressure management	0.1	Option to deliver 0.1MI/d of leakage savings over a five year period. Costs and benefits are based on equivalent PMV numbers required to meet target savings based on an average saving per scheme of 3.1m3/d. Delivery of pressure management schemes including but not limited to scheme types such as (new PMV, PMV Modulation, Pump modulation, Right sizing mains to reduce head loss, Pumps for high rise buildings, Single property boosters, Duel Feed PMV areas, etc). As long as the solution delivers leakage savings through the optimisation of pressure.
WR516a1	LEA-CRZ15_Mains rehabilitation/renewal/replacement	1.19	Undertake mains renewal based on outputs of Pioneer Model to achieve 1.19MI/d saving over a 15 year period by providing 108km of mains (assumed to be 25mm PE pipe). Assume excavations will be in both urban and rural areas, but predominantly in densely lain urban areas.
WR520a	LEA-CRZ5_DMA optimisation	0.48	Splitting large DMAs to help identify smaller outbreaks and leaks and improve targeting. Reducing the size of an area covered by a DMA meter or waste meter, enable improved efficiency to identify leakage outbreaks or burst with a smaller area, therefore improve identification and detection. Due to operability and the need to improve operability to replace meters or install meters for unmetered connections, savings are based on 75% reduction in benefit caused by miss reported leakage due to inoperability.
WR603a	EMT-CRZ5_Enhanced metering of households on single supplies (smart meters)	0.83	<p>Proactive installation of flow meters on unmetered Households (excluding voids) to be completed by 2040. It is expected that Carlisle Meter programme will start in AMP9 and be completed within the same AMP.</p> <p>Option assumes that 20% of unmetered properties are supplied by a joint supply or cannot have an external meter installed without additional works. These will be identified during the programme but meters will not be installed. Options includes the continuation of FMO metering, for customers opting to be billed from a meter. Option includes assumption that 5% of meters installs will be install into an existing meter box</p> <p>Benefits are based on supply pipe leakage reduction based on ability to identify supply pipe leaks, therefore reduction identification times and overall</p>

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Ref	Option	Yield (MI/d)	Description
			runtime of a leak. Demand reduction benefits are included, based on people moving to being billed from a meter only. This will occur based on expected level of 10% uptake during metering install programme supported by a policy change to move all change in occupancy properties which are metered to be billed based on meter reads.
WR615a	EMT-CRZ5_Replace existing non-household meters with smart meters	0.20	Replacement of existing basic meters with AMI meters
WR619a	EMT-CRZ10_Upgrade existing household meters to smart	0.40	<p>From 2030 it is planned to Swap from installing AMR meters to SMART meters as standard. This option looks at the additional benefits and cost based on the Switch of meter types from AMP9 onwards.</p> <p>This option is dependent on either option WR601a or WR603a being selected. It cannot be selected in isolation. Note that cost and benefits provided are based on being in addition to costs, Unit Rates and benefits to WR601a or WR603a. This is reflected in the assessment.</p>
WR658a	WSD-CRZ10_Free water efficiency devices (inside/internal)	0.11	<p>Provision of various water efficiency devices to be ordered via UU website, then posted to customers to fit themselves.</p> <p>Number of units and costs are based on average historic uptake of current offerings, whereas benefits have been based on a assessment of meter flow data for metered customers who have order devices, based on consumption data prior and post order of devices.</p>
WR659a	WER-CRZ15_Free water efficiency devices (outside/external)	0.08	This option provides free water efficiency devices to an estimated 6,597 households in the Carlisle WRZ by 2040 to provide 0.08MI/d
WR661a	WUA-CRZ15_Free water efficiency audits (households)	0.27	Undertake Water Audits on metered customers (existing or newly metered) and provide free supply and fitting of water saving devices to customer, fixing leaking toilets etc. (WUA); the top 10% of household consumers will be targeted based on Continuous leak alarms or identified as high users based on a daily demand above an initial threshold (500l/d).
WR669b	ISD-CRZ15_Flow regulators	0.15	Undertake a control trial of both customer flow restrictor and customer service PRVs to understand benefits and cost to implement. Utilise the trial to identify how a programme of works could be developed with scalable costs and benefits.
WR677a	WUA-CRZ15_Non-household water efficiency programme	0.39	Review and provide free Water Audits, provision and fitting of water efficiency devices on commercial properties. Targeting will be based on users with an abnormal demand for the commercial user type.
WR685a	WER-CRZ5_Rainwater harvesting and water reuse (new builds)	0.06	Work with a developer to trial rainwater harvesting and grey Water systems within a select number of new build properties so to understand the true cost and benefits of such systems within new build properties on household demand. The trial needs to developer methods of how incentivise developers to build such system going forward.

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Ref	Option	Yield (MI/d)	Description
WR694d	WSA-CRZ15_Government intervention (water labelling, standards)	0.60	Government water labelling campaign, involving the labelling of consumer devices to encourage the purchase and use/installation of water efficient devices in the Carlisle Resource Zone, to provide 0.59ML/d by 2040

Table 6.4 Preferred Demand Management, Metering and Leakage Options included in the Final WRMP24 for the North Eden Resource Zone

Ref	Option	Yield (MI/d)	Description
WR603b	EMT-NERZ5_Enhanced metering of households on single supplies (smart meters)	0.27	Proactive installation of flow meters on unmetered households (excluding voids) to be completed by 2030. It is expected that North Eden Meter programme will start in AMP9 and be completed within the same AMP. Option assumes that 20% of unmetered properties are supplied by a joint supply or cannot have an external meter installed without additional works. These will be identified during the programme, but meters will not be installed. Options includes: <ul style="list-style-type: none"> the continuation of FMO metering, for customers opting to be billed from a meter. assumption that 5% of meters installs will be install into an existing meter box
WR615b	EMT-NERZ5_Replace existing non-household meters with smart meters	0.09	Replacement of existing basic meters with AMI meters
WR619b	EMT-NERZ10_Replace existing household meters with smart meters	0.02	From 2030 it is planned to Swap from installing AMR meters to SMART meters as standard. This option looks at the additional benefits and cost based on the Switch of meter types from AMP9 onwards. <p>This option is dependent on either option WR601b or WR603b being selected. It cannot be selected in isolation. Cost and benefits are based on being in addition to costs, Unit Rates and benefits to WR601b or WR603b.</p>
WR694e	WSA-NERZ15_Government intervention (water labelling, standards)	0.06	Government water labelling campaign, involving the labelling of consumer devices to encourage the purchase and use/installation of water efficient devices in the North Eden Resource Zone, to provide 0.06ML/d by 2040


6.2.5 Further to comments received from regulators on the Draft WRMP24, the preferred plan now also includes the drought permit options listed in **Table 6.5** which are included in UUW’s Drought Plan 2022.

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Table 6.5 Drought Permit Options

Ref	Option	Description	Prorated DO benefit based on modelled 1:500 EDO (MI/d)
WR167	DPS_DELPH		1.14
WR168	DPS_DOVESTONE		2.53
WR169	DPS_JUMBLES		5.24
WR170	DPS_LONGDENDALE		5.19
WR171	DPS_RIVER LUNE		12.48
WR172	DPS_RIVINGTON 1		0.91
WR173	DPS_RIVINGTON 2		1.32
WR174	DPS_ULLSWATER		13.8
WR175	DPS_VYRNWY		3.28
WR176	DPS_WINDERMERE		24.37
WR179a	DPS_TARN WOOD		0.75
WR179b	DPS_BOWSCAR		1.67
WR179c	DPS_GAMBLESBY		0.23

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Ref	Option	Description	Prorated DO benefit based on modelled 1:500 EDO (MI/d)
WR184	DPS_FERNILEE		1.73

Summary of Effects

6.2.6 **Table 6.6** presents the summary of the construction and operational effects of the preferred supply options. The likely significant effects are then detailed by option in the remainder of the subsection.

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Table 6.6 Summary of Preferred Supply Option Assessment

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR076	Construction (negative)	-	--	0	--	0	0	--/?	--	---	-	--	-	--	0	---	-	-
	Construction (positive)	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	--	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0

WR076 SWN_RIVER BOLLIN

Construction

- 6.2.7 Construction of option WR076 would involve a significant expenditure which could have a significant positive effect on the local economy through the generation of job opportunities and use of local supply chains. Capital expenditure during construction provides the potential for a number of local businesses and SMEs to have sustained involvement and opportunities. This has been assessed as having a significant positive effect on the economy (SEA Objective 11). No further significant positive effects were identified when assessing the construction phase of the preferred supply option.
- 6.2.8 The preferred supply option has been assessed as having a significant negative effect on greenhouse gas emissions (SEA Objective 9) and waste and resource use (SEA Objective 15) during construction. This reflects the significant material requirements and embodied carbon associated with delivery of pipeline and WTW included as part of the option. The total carbon emissions associated with the implementation of the option would be 20,457 tCO₂e which has been assessed as having a significant negative effect.

Operation

- 6.2.9 The preferred supply option has been assessed as having a significant positive impact on the economy (SEA Objective 11) and health (SEA Objective 13) as it will include delivering 25MI/d of additional water capacity which would help ensure a continual supply of clean drinking water and increase resilience of supply to U UW customers
- 6.2.10 No significant negative effects were identified when assessing the operational phase of WR076.

Demand Management Options

Strategic Resource Zone

- 6.2.11 A summary of the assessment of these options is presented in **Table 6.7** with commentary on the likely significant construction and operational effects provided below.

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Table 6.7 Demand Management Preferred Options Assessment Summary: Strategic WRZ

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR502c	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	0	++	++	++	0	++	+++	0	0
WR510	Construction (negative)	-/?	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR511g	Construction (negative)	0	0	0	0	0	0	0	-/?	0	0	0	0	0	0	-	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape		
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0	0	0
WR516h1	Construction (negative)	-/?	0	0	0	0	0	0	--	---	0	-/?	-/?	-/?	0	---	-/?	-/?	-/?	
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	++	+++	0	+++	+++	0	0	0	0	0
WR516h2	Construction (negative)	-/?	0	0	0	0	0	0	--	---	0	-/?	-/?	-/?	0	---	-/?	-/?	-/?	
	Construction (positive)	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



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	++	+++	0	+++	+++	0	0	0
WR520c	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR524d	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	++	0	0	0	++	++	++	0	++	++	0	0	0
WR603e	Construction (negative)	0	0	0	0	0	0	0	---/?	--	0	0	0	0	0	--/?	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	++	+++	0	+++	+++	0	0	0
WR615c	Construction (negative)	0	0	0	0	0	0	0	---	-/?	0	0	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	++	++	0	++	+++	0	0	0
WR619c	Construction (negative)	0	0	0	0	0	0	0	-/?	0	0	-	0	0	0	--	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	+++	0	0	0	++	++	++	0	++	+++	0	0	0
WR658c	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR659c	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR661c	Construction (negative)	0	0	0	0	0	0	0	---	-	0	0	0	0	0	-/?	0	0



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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	++	++	0	++	+++	0	0	0
WR677c	Construction (negative)	0	0	0	0	0	0	0	-	0	0	0	0	0	0	-/?	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+	++	++	0	++	+++	0	0	0
WR694f	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	++	+++	0	+++	+++	0	0	0

Construction Effects

- 6.2.12 Five of the fifteen preferred demand management options identified for the Strategic WRZ were assessed as having a significant positive effect on the economy (SEA Objective 11) during the construction phase. This reflects the significant expenditure associated with their construction which could have a significant positive effect on the local economy through the generation of job opportunities and use of local supply chains. Capital expenditure would be spread over a period between of five, ten, fifteen or twenty-five years depending on the option, which could provide the potential for a number of local businesses and SMEs to have sustained involvement and opportunities.
- 6.2.13 No further significant positive effects were identified when assessing the construction phase of the preferred demand management options for the Strategic WRZ.
- 6.2.14 Options WR603e, WR615c and WR661c were assessed as having a significant negative effect or significant negative uncertain effect on air quality (SEA Objective 8) during the construction phase. This is due to the significant number of vehicle movements required during meter installation and the subsequent impact of this on air quality, if such vehicle movements were concentrated in a localised area, although this may be mitigated by greening of the fleet vehicles used by U UW.
- 6.2.15 Options WR516h1 and WR516h2 have been assessed as having a significant negative effect on greenhouse gas emissions (SEA Objective 9) and waste and resource use (SEA Objective 15) during construction. This reflects the significant material requirements (pipes) and embodied carbon associated with mains pipeline rehabilitation included as part of these options. The total carbon emissions associated with the implementation of these two options would be 32,375 tCO₂e and 79,952.3 tCO₂e respectively which have been assessed as having a significant negative effect.
- 6.2.16 No further significant negative effects were identified when assessing the construction phase of the preferred demand management options for the Strategic WRZ.

Operational Effects

- 6.2.17 Nine of the fifteen preferred demand management options assessed for the Strategic WRZ have been assessed as having a significant positive impact on water quantity (SEA Objective 5) and water resource use (SEA Objective 14). The operation of the options would result in a major reduction in the demand for water and a subsequent increase in water efficiency.
- 6.2.18 Four of the fifteen preferred demand management options assessed for the Strategic WRZ have been assessed as having a significant positive impact on greenhouse gas emissions (SEA Objective 9), the economy (SEA Objective 11) and human health and wellbeing (SEA Objective 13). The options would reduce operational carbon emissions through reduced demand for water, as less energy would be required to abstract, treat and put water back into supply. The provision of additional design capacity from these options has been assessed as of sufficient scale to have a significant positive effect during operation, helping to ensure a continual supply of clean drinking water and increase resilience of

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supply to UU customers, supporting economic growth which could result in a positive effect on the local economy and social wellbeing.

- 6.2.19 No further significant positive effects were identified when assessing the construction phase of the preferred demand management options for the Strategic WRZ.
- 6.2.20 No significant, moderate or minor negative effects were identified for the operational phase of the preferred demand management options for the Strategic WRZ.

Carlisle Resource Zone

- 6.2.21 A summary of the assessment of these options is presented in **Table 6.8** with commentary on the likely significant construction and operational effects provided below.



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Table 6.8 Demand Management Preferred Options Assessment Summary: Carlisle WRZ

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR502a	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR511a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0
WR516a1	Construction (negative)	-/?	0	0	0	0	0	0	0	--	0	-/?	-/?	-/?	0	--	-/?	-/?

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR520a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR603a	Construction (negative)	0	0	0	0	0	0	0	-/?	0	0	0	0	0	0	-	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	0	0	0	+	0	0	0
WR615a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR619a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR658a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR659a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR661a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR669b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR677a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	0	0	0	+	0	0	0
WR685a	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape		
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
WR694d	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (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	0	0	0	0
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	0	+	0	0	0	0

Construction Effects

- 6.2.22 Construction of options WR516a1 would involve a significant expenditure which could have a significant positive effect on the local economy through the generation of job opportunities and use of local supply chains. Capital expenditure would be spread across fifteen years which could provide the potential for a number of local businesses and SMEs to have sustained involvement and opportunities. This has been assessed as having a significant positive effect on the economy (SEA Objective 11).
- 6.2.23 No further significant positive effects were identified when assessing the construction phase of the preferred demand management options for the Carlisle WRZ. No significant negative effects were identified when assessing the construction phase of the preferred demand management options for the Carlisle WRZ.

Operational Effects

- 6.2.24 No significant positive or negative effects were identified for the operational phase of the preferred demand management options assessed for the Carlisle WRZ.

North Eden Resource Zone

- 6.2.25 A summary of the assessment of these options is presented in **Table 6.9** with commentary on the likely significant construction and operational effects provided below.

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Table 6.9 Summary of Preferred Demand Management Option Assessments: North Eden WRZ

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR603b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	0	+	0	0
WR615b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	0	+	0	0
WR619b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR694e	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0

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Construction Effects

- 6.2.26 No significant positive or negative effects were identified for the construction phase of the preferred demand management options assessed for the North Eden WRZ.

Operational Effects

- 6.2.27 No significant positive or negative effects were identified for the operational phase of the preferred demand management options assessed for the North Eden WRZ.

Drought Permit Options

- 6.2.28 A summary of the assessment of the drought permit options is presented in **Table 6.10**, and **6.11** with commentary on the likely significant construction and operational effects provided below.

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Table 6.10 Drought Permit Preferred Options Assessment Summary: Strategic WRZ

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR167	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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	-
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	0	0	0	+
WR168	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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	-
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	0	0	0	0
WR169	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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	-
	Operation (positive)	0	0	0	0	0	0	0	0	0	++	++	+	++	0	0	0	+
WR170	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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	-
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	++	0	++	0	0	0	0
WR171	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	++	+	++	0	0	0	0
WR172	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0
WR173	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	0	0	0	0
WR174	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	++	0	++	0	0	0	0
WR175	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	++	+	0	+	0	0	0	0
WR176	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	0	0	0	0	0	++	++	0	++	0	0	0	0
WR184	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	0	0	0	0



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Construction Effects

6.2.29 No significant positive or negative effects were identified for the construction phase of the preferred drought permit options assessed for the Strategic WRZ.

Operational Effects

6.2.30 No significant positive or negative effects were identified for the operational phase of the preferred drought permit options assessed for the Strategic WRZ.

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Table 6.11 Drought Permit Preferred Options Assessment Summary: North Eden WRZ

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR179a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0
WR179b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	0	0	0	0
WR179c	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape	
	Construction (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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0

Construction Effects

6.2.31 No significant positive or negative effects were identified for the construction phase of the preferred drought permit options assessed for the North Eden WRZ.

Operational Effects

6.2.32 No significant positive or negative effects were identified for the operational phase of the preferred drought permit options assessed for the North Eden WRZ.

6.3 Preferred Programme Assessment

6.3.1 **Table 6.12** presents the cumulative assessment of the strategic effects of the Final WRMP24 preferred programme of options. Note where effects have been quantified, they are in aggregate, across the lifetime of the plan, noting that some of the options may not be implemented until 2048/49.

Table 6.12 Preferred Programme Assessment

SEA Objective	Cumulative score	Commentary
<p>1. To protect and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species, enhance ecosystem resilience and habitat connectivity and deliver a net biodiversity gain.</p>	-/?	<p>The construction phase of the supply option WR076 will lead to some effects due to loss of/disturbance of habitats and species. The construction/implementation phase of a limited number of demand management options (WR510, WR516h1, WR516h2, WR516a1, selected in 2026, 2026, 2037 and 2038 respectively, with implementation periods of 15 years, 10 years, 25 years and 15 years respectively) may also result in similar effects, although as the exact locations of works are currently unknown, there remains some uncertainty. No likely significant effects were assessed for the options.</p> <p>With regard to operation, the HRA appropriate assessment has concluded that the surface water abstraction associated with the option will not adversely affect the integrity of the interest features of the Mersey Estuary SSSI SPA / Ramsar. This reflects that the maximum effect of the option on flows from the River Mersey catchment into the estuary is very small relative to the overall freshwater inputs to the estuary and the dominating influence of tidal flows. Any changes will be negligible and within the range of natural variation for the estuary. The appropriate assessment concludes that mobile features of the Mersey Narrows, North Wirral Foreshore SPA/Ramsar and Liverpool Bay SPA/Ramsar will not be exposed to any environmental changes as a result of the Option.</p> <p>Overall, the preferred programme is assessed as having a minor negative uncertain effect in respect of biodiversity.</p>
<p>2. To protect and enhance sustainable natural resources and the ecosystem services they provide.</p>	+/?	<p>The BNG assessment concludes that there would be a permanent loss of habitats, during the construction period of the preferred supply side option, associated with the construction of the new abstraction point and WTW. Whilst excavation of the pipeline would also result in temporary loss of habitats; however, it is noted that the pipeline route crosses predominantly low distinctiveness habitats (modified grassland and cropland). In the operational phase it is assumed that there would be operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain</p>

SEA Objective	Cumulative score	Commentary
<p>3. To avoid and, where required, manage invasive and non-native species (INNS).</p>	0	<p>However, there is potential for additional benefit to be gained through consideration of opportunities for BNG across UUW's wider landholdings and in consequence, some uncertainties remain at this stage.</p> <p>Overall, a neutral effect is assessed for preferred programme. The supply option for the preferred programme includes the abstraction of water from the River Bollin and transfer, through a new pumped main, to a new WTW on the outskirts of Altrincham (which is in a different WFD surface water catchment) and transferred to a new treated water storage reservoir at the same location, therefore creating pathways to increase the spread of INNS across the two catchments. The nature of the treatment at the new WTW suggests that it may be able to prevent the transfer of INNS between the WFD catchments. Due to these factors the option has been assessed as low risk however it is recommended that all reasonable biosecurity measures are adopted.</p>
<p>4. To protect and enhance soil quantity, quality and functionality and geodiversity and ensure the appropriate and efficient use of land.</p>	-	<p>Construction and operation of water resources infrastructure could affect existing land uses due to land take associated with new development. This may result in clearance of vegetation and loss of soil levels leading to the loss of soil function and processes. The preferred supply option with include permanent loss of some best and most versatile agricultural land required to develop the WTW. Therefore, a likely negative score is assessed for the preferred programme of options.</p>
<p>5. To protect and enhance surface and ground water levels and flows.</p>	+++ / -- / ?	<p>The demand management options in the strategic resource zone would result in a reduction for water demand of 285 MI/d which is cumulatively significant positive effect. Demand management options in the Carlisle and North Eden resource zones would also result in more minor reductions in demand. Demand management savings would be delivered incrementally (from 2026 onwards) as options are implemented year on year, with all options assumed to be fully implemented by the year 2063.</p> <p>The preferred supply side option would result in moderate negative effects as abstraction (which would commence from 2033) has the potential to affect either (i) deterioration of WFD status and/or (ii) the ability of a waterbody to attain its target status. The WFD assessment highlights that there is water available for abstraction at the proposed rate and assessment undertaken so far for NWT has found that the river downstream of the abstraction is relatively insensitive to flow changes. However, further work is being undertaken through the ongoing NWT workstream, to quantify the impacts of reduced flows on physical habitat availability and water quality. Therefore, the option is considered to be potentially WFD non-compliant on a precautionary basis and with low confidence, awaiting the outcome of the NWT Gate 3 investigations.</p>
<p>6. To protect and enhance the quality of surface and groundwater resources.</p>	-- / ?	<p>Overall, a mix of significant positive and moderate negative effect is assessed.</p> <p>The WFD assessment found that the supply option could result in moderate decreases in river flows which could affect water quality and could cause a deterioration of WFD classification. Water quality modelling carried out for NWT Gate 3 found that the supply option does not entirely meet the water quality criteria set by the EA, although this may be dependent on the abstraction location (with the modelled location being further upstream than the location currently proposed). Therefore, the option is considered to be potentially WFD non-compliant, awaiting the outcome of the NWT Gate 3 investigations. As such, risks and effects are provisional and UUW will continue to explore these potential impacts and whether additional mitigation measures may need to be built into option design.</p> <p>Overall, moderate negative uncertain effects are assessed with some uncertainty.</p>

SEA Objective	Cumulative score	Commentary
7. To reduce or manage flood risk.	0/?	<p>The preferred demand management options would have no effects on water quality.</p> <p>A very small proportion of the preferred supply option is located in an area at the highest risk of flooding, however the full extent of above ground infrastructure that would be located in this area is uncertain at this stage. Overall, construction and operation of the preferred programme of options is not expected to cause or exacerbate flooding in the area surrounding the options, or elsewhere. As such the overall effect of the preferred programme is considered to have a neutral effect but this is uncertain to some extent.</p>
8. To minimise emissions of pollutant gases and particulates and enhance air quality.	---/?	<p>Construction of the preferred programme of options will generate emissions to air which could affect local air quality. The principal source of emissions would be pollutants associated with vehicle movements. Vehicle emissions could affect sensitive receptors along transport corridors and effects are likely to be more pronounced where development is located in close proximity to AQMAs. Some sections of the A56 which may be used to access sites of proposed works associated with the preferred supply option, are within AQMA boundaries.</p> <p>Some of the preferred demand management options within the Strategic Resource Zone (WR661c, WR603e and WR615c) individually would involve significant numbers of vehicle movements during the construction period (which would be spread over 15 years, 15 years and 4 years respectively, from 2026 onwards), which could result in cumulative significant negative effects if vehicle movements were concentrated within an area, however, there remains some uncertainty as the location of demand management interventions is currently not known.</p> <p>Overall, it is concluded that there will likely be significant negative air quality effects during the construction phase, however, there remains some uncertainty. In the operational phase these effects linked to vehicle movements are expected to be negligible/neutral.</p>
9. To reduce greenhouse gas emissions.	---/+++	<p>In total, the construction of the preferred supply side will require materials with 20,457 tCO₂e embodied carbon. Construction will also generate a substantial volume of vehicle movements which, together with the operation of plant and machinery, will additionally contribute to carbon emissions. In the operational phase the preferred supply option would incur 1,350 tCO₂e/year per annum. The preferred demand management options would also require materials with significant cumulative embodied carbon, in particular, options WR516h1 and WR516h2 would require materials (related to mains pipeline renewal) with 32,375tCO₂e and 79,952.3tCO₂e embodied carbon respectively. The combined total embodied carbon of all preferred demand management options is estimated to be almost 120,000tCO₂e. The demand management options will see a reduction in carbon linked to reduced demand for water. This is equivalent to 8,100tCO₂e. per annum. Overall, a mix of significant negative and positive effects are assessed.</p>
10. To adapt and improve resilience to the threats of climate change.	+++	<p>Cumulatively the preferred programme of supply options would increase the capacity by supply of 25M/d (from 2033 onwards), in addition to a demand management reduction of approximately 291 Ml/d (which would be delivered incrementally (from 2026 onwards) as options are implemented year on year, with all options assumed to be fully implemented by the year 2063), which would make a significant contribution towards securing a continual supply of clean drinking water and increase resilience of this supply, thereby increasing resilience and adaptability to the effects of climate change.</p>

SEA Objective	Cumulative score	Commentary
<p>11. To promote a sustainable economy and maintain and enhance the economic and social well-being of local communities.</p>	<p>+++/-</p>	<p>The preferred supply side option and demand management options will cumulatively involve significant capital expenditure during the construction phase. This is considered to have a significant positive effect on the local economy through job creation and use of local supply chains which could provide the potential for a number of local businesses and SMEs to have sustained involvement and opportunities in construction.</p> <p>In the operational phase the preferred programme of options would support the delivery of an additional 25MI/d capacity which would help ensure a continual supply of clean drinking water and increase resilience of supply to UU customers (from 2033 onwards), whilst the demand management options would reduce the amount of water used (approximately 291 MI/d, which would be delivered incrementally (from 2026 onwards) as options are implemented year on year, with all options assumed to be fully implemented by the year 2063). This will, in-turn, support population and economic growth which would also support achievement of a cumulative significant positive effect.</p> <p>However, given the potential effects of construction on driver delay and disruption there are likely to be some negative effects from the preferred option programme. A mix of significant positive and minor negative effects are assessed.</p>
<p>12. To maintain and enhance tourism and recreation.</p>	<p>-/?</p>	<p>Tourism and recreation can be affected in the construction phase through, for example, temporary closures or diversions to footpaths, public rights of way or by affecting enjoyment of recreation spaces or routes such as cycle paths (from noise or visual intrusion) where these are close to works are taking place. Cumulatively, the preferred programme has been assessed as having minor negative effects due to the likely impacts of construction. However, these effects are temporary.</p>
<p>13. To protect and enhance human health and well-being.</p>	<p>+++/-</p>	<p>The construction of water resources infrastructure can adversely affect traffic, noise, vibration, air quality and emissions. These effects are temporary but can be of scale that is significant to specific locational receptors. However, overall, the impact is not considered to be significant. In the operational phase the effects on health primarily relate to the provision of additional 25 MI/d capacity infrastructure that will supply clean drinking water to UUW customers (from 2033 onwards) alongside a demand management reduction of approximately 291 MI/d (which would be delivered incrementally (from 2026 onwards) as options are implemented year on year, with all demand management options assumed to be fully implemented by the year 2063) across the UUW area. Therefore, cumulatively a mix of significant positive and minor negative effects are assessed. The negative effects will largely be temporary.</p>
<p>14. To promote and enhance the sustainable and efficient use of resilient water resources.</p>	<p>+++</p>	<p>The preferred programme of options will help to support the resilience of water resources in the UUW area. The preferred programme will cumulatively support increased water efficiency (approx. 75 MI/d), leakage reduction (approx. 135 MI/d), and metering (approx. 82 MI/d) (each of which would be delivered incrementally (from 2026 onwards) as options are implemented year on year, with all demand management options assumed to be fully implemented by the year 2063) and support the provision of 25MI/d of deployable output (from 2033 onwards). This is considered to be significant.</p>
<p>15. To minimise waste, promote resource efficiency and move towards a circular economy.</p>	<p>---</p>	<p>Given the cumulative concrete, steel and plastics that will be required to construct the preferred supply option and material required resources for the demand management options (for example in the production of meters and materials for pipeline/mains renewal), there is likely to be a significant amount of waste generated (although there is some potential for re-use of materials the presence and extent is uncertain). Additionally, the options would generate waste during operation related to chemical use, vehicle movements and energy use.</p>

SEA Objective	Cumulative score	Commentary
<p>16. To conserve and enhance the historic environment including the significance of heritage assets and their settings and archaeological important sites.</p>		<p>Cumulative significant negative effects have therefore been assessed for this objective.</p>
<p>17. To conserve, protect and enhance landscape and townscape character and visual amenity.</p>		<p>No significant effects are anticipated for the preferred programme of options. The development of water resources infrastructure may result in indirect (e.g. impacts on setting) adverse effects on the significance of heritage assets including scheduled monuments and listed buildings where they are in close proximity to works. However, any effects would be temporary (i.e. for the duration of construction of WR076 and, potentially for a limited number of demand management options (WR516h1, WR516h2 and WR516a1) over their implementation periods (10 years, 25 years and 15 years respectively)) and taking into account the scale of construction activity at each site, effects are not predicted to be significant. The preferred programme of options is considered to cumulatively have minor negative effects. As these effects are most likely to be experienced in the construction phase, they are considered to be temporary. Some residual effects may be experienced where above ground infrastructure is in the setting of assets.</p>
<p>17. To conserve, protect and enhance landscape and townscape character and visual amenity.</p>		<p>The construction and operation of the preferred programme of options would likely have negative effects on landscape/townscape. The preferred supply option (WR076) is not within a designated landscapes or in close proximity but is located in a semi-rural landscape and will likely have negative effects during construction phase. Where works are in close proximity to residential and recreational receptors, construction activity associated with the preferred programme may have short term effects on visual amenity. Potentially for a limited number of demand management options (WR516h1, WR516h2 and WR516a1) there will be landscape effects over their implementation periods (10 years, 25 years and 15 years respectively)). Where above ground infrastructure forms part of the operational phase there are also likely to be negative effects sustained. Overall, minor negative effects are assessed.</p>

6.4 Reasonable Alternative Plan Assessment

- 6.4.1 All of the supply options in the preferred plan form part of the NWT SRO. The NWT SRO is currently being assessed as part of RAPID’s gated process for SROs; this includes environmental compliance. Additional groundwater modelling, water quality, ecological and hydrological monitoring and fish pass assessments are being undertaken as part of the NWT SRO Gate 3 programme of work, which is being completed to meet the RAPID requirements. This work is not currently aligned to the WRMP24 process. Where possible, and to ensure consistency and use of the most up to date information, any modelling or investigation outputs arising from the NWT SRO Gate 3 programme of work has been used in this SEA (and HRA and WFD assessment).
- 6.4.2 Recognising this uncertainty, in compliance with the WRPG requirements and taking into account feedback from several environmental stakeholders including the EA, NE and Mersey Rivers Trust, four alternative supply options have been identified for implementation should the current stage of SRO Gate 3 assessment not allow potential non-compliance to be ruled out. The WFD Assessment and HRA have concluded that these alternative supply options are in conformity with the WFD Regulations and Habitats Regulations and, therefore, they form the reasonable alternative plan for the purposes of the SEA of the Final WRMP24.

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6.4.3 The 'WFD / Habitats Regulations compliant' options that comprise the reasonable alternative plan are listed in **Table 6.13**. A summary of the assessment of these options is presented in **Table 6.14** with commentary on the likely significant construction and operational effects provided below.

Table 6.13 Options included in the WRMP Reasonable Alternative

Option ID	Option name	Yield (MI/d)	Description
WR026c	SWN_RIVER RIBBLE	4	[Redacted]
WR065b	RES_WHITEHOLME	2	
WR185	SSO_STOCKPORT PH II	12	
WR191	PRO_NORTH LANCASHIRE	4	

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Table 6.14 Summary of Reasonable Alternative Plan Option Assessments

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR026c	Construction (negative)	-	--	0	--	0	0	--	-	--	-	-	-/?	-	0	---	-	--
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WR065b	Construction (negative)	-	---	0	0	0	0	0	-	-	0	0	-	-	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	+++	0	0	0	0	+	0	0	+	+	0	+	+	0	0	0
WR185	Construction (negative)	-	--	0	-	0	0	0	0	-	0	0	0	-	0	--	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	+++	0	0	0
WR191	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	--	0	-
	Construction (positive)	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	-
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0

WR026c SWN_RIVER RIBBLE

Construction

- 6.4.4 The construction of Option WR026c would require a significant capital spend, resulting in a positive effect on the local economy associated with employment opportunities and supply chain benefits generated by the development, together with spend by construction workers and contractors in the local economy. Capital spend would be spread across four years which could provide the potential for a number of local businesses and SMEs to see sustained involvement and opportunities. This is assessed as a significant positive effect on the economy (Objective 11).
- 6.4.5 No further significant positive effects were identified for the construction phase of Option WR026c.
- 6.4.6 Construction would require the use of significant amounts of concrete, steel, and plastic, as well as 8,484 vehicle movements over the 1.8-year implementation stage, and energy to operate machinery and plant. This is assessed as a significant negative effect on waste and resource use (Objective 15).
- 6.4.7 No further significant negative effects were identified for the construction phase of Option WR026c.

Operation

- 6.4.8 No significant positive or negative effects were identified for the operational phase of Option WR026c.

WR065b RES_WHITEHOLME

Construction

- 6.4.9 No significant positive effects were identified for the construction phase of Option WR065b.
- 6.4.10 The BNG Assessment of Option WR065b concludes that there would be a significant effect on biodiversity net loss due to the permanent loss of habitats, including parts of the SPA/SAC/SSSI that the reservoir is located within, during the construction period. This is assessed as having a significant negative effect on sustainable natural resources (Objective 2).
- 6.4.11 No further significant negative effects were identified for the construction phase of Option WR065b.

Operation

- 6.4.12 It is assumed that there would be operational biodiversity net gain, greater than the net loss during construction; however, without quantification, its magnitude is uncertain. In

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consequence, this has been assessed as having a significant positive effect on sustainable natural resources (SEA Objective 2).

- 6.4.13 No further significant positive effects were identified for the construction phase of Option WR065b.
- 6.4.14 No significant negative effects were identified for the operation phase of Option WR065b.

WR185 SSO_STOCKPORT PH II**Construction**

- 6.4.15 No significant positive or negative effects were identified for the construction phase of Option WR185.

Operation

- 6.4.16 The option would increase water efficiency, through provision of an extra 12 Ml/d deployable output, by utilising 'spare' capacity in the Manchester supply network, without the need for additional abstraction. This would increase the resilience of water resources within the U UW supply area and has been assessed as a significant effect on water resource use (SEA Objective 14).
- 6.4.17 No further significant positive effects were identified for the operation phase of Option WR185.
- 6.4.18 No significant negative effects were identified for the operation phase of Option WR185.

WR191 PRO_NORTH LANCASHIRE**Construction**

- 6.4.19 No significant positive or negative effects were identified for the construction phase of Option WR191.

Operation

- 6.4.20 No significant positive or negative effects were identified for the operation phase of Option WR191.

Overview of Reasonable Alternative Plan Effects

- 6.4.21 The four reasonable alternative supply side options are, quantifiably, relatively similar to the preferred supply option, although with a cumulative additional water capacity of 22 Ml/d, this is slightly lower than the additional capacity of the preferred supply option. They have been proposed as they have greater certainty of WFD and HRA compliance than the preferred supply options, although their best value performance overall is less than that of the selected preferred options.

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- 6.4.22 When considering the effects of the reasonable alternative plan identified against the 17 SEA objectives, significant negative effects during construction are similar to those identified for the preferred supply option. Both are assessed as having a significant negative effect against and waste and resource use (Objective 15). However, against sustainable natural resources (Objective 2), Option WR065b has been assessed as also having a significant negative effect. In contrast, the preferred supply option was not identified as having a significant negative effect against SEA Objective 2.
- 6.4.23 Significant positive effects have been identified for construction from the reasonable alternative plan options against economy (Objective 11), associated with Option WR026c.
- 6.4.24 Effects from the reasonable alternative plan options are broadly similar to those of the preferred plan. However, Option WR065b would have a significant positive effect on sustainable natural resources (Objective 2) during its operation, and Option WR185 would have a significant positive effect on water resource use (Objective 14), during its operation.
- 6.4.25 The following quantified effects will be seen through construction and operation of the reasonable alternative plan supply options:
- **SEA Objective 9.** In total, the construction of the reasonable alternative plan supply side options would require materials with 6,134tCO₂e embodied carbon. Construction would also generate 11,455 vehicle movements, which, together with the operation of plant and machinery, will additionally contribute to carbon emissions. In the operational phase, the alternative options would generate 96tCO₂e per annum.
 - **SEA Objectives 10, 11, 13 and 14.** In the operational phase, the reasonable alternative plan supply side options would support the delivery of 22MI/d of clean drinking water which would improve resilience and adaptability to the effects of climate change, support population and economic growth, contribute towards maintaining health and aid sustainable water resource provision.
 - **SEA Objective 15.** In total, the reasonable alternative plan supply side options would have cumulative material resource requirements for construction estimated as 52,159 tonnes of concrete, 1,045 tonnes of steel and 15 tonnes of plastics. Such quantities would be likely to be associated with a significant amount of waste generated.
- 6.4.26 Given that the options are broadly of similar scale and providing similar benefit, these quantified effects are comparable with the preferred supply options. Two areas of difference are noted:
- **SEA Objective 9.** Construction of the reasonable alternative plan would require materials with a total embodied carbon of 6,134tCO₂e, less than the 20,457 tCO₂e required for the preferred supply option.
 - **SEA Objective 11.** In the operational phase, the preferred supply option would deliver 25MI/d additional water capacity which would improve resilience and adaptability of supplies. This is higher than the reasonable alternative plan which would support the delivery of 22MI/d.
 - **SEA Objective 13.** In the operational phase the preferred supply option would deliver 25MI/d additional water capacity ensuring a continual supply of clean water. This is

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higher than the reasonable alternative plan which would support the delivery of 22MI/d.

6.4.27 In summary, the reasonable alternative plan supply options and preferred supply options are similar in scale and effect, although differences are noted against sustainable natural resources (Objective 2), greenhouse gases (Objective 9), economy (Objective 11), health (Objective 13), and waste and materials (Objective 15). Given the greater confidence of WFD compliance at this stage, the reasonable alternative supply options are assessed as having minor negative operational effects against the water quantity (Objective 5) and water quality (Objective 6), in contrast to the preferred supply option which is assessed as having moderate negative uncertain against the same objectives overall.

6.5 Alternative Plan Assessment

6.5.1 UUW has developed a number of plan alternatives as part of the process for developing its overall 'best value' plan. The alternatives considered in this manner have been the 'least cost plan' and 'best for the environment and society plan'. The alternative plans have been used to provide comparisons during the MCA process.

6.5.2 As highlighted in **Section 4.4**, whilst these plans are not considered equivalent to reasonable alternatives for the purposes of SEA, the potential cumulative effects of the options that comprise the two alternative plans have been considered, identified, and assessed for completeness and in response to consultee requests.

Overview of Alternative Plan Options

6.5.3 **Table 6.15** lists the supply options associated with each of the alternative plans, with comparison to the list of options included the preferred plan. **Table 6.16**, **Table 6.17** and **Table 6.18** list the demand management, metering and leakage options included in the Strategic Resource Zone, the Carlisle Resource Zone and the North Eden Resource Zone respectively, associated with each of the alternative plans, with comparison to the list of options included the preferred plan. An equivalent table setting out the drought permit options has not been included, as these remain the same across the preferred plan and the two alternative plans (and as such remain the same as those set out in **Table 6.5**).

Table 6.15 Supply Options included in the Revised Draft WRMP24 Preferred (Best Value) Plan and Alternative Plans

Option ID	Option Name	Yield (MI/d)	Preferred (Best Value) Plan	Least Cost Plan	Best For Environment and Society Plan
WR065b	RES_WHITEHOLME	2			✓
WR076	SWN_RIVER BOLLIN	25	✓		✓

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Option ID	Option Name	Yield (Ml/d)	Preferred (Best Value) Plan	Least Cost Plan	Best For Environment and Society Plan
WR105a1	GWE_LYMM a1	9.09		✓	
WR106b	GWE_WALTON 2	8.45		✓	
WR102f	GWE_WIDNES 2	11		✓	
WR185	SSO_STOCKPORT PH II	12			✓
WR191	PRO_NORTH LANCASHIRE	4			✓

Table 6.16 Demand Management, Metering and Leakage Options included in the Revised Draft WRMP24 Preferred (Best Value) Plan and Alternative Plans for the Strategic Resource Zone

Option ID	Option Name	Yield (Ml/d)	Preferred (Best Value) Plan	Least Cost Plan	Best For Environment and Society Plan
WR502c	LEA-SRZ5_Permanent network sensors	20.0	✓	✓	
WR502e	LEA-SRZ12_Permanent network sensors	48.0			✓
WR510	LEA-SRZ15_In-pipe repairs and lining technologies	4.47	✓	✓	✓
WR511g	LEA-SRZ5_Pressure management	1.0	✓		
WR511j	LEA-SRZ15_Pressure management	10.0			✓
WR516h	LEA-SRZ10_Mains rehabilitation/renewal/replacement	100.0		✓	
WR516h1	LEA-SRZ10_Mains rehabilitation/renewal/replacement	49.12	✓		✓
WR516h2	LEA-SRZ25_Mains rehabilitation/renewal/replacement	50.80	✓		✓
WR520c	LEA-SRZ5_DMA optimisation	2.00	✓		✓

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Option ID	Option Name	Yield (MI/d)	Preferred (Best Value) Plan	Least Cost Plan	Best For Environment and Society Plan
WR524d	LEA-SRZ10_Upstream tile optimisation	5.78	✓	✓	✓
WR532	LEA-SRZ15_Dynamic Network Management	31.0			✓
WR603e	EMT-SRZ15_Enhanced metering of households on single supplies (smart meters)	60.46	✓	✓	✓
WR615c	EMT-SRZ5_Replace existing non-household meters with smart meters	10.44	✓	✓	✓
WR619c	EMT-SRZ10_Replace existing household meters with smart meters	10.24	✓	✓	
WR619d	EMT-SRZ15_Replace existing household meters with smart meters	16.0			✓
WR658c	WSD-SRZ10_Free water efficiency devices (inside/internal)	4.60	✓	✓	✓
WR659c	WER-SRZ15_Free water efficiency devices (outside/external)	4.00	✓		✓
WR661c	WUA-SRZ15_Free water efficiency audits (households)	12.98	✓	✓	✓
WR669a	ISD-SRZ15_Flow regulators	2.0		✓	✓
WR677c	WUA-SRZ5_Non-household water efficiency programme	12.94	✓	✓	✓
WR685c	WER-SRZ15_Rainwater harvesting and water reuse (new builds)	6.0			✓
WR694f	WSA-SRZ15_Government intervention (water labelling, standards)	36.26	✓	✓	✓

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Table 6.17 Demand Management, Metering and Leakage Options included in the Revised Draft WRMP24 Preferred (Best Value) Plan and Alternative Plans for the Carlisle Resource Zone

Option ID	Option Name	Yield (MI/d)	Preferred (Best Value) Plan	Least Cost Plan	Best For Environment and Society Plan
WR502a	LEA-CRZ10_Permanent network sensors	0.51	✓	✓	✓
WR511a	LEA-CRZ5_Pressure management	0.1	✓		
WR511c	LEA-CRZ15_Pressure management	0.5			✓
WR516a1	LEA-CRZ15_Mains rehabilitation/renewal/replacement	1.19	✓	✓	✓
WR520a	LEA-CRZ5_DMA optimisation	0.48	✓	✓	✓
WR601a	EMT-CRZ10_Enhanced metering of households (smart meters)	1.305			✓
WR603a	EMT-CRZ5_Enhanced metering of households on single supplies (smart meters)	0.83	✓	✓	
WR615a	EMT-CRZ5_Replace existing non-household meters with smart meters	0.20	✓	✓	✓
WR619a	EMT-CRZ10_Replace existing household meters with smart meters	0.40	✓	✓	✓
WR658a	WSD-CRZ10_Free water efficiency devices (inside/internal)	0.11	✓	✓	✓
WR659a	WER-CRZ15_Free water efficiency devices (outside/external)	0.08	✓	✓	✓
WR661a	WUA-CRZ15_Free water efficiency audits (households)	0.27	✓	✓	✓
WR669b	ISD-CRZ15_Flow regulators	0.15	✓	✓	✓
WR677a	WUA-CRZ15_Non-household water efficiency programme	0.39	✓	✓	✓

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Option ID	Option Name	Yield (MI/d)	Preferred (Best Value) Plan	Least Cost Plan	Best For Environment and Society Plan
WR685a	WER-CRZ5_Rainwater harvesting and water reuse (new builds)	0.06	✓		✓
WR694d	WSA-CRZ15_Government intervention (water labelling, standards)	0.60	✓	✓	✓

Table 6.18 Demand Management, Metering and Leakage Options included in the Revised Draft WRMP24 Preferred (Best Value) Plan and Alternative Plans for the North Eden Resource Zone

Option ID	Option Name	Yield (MI/d)	Preferred (Best Value) Plan	Least Cost Plan	Best For Environment and Society Plan
WR502b	LEA-NERZ10_Permanent network sensors	0.279		✓	✓
WR511f	LEA-NERZ15_Pressure management	0.5			✓
WR520b	LEA-NERZ5_DMA optimisation	0.042		✓	✓
WR524b	LEA-NERZ5_Upstream tile optimisation	0.042			✓
WR601b	EMT-NERZ10_Enhanced metering of households (smart meters)	0.144			✓
WR603b	EMT-NERZ5_Enhanced metering of households on single supplies (smart meters)	0.27	✓		
WR615b	EMT-NERZ5_Replace existing non-household meters with smart meters	0.09	✓	✓	✓
WR619b	EMT-NERZ10_Replace existing household meters with smart meters	0.02	✓		✓
WR658b	WSD-NERZ10_Free water efficiency devices (inside/internal)	0.01			✓
WR661b	WUA-NERZ15_Free water efficiency audits (households)	0.01			✓

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Option ID	Option Name	Yield (MI/d)	Preferred (Best Value) Plan	Least Cost Plan	Best For Environment and Society Plan
WR669c	ISD-NERZ15_Flow regulators	0.01			✓
WR677b	WUA-NERZ15_Non-household water efficiency programme	0.005		✓	✓
WR685b	WER-NERZ15_Rainwater harvesting and water reuse (new builds)	0.01			✓
WR694e	WSA-NERZ15_Government intervention (water labelling, standards)	0.06	✓	✓	✓

Summary of Alternative Plan Effects

- 6.5.1 **Table 6.19, Table 6.20, Table 6.21** and **Table 6.22** provide an overview of the construction and operational effects of the least cost plan (based on the SEA of the component supply options, and the demand management, metering and leakage options in the Strategic Resource Zone, the Carlisle Resource Zone and the North Eden Resource Zone respectively), whilst **Table 6.23, Table 6.24, Table 6.25** and **Table 6.26**, provide the equivalent review of effects for the 'best for environment and society' plan options.
- 6.5.2 It should be noted that, the assessment summaries presented in the tables below are a compilation of the most recent iteration of each option assessment undertaken to date. For example:
- Where options in either of the two alternative plans are also found in the preferred plan, the preferred option assessments have been used.
 - Where options in either of the two alternative plans are found in the reasonable alternative plan (but not in the preferred plan), the reasonable alternative plan option assessments have been used.
 - Where options in the two alternative plans are not found in either the preferred plan or reasonable alternative plan, the most recent iteration of the feasible option assessments for those options have been used (i.e. those summarised in **Section 5** and presented in **Appendix F**).
- 6.5.3 Where the feasible option assessments have been relied on there may be some minor discrepancies between the identified effects and those of any comparable options taken forward for further consideration as preferred options. Overall, this has not be considered material to the outcome of the findings.

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Table 6.19 Summary of Least Cost Plan Supply Option Assessments

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR105a1	Construction (negative)	-	-	0	-	0	0	-	-	--	0	0	-	-	0	---	0	-
	Construction (positive)	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	-	-/?	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR106b	Construction (negative)	-	--	0	-	0	0	0	-	---	0	-	-	-	0	---	-	-
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WR102f	Construction (negative)	-	--	0	-	0	0	--	-	---	-	-	-	-	0	---	-	-

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	+++	0	0	0

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Table 6.20 Summary of the Assessments of the Least Cost Plan Demand Management, Metering and Leakage Options in the Strategic Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR502c	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	++	++	0	++	+++	0	0	0
WR510	Construction (negative)	-/?	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR516h	Construction (negative)	-/?	0	0	0	0	0	0	---/?	---	0	---	-/?	--/?	0	---	-/?	-/?

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	0	0	0	+++	0	0	0
WR524d	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	++	0	0	0	++	++	++	0	++	++	0	0	0
WR603e	Construction (negative)	0	0	0	0	0	0	0	---/?	--	0	0	0	0	0	--/?	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	++	+++	0	+++	+++	0	0	0
WR615c	Construction (negative)	0	0	0	0	0	0	0	---	-/?	0	0	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	++	++	0	++	+++	0	0	0
WR619c	Construction (negative)	0	0	0	0	0	0	0	-/?	0	0	-	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	++	++	0	++	+++	0	0	0
WR658c	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	--	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR661c	Construction (negative)	0	0	0	0	0	0	0	---	-	0	0	0	0	0	-/?	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	++	++	0	++	+++	0	0	0
WR669a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-/?	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	+	0	+	+	0	0	0
WR677c	Construction (negative)	0	0	0	0	0	0	0	-	0	0	0	0	0	0	-/?	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+	++	++	0	++	+++	0	0	0
WR694f	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	++	+++	0	+++	+++	0	0	0

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Table 6.21 Summary of the Assessments of the Least Cost Plan Demand Management, Metering and Leakage Options in the Carlisle Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR502a	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR516a1	Construction (negative)	-/?	0	0	0	0	0	0	0	--	0	-/?	-/?	-/?	0	--	-/?	-/?
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR520a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR603a	Construction (negative)	0	0	0	0	0	0	0	-/?	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	0	0	0	+	0	0	0
WR615a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR619a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR658a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR659a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR661a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR669b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR677a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	0	0	0	+	0	0	0
WR694d	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0

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Table 6.22 Summary of the Assessments of the Least Cost Plan Demand Management, Metering and Leakage Options in the North Eden Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR502b	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0
WR520b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0
WR615b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR677b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0
WR694e	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0

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Table 6.23 Summary of Best for Environment and Society Plan Supply Option Assessments

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR065b	Construction (negative)	-	---	0	0	0	0	0	-	-	0	0	-	-	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	+++	0	0	0	0	+	0	0	+	+	0	+	+	0	0	0
WR076	Construction (negative)	-	-	0	--	0	0	--/?	--	---	-	--	-	--	0	---	-	-
	Construction (positive)	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	--	-	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0
WR185	Construction (negative)	-	--	0	-	0	0	0	0	-	0	0	0	-	0	--	0	0
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+	0	0	0	+/?	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	+++	0	0	0
WR191	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	--	0	-
	Construction (positive)	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	-
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0

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Table 6.24 Summary of the Assessments of the Best for Environment and Society Plan Demand Management, Metering and Leakage Options in the Strategic Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR502e	Construction (negative)	0	0	0	0	0	0	0	-/?	-	0	0	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	0	+++	0	+++	+++	0	0	0
WR510	Construction (negative)	-/?	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR511j	Construction (negative)	0	0	0	0	0	0	0	-/?	-	0	0	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape	
	Construction (positive)	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
	Operation (positive)	0	0	0	0	++	0	0	0	++	0	++	0	++	++	0	0	0	0
WR516h1	Construction (negative)	-/?	0	0	0	0	0	0	--	---	0	-/?	-/?	-/?	0	---	-/?	-/?	
	Construction (positive)	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	
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	++	+++	0	+++	+++	0	0	0	
WR516h2	Construction (negative)	-/?	0	0	0	0	0	0	--	---	0	-/?	-/?	-/?	0	---	-/?	-/?	
	Construction (positive)	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	

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	++	+++	0	+++	+++	0	0	0
WR520c	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR524d	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	++	0	0	0	++	++	++	0	++	++	0	0	0
WR532	Construction (negative)	0	0	0	0	0	0	0	-	-	0	-	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	0	+++	0	+++	+++	0	0	0
WR603e	Construction (negative)	0	0	0	0	0	0	0	---/?	--	0	0	0	0	0	--/?	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	++	+++	0	+++	+++	0	0	0
WR615c	Construction (negative)	0	0	0	0	0	0	0	---	-/?	0	0	0	0	0	--	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	+++	0	0	0	++	++	++	0	++	+++	0	0	0
WR619d	Construction (negative)	0	0	0	0	0	0	0	-	?	0	-	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	0	++	0	++	+++	0	0	0
WR658c	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR659c	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	--	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR661c	Construction (negative)	0	0	0	0	0	0	0	---	-	0	0	0	0	0	-/?	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	++	++	++	0	++	+++	0	0	0
WR669a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-/?	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	+	0	+	+	0	0	0
WR677c	Construction (negative)	0	0	0	0	0	0	0	-	0	0	0	0	0	0	-/?	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+	++	++	0	++	+++	0	0	0
WR685c	Construction (negative)	0	0	0	0	0	0	0	--/?	---	0	0	0	0	0	--	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	++	0	0	0	++	0	++	0	++	++	0	0	0
WR694f	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+++	0	0	0	+++	++	+++	0	+++	+++	0	0	0

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Table 6.25 Summary of the Assessments of the Best for Environment and Society Demand Management, Metering and Leakage Options in the Carlisle Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR502a	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR511c	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR516a1	Construction (negative)	-/?	0	0	0	0	0	0	0	--	0	-/?	-/?	-/?	0	--	-/?	-/?

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	+	+	0	+	+	0	0	0
WR520a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR601a	Construction (negative)	0	0	0	0	0	0	0	-/?	0	0	0	0	0	0	-	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	+	0	+	+	0	0	0
WR615a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR619a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR658a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR659a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR661a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR669b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR677a	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	+	0	0	0	0	+	0	0	0
WR685a	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0
WR694d	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0

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Table 6.26 Summary of the Assessments of the Best for Environment and Society Plan Demand Management, Metering and Leakage Options in the North Eden Resource Zone

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR502b	Construction (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0
WR511f	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR520b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0
WR524b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0
WR601b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0
WR615b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR619b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR658b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0
WR661b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR669c	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0
WR677b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0
WR685b	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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
	Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	+	0	0	0
WR694e	Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction (positive)	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
	Operation (positive)	0	0	0	0	0	0	0	0	+	0	0	0	0	+	0	0	0

Least Cost Plan

- 6.5.4 The preferred supply option included within the preferred plan is not included in the least cost plan. There are three additional supply options included in this plan (WR105a1, WR106b, WR102f). In terms of demand management, metering and leakage options, there are some notable differences:
- In the Strategic Resource Zone, the least cost plan does not include the following options which are included in the preferred plan: WR659c, WR516h1, WR516h2, WR520c and WR511g. However, the least cost plan includes option WR516, and WR669a, which are not included in the preferred plan. Other options in this zone are the same in both the preferred plan and least cost plan.
 - In the Carlisle Resource Zone, the least cost plan does not include the following options which are included in the preferred plan: WR511a and WR685a. All other options in this zone are the same in both the preferred plan and least cost plan.
 - In the North Eden Resource Zone, the least cost plan does not include the following options which are included in the preferred plan: WR603b and WR619b. However, the least cost plan includes options WR502b, WR520b and WR677b, which are not included in the preferred plan. All other options in this zone are the same in both the preferred plan and least cost plan.
- 6.5.5 Overall, the range of significant effects associated with the least cost plan is anticipated to be similar to that of the preferred plan, however, there are some notable differences:
- The three supply options in the least cost plan, compared to the supply option included in the preferred plan, would result in a cumulative capacity of 28.54MI/d, 3.54MI/d greater than the preferred plan.
 - The differences in the selected demand management, leakage and efficiency options included in the least cost plan compared to that of the preferred plan would result in a demand saving of just over 4MI/d less than that of the preferred plan, however, the overall total would remain significant at 287MI/d.
- 6.5.6 Reflecting these changes, the least cost plan has been assessed as having overall significant positive effects across several of the SEA objectives (mainly associated with the operational phase of options) including water quantity (SEA Objective 5), carbon emissions (SEA Objective 9) (both of which would be associated with demand reductions), climate resilience (SEA Objective 10), economy (SEA Objective 11) (it is also noted that significant positive effects on SEA Objective 11 would be associated with the capital investment required for construction/implementation), human health and well-being (SEA Objective 13) and water resource use (SEA Objective 14) associated with the improved resilience and adaptability to the effects of climate change, the contribution to population and economic growth, health and wellbeing and sustainable water resource provision and reduction in water use (through demand management measures) and associated reduction in carbon emissions that the plan would result in during operation.
- 6.5.7 However, reflecting the scale of construction/implementation of the options in the least cost plan, significant negative effects were identified against air quality (SEA Objective 8),

greenhouse gas emissions (SEA Objective 9) and resource use (SEA Objective 15), associated with the required vehicle movements, material use and potential waste generation and embodied/construction carbon emissions that the implementation of the plan would result in.

Best for Environment and Society Plan

- 6.5.8 The supply options included within the preferred plan is also included within the best for environment and society plan, however, there are three additional supply options included in this plan (WR065b, WR185 and WR191). In terms of demand management, metering and leakage options, there are also some notable differences:
- In the Strategic Resource Zone, the best for environment and society plan does not include the following options which are included in the preferred plan: WR502c, WR511g and WR619c. However, the best for environment and society plan includes options WR502e, WR511j, WR532, WR619d, WR669a and WR685c, which are not included in the preferred plan. All other options in this zone are the same in both the preferred plan and best for environment and society plan.
 - In the Carlisle Resource Zone, the best for environment and society plan does not include the following options which are included in the preferred plan: WR511a and WR603a. However, the best for environment and society plan includes options WR511c and WR601a, which are not included in the preferred plan. All other options in this zone are the same in both the preferred plan and best for environment and society plan.
 - In the North Eden Resource Zone, the best for environment and society plan does not include option WR603b, which is included in the preferred plan. However, the best for environment and society plan includes options WR502b, WR511f, WR520b, WR524b, WR601b, WR658b, WR661b, WR669c, WR677b and WR685b, which are not included in the preferred plan. All other options in this zone are the same in both the preferred plan and best for environment and society plan.
- 6.5.9 Overall, the range of significant effects associated with the best for environment and society plan is anticipated to be similar to that of the preferred plan, however, there are some notable differences:
- The addition of the three additional supply options in the best for environment and society plan, compared to those included in the preferred plan, would result in a cumulative yield of 43MI/d, a total of 18MI/d greater than the preferred plan.
 - The selected demand management, leakage and efficiency options included in the best for environment and society plan would result in a demand saving of just over 374MI/d, a total of 83MI/d more than that of the preferred plan.
- 6.5.10 Reflecting these changes, the best for environment and society plan has been assessed as having overall significant positive effects across several of the SEA objectives. These occur mainly during the operational phase of options and include significant positive effects on water quantity (SEA Objective 5), climate resilience (SEA Objective 10), economy (SEA Objective 11), human health and well-being (SEA Objective 13) and water resource use

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(SEA Objective 14). These operational effects arise from the improved resilience and adaptability to the effects of climate change, the contribution to population and economic growth, health and wellbeing and sustainable water resource provision and reduction in water use (through demand management measures) and associated reduction in carbon emissions that the plan would result in during operation. There is also a significant positive effect on economy (SEA Objective 11) associated with the capital investment required for construction/implementation.

- 6.5.11 As a result of the increased number of supply and demand management options in the best for environment and society plan when compared to the preferred plan, there would be increased quantity of embodied carbon associated with materials required for construction (albeit that this would be significant across both plans). However, the scale of carbon emission reductions during operation achieved by the best for environment and society plan (associated with demand management savings) would be significantly greater than that of the preferred plan. In consequence, a significant positive effect on greenhouse gas emissions (SEA Objective 9) was identified during operation.
- 6.5.12 Reflecting the scale of construction/implementation of the options in the best for environment and society plan, significant negative effects were also identified against air quality (SEA Objective 8) and resource use (SEA Objective 15), associated with the required vehicle movements and material use and potential waste generation during construction. Overall, the assessment of significance against these objectives therefore remains similar for both the preferred plan and the best for environment and society plan.

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6.6 Final WRMP 24 Scenarios

- 6.6.1 The Draft WRMP24 identified fourteen scenarios relating to alternative futures covering some key uncertainties, including the impacts of climate change, alternative option phasing, changes to environmental destination and the pace of technological change. UUW developed the alternative scheme portfolios with branching decision points to provide adaptive plan pathways in response to each scenario. This approach helps to ensure resilience and robustness in the plan making process.
- 6.6.2 Given the numerous uncertainties that underpin the work, and the diversity of portfolios that could then be considered, for the purpose of the SEA of the Draft WRMP24, they were not considered reasonable alternatives to the preferred plan and were not assessed. However, the Environmental Report highlighted the following in respect of the environmental effects of the scenarios:

"...it is worth noting that for many of the scenarios, it is envisaged that further sources of supply would be required. In consequence, it would seem likely that the range of likely significant effects (identified for the preferred plan and reasonable alternative) would continue, with the quantum of effects increased. It is also possible that the effects arising from phasing of the work would need to be further taken into account to avoid undue concentration of construction activity on local communities, causing disruption and a range of localised negative effects. Such cumulative effects may become particularly acute where effects could occur in conjunction with other construction projects, unrelated to the draft WRMP24".

- 6.6.3 The final regional planning reconciliation round reconciled three pathways related to water trading between WRW and WRSE:
- **Preferred pathway:** Minworth Reuse SRO raw water flow augmentation to support the Grand Union Canal (GUC) Transfer SRO, selected from 2031 ([REDACTED] in 2031 [REDACTED] in 2040).
 - **WRSE higher demand scenario:** GUC with Minworth support selected from 2031 ([REDACTED] in 2031 [REDACTED] in 2040); Severn Thames Transfer (STT) SRO [REDACTED] pipeline with support selected from 2050 (Netheridge [REDACTED] in 2050, Vyrnwy [REDACTED] in 2050 [REDACTED] in 2060 [REDACTED] in 2061 ([REDACTED] Minworth [REDACTED] in 2054).
 - **WRSE no SESRO scenario:** GUC with Minworth support selected from 2031 ([REDACTED] in 2031 increasing to 100 in 2040); STT SRO [REDACTED] pipeline with support selected from 2039 (Netheridge [REDACTED] in 2039, Vyrnwy [REDACTED] in 2042 [REDACTED] in 2045 [REDACTED] in 2046 [REDACTED] in 2050 ([REDACTED]), Minworth [REDACTED] in 2050 and [REDACTED] in 2054 ([REDACTED]).
- 6.6.4 The Final WRMP24 preferred plan is consistent with the reconciled regional preferred pathway. Under the 'WRSE higher demand' and 'No SESRO' scenarios, additional water from Vyrnwy Reservoir would be transferred to WRSE as part of the Severn to Thames Transfer (STT) SRO, requiring further sources of supply (from the constrained list of WRMP24 options) to maintain supply resilience to UUW customers. In this context, **Table 6.27** lists the supply options associated with each scenario.

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Table 6.27 Final WRMP24 Scenarios and WRMP24 Supply Options

Option ID	Option name	Yield (MI/d)	Preferred Pathway	WRSE Higher Demand Scenario	WRSE No SESRO Scenario
WR015a2	SWN_RIVER IRWELL a2	60		✓	✓
WR049d	SWN_RIVER RIBBLE 49d	40		✓	
WR049e	SWN_RIVER RIBBLE 49e	60			✓
WR076	SWN_RIVER BOLLIN	25	✓	✓	✓
WR102f	GWE_WIDNES 2	11		✓	
WR105a1	GWE_LYMMa1	9.09		✓	✓

6.6.5 There remains considerable uncertainty with respect to the WRSE higher demand and WRSE no SESRO scenarios. This uncertainty relates to factors associated with water trading such as a high degree of variability in the trading volumes and timing requested by other water companies (given future uncertainties relating to demand, climate change and environmental destination) and the reliability or acceptability of other large-scale options. Importantly, decisions relating to implementation of the scenarios are also external to UUW’s own decision making, including RAPID’s gated decision making process in respect of STT.

6.6.6 Owing to the uncertainties associated with the scenarios, the ‘WRSE higher demand’ and ‘WRSE no SESRO’ scenarios have not been assessed within the SEA as reasonable alternatives to the revised preferred options. However, to help stakeholders understand the potential environmental effects of the scenarios and inform future decisions relating to water trading, a review of the construction and operational effects of the scenarios (based on the SEA of the composite supply options) is presented in **Table 6.28** and **Table 6.29**.

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Table 6.28 WRSE “Higher Demand” Scenario: Review of Potential Effects

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR015a2	Construction (negative)	--/?	--	0	-	0	0	--	--	---	-	--	--	--	0	---	--	-
	Construction (positive)	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	--	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
WR049d	Construction (negative)	-	--	0	-	0	0	--	---	---	-	--	-	-	0	---	-	-
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	+++	0	0	0	+/?	0	0
	Operation (negative)	-/?	0	--/?	0	--/?	--/?	--	--	---	0	-/?	-	0	0	--	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0
WR076	Construction (negative)	-	-	0	--	0	0	--/?	--	---	-	--	-	--	0	---	-	-

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	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	--	-	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0
WR102f	Construction (negative)	-	--	0	-	0	0	--	-	---	-	-	-	-	0	---	-	-
	Construction (positive)	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	+++	0	0	0
WR105a1	Construction (negative)	-	-	0	-	0	0	-	-	--	0	0	-	-	0	---	0	-
	Construction (positive)	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	-	-/?	-

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0

Table 6.29 WRSE “No SESRO” Scenario: Review of Potential Effects

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
WR015a2	Construction (negative)	--/?	--	0	-	0	0	--	--	---	-	--	--	--	0	---	--	-
	Construction (positive)	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	--	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
WR049e	Construction (negative)	-	--	0	-	0	0	-	--	---	-	-	-	-	0	---	-	-

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	+++	0	0	0	+/?	0	0
	Operation (negative)	--/?	0	--/?	0	--/?	-/?	--	--	---	0	-/?	-	0	0	--	-	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
WR076	Construction (negative)	-	-	0	--	0	0	--/?	--	---	-	--	-	--	0	---	-	-
	Construction (positive)	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	--	-	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	+++	0	+++	++	0	0	0
WR105a1	Construction (negative)	-	-	0	-	0	0	-	-	---	0	0	-	-	0	---	0	-
	Construction (positive)	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	-

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Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
	Operation (positive)	0	+	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0

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- 6.6.7 Both scenarios, if realised, would be expected to generate significant positive effects across several of the SEA objectives including climate change (SEA Objective 10), economy (SEA Objective 11), health and well-being (SEA Objective 13) and water resources (SEA Objective 14). These positive effects would be associated with the support provided for water trading which would improve resilience and adaptability to the effects of climate change, support population and economic growth, contribute towards maintaining health and aid sustainable water resource provision. However, the supply options that comprise the scenarios have the potential to result in deterioration of WFD status or prevention of achievement of WFD target status of waterbodies (these conclusions are provisional, and would be dependent on further investigation). Where negative effects have been identified, generally, these are expected to be either minor or moderate only, although uncertainties remain. The exception to this is in respect of air quality (SEA Objective 8), greenhouse gas emissions (SEA Objective 9) and resource use (SEA Objective 15) where significant negative effects have been identified during construction.
- 6.6.8 Overall, due to the increased number of supply options under the WRSE higher demand and WRSE no SESRO scenarios, cumulatively the positive and negative effects outlined above would likely be greater than those associated with the implementation of the Revised Draft WRPM24 preferred plan. Allied to this, there would likely be more uncertainty in terms of WFD compliance and wider environmental effects.

6.7 Secondary, Cumulative and Synergistic Effects Assessment

- 6.7.1 The SEA Regulations require that the cumulative effects of the Final WRMP24 are assessed. This includes the cumulative effects of the individual preferred options that comprise the preferred plan and the effects of the Final WRMP24 in combination with other plans and programmes.
- 6.7.2 The cumulative effects of the individual options that comprise the preferred programme of WRMP24 options have already been presented in **Section 6.3**. This section therefore considers the cumulative effects of the Final WRMP24 in combination with other plans and programmes, including:
- the Final WRMP24 with other UuW plans (UuW's Drought Plan and Drainage and Wastewater Management Plan (DWMP));
 - the Final WRMP24 with adjacent water company plans and projects (SROs);
 - the Final WRMP24 as part of the WRW draft Regional Plan;
 - the Final WRMP24 with other plans e.g., Local Plans, National Policy Statements (NPSs);
 - the Final WRMP24 with other Nationally Significant Infrastructure Projects (NSIPs).
- 6.7.3 The cumulative effects of the Final WRMP24 are difficult to accurately assess given the inherent uncertainties concerning (*inter alia*): future changes to baseline environmental conditions; future population and economic growth; the deliverability of some NSIPs (and the potential for new NSIPs to be brought forward); and the proposals of emerging water company WRMPs. As such, it will be necessary to keep under review these factors as the

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preferred programme is implemented (e.g. in Environmental Impact Assessments (EIA) and HRAs) to ensure that the latest and most up to date information is taken into account.

Other U UW plans and projects

U UW Drought Plan

6.7.4 U UW’s Final Drought Plan 2022 provides a comprehensive statement of the actions that U UW will consider implementing during drought conditions in order to protect essential water supplies for customers and to minimise environmental impact. The Plan includes a range of drought management actions (linked to drought triggers), that can be broadly categorised as:

- Operational actions;
- Demand-side actions (water efficiency measures; identifying and repairing leaks; managing pressure in the water network; and water use restrictions);
- Water use restrictions (temporary use bans; ordinary drought orders to ban non-essential use; and emergency drought orders);
- Supply-side actions (drive increased use of boreholes across the region (closer control to acceptable water quality blend; enforce tighter compensation control (controlling closer to legal limits); and utilise strategic pumping, where available and outage management);
- Drought permits and orders;
- Extreme drought measures.

6.7.5 The resource management actions and potential drought permit/order sites are summarised in **Table 6.30** and **Table 6.31** respectively.

Table 6.30 Final Drought Plan 2022 – Supply-side actions

Source	Resource Zone	Deployable Output in Drought (Ml/d)
	Carlisle Resource Zone	6.0
	Strategic Resource Zone	8.0
	Strategic Resource Zone	9.0
	Strategic Resource Zone	5.8
	Strategic Resource Zone	6.2

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Table 6.31 Final Drought Plan 2022 - Potential Drought Permit/Order Sites

Potential Drought Permit/Order Sites	Change Sought
	Reduce compensation flow from 3.7 to 1.0 MI/d
	Reduce compensation flow from 15.9 to 10.0 or 5.0 MI/d
	Reduce maintained flow from 13.6 to 6.8 MI/d
	Reduce compensation flow from 19.9 to 12.0 or 6.0 MI/d
	Reduce compensation flow from 45.5 to 22.5 or 15.0 MI/d
	Reduce hands-off flow from 365 to a minimum of 200 MI/d
	Reduce compensation flow from 3.9 to 2.0 MI/d
	Reduce compensation flow from 4.9 to 2.0 MI/d
	Reduce hands-off flow to a minimum of 175 MI/d and relax 12-month rolling abstraction licence limit
	Reduce compensation flow from 45.0 to 25.0 MI/d
	Reduce hands-off flow to a minimum of 95 MI/d and relax 12-month rolling abstraction licence limit
	Increase annual licence limit to enable continuation at the maximum daily abstraction rate
	Increase annual licence limit to enable continuation at the maximum daily abstraction rate
	Increase annual licence limit to enable continuation at the maximum daily abstraction rate

6.7.6 The Final WRMP24 includes the drought measures and drought permit supply options and complements, and is consistent with, the Drought Plan. It is not anticipated that there would be any additional adverse cumulative effects from implementation of the Final WRMP24 in-combination with the Drought Plan. Through leakage reduction and network metering, the preferred programme of Final WRMP24 options is designed to improve levels of service for drought permits and orders to 1 in 40 years on average (taking forward the previous Drought Plan 2018) and reduce temporary use bans from a 1 in 20 year frequency to 1 in 40 years by 2040. The demand management options will also result in reduced required abstraction at source.

FINAL**UUW's Drainage and Wastewater Management Plan**

- 6.7.7 The DWMP sets out how UUW intends to extend, improve and maintain a robust and resilient drainage and wastewater system. It takes a long-term view, setting out a planning period that is appropriate to the risks faced by UUW, covering 2025 to 2050.
- 6.7.8 A draft DWMP was published in June 2022 and following consultation, further detailed modelling and optioneering, a final DWMP⁵⁸ was published in May 2023. UUW has identified 372 (of a total of 567) Tactical Planning Unit (TPU) drainage areas where drainage, flooding, pollution and treatment risks have been identified. The DWMP sets out options that have been developed to address the identified risks at the TPU level and to deliver one or more of the UUW planning objectives. These options are based around the following option themes:
- Combined and Foul Sewer Systems;
 - Customer Side Management;
 - Indirect Measures;
 - Sludge;
 - Surface Water Management; and
 - Wastewater Treatment.
- 6.7.9 No additional negative cumulative construction effects are expected from the implementation of the WRMP24 in combination with the DWMP above those already identified for the Final programme of WRMP24 options in **Section 6.3**. The Final WRMP24 includes a range of measures (such as WTW provision) which complement those set out in the DWMP. There may be specific instances where the schemes in the DWMP and WRMP24 are located in similar areas or catchments which may lead to localised cumulative effects at construction (affecting factors such as the economy, air quality, landscape or cultural heritage). However, given the nature of the DWMP options which will involve minor and/or unexceptional construction works, such effects are considered highly unlikely to occur.
- 6.7.10 Regarding operational in-combination effects, implementation of the DWMP options must be consistent with the DWMP objectives and these include meeting all permitting requirements (now, or in the future) and protecting, restoring or improving the environment by reducing spills from storm overflows and delivering WINEP-driven schemes. Operational effects on water quality would therefore be neutral or positive both collectively and for individual schemes. Other operational effects are conceivable (for example, new pumping stations may introduce noise and vibration effects), but these will be scheme-specific, not systematically driven by the options in the DWMP, and avoidable with best-practice design measures.

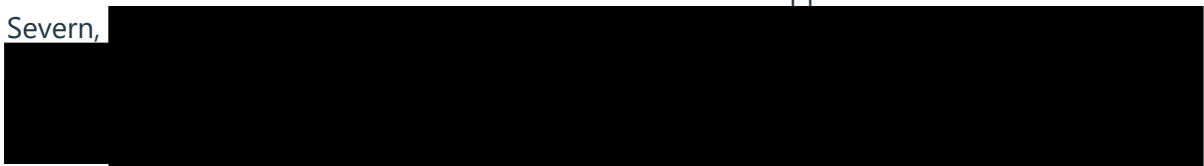
⁵⁸ UUW (2023) *Drainage and Wastewater Management Plan 2023 Main Document*. Document Reference: DP1, May 2023. Available online: <https://www.unitedutilities.com/corporate/about-us/our-future-plans/Our-long-term-plans/dwmp-publication-may-2023/>

FINAL**Haweswater Aqueduct Resilience Programme**

- 6.7.11 The Haweswater Aqueduct Resilience Programme (HARP), promoted by UUW, involves major upgrade and replacement works across six sections of the 110km Haweswater Aqueduct through Cumbria, Lancashire and Greater Manchester in order to maintain water supply and quality. The Final WRMP24 preferred options are not in the general geographic area of the HARP and in consequence, significant in-combination effects are not predicted.

Adjacent water company plans and projects (SROs)

- 6.7.12 The STT SRO involves the transfer of raw water to the South East region, utilising excess flows in the River Severn. Additional water sources would supplement flows in the River Severn,



This is illustrated in **Figure 6.1**.

Figure 6.1 STT SRO Key Elements**REDACTED**

- 6.7.13 Seven supply options were included in the Draft WRMP24 preferred plan to support STT and the cumulative effects of the Draft WRMP24 preferred plan with the STT SRO were assessed in the Environmental Report on that basis. However, following the final round of regional reconciliation, STT does not now form part of either the WRW or WRSE Regional Plans Preferred Pathways, or relevant WRMPs and, accordingly, options required by UUW to support the transfer are not now included in the Final WRMP24.
- 6.7.14 The SRO Gate 1 submission SEA⁵⁹ identified a range of significant positive and negative effects from those engineering elements of the STT SRO within UUW's operational area, including:
- Vyrnwy Reservoir release was identified as having:
 - ▶ Major positive effects from the provision of a significant volume of reliable water supplies and improved resilience to the water supply system. This could help support economic and population growth and reduce the vulnerability to climate change effects.
 - ▶ Major negative effect on water quality associated with a potential impact on WFD compliance during operation associated with potential adverse effects on aquatic

⁵⁹ STWL, TWL and UUW (2021) *River Severn to River Thames Transfer (STT) Strategic regional water resource solution Regulatory Assessment Report: Strategic Environmental Assessment (SEA)*, July 2021. Available online:

https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/severn-to-thames-transfer-sro/stt-s5-021-regulatory-assessment-reports-sea-3---redacted.pdf

ecology in the River Vyrnwy, between Vyrnwy Reservoir and the confluence with the Banwy.

- Vyrnwy Bypass release was identified as having:
 - ▶ Major positive effects from the provision of a significant volume of reliable water supplies and improved resilience to the water supply system.
 - ▶ Major negative effect on water quality including the potential effects of option operation on surface water flows and aquatic ecology in the River Vyrnwy between the bypass outfall and the confluence with the Severn and the potential impact on WFD compliance.

6.7.15 The SRO Gate 1 submission SEA states that these effects could be mitigated to reduce effects to a minor negative or neutral effect through the implementation of additional mitigation measures.

6.7.16 The effects of the STT SRO were subject to further investigation as part of the STT Gate 2 submission. The Initial Environmental Appraisal Report⁶⁰ found that, across all topics and receptors considered, there were no 'red' constraints identified in the construction or operational phases of the STT solution.

6.7.17 As the STT is not included in the WRW or WRSE Regional Plans Preferred Pathways, cumulative effects with the Final WRMP24 are not predicted. In a scenario where STT is required (see **Section 6.6** above), the cumulative effects during construction would be restricted to those arising from the potential phasing of construction activities, with resultant localised construction effects on communities e.g. noise, dust, vibration, disturbance and traffic, which through best practice construction mitigation measures could be minimised. Cumulative operational effects, however, would not be expected to occur, as the Final WRMP24 and STT SRO would abstract water from different and unconnected sources.

Water Resources West Draft Regional Plan

6.7.18 WRW is one of five regional groups established to develop regional water resources plans, to ensure the continuous provision of resilient, efficient and sustainable water supplies for the future. The requirement was established by the National Framework for Water Resources⁶¹. WRW includes all or part of the operational areas of DCWW, Hafren Dyfrdwy⁶², STW, SSW and U UW. The Regional Plan focuses on demand management and supply options to address water supply deficits.

6.7.19 WRW is taking an integrated approach to preparing the Regional Plan and the WRMPs and aims to provide a Regional Plan that is multi-sector and takes account of the water

⁶⁰ Ricardo (2022) Severn Thames Transfer (ST) Solution Initial Environmental Appraisal (IEA) Report. Available from <https://www.severntrent.com/content/dam/sros-gate-2-documents/stt/statutory-reports/STT-G2-S3-120-Initial-Environmental-Appraisal-Report.pdf> [Accessed May 2023].

⁶¹ EA (2020) *Meeting our future water needs: a national framework for water resources*

⁶² At 1st July 2018, Hafren Dyfrdwy combined the water service area of Dee Valley Water and Severn Trent lying in Wales.

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supply needs of non-public water supply (non-PWS) abstractors as well as public water supplies. As set out in **Section 1**, WRW published its Draft Regional Plan for consultation in November 2022. The Draft Regional Plan identified that by 2050, the WRW region would need an additional 221 MI/d to meet public water supply needs and 97 MI/d to meet the needs of other sectors. To meet this demand, whilst also reflecting the needs of other regions, WRW's draft best value plan included:

- action to reduce daily water demand by over 900 million litres across the whole region. This included the Government introducing water labelling to save 280 MI/d;
- STW delivering a large number of supply options to offset abstraction reduction for environmental improvement;
- UUW developing new water resources in the North West to support water transfers and provide benefit to customers in the North West, by reducing the frequency of temporary use bans (hosepipe bans);
- DCWW upgrading the network in South-East Wales and recovering losses from a water treatment works; and
- a range of options to take water resources towards WRW's environmental destination. This includes improving water quality and improving habitats.

6.7.20 The Draft Regional Plan included all of the options that comprised the Draft WRMP24. Since the publication of the Draft Regional Plan, the final regional planning reconciliation round has taken place and it is anticipated that the Final WRW Regional Plan will align with the reconciled Preferred Pathway and hence include the Final WRMP24.

6.7.21 The Final Regional Plan will contain all the options that make up the UUW Final WRMP24, along with the preferred options of the other component Final WRMP24s. Given the changes to the UUW Final WRMP24, and the emphasis placed on demand management, efficiency and leakage options, cumulative effects arising from proximity of source options does not arise, and as a result, there are no additional cumulative effects identified other than those identified in **Section 6.3**, that relate to the likely significant effects for the preferred programme of Final WRMP24.

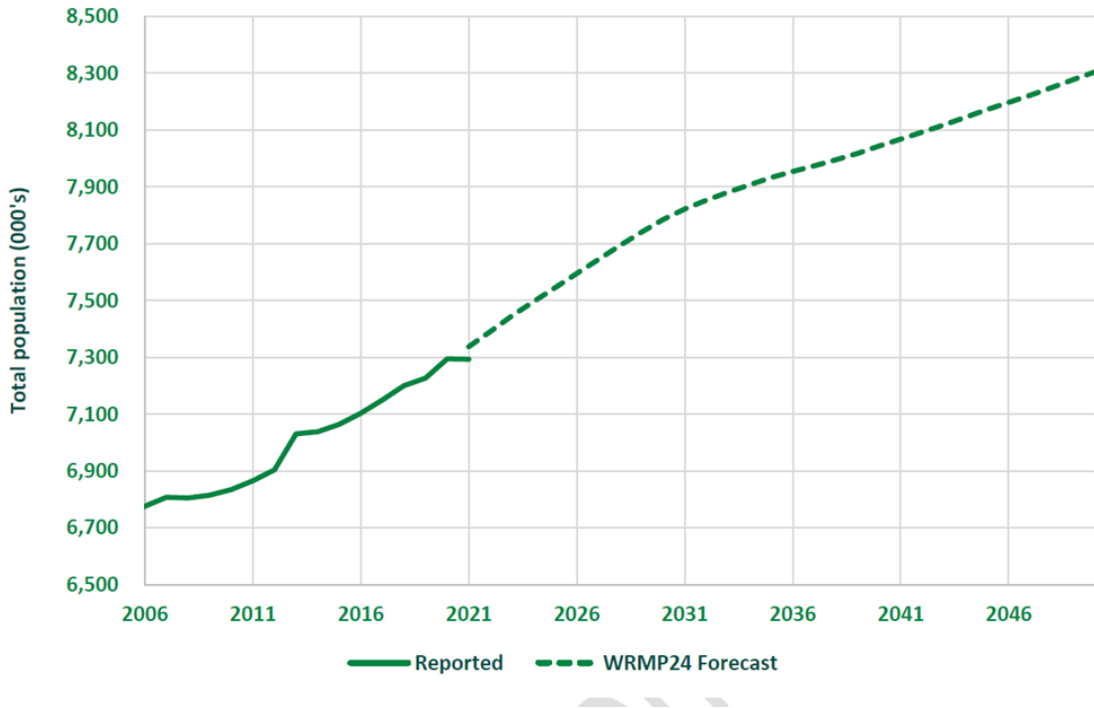
Other plans

Local Plans

6.7.22 Population change in the UUW region has already been considered in the Final WRMP24 along with the potential for further changes in demographics throughout the plan period. These forecasts have been based upon population projections published by the ONS and engagement with local and unitary authorities regarding their local plans to determine how many household properties are likely to be built in the region over the planning horizon. The forecasts have also taken into account potential economic growth in the North West region. UUW has also carried out an initial impact assessment of the 2021 Census findings on population data. **Figure 6.2** shows the Revised Draft WRMP24 plan based population forecast.

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Figure 6.2 Population forecast

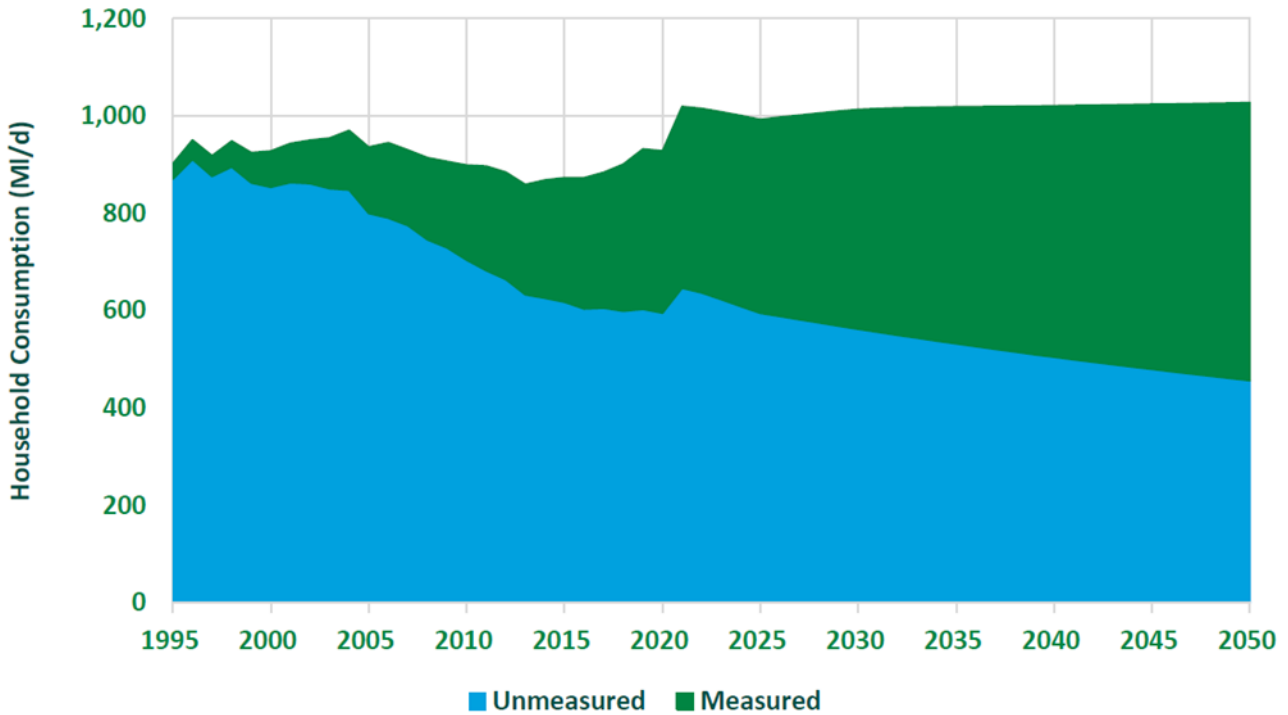


Source: U UW – Revised Draft WRMP24

- 6.7.23 As a result, the in-combination water-resource effects of growth promoted by other plans (for example, local planning authority local plans including the emerging 'Places for People' development plan being jointly prepared by Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Tameside, Trafford and Wigan councils), strategies (such as the Greater Manchester Strategy 2021 to 2031) or projects are considered and accounted for during the WRMP24 development process. Arguably, therefore, potential in-combination effects in respect of water-resource demands due to other plans or projects are unlikely since these demands are explicitly modelled when determining the supply-demand balance. Conversely, in respect of water resources, the WRMP24 is not likely to make non-significant effects in other plans significant (indeed, other plans are arguably the 'source' of any potential effects in respect of water demand, with the WRMP24 having to manage potential effects that are not generated by the WRMP24 itself).
- 6.7.24 U UW tested a range of different scenarios for their forecasts of household consumption, based on different assumptions regarding the housing and population growth, rate of meter switching and other factors. U UW selected a core or principal forecast to adopt for the WRMP24 and applied this forecast in their analysis of the baseline supply-demand balance to assess the potential timing and magnitude of any future supply-demand options which may be required. Projections are set out in **Figure 6.3**.

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Figure 6.3 Measured/unmeasured household consumption trends and projections to 2049/50



Source: U UW – Revised Draft WRMP24

- 6.7.25 U UW’s baseline supply-demand balance in the WRMP24 shows that without intervention there is a potential deficit in our Strategic Resource Zone, of 14.9 MI/d in 2025/26 and rising to 321.9 MI/d by 2049/50. All other resource zones maintain a positive supply-demand balance across the 25-year planning horizon.
- 6.7.26 The forecast deficit will be offset through the implementation of the supply side option and demand management measures that comprise the preferred programme of WRMP24 options. Additionally, the preferred programme seeks to implement measures to enhance leakage reduction, improve levels of service for drought permits and orders and increase resilience to other hazards which are expected to help ensure that a continual supply of water is maintained to support future population, household and economic growth within U UW’s region.

National Policy Statements (NPSs)

- 6.7.27 The Planning Act 2008 introduced a procedure to streamline the decision-making process for NSIPs. Under the Act, a developer wishing to construct a Nationally Significant Infrastructure Projects (NSIP) must first apply to the Secretary of State for development consent. National Policy Statements (NPSs) establish the need for specific types of infrastructure and provide planning guidance for promoters of NSIPs, and the basis for the examination by the Examining Authority and decisions by the Secretary of State on development consent order applications. A number of NPSs have been published which set out the definition, and in some cases the location, of NSIPs. The current status of NPSs is set out in **Table 6.32**.

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Table 6.32 Current Status of National Policy Statements

National Policy Statement (NPS)	Status	Are Potential Locations of NSIPs included in the NPS?
Overarching Energy EN-1⁶³	Designated January 2024	No
Fossil Fuel Electricity Generating Infrastructure EN-2	Designated January 2024	No
Renewable Energy Infrastructure EN-3	Designated January 2024	No
Natural Gas Supply Infrastructure and Gas and Oil Pipelines EN-4	Designated January 2024	No
Electricity Networks Infrastructure EN-5	Designated January 2024	No
Nuclear Power Generation EN-6⁶⁴	Designated July 2011	Yes
Ports	Designated January 2012	No
Waste Water Infrastructure	Designated March 2012	Yes
Hazardous Waste Infrastructure	Designated June 2013	No
National Networks	Designated January 2015	No
Airports NPS: new runway capacity and infrastructure at airports in the South East of England	Designated June 2018	Yes
Water Resources Infrastructure	Designated April 2023	No
Geological Disposal Infrastructure	Designated July 2019	No

6.7.28 The Final WRMP24 is not expected to have any adverse cumulative effects in-combination with the NPSs listed above. This is because the NPS are either not site specific or because specific NSIP proposals are unlikely to affect, or be affected by, the measures that comprise the Final WRMP24.

6.7.29 The Nuclear Power NPS (EN-6) sets out eight potentially suitable sites for the deployment of new nuclear power stations in England and Wales. Of these sites, two are located within the UUW WRMP24 area: Heysham and Sellafield. Work on proposals for a new nuclear build at Sellafield (known as NuGen’s Moorside Project) underwent pre-application but this is no longer being taken forward and has been formerly withdrawn from consideration as a NSIP; National Grid’s North West Coast Connections Project, a 400kV electricity transmission connection from proposed new nuclear generating station at Moorside to the existing transmission system in Cumbria/Lancashire, underwent pre-application but has also been withdrawn from consideration. Wylfa (Isle of Anglesey) is

⁶³ A revised draft National Policy Statement for Energy (and for EN2 to EN5) was published by the Government for consultation in March 2023 and came into force in January 2024, replacing the NPS designated in 2011.

⁶⁴ In January 2024 the Government launched a nuclear siting consultation to begin the process towards designating a new Nuclear National Policy Statement, applicable to nuclear power stations expected to deploy beyond 2025.

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also identified for the deployment of a new nuclear power station but is also not currently being progressed.

- 6.7.30 Given these schemes are not progressing (and Wylfa is also located some distance from the UUW area), no significant cumulative effects in-combination with the implementation of the Final WRMP24 are predicted.
- 6.7.31 Two NSIPs are set out in the Waste Water Treatment NPS; however, both of these are located in London and are not expected to have any effect on water resource management within the UUW Final WRMP24 area. Similarly, the Airports NPS concerns runway capacity in the South East of England only.
- 6.7.32 The NPS for Water Resources was designated in April 2023. This sets out the need for NSIPs related to water resources, and the Government’s policies to deliver them. Whilst this NPS is not site specific, implementation of the Final WRMP24 is compatible with those objectives of the NPS for improving water supply resilience.

Nationally Significant Infrastructure Projects (NSIPs)

- 6.7.33 A number of other NSIPs that are not detailed in NPSs are listed on the Planning Inspectorate website⁶⁵. At the time of writing, seventeen additional projects in the North West region were at various stages (with a further project withdrawn from consideration):
 - 4 at pre-application;
 - 1 at pre-examination;
 - 2 at examination; and
 - 10 decided.
- 6.7.34 These are detailed in **Table 6.33**.

Table 6.33 NSIPs in the North West region

Project	Developer	Stage
Morecambe Offshore Windfarm Generation Assets	Morecambe Offshore Windfarm Ltd.	Pre Examination
Dean Moor Solar Farm	FVS Dean Moor	Pre Application
Morgan and Morecambe Offshore Wind Farms Transmission Assets	Morgan Offshore Wind Limited and Morecambe Offshore Windfarm Limited	Pre Application
Hynet North West Hydrogen Pipeline	Cadent Gas Limited	Pre Application
Frodsham Solar Project	Frodsham Solar Ltd	Pre Application

⁶⁵ <https://infrastructure.planninginspectorate.gov.uk/projects/North West/> (Accessed June 2023)

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Project	Developer	Stage
M60/M62/M66 Simister Island	National Highways	Examination
Morgan Offshore Wind Project Generation Assets	Morgan Offshore Wind Limited	Examination
Keuper Gas Storage Project	Keuper Gas Storage Limited	Decided
A66 Northern Trans-Pennine Project	National Highways	Decided
A57 Link Roads (previously known as Trans Pennine Upgrade Programme)	Highways England	Decided
A585 Windy Harbour to Skippool Improvement Scheme	Highways England	Decided
Preesall Saltfield Underground Gas Storage	Halite Energy Group Ltd	Decided
Burbo Bank Extension offshore wind farm	DONG Energy Burbo Extension (UK) Ltd.	Decided
Walney Extension Offshore Wind Farm	DONG Energy Walney Extension (UK) Ltd	Decided
Whitemoss Landfill Western Extension	Whitemoss Landfill Limited	Decided
A556 Knutsford to Bowdon Scheme	Highways Agency	Decided
Heysham to M6 Link Road	Lancashire County Council	Decided

6.7.35 Most of the proposed NSIP schemes would not be in close proximity to the preferred options such that no significant cumulative effects are anticipated at this stage. The Hynet North West Hydrogen Pipeline could be developed in proximity to WR076 however, it is too early at this stage for any cumulative assessment. Cumulative effects are only likely in relation to construction, and these will be avoidable at the scheme level with mitigation. Impacts on water resources will be considered during the examination into the project and no additional cumulative effects are considered likely. Nevertheless, the water demands of all of these projects should be considered in their applications for development consent and if significant demand is forecast, this should be considered by UUW during monitoring of the WRMP and in the five year review.

High Speed 2

6.7.36 High Speed 2 (HS2) is a planned high-speed railway line between London and the major cities in the north of England. HS2 is being constructed in phases; of relevance to WRMP24 is Phase 2b and, specifically the 'Western Leg' connection from Crewe to Manchester which extends into UUW's operational area.

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- 6.7.37 On 24 January 2022, the Government introduced the High Speed Rail (Crewe – Manchester) Bill into Parliament to secure the powers to construct and maintain HS2 Phase 2b. However, in October 2023, the Government⁶⁶ outlined significant changes to the HS2 project, which included scaling back the railway to a high-speed line between London Euston and Birmingham Curzon Street. As part of this announcement, the Government proposed to adapt the High Speed Rail (Crewe-Manchester) Bill to remove the scope that was only needed for HS2 but retain the approach into Manchester. Safeguarding on the Phase 2b route, between Crewe and Manchester Piccadilly, will be amended to allow for the requirements of Northern Powerhouse Rail.
- 6.7.38 In consequence, whether for HS2 or Northern Powerhouse Rail, consideration has been given to the Western Leg of the route as it is in the broad geographic area of the preferred programme of WRMP24 options with Option WR111 being in proximity to the route corridor.
- 6.7.39 When part of HS2, Phase 2b construction was expected to commence in 2025 with operation starting in 2038. In consequence, there is the potential for cumulative environmental effects in-combination with the construction of the preferred options. Any potential in-combination effects are likely to be localised and primarily associated with noise/vibration disturbance, emissions to air and landscape and visual impacts which could affect receptors that are in close proximity to both the preferred options and the HS2 works. Construction traffic associated with both the WRMP24 preferred programme of options and Phase 2b may additionally result in cumulative effects on the strategic and local road network (depending on the routing of traffic). However, in-combination effects are considered unlikely to be of a magnitude that is substantially greater than the effects associated with each preferred option/HS2 Phase 2b alone.
- 6.7.40 It should be noted that the potential for in-combination effects to occur during construction will be dependent on the exact timing of works associated with Phase 2b and implementation of the preferred options such that there is a high degree of uncertainty at this stage. The in-combination effects assessment will therefore require further, more detailed investigation at the project stage.
- 6.7.41 Given the nature of the WRMP24 preferred programme of options and HS2, it is considered unlikely that there would be significant in-combination operational effects, particularly as the operation of Phase 2b will not involve the abstraction of water. This is a preliminary conclusion based on current, publicly available information and will require further assessment at the project stage.

Overall Cumulative Effects

- 6.7.42 Taking the above sub-sections into account, the overall cumulative effects of the UU WRMP24, in conjunction with other projects, against the 17 SEA Objectives are displayed in **Table 6.34** below using the qualitative scoring system outlined in **Section 4.4**. In-

⁶⁶ DfT (2023) *Network North: Transforming British Transport*. Available online:

<https://assets.publishing.service.gov.uk/media/65290f86697260000dcdf78b/network-north-transforming-british-transport-print-version.pdf> (Accessed May 2024)

combination effects between the WRMP24 and other significant projects are considered unlikely for the majority of projects assessed. There is potential for positive operational effects on water quality in combination with the DWMP, and negative effects from noise and vibration however these will be scheme specific and avoidable. There is also potential for synergistic effects arising from changes in water quality and quantity from the WRMP and DWMP taking account the consequences of climate change; however, these are already considered through the climate change modelling necessary to complete both plans. There are also likely to be cumulative effects where the WRMP works with the WRW Regional Plan to support effective management of water resources. This may also lead to additional significant effects on cultural heritage or landscape where the plans may together lead to development within or near to designated landscapes. There is also potential for in-combination effects during construction of any rail line between Crewe and Manchester, and Hynet North West Hydrogen Pipeline depending on the location and timing of works in relation to that of preferred options. Overall, in-combination effects will require additional assessment at the project stage in a number of cases.

Table 6.34 Effects of the UU WRMP24 In-Combination with Other Projects

SEA Objective	Cumulative score
1. To protect and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species, enhance ecosystem resilience and habitat connectivity and deliver a net biodiversity gain.	--/?
2. To protect and enhance sustainable natural resources and the ecosystem services they provide.	++/?
3. To avoid and, where required, manage invasive and non-native species (INNS).	0
4. To protect and enhance soil quantity, quality and functionality and geodiversity and ensure the appropriate and efficient use of land.	+/--
5. To protect and enhance surface and ground water levels and flows.	+++/--
6. To protect and enhance the quality of surface and groundwater resources.	--
7. To reduce or manage flood risk.	0
8. To minimise emissions of pollutant gases and particulates and enhance air quality.	---/?
9. To reduce greenhouse gas emissions.	---/+++
10. To adapt and improve resilience to the threats of climate change.	+++/--
11. To promote a sustainable economy and maintain and enhance the economic and social well-being of local communities.	+++/-
12. To maintain and enhance tourism and recreation.	-/?

SEA Objective	Cumulative score
13. To protect and enhance human health and well-being.	+++/--
14. To promote and enhance the sustainable and efficient use of resilient water resources.	+++
15. To minimise waste, promote resource efficiency and move towards a circular economy.	---
16. To conserve and enhance the historic environment including the significance of heritage assets and their settings and archaeological important sites.	--/?
17. To conserve, protect and enhance landscape and townscape character and visual amenity.	--/?

Where more than one symbol is included, this reflects a mixed score against the objective.

6.8 Contribution of the Final WRMP to Wales’ Well-being Goals and the Objective for SMNR

6.8.1 As set out in **Section 1.8**, the *Well-being of Future Generations (Wales) Act 2015* places a duty on public bodies including Welsh Water to carry out sustainable development, aimed at achieving the seven well-being goals for Wales. The well-being goals established by the Act are as follows:

- A prosperous Wales;
- A resilient Wales;
- A healthier Wales;
- A more equal Wales;
- A Wales of cohesive communities;
- A Wales of vibrant culture and thriving Welsh language; and
- A globally responsible Wales.

6.8.2 The Environment (Wales) Act 2016, meanwhile, has established an objective for the sustainable management of natural resources (SMNR) “to maintain and enhance the resilience of ecosystems and the benefits they provide and, in so doing—

(a) meet the needs of present generations of people without compromising the ability of future generations to meet their needs, and

(b) contribute to the achievement of the well-being goals in section 4 of the Well-being of Future Generations (Wales) Act 2015”.

6.8.3 The Water Resources Planning Guideline (WRPG)⁶⁷ sets out that water companies “should consider how your plan could contribute to the Well-being of Future Generations (Wales) Act

⁶⁷ EA, OfWAT and NRW (2023) *Water Resources Planning Guideline*, 5th bullet point after heading ‘Wales’ in paragraph 4.1.1.

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2015, if you supply customers in Wales or your plan affects sites in Wales". Whilst the preferred options in the Final WRMP24 do not affect Wales, on a precautionary basis, and for completeness, the effects of the Final WRMP24 have been considered for their contribution to the well-being goals.

- 6.8.4 The well-being goals and SMNR objective have been mapped to the SEA objectives that comprise the SEA assessment framework (see **Table 6.35**). Through the assessment of the Final WRMP24 measures against the SEA objectives, it is therefore possible to assess the contribution that the implementation of the Plan would make to the achievement of the goals and objective.
- 6.8.5 A matrix has been used to record this assessment and is presented in **Table 6.35** below. Informed by the assessment of the measures against the SEA objectives, as well as the cumulative effects of the Final WRMP24 (as summarised in the preceding section), a judgement has been made regarding whether, and the extent to which, the Final WRMP24 would support or detract from the achievement of each well-being goal (and by extension, the SMNR objective) in-turn with commentary provided to justify the conclusions reached.

Table 6.35 Assessment of the Contribution of the Final WRMP24 to the Well-being Goals for Wales

Well-being Goals	Related SEA Objective	Contribution to the Well-being Goal	Commentary
<p>A prosperous Wales: An innovative, productive and low carbon society which recognises the limits of the global environment and therefore uses resources efficiently and proportionately (including acting on climate change); and which develops a skilled and well-educated population in an economy which generates wealth and provides employment opportunities, allowing people to take advantage of the wealth generated through securing decent work.</p>	SEA Objectives 9, 10, 11, 14, 15	↕	<p>The assessment of the Final WRMP24 has identified that, where options involve the construction of new infrastructure, the associated capital expenditure may generate benefits in respect of the supply chain and local employment creation. At the individual scheme level such benefits are likely to vary, depending on the size, scale and duration of the proposed intervention, and have collectively been assessed as supporting the achievement of the well-being goal. The operation of the preferred options will increase the sustainability and resilience of the supply network will in-turn will support economic and population growth and improve resilience to the effects of climate change.</p> <p>The assessment of the Final WRMP24 schemes against the SEA objectives has also, however, highlighted the potential for direct and indirect adverse environmental effects which has been assessed as not supporting the achievement of this well-being goal. These effects would be most significant during the construction of the schemes involving significant infrastructure which would include resource use and embodied carbon. For example, the construction of the preferred supply side option will require materials with 20,457 tCO2e embodied carbon and in the operational phase would incur 1,350 tCO2e/year per annum. The demand management options will lead to a reduction in operational carbon associated with reduction of energy used equivalent to approximately 8,100tCO2e per annum.</p>
<p>A resilient Wales: A nation which maintains and</p>	SEA Objectives 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13	↕	<p>Overall, the Final WRMP24 will contribute to increasing resilience and adaptability to the effects of climate change by increasing the capacity of sustainable supply of 25M/d and providing demand</p>

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Well-being Goals	Related SEA Objective	Contribution to the Well-being Goal	Commentary
<p>enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change).</p>			<p>management reduction of 290.9 Ml/d. The BNG assessment identifies that there would be a loss of habitat during the construction of the preferred supply side options. However, as a result of the net gain commitment, there would be an overall net gain in biodiversity for the preferred programme.</p> <p>The assessment of the Final WRMP24 against the SEA objectives has identified the potential for direct and indirect adverse environmental effects which has been assessed as not supporting the achievement of this well-being goal. These effects would be particularly felt during construction, where there could be effects on (inter alia) biodiversity, soils, water and landscape which contribute to the resilience ecosystems. However, these effects would be largely temporary, and it is likely that adverse impacts would be mitigated where possible at the project level.</p>
<p>A healthier Wales: A society in which people’s physical and mental well-being is maximised and in which choices and behaviours that benefit future health are understood.</p>	<p>SEA Objectives 11 and 13</p>	<p>↕</p>	<p>The operational phase of the Final WRMP24 will contribute positively to the effects on health from the provision of an additional capacity of 25 Ml/d supporting the provision of clean drinking water across the U UW area. This is considered to support the achievement of the well-being goal.</p> <p>Emissions to air, alongside noise and vibration disturbance, during construction of the hard engineering elements of proposed schemes (where applicable) may have minor adverse effects on human health which has been assessed as not supporting the achievement of this well-being goal. However, any adverse impacts in this regard would be temporary and localised and, further, are likely to be managed through the implementation of best practice construction methods.</p>
<p>A more equal Wales: A society that enables people to fulfil their potential no matter what their background or circumstances (including their socio economic background and circumstances).</p>	<p>SEA Objectives 11 and 13</p>	<p>↑</p>	<p>As noted above, the Final WRMP24 will contribute towards increasing the sustainability and resilience of the water supply network. This has been assessed as supporting the achievement of the well-being goal.</p> <p>The assessment of the Final WRMP24 has identified that, where measures involve the construction of new infrastructure, the associated capital expenditure may generate benefits in respect of the supply chain and local employment creation. At the individual scheme level such benefits are likely to vary, depending on the size, scale and duration of the proposed intervention; however, cumulatively they have been assessed as supporting the achievement of this well-being goal.</p>
<p>A Wales of cohesive communities: Attractive, viable, safe and well-connected communities.</p>	<p>SEA Objectives 11 and 13</p>	<p>↕</p>	<p>The Final WRMP24 will contribute towards increasing the sustainability and resilience of the water supply network. This has been assessed as supporting the achievement of the well-being goal.</p> <p>Emissions to air, alongside noise and vibration disturbance, during construction of the preferred supply-side measures (where applicable) may have minor adverse effects on host communities</p>

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Well-being Goals	Related SEA Objective	Contribution to the Well-being Goal	Commentary
			<p>which has been assessed as not supporting the achievement of this well-being goal. However, any adverse impacts in this regard would be temporary and localised and, further, are likely to be managed through the implementation of best practice construction methods.</p> <p>The assessment of the Final WRMP24 measures against the SEA objectives has also highlighted the potential for direct and indirect adverse environmental effects including in respect of landscape which could affect the attractiveness of communities. However, any effects in this regard would be temporary and localised.</p>
<p>A Wales of vibrant culture and thriving Welsh language: A society that promotes and protects culture, heritage and the Welsh language, and which encourages people to participate in the arts, and sports and recreation.</p>	<p>SEA Objective 11 and 13</p>		<p>The final WRMP24 will contribute towards increasing the sustainability and resilience of the water supply network. This has been assessed as supporting economic and social well-being and will provide foundations for the protection and enhancement of this well-being goal.</p> <p>The SEA of the Final WRMP24 reflects guidance that includes Planning Policy Wales and the Technical Advice Note 24: the historic environment. Scheme development and assessment has taken into account new infrastructure locations, and the proximity and effects on World Heritage Sites, Scheduled Monuments and Listed Buildings. No significant effects are anticipated for the preferred programme, although the development of water resources infrastructure may result in indirect (e.g. impacts on setting) adverse effects where they are in close proximity to works. However, any effects would be temporary (i.e. for the duration of construction) and taking into account the scale of construction activity at each site, effects are not predicted to be significant. Where appropriate, mitigation of any likely effects on the significance of a historic asset and its setting, consistent with the guidance has been considered.</p>
<p>A globally responsible Wales: A nation which, when doing anything to improve the economic, social, environmental and cultural well-being of Wales, takes account of whether doing such a thing may make a positive contribution to global well-being.</p>	<p>SEA Objectives 1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16 and 17</p>		<p>Taking into account the nature and scale of the Final WRMP24, and that effects associated with the construction and operation would be predominantly felt at a local/sub-regional level, it is not expected that the Final WRMP24 would make a contribution to this well-being goal.</p> <p>It is recognised that the construction and operation of the measures would result in resource use and greenhouse gas emissions; however, in the context of national and global emissions, any impact in this regard would be negligible.</p>

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Key

Symbol	Effect
↑	The Final WRMP24 supports the achievement of the well-being goal.
↔	The Final WRMP24 will not make a contribution to the achievement of the well-being goal.
↓	The Final WRMP24 does not support the achievement of the well-being goal.
↕	The Final WRMP24 has a mixed contribution to the achievement of the well-being goal.

6.8.6 **Table 6.35** demonstrates that the Final WRMP24 is likely to support the achievement of the majority of the well-being goals for Wales, although it is noted that much of the activities and effects occur outside Wales. However, the implementation of the Final WRMP24 will seek to ensure sustainable and resilient water resource supplies can be provided to support economic and population growth, reduce adverse environmental effects, and improve resilience to the effects of climate change, making a long-term contribution to the well-being goals for Wales and the objective for SMNR.

6.9 Mitigation and Enhancement

6.9.1 The potential effects of the Final WRMP24 are described in the sections above. In some cases, there is an opportunity to reduce some of the potential negative effects identified, subject to further investigation. The detail of this mitigation needs to be considered during the planning phases of each of the individual measures if and when they are taken forward for implementation. This should then be consolidated into a Construction Environmental Management Plan (CEMP) for the scheme, noting that all works should be carried out in accordance with relevant Construction Design Management (CDM) Regulations 2015.

Species Specific Measures and Biodiversity

6.9.2 Most species-specific avoidance or mitigation measures can only be determined at the scheme level, following scheme-specific surveys, and ‘best-practice’ mitigation for a species will vary according to a range of factors that cannot be determined at this stage. The CEMP should include measures to minimise disturbance to biodiversity during the construction phase, for example:

- scheme design should aim to minimise the environmental effects by ‘designing to avoid’ potential habitat features that may be important e.g. those used by species that are European site interest features when outside the site boundary (e.g. linear features such as hedges or stream corridors; large areas of scrub or woodland; mature trees; etc.) through scheme-specific routing studies;

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- the works programme and requirements for each measure should be determined at the earliest opportunity to allow investigation schemes, surveys and mitigation to be appropriately scheduled and to provide sufficient time for consultations with NE;
- night-time working, or working around dusk / dawn, should be avoided to reduce the likelihood of negative effects on nocturnal species;
- any lighting required (either temporary or permanent) will be designed with an ecologist to ensure that potential 'displacement' effects on nocturnal animals, particularly designated bat species, are avoided;
- all materials will be securely stored away from migratory routes / foraging areas that may be used by designated species;
- all excavations will have ramps or battered ends to prevent species becoming trapped; and
- pipe-caps must be installed overnight to prevent species entering and becoming trapped in any laid pipework.

6.9.3 For all river water bodies that could be impacted by abstraction, further ecological evidence has been identified as being required including:

- improving the understanding of the impacts of changes to flow on physical habitat parameters, and resulting impacts for species;
- improving the understanding of impacts of changes to flow on ability of fish to pass barriers; and
- undertaking further ecology surveys including macroinvertebrate and macrophyte surveys, and eDNA for fish (while some data is available in all water body catchments, there is variability in the extent of data and the most recent sample dates).

6.9.4 Specific enhancement measures will relate to the potential for the creation of new habitats associated with biodiversity net gain. These are being considered on a scheme specific basis and as part of a wider suite of corporate biodiversity actions linked to U UW's management of its land holdings.

Scheme Design and Planning

6.9.5 All measures will be subject to project-level environmental assessment, which will include assessments of their potential to affect European sites during their construction or operation. These assessments should consider or identify (inter alia):

- opportunities for avoiding potential effects on European sites through design (e.g. alternative pipeline routes; micro-siting; etc);
- construction measures that need to be incorporated into scheme design and or planning to avoid or mitigate potential effects – for example, ensuring that sufficient space is available for pollution prevention measures to be installed, such as sediment traps; and

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- operational regimes required to ensure no adverse effects occur (e.g. maintain minimal flows – although note that these measures can only be identified through detailed investigation schemes).

Pollution Prevention

- 6.9.6 There is a substantial body of general construction good-practice which is applicable to all of the proposed measures and can be relied on (at this level) to prevent significant or adverse effects on a European site occurring as a result of construction site-derived pollutants. The following guidance documents detail the current industry best-practices in construction that are relevant to the proposed schemes:
- DEFRA’s Pollution prevention for businesses (<https://www.gov.uk/guidance/pollution-prevention-for-businesses>);
 - Venables R. et al. (2000) Environmental Handbook for Building and Civil Engineering Projects. 2nd Edition. Construction Industry Research and Information Association (CIRIA), London.
- 6.9.7 The best-practice procedures and measures detailed in these documents should be followed for all construction works derived from the Final WRMP24 as a minimum standard, unless scheme-specific investigations identify additional measures and / or more appropriate non-standard approaches for dealing with potential site-derived pollutants.
- 6.9.8 Care should also be taken during construction regarding the potential for contaminants such as silt, concrete or fuel oil to pollute water courses via surface run off. This can be mitigated by undertaking all construction activities in accordance with relevant best practice pollution prevention guidance. Pollution Incident Control Management Plans should be developed to limit adverse effects arising from pollution events.

Air Quality

- 6.9.9 With regard to the potential for effects on air quality, the following measures should be considered for inclusion within the CEMP:
- U UW should consider the use of low emission plant, air quality monitoring and preparation of a Dust Management Plan;
 - a Construction Traffic Management Plan (CTMP) could be prepared for each preferred supply option to manage the traffic impacts associated with construction which would include measures to mitigate air quality effects including routing of traffic to avoid sensitive receptors and the timing of HGV movements to avoid peak traffic hours;
 - low emission/electric vehicles should be used during the construction and operational phases where possible, consistent with the Water UK Net Zero 2030 Route Map and U UW’s Climate Change Mitigation Strategy.

FINAL**Effects on Human Health and Social and Economic Well-being**

- 6.9.10 With regard to the potential for effect on health, social and economic well-being, U UW and its 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 for inclusion within the CEMP:
- care should be taken to avoid works near to the most sensitive health receptors In the development of detailed designs for pipeline routes;
 - routing of traffic to avoid sensitive receptors and the timing and phasing of HGV movements to avoid peak traffic hours;
 - construction activities should be undertaken so as to minimise short term adverse effects on recreational areas, such as footpaths, and on landscape and biodiversity.
- 6.9.11 To maximise economic benefits in the U UW 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, U UW should seek to use locally-sourced materials.

Effects Climate Change and Resource Use

- 6.9.12 To help U UW respond to the challenges of climate change, noting that greenhouse gas emissions are a likely significant effect identified by the SEA, a Carbon Management Plan should be developed. This should be consistent with U UW's commitment to achieve net zero emissions by 2030, which is aligned with the Water UK Net Zero 2030 Route Map and could include:
- the provision of on-site renewables during both the construction and operational phases of the sub-options;
 - adoption of high quality, sustainable design principles to maximise energy efficiency in new infrastructure;
 - use of low emission and electric vehicles in construction and operational fleets;
 - use of low emission plant during construction;
 - provision of enhanced carbon sequestration as part of biodiversity enhancement measures; and
 - offsetting of all residual carbon emissions.
- 6.9.13 Design measures should be adopted to ensure the long-term resilience of infrastructure to the effects of climate change. Measures may include, for example, the provision/enhancement of natural flood management measures as part of wider biodiversity enhancement and habitat creation.

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- 6.9.14 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.

Effects on Cultural Heritage and Landscape

- 6.9.15 The potential for adverse impacts of the settings of cultural heritage assets should be considered early in the design process and any adverse effects minimised, for example through micrositing/ alternative pipeline routes to avoid designated sites. Further measures, for consideration within the CEMP could include:
- careful consideration being given to the presence of heritage assets when finalising proposals for pipeline routing;
 - where required, a programme of trial trenching and archaeological recording should be undertaken at development sites, with results disseminated;
 - new above-ground infrastructure should be screened, where possible and informed by informed by a heritage appraisal/assessment, to minimise effects on the settings of heritage assets;
 - consideration should be given to enhancing the significance of, and access to, heritage assets.
- 6.9.16 Proposed Final WRMP24 schemes could have a negative effect on landscape if new infrastructure is required, particularly where development cannot be located on previously developed land. In order to minimise such effects, new structures could be located close to existing structures or hedgerows and trees to provide some screening with the potential to utilise local building styles or incorporate landscaping schemes (e.g. tree/hedge planting). Further measures, for consideration within the CEMP could include:
- where required, proposals should be accompanied by a lighting strategy that is designed to minimise outward glows;
 - new above ground infrastructure should adopt high quality design principles where possible (for example, the use of local materials);
 - proposals should be accompanied by a landscape mitigation plan, informed by a landscape and visual assessment (where required).

6.10 Conclusions

- 6.10.1 The Final WRMP24 is focussed on delivering three strategic choices:
- achieving the government targets to halve leakage and reduce customer consumption to 110 litres per person per day by 2050;
 - support national planning by developing large-scale water transfers that are adaptable and flexible to the changing needs of other regions;
 - improve the level of service for temporary use bans (TUBs), halving the expected frequency of occurrence to 1 in 40 years (5% annual chance) and improving the

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frequency of implementing drought orders and drought permits to 1 in 50 years (2% annual chance).

- 6.10.2 The Final WRMP24 encompasses a combination of preferred demand management, metering and leakage options and a resilience option designed to achieve the three strategic choices .
- 6.10.3 Overall, the Final WRMP24 is expected to generate significant positive effects across several of the SEA objectives including climate change (SEA Objective 10), economy (SEA Objective 11), health and well-being (SEA Objective 13) and water resources (SEA Objective 14) as the provision of 25 MI/d of water capacity from the new supply option and 291 MI/d from the demand management, efficiency and leakage measures will improve resilience and adaptability to the effects of climate change, support population and economic growth, contribute towards maintaining health and aid sustainable water resource provision.
- 6.10.4 The supply option (WR076 – River Bollin) in the Final WRMP24 forms part of the North West Transfer (NWT) Strategic Resource Option (SRO). The environmental compliance assessments, and the supporting investigations, are ongoing with the outcomes available to inform the RAPID Gate 3 submission in 2026. In consequence, these findings have not been available in time for the final plan. The supply option has residual WFD uncertainties until the NWT SRO Gate 3 investigations conclude, and whilst it is considered likely that the option will be concluded to be compliant following further assessment, on a precautionary basis the WFD assessment has identified potential non-compliance reflected in a moderate negative effect (with uncertainty) for water quantity (SEA Objective 5) and water quality (SEA Objective 6).
- 6.10.5 The HRA has concluded that the preferred option (WR076 – River Bollin) will have no adverse effects, alone or in combination, on the integrity of any European sites. The HRA included specific assessment of the downstream designated sites, notably the Mersey Estuary SPA / Mersey Estuary Ramsar. No significant effects on biodiversity (SEA Objective 1) have therefore been identified.
- 6.10.6 Where negative effects have been identified, generally, these are expected to be either minor or moderate only, although uncertainties remain. The exception to this is in respect of air quality (SEA Objective 8), climate change (SEA Objective 9) and resource use (SEA Objective 15) where significant negative effects have been identified during construction. However, these effects reflect the emissions to air, energy and resource use associated with the implementation of the water management measures which is to a large extent unavoidable (although effects may be reduced at the project stage through, for example, the use of renewable energy and sustainably sourced construction materials).
- 6.10.7 Detailed mitigation and enhancement measures have been identified to help avoid, minimise, reduce or mitigate effects where identified.
- 6.10.8 Recognising that there are residual WFD uncertainties associated with the preferred supply option, and in compliance with the revised WRPG requirements, Uuw has identified alternatives that provide greater certainty of WFD compliance. Given that the options are broadly of similar scale and providing similar benefit, these quantified effects are comparable with the preferred supply options. Two areas of difference are noted in

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regard of the quantum of effects as the reasonable alternative options contain smaller amounts of embodied carbon (6,134tCO₂e compared to 20,457tCO₂e) and provide lower additional water capacity (22MI/d compared to 25MI/d) when compared to the preferred plan.

7. Next Steps

7.1 Next Steps

7.1.1 UUW is publishing the Final WRMP24 following Defra's direction to UUW to publish. This Environmental Report has been prepared to update the environmental assessment of the WRMP24 following changes made to the preferred options since the Revised Draft WRMP24. Following publication, UUW will implement the Final WRMP24 accordingly.

7.1.2 In conjunction with publishing the Final WRMP24, and SEA Environmental Report, a Post Adoption Statement will also be issued (to meet the requirements of SEA regulation 16 (4)). This will set out the results of the consultation and SEA processes and the extent to which the findings of the SEA have been accommodated in the final plan.

7.2 How Environmental Effects will be Considered During Plan Implementation

7.2.1 Following publication of the Final WRMP24, the selected schemes for water resource management will need to be implemented through specific projects. As part of this process, each project may be subject to further assessment to understand and manage its potential environmental and social impacts. These assessments, which may include HRA and EIA, will take account of the issues discussed in this report but will also be informed by the greater detail available as the work progresses about construction techniques, building materials, and agreed locations and routes.

7.3 Monitoring the Effects of the WRMP24

7.3.1 Following direction from Defra, UUW will now publish and begin to implement its WRMP24. When specific options are deployed, 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?

7.3.2 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.

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- 7.3.3 UUW 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 UUW or by other relevant organisations such as the EA, NE and NRW. For example, UUW already collects certain data for an annual review process (the Annual Performance Report) that is submitted to the Office of Water Services (Ofwat) and their own environmental reporting.
- 7.3.4 **Table 7.1** indicates some of the issues currently monitored or which could be monitored in future, and how they relate to the SEA objectives used in this SEA of the Final WRMP24. This list is provisional and indicative only; monitoring proposals, including timescales and frequency, will be considered further and a final monitoring framework that satisfies the requirements of the SEA Regulation will be presented in the Post Adoption Statement.

Table 7.1 Potential Indicators for Monitoring Effects

SEA Objective	Indicator	Source of Information	Indicative Reporting Frequency	Commentary
1. To protect and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species, enhance ecosystem resilience and habitat connectivity and deliver a net biodiversity gain.	Condition of specific protected sites (e.g. SACs, SPAs, SSSIs)	United Utilities Water (UUW), Environment Agency, Natural England (NE), Natural Resources Wales (NRW)	Annual (subject to data availability)	Additionally, open communication between Environment Agency, NE and UUW results in up-to-date information and identification of any potential issues. NRW included, given the potential to consider sites in Wales.
2. To protect and enhance sustainable natural resources and the ecosystem services they provide.	Biological monitoring (macroinvertebrates, macrophytes, fisheries, bird surveys)	UUW, EA, NRW, Angling clubs, BTO	Annual (subject to data availability)	Using data sets and comparing them against other monitored information such as levels and flows will assist in identifying whether there are any adverse effects and if mitigation measures are performing as well as expected.
	Number and area of new or restored habitats	UUW	Annual	United Utilities could consider recording the number of locations and area of habitats created or restored.

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SEA Objective	Indicator	Source of Information	Indicative Reporting Frequency	Commentary
3. To avoid and, where required, manage invasive and non-native species (INNS).	INNS presence	UUW, NBN Atlas and the EA's Ecology & Fish Data Explorer website	Annual (subject to data availability)	UUW are undertaking INNS RA using the EA Aquatic INNS Risk Assessment Tool (SAI-RAT) for the NWT SRO, and could consider its ongoing update for selected options, taken forward for Gate 3.
4. To protect and enhance soil quantity, quality and functionality and geodiversity and ensure the appropriate and efficient use of land.	Area of previously undeveloped land used during construction	UUW	Annual	UUW could record the area of previously undeveloped land that is built on as a result of the WRMP24 scheme, linked to biodiversity net gain/resilience assessment completed.
	Condition of sites designated for geological interest (e.g. geological SSSIs) on water industry land holdings	UUW, NE, NRW	Annual (subject to data availability)	Previous studies may also be used to inform monitoring and assessment. NRW included, given the potential to consider sites in Wales.
5. To protect and enhance surface and ground water levels and flows.	River flows, river levels, lake and reservoir levels. Groundwater levels, recharge characteristics and abstracted groundwater quality	UUW, EA, NRW	Annual (subject to data availability)	Previous studies may also be used to inform monitoring and assessment. e.g. WINEP, plus additional studies and investigations being commissioned such as the Manchester and East Cheshire groundwater model.
6. To protect and enhance the quality of surface and groundwater resources.	Water quality of surface and ground water.	UUW, EA, NRW	Annual (subject to data availability)	Previous studies may also be used to inform monitoring and assessment.
7. To reduce or manage flood risk.	Number of properties that experience internal flooding from public sewers	UUW, EA, NRW	Annual	UUW report these data to Ofwat as part of the statutory returns process.
8. To minimise emissions of pollutant gases and particulates and enhance air quality.	Number of vehicle movements/distance travelled	UUW	Annual	UUW could considered recording the number of vehicle movements and distance travelled as an indicator of air quality

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SEA Objective	Indicator	Source of Information	Indicative Reporting Frequency	Commentary
				impacts during implementation.
9. To reduce greenhouse gas emissions.	Quantity of greenhouse gas emissions per megalitre of water supplied.	UUW	Annual	UUW energy managers can use company data, and guidance from the UKWIR greenhouse gas workbook and BEIS (Department for Business, Energy & Industrial Strategy) conversion factors to derive this information. Potential to supplement with any monitoring information gathered in support of UUW's Climate Change Mitigation Strategy
	Energy use used in the operation of options.	UUW	Annual	UUW should hold and record energy consumption data e.g. via accounts / invoices.
	Renewable energy generated or purchased.	UUW	Annual	UUW should record renewable energy generation data, in addition to data on renewable energy purchased e.g. via accounts / invoices.
10. To adapt and improve resilience to the threats of climate change.	Number of properties that experience internal flooding from public sewers	UUW, EA, NRW	Annual	UUW report these data to Ofwat as part of the statutory returns process. Potential to supplement with any monitoring information gathered in support of UUW's Climate Change Mitigation Strategy.
11. To promote a sustainable economy and maintain and enhance the economic and social well-being of local communities.	Number of UUW sites with public access which provide sporting, recreational and leisure resources and number of visits per year.	UUW	Annual	UUW hold information on the number of annual visitors to sites where specific visitor facilities are provided. These could be analysed to determine effects of operation on visitor use.

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SEA Objective	Indicator	Source of Information	Indicative Reporting Frequency	Commentary
	Planned residential new development (informing predicted growth forecast to target catchments requiring investigations for potential future capacity constraints).	UUW	Annual	UUW examine information on planned growth and forecasts across LPA within the area.
12. To maintain and enhance tourism and recreation.	Number of UUW sites with public access which provide sporting, recreational and leisure resources and number of visits per year.	UUW	Annual	UUW hold information on the number of annual visitors to sites where specific visitor facilities are provided. These could be analysed to determine effects of operation on visitor use.
13. To protect and enhance human health and well-being.	Compliance with drinking water standards at customers' taps (%).	UUW	Annual	UUW reports these data to Ofwat as part of the statutory returns process (Annual Performance Report) and to the Drinking Water Inspectorate.
	Compliance with water quality standards under the EC Bathing Waters Directive.	Environment Agency		Environment Agency monitors the compliance of bathing waters and report this annually.
	Number of nuisance-related complaints e.g. noise, dust.	UUW	Annual	UUW could record the number of nuisance-related complaints made in relation to implementation of the WRMP.
	Pollution and flooding Incidents	UUW, Environment Agency	Annual	UUW measure the number of pollution incidents per year and keep a record of all flooding incidents per year and maintain a list of intermittent discharges.
14. To promote and enhance the sustainable and efficient use of resilient water resources.	Leakage Water saved through demand management/ water efficiency measures	UUW	Annual	UUW report these data to Ofwat as part of the annual returns process.

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SEA Objective	Indicator	Source of Information	Indicative Reporting Frequency	Commentary
15. To minimise waste, promote resource efficiency and move towards a circular economy.	Amount of recycled / reused materials used	U UW (contractors/consultants)	Annual	Information on the use of recycled / reused materials should be held by construction managers and accounts (contractors / consultants accounts, waste or procurement records).
	Proportion of waste sent to landfill	U UW (services data)	Annual	Information on waste disposal to landfill should be held by U UW.
	Chemical use in water treatment	U UW (services data)	Annual	Information (quantities, composition) on chemical use should be held in accounts.
16. To conserve and enhance the historic environment including the significance of heritage assets and their settings and archaeological important sites.	Loss / damage or discovery / protection of cultural, historic and industrial heritage features.	U UW, Historic England, Cadw, Local Planning Authority (LPA)	Annual	Historic England, the LPA and Cadw monitor the condition of all statutorily protected monuments.
17. To conserve, protect and enhance landscape and townscape character and visual amenity.	Loss or damage to landscape character and features of designated sites.	U UW	Annual	U UW could record the number and size of infrastructure built within designated landscape sites.

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8. Glossary

Term	Definition
AIC	Average Incremental Cost. A unit cost used to compare different water resources options. Calculated from the option's future costs, discounted over time, and divided by the supply demand benefits similarly discounted. Normally expressed in units of pence per cubic metre of water.
Alternative plans	A plan, within the context of a WRMP, is a selection of options with a schedule of implementation dates which meet the objectives required. Different plans can be compared through consultation and they would usually be presented as a preferred plan and alternative plans.
Adaptive plan	An adaptive plan is one which responds to future uncertainties by setting out a sequence of manageable steps or decision-points over time. At each decision-point the plan could follow two or more different <i>pathways</i> . Each pathway would specify the options needed and implementation dates to meet the objectives in a particular future state. The full range of pathways in an adaptive plan can then be shown to allow stakeholders to understand how different options could be needed in the future.
Constrained options	The list of options remaining after two stages of screening: <i>high-level screening</i> and <i>detailed screening</i> . These options are suitable candidates for selection and are part of the <i>preferred plan</i> or <i>alternative plans</i> .
Decision making metrics	Decision making metrics are properties of each water resources option which are given a numerical value to indicate how well the option performs. Metrics are specified in relation to the objectives to be achieved in the plan. For example, they might include measures of cost, supply demand benefits and environmental benefits. Each metric is a criterion when multi-criteria analysis is used.
Detailed screening	A process in which if, during more detailed consideration of the <i>revised feasible options</i> , constraints that make an option unsuitable for promotion are identified, then that option is removed from the list. The outcome of detailed screening is the list of <i>constrained options</i> .
Feasible options	A set of options that are considered to be suitable to assess for inclusion in the preferred plan. Feasible options are identified from a longer list of <i>unconstrained options</i> by a process of <i>high-level screening</i> to remove options with unalterable constraints that make them unsuitable for promotion.
High-level (primary) screening	The process where unconstrained options are filtered using a set of screening criteria. Any options with unalterable constraints that make them unsuitable for promotion are identified and removed from the list. Defined screening criteria are used to ensure options are screened consistently. The output of high-level screening is the set of feasible options.
Revised feasible options	A subset of the feasible options, post AIC cuts which are considered in more detail through the decision making process. The list of revised feasible options is generated by high level screening.
Multi-criteria analysis (MCA)	Multi-criteria analysis is a structured approach to determine overall preferences among alternative options, where the options accomplish several objectives. It can also be used to explicitly explore the trade-offs between different candidate plans to inform the selection of preferred or <i>alternative plans</i> .
Plan pathway	A pathway within an <i>adaptive plan</i> .
Preferred options	The set of water resources options included in the <i>preferred plan</i> .
Preferred plan	Comprises a set of options and a schedule of dates for implementing these options. These options have been selected through the planning process and evidence provided as to why they perform better against the objectives of the plan. Sometimes also referred to as the preferred programme of options.
Detailed screening	A step following <i>high-level screening</i> and the completion of the determination of the AIC to further reduce the number of <i>feasible options</i> being considered in detail through the decision making. Its purpose is to reduce complexity, resource requirements and computational burden without affecting

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Term	Definition
	the final plan. It therefore seeks to remove those options which would not in any case be selected as part of the best value plan The output of detailed screening is the set of constrained options.
Unconstrained list of options	All the possible options that could reasonably be used in the plan. This will include all the options considered in the previous planning round, as well as any options that have been identified since.
Water Resource Zone	Section 4.4. of the draft WRPG defines a water resource zone as “ <i>an area within which the abstraction and distribution of water to meet demand is largely self-contained (with the exception of agreed bulk transfers)</i> ”.

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Appendix A

Quality Assurance Checklist

The Government’s Guidance on SEA⁶⁸ contains a quality assurance checklist to help ensure that the requirements of the SEA Regulations are met.

Quality Assurance Checklist	
Objectives and Context	
The plan’s or programme’s purpose and objectives are made clear.	The purpose of the Final WRMP24 is set out in Section 1.3 of this Environmental Report. The objectives of the Final WRMP24 are set out in Section 1.3 .
Environmental issues and constraints, including international and EC environmental protection objectives, are considered in developing objectives and targets.	Key environmental issues identified through a review of relevant plans and programmes (see Section 2 and Appendix C of this report) and analysis of baseline conditions (see Section 3 and Appendix D) have informed the development of the assessment framework presented in Section 4.3 .
SEA objectives, where used, are clearly set out and linked to indicators and targets where appropriate.	SEA objectives and guide questions are set out in Section 4.3 of this report. Quantitative and qualitative thresholds of effects provide values for neutral, minor, moderate and significant effects (Appendix E).
Links with other related plans, programmes and policies are identified and explained.	Links are identified in Section 2 and Appendix C .
Conflicts that exist between SEA objectives, between SEA and plan objectives and between SEA objectives and other plan objectives are identified and described.	The relationships between the SEA, WRMP24 and other plan objectives have been identified in the review of plans and programmes included in Appendix C .
Scoping	
Consultation Bodies are consulted in appropriate ways and at appropriate times on the content and scope of the Environmental Report.	The SEA Scoping Report was consulted upon and responses to this are included in this Environmental Report (see Appendix B).
The assessment focuses on significant issues.	The scope of the assessment reflects the geographic extent of the WRMP24 area and provides a comprehensive approach to assessment (reflecting the large number of interactions dependent on the continued supply of water). This enables the assessment to determine which impacts will be considered significant.
Technical, procedural and other difficulties encountered are discussed; assumptions and uncertainties are made explicit.	General difficulties, limitations and assumptions are set out in Section 4.6 of this report. Baseline data limitations are discussed in Section 3.3 .
Reasons are given for eliminating issues from further consideration.	The proposed scope of the assessment is set out in Section 4.2 . All SEA topics have been scoped in to the assessment.

⁶⁸ Office of the Deputy Prime Minister (2005) *A Practical Guide to the Strategic Environmental Assessment Directive*.

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Quality Assurance Checklist	
Alternatives	
Realistic alternatives are considered for key issues, and the reasons for choosing them are documented.	All options were assessed as set out in Section 5 and Appendix F of this report.
Alternatives include 'do minimum' and/or 'business as usual' scenarios wherever relevant.	A 'do minimum' and/or 'business as usual' scenario is not appropriate for the draft WRMP due to the need to provide sufficient water to customers.
The environmental effects (both adverse and beneficial) of each alternative are identified and compared.	This is included in Section 5 and 6 and Appendix F of this report.
Inconsistencies between the alternatives and other relevant plans, programmes or policies are identified and explained.	No inconsistencies were identified.
Reasons are given for selection or elimination of alternatives.	This is set out in Section 1.3 , and as relevant of this report.
Baseline Information	
Relevant aspects of the current state of the environment and their likely evolution without the plan or programme are described.	Section 3 and Appendix D of this report characterises the current environmental baseline conditions, along with how these are likely to change in the future.
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.	The environmental characteristics of the WRMP24 area are described in Section 3 and Appendix D of this report.
Difficulties such as deficiencies in information or methods are explained.	Baseline data limitations are discussed in Section 3.3 . Further difficulties and limitations are set out in Section 4.6 .
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.	The potential effects of the options are identified in Section 5 and 6 and Appendix F and G .
Both positive and negative effects are considered, and the duration of effects (short, medium or long-term) is addressed.	The nature and duration of potential effects has been set out in the detailed assessment matrices contained in Appendix F and G of this report.
Likely secondary, cumulative and synergistic effects are identified where practicable.	Information on secondary, cumulative and synergistic effects is set out in Section 6.7 .
Inter-relationships between effects are considered where practicable.	These relationships are identified where appropriate in the detailed assessment matrices contained in Appendix F and G of this report.
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.
Methods used to evaluate the effects are described.	Information on the methods used for evaluation of potential effects is included in Section 4 and in the detailed assessment matrices contained in Appendix F and G of this report. The definitions of significance used in the assessment are set out in Appendix E .

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Quality Assurance Checklist	
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 are set out in Section 6.9 and in the commentary to the matrices in Appendix F and G .
Issues to be taken into account in project consents are identified.	Issues to be taken into account in project consents, where relevant are included in Section 6.9 and in the commentary to the matrices in Appendix F and G .
The Environmental Report	
Is clear and concise in its layout and presentation.	We believe the report is clear and concise, reflective of the information in the draft WRMP.
Uses simple, clear language and avoids or explains technical terms.	The report uses accessible language wherever possible.
Uses maps and other illustrations where appropriate.	Maps and illustrations have been utilised in the report.
Explains the methodology used.	The method used is set out in the report in Section 4 .
Explains who was consulted and what methods of consultation were used.	Appendix B of this report outlines the consultation that has been carried out to-date.
Identifies sources of information, including expert judgement and matters of opinion.	Sources of information are included throughout the report.
Contains a non-technical summary covering the overall approach to the SEA, the objectives of the plan, the main options considered, and any changes to the plan resulting from the SEA.	A Non-Technical Summary has been included as part of the report.
Consultation	
The SEA is consulted on as an integral part of the plan-making process.	The previously issued SEA Scoping Report was consulted upon and responses are included in this Environmental Report (see Appendix B).
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 time frames to express their opinions on the draft plan and Environmental Report.	Consultation on the draft WRMP and this Environmental Report will be undertaken by the water company.
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.	This will be incorporated in the PAS.
An explanation is given of how they have been taken into account.	This will be incorporated in the PAS.
Reasons are given for choosing the plan or programme as adopted, in the light of other reasonable alternatives considered.	This will be incorporated in the PAS.
Monitoring Measures	
Measures proposed for monitoring are clear, practicable and linked to the indicators and objectives used in the SEA.	The report sets out potential monitoring measures that could be used in Section 7.3 .

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Quality Assurance Checklist	
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 are included in Section 7.3 of the report.
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 made in Section 7.3 are for the water company to act on, with monitoring taking place following implementation of the WRMP24.
Proposals are made for action in response to significant adverse effects.	Mitigation methods are outlined for the preferred options in Section 6.9 of this report and Appendix G .

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Appendix B

Schedule of Consultation Response

Consultation on the SEA Scoping Report

Consultation on the WRW Regional Plan and WRMP24s environmental assessment methodologies took place between the 8th April and the 13th May 2021.

To support the consultation, a series of method statements for the proposed approaches to undertaking the environmental assessments of the respective plans were issued and comments invited. These were for:

- Strategic Environmental Assessment (SEA) – SEA Scoping Report and four separate appendices presenting contextual information for DCWW, STW, SSW and UUW
- Habitats Regulations Assessment (HRA) – HRA Method Statement
- Water Framework Directive (WFD) Assessment – WFD Assessment Methodology Statement
- Natural Capital/Environmental Resilience – Assessment Methodology.

The method statements were issued to Cadw, the Environment Agency, Historic England, Natural England, Natural Resources Wales and Welsh Government.

A workshop was held on the 28th April 2021 to discuss the approaches to which all consultees were invited.

Responses were received to all Method Statements. The comments on the WFD Assessment Methodology Statement were material to the proposed approach, and in consequence, a revised Methodology was issued (for information) to the regulators on the 21st July 2021. Comments on the remaining three method statements did not require substantive revision. Each has then been summarised in a separate note. This note presents the responses to the SEA Scoping Report.

Responses to the SEA Scoping Report were received from Cadw, the Environment Agency, Natural England and Natural Resources Wales.

Table B.1 – B.4 presents a summary of these responses.

Consultation on the Environmental Report

UUW published its Draft WRMP24 for consultation between the 7th December 2022 and 15th March 2023. It was accompanied by the SEA Environmental Report, as part of the technical suite of documents.

Responses were received from the Environment Agency and Natural Resources Wales.

Table **B5 and B6** present a summary of these responses.

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Table B.1 Responses to Cadw comments on the SEA Scoping Report

Consultation Question	Section	Consultee Response	Response/Action
Q1. Do you think that the Scoping Report sets out sufficient information to provide the context for the SEAs of the draft WRW Regional Plan and WRMP24s in terms of an overview of each plan, the review of relevant plans and programmes and baseline evidence and analysis? If not, what additional information should be included?	Section 2.2/Table 2.1/Section 2.3/Table 2.2/Appendix E	<p>No</p> <p>Cadw is of the opinion that the following documents should be amended or added as stated.</p> <p><u>Table 2.1 National Programmes</u></p> <p>Change:</p> <ul style="list-style-type: none"> Welsh Government (2018) Planning Policy Wales (Edition 10) has been replaced by Welsh Government (2021) Planning Policy Wales (Edition 11). <p>Add:</p> <ul style="list-style-type: none"> Welsh Government (2017) Technical Advice Note 24 The Historic Environment Welsh Government (2018) Priorities for the Historic Environment of Wales Welsh Government (2020) Historic Environment and Climate Change in Wales <p><u>Table 2.2 Cultural Heritage</u></p> <p>Change:</p> <ul style="list-style-type: none"> Welsh Government (2018) Planning Policy Wales (Edition 10) has been replaced by Welsh Government (2021) Planning Policy Wales (Edition 11). <p>Add:</p> <ul style="list-style-type: none"> Historic Environment (Wales) Act Welsh Government (2017) Technical Advice Note 24 The historic Environment Welsh Government (2018) Priorities for the Historic Environment of Wales 	<p>Comments noted.</p> <p>Welsh Government (2018) Planning Policy Wales (Edition 10) will be replaced by Welsh Government (2021) Planning Policy Wales (Edition 11) in the review of plans and programmes in the Environmental Report.</p> <p>The following additional national-level plans and programmes will be included in the relevant tables and appendix of the relevant Environmental Report issued to accompany the WRW Regional Plan and draft WRMP24s:</p> <ul style="list-style-type: none"> Welsh Government (2017) Technical Advice Note 24 The Historic Environment Welsh Government (2018) Priorities for the Historic Environment of Wales Welsh Government (2020) Historic Environment and Climate Change in Wales <p>The following additional regional-level plans and programmes will be included in the relevant Environmental Report issued to accompany the WRW Regional Plan and draft WRMP24s:</p> <ul style="list-style-type: none"> Welsh Government (2018) Castles and Town Walls of King Edward in Gwynedd World Heritage Site: World Heritage Site Management Plan 2018 -28 Wrexham County Borough Council British Waterways and the Royal Commission on the

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Consultation Question	Section	Consultee Response	Response/Action
		<ul style="list-style-type: none"> Welsh Government (2020) Historic Environment and Climate Change in Wales <p>The above documents should also be included and reviewed in Appendix E along with the documents below:</p> <p><u>Regional Plans and Programmes</u></p> <ul style="list-style-type: none"> Welsh Government (2018) Castles and Town Walls of King Edward in Gwynedd World Heritage Site: World Heritage Site Management Plan 2018 -28 Wrexham County Borough Council British Waterways and the Royal Commission on the Ancient and Historical Monuments of Wales (2012) Pontcysyllte Aqueduct and Canal World Heritage Site – Management Plan Torfaen County Borough Council (2011) Blaenavon Industrial Landscape World Heritage Site Management Plan 	<p>Ancient and Historical Monuments of Wales (2012) Pontcysyllte Aqueduct and Canal World Heritage Site – Management Plan</p> <ul style="list-style-type: none"> Torfaen County Borough Council (2011) Blaenavon Industrial Landscape World Heritage Site Management Plan <p>The changes and additions to the review of plans and programmes have been reflected Table 2.1/Appendix C of this Environmental Report.</p>
Q2. Do you agree that the main environmental issues identified are relevant to the SEAs of the draft of the draft WRW Regional Plan and WRMP24s? If not, which issues do you think need to be included or excluded?	N/A	Yes	Comment noted.
Q3. Do you agree with the proposed approach to the SEAs of the draft	N/A	Yes	Comment noted.

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Consultation Question	Section	Consultee Response	Response/Action
<p>WRW Regional Plan and WRMP24s? Are the proposed SEA objectives, guide questions and significance thresholds appropriate for the scope of each plan assessment? If not, which objectives/guide questions should be amended and which other objectives/guide questions do you believe should be included?</p>			

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Table B.2 Responses to Environment Agency’s comments on the SEA Scoping Report

Consultation Question	Section	Consultee Response	Response/Action
Q1. Do you think that the Scoping Report sets out sufficient information to provide the context for the SEAs of the draft WRW Regional Plan and WRMP24s in terms of an overview of each plan, the review of relevant plans and programmes and baseline evidence and analysis? If not, what additional information should be included?	Section 1.4	S 1.4.12 (p20) – good to see specific reference to RAPID SRO’s, please replicate across all the environmental assessments	Comment noted.
	Section 3.2/Table 3.1	Table 3.1 (p37) – needs to recognise the pressures on Public Water Supply in WR West patch as well as in WR East / WR South East. For example, our National Framework shows pressure equivalent to around 640 MI/d in WR West and 570 MI/d in WR East at 2050.	<p>Comment noted.</p> <p>Reference to increased pressure on Public Water Supply in the WRW area will be included in the ‘Summary of Key Issues’ table in the Environmental Reports issued to accompany the WRW Regional Plan and draft WRMP24s.</p> <p>This issue has been reflected in Table 3.1 and Table NTS.1 of this Environmental Report.</p>

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Consultation Question	Section	Consultee Response	Response/Action
	Section 4.4	S 4.4 (p47) – please add information to explain how interactions with environmental assessment work in neighbouring companies / regional groups will work.	<p>Comment noted.</p> <p>Information explaining how interactions with environmental assessment work in neighbouring companies and regional groups will be included in the Environmental Reports issued to accompany the WRW Regional Plan and draft WRMP24s, as relevant and appropriate.</p> <p>This information has been presented within the 'Assessment of Secondary, Cumulative and Synergistic Effects' subsection under Section 4.4 of this Environmental Report.</p>
<p>Q2. Do you agree that the main environmental issues identified are relevant to the SEAs of the draft of the draft WRW Regional Plan and WRMP24s? If not, which issues do you think need to be included or excluded?</p>	N/A	<p>The SEA needs to recognise that we are in the midst of a climate emergency – every option and the overall plan(s) needs to be viewed through this lens. We need to consider the 2019 amends to the 2008 Climate Change Act and recent Government announcements to cut carbon emissions further and faster ie 78% by 2035. WR West plan and the core company WRMP's will need to demonstrate how their actions are helping us achieve this.</p>	<p>Comment noted.</p> <p>Climatic factors are scoped into the SEA, with international, national and regional plans and programmes reviewed, with the resultant issues identified relevant to the assessment of the WRW Regional Plan and the WRMPs. SEA objectives concerning the reduction in greenhouse gas emissions along with the improvement of climate resilience are included in the Assessment Framework, along with associated guide question and thresholds.</p> <p>The review of plans and programmes will be updated in the Environmental Report to reflect the 2019 updates to the Climate Change Act 2008.</p> <p>The comment relating to the need for the WRW Regional Plan and the WRMPs to demonstrate how their actions will contribute to the achievement of carbon emissions reduction targets set by the government, relates to the WRW Regional Plan and WRMPs themselves, rather than the</p>

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Consultation Question	Section	Consultee Response	Response/Action
<p>Q3. Do you agree with the proposed approach to the SEAs of the draft WRW Regional Plan and WRMP24s? Are the proposed SEA objectives, guide questions and significance thresholds appropriate for the scope of each plan assessment? If not, which objectives/guide questions should be amended and which other objectives/guide</p>	Appendix B Section 3. p34	<p>It is stated on p34 that one of the key issues relevant to the WRMP is, 'The need to maintain and improve the quantity and quality of GW resources taking into account WFD status targets'. I have added the words and improve to the sentence as I believe this should also be the aspiration.</p>	<p>SEA of the plans, although where such effects occur, these may also be set out in the appropriate Environmental Report.</p> <p>The 2019 updates to the Climate Change Act 2008 have been reflected Table 2.1/Appendix C of this Environmental Report.</p>
	Appendix F	<p>most of the thresholds are not quantified and this means the outcomes will for the most part be subjective / qualitative. We'd expect demand for water to be quantifiable e.g. in MI/d and/or % Distribution Input. We quantify flood risk in terms of properties protected and environmental enhancement by (say) km of river improved and/or improvements to Waterbody status (or improvements to elements within waterbody status). WR West should consider if more quantified thresholds can be used.</p>	<p>Agreed and will be updated in the relevant Environmental Report.</p> <p>This change has been reflected in Table 3.1 and Table NTS.1 of this Environmental Report.</p>
	<p>Comment noted.</p> <p>The 'Definitions and Thresholds of Significance' set out in Appendix F of the Scoping Report, are considered to provide a balance of both quantitative and qualitative measures (as per UKWIR Guidance) which help to ensure a consistent approach to interpreting the significance of effects and helps the reader understand the decisions made by the assessor.</p> <p>In developing the definitions and thresholds of significant effects, information has been drawn from:</p> <ul style="list-style-type: none"> the previous definitions and thresholds used in the SEAs of DCWW, SSW, STW and UUU's WRMP19s; suggested definitions and thresholds for assessment scoring from the All Company Working Group (ACWG) for application to the SROs; suggested definitions and thresholds detailed in the WRSE Scoping Report, for application to the SEA of the WRSE Regional Plan; and, 		

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Consultation Question	Section	Consultee Response	Response/Action
<p>questions do you believe should be included?</p>			<ul style="list-style-type: none"> an evaluation of the range of quantitative values (such as yield, capex, embodied carbon, operational carbon and material quantities) available for a selection of the DCWW, STW, SSW and UUW WRMP19 options for different option types (e.g., supply-side options such as reservoirs, transfers, boreholes, enhanced treatment).
			<p>The proposed thresholds include reference to yield (MI/d), design capacity (MI/d), capex (£m), embodied and operational carbon (tCO2e), flood risk (% site in FZ3), air quality (AQMAS) and water quality (WFD status). These quantified measures address and go beyond the examples cited in the consultee response.</p>
			<p>However, in order to ensure, no opportunity is lost to take into account the point made, consideration will be given to whether any additional quantifiable measures can be utilised in the assessment and any additional measures that are identified will be highlighted in the Environmental Reports to accompany the WRW Regional Plan and draft WRMP24s, as relevant and appropriate.</p>
	Table 4.2/Appendix F	<p>Under SEA Table 4.2 & Appendix F there is no mention specifically of geomorphology.</p>	<p>Comment noted.</p>
		<p>Flow abstraction and associated infrastructure is likely to affect fluvial sediment transport regime (transport, erosion, deposition), channel character (morphology) and river behaviour (morpho-dynamics).</p>	<p>Whilst absent from Table 4.2 of the Scoping Report, geomorphology is highlighted as a key issue in WRMP specific baselines e.g., Appendix A, where the <i>“the need to protect, maintain and enhance geomorphological functions and services”</i> is identified.</p>
		<p>Objective 5 - Request that the following question be included in relation to water resource pressures on geomorphic/sediment systems:</p>	<p>To ensure it is appropriately reflected in the SEA, and to minimise any unintended duplication, the following guide question will be added to the Assessment Framework under Objective 1 (Biodiversity):</p>

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Consultation Question	Section	Consultee Response	Response/Action
		<ul style="list-style-type: none"> Will it alter the sediment transport regime of the surface waters? (i.e. Will it result in a change in fine sediment deposition? Will it result in a change in sediment flux?) 	<p><i>Will it alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems?</i></p> <p>The WFD Assessment (Stage 3 Impact Assessment) also includes consideration of geomorphology through the source-pathway-receptor approach to identifying effects. The source of change would be the construction or operational activity. The pathway would include physical environment changes such as water level change, flow velocity change, morphological change. The receptor would be the WFD status element or the WFD protected area. Where relevant, such information will be used to inform the assessment of any options against the above guide question.</p> <p>The additional guide question is reflected in Table 4.2 and Appendix E of this Environmental Report.</p>
	Table 4.2/Appendix F/ Section 3.1 (Appendix D)	<p>Appendix F, Objective 3 talks about preventing the spread/introduction of INNS. Would it also be possible to include a guide question around eradication of INNS where they are already present and to do so is technically and economically feasible?</p> <p>Same applies to the key issues listed on page 19 of Appendix D.</p>	<p>Comment noted.</p> <p>The following guide question will be added to the assessment framework under Objective 3:</p> <p><i>Will it contribute to the eradication of invasive and non-native species, where they are already present and it is technically and economically feasible to do so?</i></p> <p>However, it may only be applicable in highly specific circumstances.</p> <p>The key issues relating to Biodiversity (set out in section 3.1 of Appendix D) will also be amended to highlight the need to eradicate INNS where already present.</p>

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Consultation Question	Section	Consultee Response	Response/Action
			<p>The additional guide question is reflected in Table 4.2 and Appendix E of this Environmental Report. The need to eradicate INNS is reflected as a key issue within Table 3.1, Table NTS.1 and Appendix D (within the 'Key Issues Relevant to the WRMP' subsection of the 'Biodiversity, Flora and Fauna' section) of this Environmental Report.</p>
	Table 4.2/Appendix F	Table 4.2 – there is no reference to impact on geomorphology. A question on this should be included to reflect potential changes in flow regimes.	<p>Comment noted.</p> <p>Table 4.2 includes two guide questions under SEA Objective 5, that reference flow:</p> <ul style="list-style-type: none"> • <i>Will it result in changes to river flows, wetted width or river levels?</i> • <i>Will it alter the flow regime of surface waters?</i> <p>In response to a separate comment, the first guide question will be amended to the following '<i>Will it result in changes to river flows, <u>channel morphologies</u>, wetted width or river levels?</i>'</p> <p>Whilst absent from Table 4.2 of the Scoping Report, geomorphology is highlighted as a key issue in WRMP specific baselines e.g., Appendix A, where the "<i>the need to protect, maintain and enhance geomorphological functions and services</i>" is identified.</p> <p>The WFD Assessment (Stage 3 Impact Assessment) also includes consideration of geomorphology through the source-pathway-receptor approach to identifying effects. Where relevant, such information will be used to inform the assessment of any options against the above guide questions.</p>

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Consultation Question	Section	Consultee Response	Response/Action
			<p>The revision to the guide question is reflected in Table 4.2 and Appendix E of this Environmental Report.</p>
	Table 4.2/Appendix F	<p>Appendix F, Objective 1. Request that the following question be included: Will it alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems?</p>	<p>Comment noted.</p> <p>To ensure it is appropriately reflected in the SEA, the following guide question will be added to the Assessment Framework under Objective 1 (Biodiversity):</p> <p><i>Will it alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems?</i></p> <p>The WFD Assessment (Stage 3 Impact Assessment) also includes consideration of geomorphology through the source-pathway-receptor approach to identifying effects. Where relevant, such information will be used to inform the assessment of any options against the above guide question.</p> <p>The additional guide question is reflected in Table 4.2 and Appendix E of this Environmental Report.</p>
	Table 4.4	<p>Table 4.4 – we note that an option cannot be scored as “moderate impact” within the UU Sources SRO SEA work but this scoring (moderate) can be applied to the same option in WRW SEA. What is the reason for this difference, especially given WRW will be scoring some of the same options included in UU Sources SRO?</p>	<p>Comment noted.</p> <p>The UU Sources SRO Gate 1 SEA was undertaken in advance of the publication of the All Company Working Group (ACWG) guidance on SEA (2020) and the UKWIR Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans (2021).</p> <p>The approach to assessing the likely significant effects of the WRP24s and WRW Regional Plan includes the identification of minor, moderate and major/significant positive and negative effects, reflecting the guidance, not previously available to the UU Sources SRO. Definitions and thresholds</p>

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Consultation Question	Section	Consultee Response	Response/Action
			<p>for minor, moderate and major/significant effects, are included, which have used information drawn from:</p> <ul style="list-style-type: none"> the previous definitions and thresholds used in the SEAs of DCWW, SSW, STW and U UW's WRMP19s; suggested definitions and thresholds for assessment scoring from the ACWG for application to the SROs; suggested definitions and thresholds detailed in the WRSE Scoping Report, for application to the SEA of the WRSE Regional Plan; an evaluation of the range of quantitative values (such as yield, capex, embodied carbon, operational carbon and material quantities) available for a selection of the DCWW, STW, SSW and U UW WRMP19 options for different option types (e.g., supply-side options such as reservoirs, transfers, boreholes, enhanced treatment). <p>Where the WRMP24 assessment is of a SRO option or a revised WRMP19 option, the assessment will take into account, where appropriate, the previous assessment findings and any regulators and stakeholder feedback already received. See for example reference to the STT SRO and Gate and 2 assessments in Section 6.7 of this Environmental Report.</p>
	Table 4.2/Appendix F	<p>Appendix F, Objective 5. Suggest amendment to question 2:</p> <ul style="list-style-type: none"> Will it result in changes to river flows, <u>channel morphologies</u>, wetted width or river levels? 	<p>Agreed.</p> <p>The second guide question under SEA Objective 5 of the assessment framework will be changed to:</p> <p><i>Will it result in changes to river flows, <u>channel morphologies</u>, wetted width or river levels?</i></p> <p>The revision to the guide question is reflected in Table 4.2 and Appendix E of this Environmental Report.</p>

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Consultation Question	Section	Consultee Response	Response/Action
	N/A	WR West should explain the scale being used to decide significance. For example, a 1 MI/d demand saving option may be significant within a small water resource zone but relatively insignificant when viewed across WR West patch as a whole. A better explanation of this would be appreciated.	<p>Comment noted.</p> <p>WRW is taking an integrated approach to preparing the Regional Plan and the WRMP24s. WRW member water companies are using a regionally consistent set of methodologies to reflect local, regional and national needs in the development of the plans. The definitions of significance have been developed so that they can apply to the SEA of each of the plans, whether the WRW Regional Plan or the individual WRMPs to ensure a consistent approach to interpreting the significance of effects. In developing the approach to thresholds, cognisance was taken of:</p> <ul style="list-style-type: none"> the previous definitions and thresholds used in the SEAs of DCWW, SSW, STW and UUW's WRMP19s; suggested definitions and thresholds for assessment scoring from the ACWG for application to the SROs; suggested definitions and thresholds detailed in the WRSE Scoping Report, for application to the SEA of the WRSE Regional Plan; an evaluation of the range of quantitative values (such as yield, capex, embodied carbon, operational carbon and material quantities) available for a selection of the DCWW, STW, SSW and UUW WRMP19 options for different option types (e.g., supply-side options such as reservoirs, transfers, boreholes, enhanced treatment).
	Table NTS.2/Table 4.2/Appendix F	Table 2 NTS – Proposed objectives – why only where required for INNS?	<p>Comment noted.</p> <p>The use of the wording 'where required' is intended to reflect source options where INNS may be present, or where transfer methods, such as unenclosed water bodies could</p>

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Consultation Question	Section	Consultee Response	Response/Action
			lead to INNS being introduced, and so requiring management and mitigation measures prior to the introduction into a new catchment.
	Table 2.2/Table 4.2/Appendix F	No specific measurable objective to reduce operational or embodied carbon. This appears to a reoccurring theme with water company plans. Table 2.2 highlights the relevance of carbon reduction targets to the Plan(s), however although the assessment questions in Table 4.2 reflects the need it would be good to see this reflected more specifically in the objectives.	<p>No change. Comment noted.</p> <p>Whilst there is no objective relating to the reduction of operational and embodied carbon specifically, it is considered that this is already covered by Objective 9: <i>To reduce greenhouse gas emissions</i>. Furthermore, as noted in the comment, the need to reduce operational and embodied carbon emissions is reflected within the guide questions for Objective 9 and specific values/thresholds for assessing plan options/measures against this Objective, in terms of their embodied and operational carbon emissions (tCO₂e and tCO₂e/year respectively) are provided in Appendix F.</p>
	Table 4.2/Appendix F	WFD – although implied in the objectives, it would be good to see “contributing to WFD objectives” reflected more specifically. Consider modifying the assessment questions in Table 4.2 to address this point.	<p>No change. Comment noted.</p> <p>Contribution to the achievement of WFD objectives is already specifically reflected in the guide questions for Objective 6 (Water Quality).</p>
4. Have the consultants missed any key plans/programmes (our own or 3rd party ones like Rivers Trusts maybe?) from your local perspective?		Should options being proposed by WRW core companies for Ofwat “Green Recovery funding” be considered within the assessment?	<p>Comment noted.</p> <p>WRW aims to provide a Regional Plan that is multi-sector and takes account of the water supply needs of non-public water supply (non-PWS) abstractors as well as public water supplies. All options being considered by the core member water companies for inclusion in the WRMP24s and Regional Plan will be assessed.</p>

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Consultation Question	Section	Consultee Response	Response/Action
	Section 2 (Appendices A, B, C and D)	<p>There is a lack of consistency between the core company lists of relevant plans/programmes that needs to be addressed. Focussing on the companies wholly/mainly in England, UU's list of relevant plans and programmes appears to be the most comprehensive and should be used as a guide for SvT and SSW too. As a minimum, reference needs to be made to a company's own WRMP and Drought Plan plus the WRMPs and Drought Plans of neighbouring companies. Natural England's Site Improvement Plans for Natura 2000 sites are also key documents to consider across the board.</p> <p>Need to ensure consistency with SRO SEAs and other initial assessments. Gate 1 reports will help with this.</p>	<p>Comment noted. The lists of relevant plans and programmes within each of the core company appendices will be checked/cross referenced to ensure consistency in the Environmental Reports to accompany the WRW Regional Plan and draft WRMP24s.</p> <p>This is reflected in Table 2.1/Appendix C of this Environmental Report.</p>
			<p>Comment noted.</p> <p>Where the WRMP24 assessment is of a SRO option or a revised WRMP19 option, the assessment will take into account, where appropriate, the previous assessment findings and any regulators and stakeholder feedback already received. See for example reference to the STT SRO and Gate and 2 assessments in Section 6.7 of this Environmental Report.</p>
	Section 2/Table 2.1/Appendix E	<p>Refers to some plans/strategies from early 2000's (e.g. BEIS, Defra) – are these still the best available on those topics?</p>	<p>Over 200 international/European, national, regional/sub-regional and local level plans were reviewed during the preparation of the Scoping Report.</p> <p>Whilst the review of plans and programmes contains some older plans and programmes, these have been included as they are still valid and are relevant to the SEA of the WRW Regional Plan and WRMPs.</p> <p>Should revised or updated plans/programmes become available during the preparation of the Environmental Report, they will be included.</p>

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Consultation Question	Section	Consultee Response	Response/Action
	Section 2/Table 2.1/Appendix E	Some thoughts on important national plans/programmes/legislation that seemed to be missing...2020 Defra Drought Plan Direction; 2nd UK Climate Change Risk Assessment (CCRA2) 2017 (HM Gov); EA 2020 consultation on update to areas of water stress; EA/Ofwat/NRW WR Planning Guideline 2021; HM Gov 2020 National Infrastructure Strategy; CEFAS/EA/NRW assessment of salmon stocks and fisheries in Eng&Wales (2019). Not a comprehensive list but some key ones that sprung to mind that I couldn't see in the SEA Scoping Report.	<p>This is reflected in Table 2.1/Appendix C of this Environmental Report.</p> <p>Comment noted.</p> <p>The following additional plans and programmes will be included in the review of plans and programmes contained within the Environmental Report:</p> <ul style="list-style-type: none"> • Defra (2020) Drought Plan Direction 2020 • HM Government (2017) 2nd UK Climate Change Risk Assessment (CCRA2) • Centre for Environment Fisheries and Aquaculture Science (CEFAS), Environment Agency and Natural Resources Wales (2019) Assessment of Salmon Stocks and Fisheries in England and Wales 2019 <p>Since scoping consultation, the third UK Climate Change Risk Assessment (CCRA3) evidence report has been published and has also been referenced as appropriate in the baseline information. CEFAS has also produced 2020 versions of the two reports identified, and these have been referenced as appropriate.</p> <p>To avoid undue reliance on draft versions of plans and programmes that could be subject to change, consultation documents and draft legislation are not included in the plans and programmes reviewed, unless highly relevant e.g., the Water Resources Planning Guidelines.</p> <p>The changes and additions to the review of plans and programmes have been reflected Table 2.1/Appendix C of this Environmental Report.</p>
	Appendix E	See comments about plans/programmes under water company headings. We expect to see a greater degree of consistency in the	Comment noted.

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Consultation Question	Section	Consultee Response	Response/Action
		<p>plans / programmes being considered across the core water companies in WR West and the regional plan as a whole.</p>	<p>Plans and programmes will be reviewed to ensure consistency between the categories of plans considered, noting regional/sub-regional differences.</p> <p>This is reflected in Table 2.1/Appendix C of this Environmental Report.</p>
N/A	N/A	<p>A few further general points cutting across environmental assessments:-</p> <ul style="list-style-type: none"> • Important to seek joint Flood and Coastal Risk Management and Water Resources options to improve cost benefit and collaboration. • WRW should actively work with non PWS stakeholders such as agriculture sector to promote storage techniques and improve overall resilience / adaptation to prolonged dry weather. • Objectives should include delivering more efficient and targeted use of available water banks, whether for purpose of regulation / abstraction, through improved modelling, monitoring, and control. This includes consideration of the use of new 5g technology. • Assessment methodology should include climatic risks to critical infrastructure. For example, greater stress pressures from cyclic loading (fill / refill) of assets, including reservoirs, as well as direct impact of storm events and extreme temperatures. Severn Regulation reduces the risk of flow deficits to the Estuary and Bristol Water abstraction. • Would like to see more open inclusion of RSA/ AMP/ WINEP under the umbrella of WRW. Should waste water plans not be included at some point too? Feels a bit disconnected from the dirty water side. 	<p>Comments noted.</p> <p>Where relevant, WRW and individual core member water companies will take such additional issues into account when developing their plans.</p>

Table B.3 Responses to Natural Resources Wales comments on the SEA Scoping Report

Consultation Question	Section	Consultee Response	Response/Action
N/A	N/A	<p>We welcome and support the development of your regional water resources plan and the individual Water Resource Management Plans, together with your commitment to SEA.</p> <p>We welcome the inclusion of the considerations and products of the Environment (Wales) Act 2016 and the Wellbeing of Future Generations (Wales) Act 2015 within your reports.</p>	Comment noted.
	N/A	<p>Whilst these considerations and the Welsh aspects of baseline assessment are more comprehensively included within Appendix A (Dŵr Cymru Welsh Water DCWW scoping), we feel that there are elements relating to Welsh data and legislation that should be strengthened within the other documents. A consistent baseline of evidence for Wales should be used across all plans considering these areas. As it stands the information presented in Appendix B and D does not provide meaningful context for strategic decision-making in Wales.</p>	<p>Comment noted.</p> <p>This will be considered at the Environmental Report stage to ensure a consistent baseline across these water companies.</p> <p>This is reflected in Section 3 and Appendix D of this Environmental Report.</p>
Q1. Do you think that the Scoping Report sets out sufficient information to provide the context for the SEAs of the draft WRW Regional Plan and WRMP24s		<p>We welcome the comprehensive review of plans and programmes. We note some missing items and amendments below for further consideration. We recognise that the scope of this document lists the preferred water resource options and Strategic Resource Options (SRO) as separate items. We believe clarification</p>	<p>Comment noted.</p> <p>The SRO options are being considered and assessed through the integrated options development programme and will be included in the will be included in the relevant WRMP and in the WRW Regional Plan.</p>

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Consultation Question	Section	Consultee Response	Response/Action
<p>in terms of an overview of each plan, the review of relevant plans and programmes and baseline evidence and analysis? If not, what additional information should be included?</p>		<p>is required as to where the SEA of the SROs will sit if not within the WRMP of the individual water companies.</p> <p><u>Biodiversity, flora and fauna</u> When assessing the baseline evidence you should consider all of the elements of ecosystem resilience as set out in the Environment (Wales) Act 2016, taking account of the diversity between and within ecosystems, the connections between and within ecosystems, the scale of ecosystems, the condition of ecosystems (including their structure and functioning) and the adaptability of ecosystems. This should be included across all of the reports for areas within or affecting Wales.</p>	<p>The SROs were identified as separate items covered by the scope of the assessment in S1.4 of the Scoping Report as we are aware that regulators have a substantial interest in these options, which are also being considered through the gated stages required by RAPID.</p> <p>Comment noted</p> <p>Ecosystem resilience will be considered where relevant to the WRW Regional Plan and WRMP24 and in line with the developed SEA assessment methodology; particularly the SEA objectives under the Biodiversity, Flora and Fauna Topic: SEA Objective 1. To protect and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species, enhance ecosystem resilience and habitat connectivity and deliver a net biodiversity gain; and SEA Objective 2. To protect and enhance sustainable natural resources and the ecosystem services they provide.</p> <p>The Environment (Wales) Act 2016 requirements of Sustainable Management of Natural Resources are reflected in the WRW detailed screening criteria, applied to WRMP revised feasible options. They will also be addressed through the non-monetised elements of ecosystem resilience and enhancement opportunities evaluated as part of the Natural Capital Assessment (NCA) undertaken of the revised feasible options within each WRMP.</p>

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Consultation Question	Section	Consultee Response	Response/Action
		<p><u>Biodiversity, flora and fauna</u> It is also worth including non-statutory designations or information relating to biodiversity beyond Local Nature Reserves, such as Sites of Importance for Nature Conservation or other local information from Wildlife Trusts, Local Authorities or other conservation charities to help make an assessment of the ecological networks.</p>	<p>Comment noted. Regard will be given to non-statutory designations as per the objectives and guide questions of the SEA assessment methodology.</p>
		<p><u>Biodiversity, flora and fauna</u> We welcome the inclusion of Section 7 species and Invasive and Non-Native Species (INNS). There is however no indication of their baseline or trends and as such it is then difficult to make an assessment of change in the future.</p>	<p>Comment noted. The baseline data for these species are not readily included in reports at a strategic level.</p>
		<p><u>Biodiversity, flora and fauna</u> The Biodiversity and Water sections would be greatly improved with more information included to on freshwater habitats and species as these are those which are likely to be impacted, and the issues facing them such as water quality, flow and physical modifications. This would include reference to areas which are already impacted by water resource activities.</p>	<p>Comment noted. These issues will be considered in the HRA where European sites are designated for migratory species and to a certain extent in the WFD report. Where relevant it may also be included in the appropriate Environmental Report (to accompany either the WRW Regional Plan or WRMP24).</p>
		<p><u>Geology, land use and soils</u> The reference given for the Agricultural Land Use data is for England only. Please include a reference for the Welsh data used, the most up-to-date being Predictive Agricultural Land Classification (ALC) Map 2.</p>	<p>Comment noted. Appendix A: Dŵr Cymru Welsh Water presents in Table A3.2 Agricultural Land Quality (as a percentage of land area) for each ALC category for Wales and England. Figure A3.11 Agricultural Land Classification presents</p>

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Consultation Question	Section	Consultee Response	Response/Action
			<p>ALC information for Wales. This will be updated with information from the Predictive Agricultural Land Classification (ALC) Map 2 (DataMapWales (2019).</p> <p>This data has been utilised in the 'Geology, Land Use and Soils' section of Appendix D.</p>
		<p><u>Water</u> The reference given for the water availability mapping refers to an Environment Agency dataset. Refer to the NRW Abstraction Licensing Strategies published at Natural Resources Wales / Water available in our catchments. For updated national-scale water resource mapping please refer to: Lle - Water Resource Reliability Data (gov.wales) (http://lle.gov.wales/catalogue/item/WaterResourceReliabilityData) Lle - Water Resource Availability Data (gov.wales) http://lle.gov.wales/catalogue/item/WaterResourceAvailabilityData</p>	<p>Comment noted.</p> <p>This data appears to be publicly available via the Welsh data portal and will be used where applicable, included in updated baselines contained in relevant Environmental Reports.</p>
		<p><u>Water</u> UK CCRA2 is referenced in terms of projected water availability. Whilst UKCCRA3 is not yet publicly available the updated water availability research supporting this is https://www.ukclimaterisk.org/ccra-research/ . We recommend you use the most up-to-date information.</p>	<p>Comment noted.</p> <p>This will be updated as appropriate in the relevant Environmental Reports.</p> <p>This data has been utilised in the 'Climatic Factors' section of Appendix D.</p>
		<p><u>Water</u> Given the context of the plan(s) being assessed this section in all of the reports would benefit from further</p>	<p>Comment noted.</p> <p>In undertaking the SEA assessments, regard is given to interrelationships across topics.</p>

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Consultation Question	Section	Consultee Response	Response/Action
		<p>integrated with the biodiversity section, considering the full range of freshwater biodiversity and protected sites, including lakes and wetlands.</p>	
		<p><u>Water</u> We note in Section 1.7.3 and 1.7.4 pg. 23 the water companies' commitments to considering the requirements of the Water Framework Directive Regulations 2017 in the SEA is welcomed. It should be noted that this will be relevant to not just the water quality topic but to other topics as well, particularly in terms of water dependant protected areas.</p>	<p>Comment noted.</p> <p>The following stages of the SEA will continue to consider the inter-relationships across topics.</p> <p>The WFD Regulations 2017 mitigation measures will be considered during the Environmental Reporting stage.</p>
		<p><u>Water</u> No information is presented on fluvial geomorphology or river dynamics. We recommend that you consider this within your SEA.</p>	<p>Comment noted.</p> <p>Geomorphology is highlighted as a key issue in WRMP specific baselines e.g., Appendix A, where the "<i>the need to protect, maintain and enhance geomorphological functions and services</i>" is identified. Given its strategic nature and the geographic extent covered, further additional information on fluvial geomorphology will not be provided in the baseline.</p> <p>The following supplementary or amended guide questions will be included to permit consideration of geomorphology effects:</p> <ul style="list-style-type: none"> • <i>Will it alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems? Objective 1.</i> • <i>'Will it result in changes to river flows, <u>channel morphologies</u>, wetted width or river levels? Objective 5.</i>

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Consultation Question	Section	Consultee Response	Response/Action
			<p>The WFD Assessment (Stage 3 Impact Assessment) also includes consideration of geomorphology through the source-pathway-receptor approach to identifying effects. Where relevant, such information will be used to inform the assessment of any options against the above guide questions.</p> <p>The supplementary guide question and revised guide question are reflected in Table 4.2 and Appendix E of this Environmental Report.</p>
		<p><u>Air quality</u> We welcome the inclusion of data linking air quality to public health. However, a lack of information presented linking air pollution to the impacts on ecosystems.</p>	<p>Comment noted.</p> <p>Table 3.1 of the Scoping Report identifies key pressures and risks in respect of biodiversity and nature conservation that are relevant as including atmospheric pollution (acid precipitation, nitrogen deposition). This also includes reference to increases in transport movements and works associated with the construction and operation of nationally significant water resources infrastructure could affect air quality and lead to increased nitrogen deposition in sensitive habitats.</p>
		<p><u>Population and human health</u> Whilst the DCWW report does use the 2019 Welsh Index of Multiple Deprivation (WIMD), the SVT report uses the 2015 version and the text of the UU report under deprivation makes no mention of Wales (nor are the Welsh areas under consideration mentioned within the rest of this section). Both SVT and UU should include Welsh data where relevant.</p>	<p>Comment noted.</p> <p>Data from the 2019 Welsh Index of Multiple Deprivation (WIMD) will be used, where relevant, within the Environmental Report.</p> <p>This data has been used in the 'Population and Human Health' section of the baseline, presented in Appendix D of this Environmental Report. Specifically, Figure D.12 presents both English IMD 2019 and Welsh IMD 2019 data.</p>

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Consultation Question	Section	Consultee Response	Response/Action
	Table 2.1/Appendix E	<p><u>Material assets and resource use</u></p> <ul style="list-style-type: none"> The review of National Plans & Programmes (Appendix E) should refer to UK Governments 2020 Energy white paper: Powering our net zero future as the latest expression of UK energy policy. There should be reference to UK Govts Offshore Energy Plan and Welsh Government's Marine Energy Programme (although worth checking with WG its exact status and timetable and intended outputs). Both include consideration of tidal range technologies The National transport plan has been included however regional transport plans should also be included under local / regional plans. 	<p>Comments noted.</p> <p>The following plans/programme will be added to the review of plans and programmes in the Environmental Report:</p> <ul style="list-style-type: none"> HM Government (2020) Energy White Paper: Powering our net zero future <p>The UK government issued a call for evidence on the scope for marine energy technologies, including floating offshore wind and wave and tidal energy. This fed into the energy white paper. The WG Marine Energy Programme for Wales is included in the review of plans and programmes and provides planning policy for offshore and tidal energy.</p> <p>Regional transport plans will also be included in the review of plans and programmes included within the Environmental Report accompany the relevant plan. Information will be provided proportionate to that provided for other generic plan types such as Local Planning Authority Land Use Plans.</p> <p>The additional plans and programmes have been reflected Table 2.1/Appendix C of this Environmental Report.</p>
	Table 2.1/Appendix E	<p><u>Cultural heritage and landscape</u></p> <p>Only Appendix A (DCWW) contains the Welsh landscape and cultural baseline evidence and analysis we would expect. LANDMAP, Designated Landscapes, Tranquillity, Historic Landscape, Heritage Coast and Landscape Character Areas are missing from UUW and Severn Trent reports. Analysis of the issues is therefore weak for Wales in these two reports and should be reviewed.</p>	<p>Comment noted.</p> <p>These issues will be included in the relevant Environmental Report.</p> <p>This has been reflected in the 'Landscape' section of Appendix D of this Environmental Report.</p>

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Consultation Question	Section	Consultee Response	Response/Action
<p>Q2. Do you agree that the main environmental issues identified are relevant to the SEAs of the draft of the draft WRW Regional Plan and WRMP24s? If not, which issues do you think need to be included or excluded?</p>		<p>The review of plans and programmes is comprehensive for landscape.</p>	<p>Comment noted.</p>
		<p><u>Biodiversity, flora and fauna</u></p> <p>When looking at the key issues you should consider all of the elements of ecosystem resilience as set out in the Environment (Wales) Act 2016, we welcome the inclusion of some of the elements here and the explicit references to ecosystem resilience with DCWW's report. However, this is an element which requires strengthening within the other water company reports (Appendix B And D).</p>	<p>The elements of ecosystem resilience as set out in the Environment (Wales) Act 2016, will be considered in the baseline/key issues section for biodiversity within the relevant Environmental Report (to accompany the WRMP24s).</p>
		<p><u>Biodiversity, flora and fauna</u></p> <p>Key issues for biodiversity should explicitly reference issues faced by freshwater habitats including flow regime and physical modifications. The effects on migratory species, including effects on migratory fish from barriers to migration, changes in flow and gravel movement should be considered as these are currently missing.</p>	<p>These issues will be considered in the HRA where European sites are designated for migratory species and to a certain extent in the WFD report. Where relevant it may also be included in the appropriate Environmental Report (to accompany either the WRW Regional Plan or WRMP24).</p>
	<p>Section 3.2/Table 3.1</p>	<p><u>Geology, land use and soils</u></p> <p>Minimising loss of best and most versatile agricultural land has been included. We believe that you also need to consider the wider impacts on other land-uses (such as forestry operations).</p>	<p>Comment noted.</p> <p>An additional guide question will be added against the SEA Objective 4 for the 'Soils, Land Use and Geology' topic:</p> <p><i>Will it avoid adverse effects on other land uses (such as forestry)?</i></p> <p>In this way, where appropriate, wider impacts on other land-uses will considered in the relevant Environmental Report.</p>

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Consultation Question	Section	Consultee Response	Response/Action
			The supplementary guide question is reflected in Table 4.2 and Appendix E of this Environmental Report.
	Section 3.2/Table 3.1	<u>Water</u> Requires strengthened links to freshwater habitats – as per previous comments.	Comments noted. Where relevant, revised information may be included in the appropriate Environmental Report. These issues will be considered in the HRA where European sites are designated for migratory species and to a certain extent in the WFD report.
		<u>Water</u> We would recommend that you consider any potential changes to ‘fluvial geomorphology’ (for example sediment loading) from your WRMP options and therefore any potential impacts to WFD status or impacts to freshwater ecology.	Comments noted. Geomorphology is highlighted as a key issue in WRMP specific baselines e.g., Appendix A, where the “ <i>the need to protect, maintain and enhance geomorphological functions and services</i> ” is identified. Given its strategic nature and the geographic extent covered, further additional information on fluvial geomorphology will not be provided in the baseline. The following supplementary or amended guide questions will be included to permit consideration of geomorphology effects: <ul style="list-style-type: none"> • <i>Will it alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems? Objective 1.</i> • <i>‘Will it result in changes to river flows, <u>channel morphologies</u>, wetted width or river levels?’ Objective 5.</i> The WFD Assessment (Stage 3 Impact Assessment) also includes consideration of geomorphology through the source-pathway-receptor approach to identifying effects. Where relevant, such information will be used to

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Consultation Question	Section	Consultee Response	Response/Action
			<p>inform the assessment of any options against the above guide questions.</p> <p>The supplementary guide question and revised guide question are reflected in Table 4.2 and Appendix E of this Environmental Report.</p>
		<p><u>Water</u> We would recommend that you also refer to consideration of the implementation of WFD Regulations 2017 mitigation measures as many of the existing reservoirs and abstractions still have mitigation measures that need to be put in place.</p>	<p>Comments noted.</p> <p>These issues will be considered in the WFD report. Where relevant it may also be included in the appropriate Environmental Report (to accompany either the WRW Regional Plan or WRMP24).</p>
	Table 3.1	<p><u>Air quality</u> Recommend a wording change from 'minimise emissions' to 'ensure that people and sensitive habitats are protected from emissions by enhancing air quality'.</p>	<p>Comment noted.</p> <p>It is considered that the existing wording (<i>The need to minimise emissions of pollutant gases and particulates and enhance air quality arising from the implementation of the WRMPs and WRW Regional Plan.</i>) is sufficiently broad, such that it already captures the need to enhance air quality to protect people and sensitive habitats and goes further by saying that emissions should be also be minimised.</p>
	Table 3.1	<p><u>Climatic factors</u> The climate change section of Table 3.1 refers to coastal change and cross references to the water -flood risk section. Whilst vulnerability to flooding and coastal change is recognised, the relevant key issue highlighted relates to resilience only. It is recommended that adaptation is also considered for coastal assets which are at flooding or erosion risk.</p>	<p>No change. Comment noted.</p> <p>Table 3.1 includes the need to take into account, and where possible adapt to, the potential effects of climate change. Flood risk is also identified as a separate issue. Taking into account the nature and scope of the plans being assessed and the information already provided, the additional information suggested regarding coastal</p>

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Consultation Question	Section	Consultee Response	Response/Action
			assets and erosion are considered to be appropriately covered within the assessment.
	Table 3.1	<p><u>Landscape</u></p> <p>Suggest adding Protect against wildfires (due to extreme weather events linked to climate change) as key issues throughout the reports.</p>	<p>Comment noted. '</p> <p>Taking into account the nature and scope of the plans being assessed and the information already provided, the additional information suggested is considered outside of scope for the assessment.</p>
<p>Q3. Do you agree with the proposed approach to the SEAs of the draft WRW Regional Plan and WRMP24s? Are the proposed SEA objectives, guide questions and significance thresholds appropriate for the scope of each plan assessment? If not, which objectives/guide questions should be amended and which other objectives/guide questions do you believe should be included?</p>		<p>We welcome that a 'high-level' analysis of the impact that the draft WRW Regional Plan and WRMPs will have on the achievement of the seven well-being goals for Wales and that the objective for the 'Sustainable Management of Natural Resources' will be undertaken. The Sustainable Development principle and the SMNR principles should be built into your SEA process (in addition to the WRMP process) to ensure that these are fully embedded, and you are maximising your contributions to the well-being of Wales, as per the WRMP guidance. Please see our comments on HRA process with regards to boundaries for assessing impacts. Where specific quantified thresholds are given to determine impact, these should be considered in relation to the local context.</p>	<p>Comment noted.</p> <p>The high-level analysis of the impact that the draft WRW Regional Plan and WRMPs on the seven well-being goals for Wales and the objective for the SMNR will build on that completed for the relevant WRMP19s (informed by any available guidance from Welsh Government or the Future Generations Commissioner for Wales. It will be undertaken following mapping of the 17 SEA objectives against the seven well-being goals.</p> <p>WRW is taking an integrated approach to preparing the Regional Plan and the WRMP24s. WRW member water companies are using a regionally consistent set of methodologies to reflect local, regional and national needs into the development of the plans. The definitions of significance have been developed so that they can apply to the SEA of each of the plans, whether that be the WRW Regional Plan or the individual WRMPs to ensure a consistent approach to interpreting the significance of effects.</p> <p>The mapping of the 17 SEA Objectives against the seven well-being goals and the analysis of the impact that the revised draft WRMP24 has on the seven well-being goals and objective for SMNR is presented in section 6.8</p>

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Consultation Question	Section	Consultee Response	Response/Action
			<p>(‘Contribution of the Draft WRMP to Wales’ Well-being Goals and the Objective for SMNR’) of this Environmental Report.</p>
	<p>Table 4.2/Appendix F</p>	<p><u>Biodiversity, flora and fauna</u></p> <ul style="list-style-type: none"> We believe that objective 1 and guide question should be amended to “Protect, restore and enhance”. This would reflect the current need to work towards restoring many of our protected sites to favourable condition. There is a long legacy of damage to our protected sites and it takes time and considerable resources to tackle many of the complex issues. Include minimise the “risk” of spread of Invasive and Non-Native Species. 	<p>Agreed.</p> <p>The wording of Objective 1 (Biodiversity) and Objective 3 (INNS) and corresponding guide questions will be revised to reflect these comments.</p> <p>The revised wording for Objective 1 and corresponding guide questions is reflected in Table 4.2, Table 4.5, Table NTS.2 and Appendix E of this Environmental Report.</p> <p>The revised wording for Objective 3 and corresponding guide question is reflected in Table 4.2, Table NTS.2 and Appendix E of this Environmental Report.</p>
		<p><u>Geology, land use and soils</u></p> <ul style="list-style-type: none"> You will need to consider all types of relevant land use (such as different types of agriculture, horticulture, forestry) within the local area and will need to consider what is important in the context. Currently these considerations are missing from SEA scoping document. 	<p>Comment noted.</p> <p>An additional guide question will be added against the SEA Objective 4 for the ‘Soils, Land Use and Geology’ topic:</p> <p><i>Will it avoid adverse effects on other land uses (such as forestry)?</i></p> <p>In this way, where appropriate, wider impacts on other land-uses will considered in the relevant Environmental Report.</p> <p>The supplementary guide question is reflected in Table 4.2 and Appendix E of this Environmental Report.</p>

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Consultation Question	Section	Consultee Response	Response/Action
	Table 4.2/Appendix F	<p><u>Water</u></p> <ul style="list-style-type: none"> There needs to be greater integration and consideration of how the guide questions and objectives work together for example in the Water topic, when referring to sustainable use of water. The use of water is not just for people as its vital to sustain biodiversity in the face of climate change. The Water quantity and quality topics should link the other topic objectives, such as Biodiversity and Climatic factors topics. These topics would benefit from having guide questions that relate to the sustainable use of water and SMNR principles. Linked to comment on objective 1 above – you should consider whether the Regional Plans/WRMP options will contribute to restoration of species that are currently not achieving management objectives, including due to flow regime or physical modifications. Water quantity should also include the guide questions “Will it support the achievement of WFD protected area objectives?” and “Will it prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?” as listed in the Water quality topic, can these be added as guide questions? These questions would benefit from the inclusion of lakes and wetlands. 	<p>Comments noted.</p> <p>Schedule 2 (6) of the SEA Regulations requires the assessment and reporting of the likely significant effects on the following topics: “biodiversity; population; human health; fauna; flora; soil; water; air; climatic factors; material assets; cultural heritage, including architectural and archaeological heritage; landscape; <u>and the inter-relationship between the issues.</u>” This will be undertaken through the assessment of cumulative effects of individual options which will also be informed by the findings of the HRA, WFD assessment and NCA.</p> <p>The wording of Objective 1 (Biodiversity) and corresponding guide questions will be revised to include ‘restoration’, to ensure, where relevant effects are identified, described and assessed. These issues will be considered in the HRA and the WFD report.</p> <p>Contribution to the achievement of WFD objectives is already specifically reflected in the guide questions for Objective 6 (Water Quality).</p> <p>The guide questions for Objectives 5 (Water Quantity) and 6 (Water Quality) include reference to surface waters and water bodies, and to avoid unintended duplication, reference to ‘lakes and wetlands’ will not be included.</p> <p>Comment noted.</p>

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Consultation Question	Section	Consultee Response	Response/Action
		<ul style="list-style-type: none"> Flooding should also be considered as a key ecosystem function of rivers. 	The revised wording for Objective 1 and corresponding guide questions is reflected in Table 4.2, Table 4.5, Table NTS.2 and Appendix E of this Environmental Report.
	Table 4.2/Appendix F	<u>Air quality</u> <ul style="list-style-type: none"> Please see comments from question 2 on air quality for suggested amendment. 	Comment noted.
	Table 4.2/Appendix F	<u>Climatic factors</u> <ul style="list-style-type: none"> The guide question “Will the option increase environmental resilience to the effects of climate change?” could be expanded to identify impacts on flood risk/water quality. 	<p>Comment noted.</p> <p>This guide question already includes reference to impacts on flood risk and water quality.</p>
	Table 4.2/Appendix F	<u>Population and human health</u> <ul style="list-style-type: none"> Within the guide questions and thresholds further integration of the wellbeing goals should be considered to maximise the wellbeing benefits provided of any option, including enjoyment of green and blue space providing both mental and physical wellbeing benefits, social wellbeing factors and economic wellbeing. 	<p>No change.</p> <p>Comment noted.</p> <p>SEA Objective 12 includes the following guide question “Will it protect and enhance public access to, and enjoyment of, green and blue infrastructure, open space/recreational facilities and the natural and historic environment, and in doing so help promote healthy lifestyles including mental well-being?” which along with SEA Objectives 1 (Biodiversity), 2 (Sustainable Natural Resources), 10 (Resilience), 11 (Economic and social well-being), 13 (Human health) and 16 (Cultural heritage) provide a broad framework to consider the effects on the well-being goals. Further review of the updated SEA framework following scoping consultation will be undertaken to ensure any opportunities to strengthen the assessment are identified and incorporated. See Table 4.2 of this Environmental Report.</p>

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Consultation Question	Section	Consultee Response	Response/Action
	Table 4.2/Appendix F	<p><u>Landscape</u></p> <ul style="list-style-type: none"> <li>• We would recommend an addition to one of the proposed guide questions on landscapes (which includes Designated Landscapes). Therefore, we suggest the addition of 'and the settings of Designated Landscapes'. 	<p>Agreed. The wording of the first guide question under Objective 17 (Landscape) has been amended to read:</p> <p><i>Will it avoid adverse effects to, and enhance where possible, protected/designated landscapes <u>and the settings of designated landscapes</u> (including woodlands) such as National Parks or AONBs?</i></p> <p>The revised wording for this guide question is reflected in Table 4.2 and Appendix E of this Environmental Report.</p>

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Table B.4 Responses to Natural England comments on the SEA Scoping Report

Consultation Question	Section	Consultee Response	Response/Action
N/A	N/A	There is much in the Strategic Environmental Assessment (SEA) scoping report that is good and Natural England welcomes WRW’s commitment to environmental assessment.	Comment noted.
Q1. Do you think that the Scoping Report sets out sufficient information to provide the context for the SEAs of the draft WRW Regional Plan and WRMP24s in terms of an overview of each plan, the review of relevant plans and programmes and baseline evidence and analysis? If not, what additional information should be included?	Section 2, Table 2.1, Appendix E	<p>Natural England applauds the very thorough consideration of plans and programmes that underpin it’s plan. Some additional plans that may be relevant:</p> <p>The Environment Bill 2020, although not yet finally published, should be as this includes long term targets set by the government relating the natural environment – and may be especially relevant to the environmental destination.</p> <p>The Land Drainage Act 1991 – ground water levels.</p> <p>The Conservation of Habitats and Species Regulations 2017 – current transposed directive in the UK of The Habitats Directive 1992.</p> <p>The Conservation (Natural Habitats, &c.) Regulations 1994 – imposed a duty on the IDB to develop WLMP for SSSI sites.</p> <p>The Nitrate Pollution Prevention Regulations 2015</p>	<p>Comment noted.</p> <p>The following additional plans and programmes will be included in the Environmental Report:</p> <ul style="list-style-type: none"> • The Land Drainage Act 1991 • The Conservation (Natural Habitats, &c.) Regulations 1994 • The Nitrate Pollution Prevention Regulations 2015 • The Agriculture Act 2020 <p>The Conservation of Habitats and Species Regulations 2017 is already included in the review of plans and programmes and also considered within section 1.6 of the Scoping Report. These 2017 regulations consolidate all the various amendments made to the Conservation (Natural Habitats) Regulations 1994. It is noted that changes to the 2017 Regulations came into force in January 2021, as a result of the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019, reflecting the UK’s exit from the EU. These changes will be reflected within the review of plans and programmes in the Environmental Report.</p> <p>To avoid undue reliance on draft versions of plans and programmes that could be subject to change, consultation documents and draft legislation are not included in the plans and programmes reviewed, unless</p>

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Consultation Question	Section	Consultee Response	Response/Action
		Agriculture Act 2020 – changes to farm subsidies could have a significant impact on the farming industry & thus water usage.	highly relevant e.g., the Water Resources Planning Guidelines. The changes and additions to the review of plans and programmes have been reflected Table 2.1/Appendix C of this Environmental Report.
		We would like to see the key objectives for the Governments 25Year Plan to Improve the Environment highlighted more prominently, including the objectives for protected sites and the governments commitment to protect 30% of land by 2030.	Comment noted. The Government’s 25 Year Environment Plan: ‘A Green Future: Our 25 Year Plan to Improve the Environment’, is one of over 200 international/European, national, regional/sub-regional and local level plans were reviewed during the preparation of the Scoping Report. It has been reviewed and summarised (in Appendix E). Each has a claim of importance and relevance. Key policy objectives have been summarised in Table 2.2 with the 25 Year Plan identified.
Q2. Do you agree that the main environmental issues identified are relevant to the SEAs of the draft of the draft WRW Regional Plan and WRMP24s? If not, which issues do you think need to be included or excluded?	Table 3.1	Table 3.1 sets out the key issues relating to Biodiversity Flora and Fauna. Natural England would like to see added to the list depletion and pollution of groundwater as we feel this has significantly impacted a large number of protected sites.	Comment noted. <i>‘Depletion and pollution of groundwater’</i> is considered to be addressed in the revised key issues included under the water quality topic <i>‘The need to maintain the quantity and quality of groundwater resources taking into account WFD objectives’</i> which in summary contains aspects of both groundwater quantity and quality.
	Table 3.1	Table 3.1 – section 5. Flood Risk – natural flood management (NFM) tools area key tool for improving the water resource infrastructure.	Comment noted.
	Table 3.1	Table 3.1 – section 5. Flood Risk – key issues include the lack of connectivity of our rivers to their floodplains, the channelisation and dredging of rivers, the historic conversion of	Comment noted. The key issues summarised in Table 3.1 relate to the scope of the WRMPs and the assessment. The issues

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Consultation Question	Section	Consultee Response	Response/Action
		rivers into drains, and historic land drainage acts.	highlighted in the response will where appropriate be added to those taken forward for consideration within the SEA and subsequently presented in the relevant Environmental Report, accompany each plan.
	N/A	We would also like to see specifically referenced the requirement to increase landscape resilience and ensure that our future dependence on the natural environment relies on us using it more sustainably. We would also highlight that many of the solutions that are required to reverse biodiversity loss and restore protected sites and meet other objectives are entirely compatible with other key strategies that could be seen as competing, such as the need to protect drinking supplies and prevent flooding. Nature Based Solutions work synergistically and can offer significant cost-benefit compared to more traditional approaches.	<p>Comments noted.</p> <p>SEA Objective 1 'To protect and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species, enhance ecosystem resilience and habitat connectivity and deliver a net biodiversity gain' and SEA Objective 2 'To protect and enhance sustainable natural resources and the ecosystem services they provide' explicitly seeks to address many of the wide-ranging issues highlighted.</p> <p>WRW and its core members are seeking to develop an ambitious long-term, multi-sector adaptive water resources plan. This includes taking into account wider societal needs including flood risk considerations, environmental improvement and cross-sector working, where innovative approaches such as NBS could afford benefits.</p>
	N/A	Reference should be made to opportunities to use nature based solution to deliver multiple benefits such as carbon sequestration, biodiversity, nutrient capture, urban cooling, flood risk mitigation in addition to improved infiltration and storage of water for resources.	Comment noted.
	N/A	One issue common to all SEAs is that separating the impacts into separate topics makes it more difficult to identify the	<p>Comment noted.</p> <p>Schedule 2 (6) of the SEA Regulations requires the assessment and reporting of the likely significant effects</p>

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Consultation Question	Section	Consultee Response	Response/Action
		<p>synergistic impacts of schemes but also the multiple benefits from nature-based solutions.</p>	<p>on the following topics: “biodiversity; population; human health; fauna; flora; soil; water; air; climatic factors; material assets; cultural heritage, including architectural and archaeological heritage; landscape; <u>and the inter-relationship between the issues.</u>” This will be undertaken through the assessment of cumulative effects of individual options which will also be informed by the findings of the HRA, WFD assessment and NCA.</p> <p>Secondary, cumulative and synergistic effects of individual options, programmes of options within each of the WRZs in deficit, the WRW Regional Plan and WRMPs as a whole and the WRW Regional Plan and WRMPs in combination with other plans and programmes will be assessed as part of the SEA.</p> <p>The assessment of the cumulative effects of the preferred options is presented in section 6.3, whilst the secondary, cumulative and synergistic effects of the revised draft WRMP24 in combination with other plans, programmes and infrastructure projects is presented in section 6.7 of this Environmental Report.</p>
<p>Q3. Do you agree with the proposed approach to the SEAs of the draft WRW Regional Plan and WRMP24s? Are the proposed SEA objectives, guide questions and significance thresholds appropriate for the scope of each plan assessment? If not, which objectives/guide questions should be amended and</p>	<p>Table 4.2/Appendix F</p>	<p>Table 4.2 – Topic. Biodiversity, Flora and Fauna – bullet point 10 references as an example climate change adaptability. Suggest having a specific question referring to the impacts of climate change on protected / non protected sites / species e.g. – Will it provide opportunities for climate adaptation and protect the climate resilience of vulnerable and priority sites?</p>	<p>Comment noted.</p> <p>The following guide question will be added under Objective 2 of the assessment framework:</p> <p><i>Will it provide opportunities for climate adaptation and protect the climate resilience of vulnerable and priority sites?</i></p> <p>The supplementary guide question is reflected in Table 4.2 and Appendix E of this Environmental Report.</p>

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Consultation Question	Section	Consultee Response	Response/Action
<p>which other objectives/guide questions do you believe should be included?</p>	?	<p>Table 4.1 – Topic. Water Quality - Highlight the issues of emerging substances (PCPs) & plastic pollution & knowledge gaps within this area.</p>	<p>Comment noted.</p> <p>Issues relating to water quality, in terms of emerging substances (PCPs) and plastic pollution, and knowledge gaps within this area will be highlighted within the Environmental Report, where relevant.</p>
	Appendix F	<p>Few semi-quantitative or quantitative metrics within the assessment to support guide questions. Do we think going forward that some less subjective ‘measures’ need to be included? How are we going to balance things against environmental impacts without quantifiable measures? UKWIR 2020 guidance suggests a mix of qualitative, semi-qualitative and quantitative measure might be used.</p>	<p>Comment noted.</p> <p>The ‘Definitions and Thresholds of Significance’ set out in Appendix F of the scoping report, are considered to provide a balance of both quantitative and qualitative measures (as per UKWIR Guidance) which help to ensure a consistent approach to interpreting the significance of effects and helps the reader understand the decisions made by the assessor.</p> <p>The proposed thresholds include reference to yield (Ml/d), design capacity (Ml/d), capex (£m), embodied and operational carbon (tCO₂e), flood risk (% site in FZ3), air quality (AQMA) and water quality (WFD status). Additional quantitative measures for air quality and Material Assets – Waste and Resource Use have also now been added to ensure consistency between assessments.</p> <p>These will be set out in the relevant Environmental Reports.</p> <p>These additional quantitative measures are reflected in Appendix E of this Environmental Report.</p>

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Table B.5 Responses to Environment Agency comments on the SEA Environmental Report

Consultation Question	Section	Consultee Response	Response/Action
N/A	N/A	<p>Additionally, the current environmental assessments accompanying the plan are inadequate and further work is required. It is critical that all feasible and alternative options have been assessed appropriately, with consideration of transboundary impacts and this should help underpin decisions around options selected in the best value plan.</p>	<p>The SEA Environmental Report of United Utilities revised draft WRMP24 has been amended to reflect the changes in the revised preferred options and reasonable alternatives to the plan, consistent with the requirements of SEA Regulation 12 (2), government and sector guidance and case law. This necessitates that alternatives to the plan must meet the plan objectives (consistent with the WRPG requirement that the plan must achieve best value). Reasonable alternatives to the plan have then been identified, described and evaluated consistent with this requirement.</p> <p>The effects of all revised feasible options have been identified, described and assessed, and are presented in Section 5 and individually in Appendix F.</p> <p>SEA findings from the revised feasible option assessment have also been used in the completion of the detailed screening of the revised feasible options and as inputs into the MCDA ('ValueStream') for option appraisal and plan selection. This is presented in the WRW Decision metrics supplementary note v1.0 (16.06.2020) and the WRW Regional Plan Decision Tool Workshop Report (August 2021). The use of the SEA findings within UUW's WRMP24 option appraisal and decision making is outlined in Section 5.5 of this Environmental Report.</p> <p>Section 6.3 and 6.7 of the dWRMP SEA Environmental Report details cumulative effects, including consideration of transboundary issues. These have been revised as necessary to reflect the revised preferred option suite.</p>

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Consultation Question	Section	Consultee Response	Response/Action
N/A	N/A	<p>Recommendation 9: Revise the strategic environmental assessment (SEA) so that it is clear how the options compare to least cost, best value and best for society and the environment plans. The company should also address other shortcomings in its SEA, including identifying transboundary effects and showing how in-combination and cumulative effects have been considered within the SEA.</p>	<p>The SEA Environmental Report of United Utilities revised draft WRMP24 has been amended to reflect the changes in the revised preferred options and reasonable alternatives to the plan, consistent with the requirements of SEA Regulation 12 (2), government and sector guidance and case law. This necessitates that alternatives to the plan must meet the plan objectives (consistent with the WRPG requirement that the plan must achieve best value). Reasonable alternatives to the plan, have then been identified, described and evaluated consistent with this requirement.</p>
N/A	Section 4	<p>Issue 9.1: Reasonable plan alternatives</p> <p>It has been identified in Section 4 of the SEA, that the revised feasible options are considered as reasonable alternatives to the preferred options. When assessed for reasonable plan alternatives, the reasonable alternative options have been compared to the preferred</p>	<p>SEA findings from the revised feasible option assessment have also been used in the completion of the detailed screening of the revised feasible options and as inputs into the into the MCDA ('ValueStream') for option appraisal and plan selection. This is presented in the WRW Decision metrics supplementary note v1.0 (16.06.2020)) and the WRW Regional Plan Decision Tool Workshop Report (August 2021).</p> <p>Section 6.3 and 6.7 of the dWRMP SEA Environmental Report details cumulative effects, including consideration of transboundary issues. These have been revised as necessary to reflect the revised preferred option suite.</p> <p>The SEA Environmental Report of United Utilities revised draft WRMP24 has been amended to reflect the changes in the revised preferred options and reasonable alternatives to the plan, consistent with the requirements of SEA Regulation 12 (2), government and sector guidance and case law. This necessitates that alternatives to the plan must meet the plan objectives (consistent with the WRPG requirement that the plan must achieve best value). Reasonable alternatives to the plan, have</p>

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Consultation Question	Section	Consultee Response	Response/Action
		<p>options rather than collectively compared as different alternative plans for example comparing the least cost plan with the best value plan.</p>	<p>then been identified, described and evaluated consistent with this requirement.</p>
		<p>The lack of reasonable alternative plan assessments reduces the effectiveness of the plan and has the potential to overlook significant effects of the options such as transboundary effects. This approach is not compliant with the SEA Regulations and poses a risk to legal challenge.</p>	<p>Each revised feasible option was subject to SEA. The SEA findings from each revised feasible option assessment were then used in UU's option appraisal process:</p>
		<p>The reasonable alternative options need to be re-assessed as reasonable alternative plans, to include a least cost, best value and best for society and environment plan.</p>	<ul style="list-style-type: none"> - as part of the detailed screening of the revised feasible options to determine the constrained options (by informing the assessment against the criterion 'Does the option meet the social and environmental objectives of the relevant SEA?') - by conversion into values for input into the MCDA ('ValueStream') for assessment of four of the eight decision making metrics. This is presented in the WRW Decision metrics supplementary note v1.0 (16.06.2020)) and the WRW Regional Plan Decision Tool Workshop Report (August 2021).
		<p>The company should improve the clarity in the SEA that the revised feasible options are considered the reasonable alternatives.</p>	<p>In consequence, and with reference to reasonable alternatives, each revised feasible option is considered as a reasonable alternative, when selecting the constrained and preferred options. For the avoidance of doubt, an individual feasible option is not considered a reasonable alternative to the plan.</p>
			<p>The assessment of the revised feasible options is presented in section 5 of this Environmental Report (individual option assessment matrices are presented in Appendix F), whilst the assessment of the revised preferred options is presented in section 6.2, the preferred programme assessment is presented in section 6.3 and the assessment of the reasonable alternative plan is presented in section 6.4 (individual preferred plan</p>

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Consultation Question	Section	Consultee Response	Response/Action
N/A	Section 4.4 (Paragraph 4.4.4)	<p>Issue 9.2: Revised feasible options - characteristics and significant effects</p> <p>The characteristics of effects have been outlined within the methodology section of the SEA in Section 4.4.4, despite this the characteristics have not been considered through the assessment. For some objectives there is no acknowledgement of the duration, magnitude, or geographic scale within the assessment. The geographic scale is pertinent as it can identify transboundary effects which currently haven't been considered, resulting in some significant effects being missed.</p> <p>The omission of transboundary effects poses a significant risk and could result in unidentified significant effects which have not been reviewed within the SEA.</p> <p>Further information on the characteristic of effects should be included within the SEA. Further clarity should be provided within the SEA to demonstrate no significant cross-boundary conflicts or issues that could significantly affect the approval and adoption of the WRMP.</p>	<p>option/reasonable alternative plan option assessments are presented in appendix G).</p> <p>The SEA Environmental Report of United Utilities revised draft WRMP24 has been amended to reflect the changes in the revised preferred options that have been selected and for those options, where appropriate, reference has been made to the characteristics of effects (such as timing and location) and transboundary effects.</p>
N/A	Section 1.1	<p>Issue 9.3: Inconsistent objectives between the draft WRMP and the SEA</p> <p>Information on the needs and contents in the company plan is provided in the SEA but the objectives listed under Section 1.1 of the Main report have not been included within the SEA. Schedule 1 (Article 1) of the SEA Regulations requires an environmental report to provide</p>	<p>The SEA Environmental Report of United Utilities revised draft WRMP24 has been amended to include the revised draft WRMP24 objectives.</p> <p>This is reflected in section 1.3 of this Environmental Report.</p>

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Consultation Question	Section	Consultee Response	Response/Action
		<p>an outline of the contents and main objectives of the plan being assessed.</p> <p>There is a risk of legislative non-compliance and poses a risk to customer understanding.</p> <p>The company should include the objectives listed under Section 1.1 of the Main report within the SEA report to meet legislative requirements.</p>	
N/A	Section 2 (Table 2.2); Appendix C	<p>Issue 9.4: Plan, Policy, and Programme (PPP) review</p> <p>There is a lack in clarity of how the policy objectives and messages included in Table 2.2 in the SEA have influenced the development of the objectives and focus of the SEA.</p> <p>Appendix C details the relationships and influences of the plans and programmes of the SEA. However, 'should' is referred to frequently and it is unclear whether the plans and policies listed have been considered in the SEA.</p> <p>There is a potential risk of the SEA objectives not addressing key themes identified in the PPP review, which may have an impact on water security and fail to protect the environment. The adoption of the plan is also vulnerable to legal challenge, as the SEA Regulations require Environmental Reports to identify and explain the relationship with other PPPs.</p>	<p>The SEA Environmental Report of United Utilities revised draft WRMP24 has been amended. Table 2.1 lists all the plans, programmes and strategies that have been considered within the SEA (with each plan and programme reviewed and included in Appendix C). Supplementary information has been included in Table 2.2 of the updated Environmental Report linking the key policy objectives and messages explicitly to the relevant SEA objectives and guide questions.</p>

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Consultation Question	Section	Consultee Response	Response/Action
		<p>The company should:</p> <ul style="list-style-type: none"> update Table 2.2 or text supporting Table 2.2 to clearly explain how policy objectives and messages have influenced the development of the objectives and focus of the SEA report <p>provide a clear explanation on which plans, and programmes have been considered within the SEA and the influence these plans and programmes have had on the SEA</p>	
<p>N/A</p>	<p>Section 6.5; Section 6.3 (Table 6.9)</p>	<p>Issue 9.5: In-combination and cumulative effects</p> <p>In-combination and cumulative effects have been assessed under Section 6.5 'Secondary, Cumulative and Synergistic Effects Assessment' of the SEA report. Although the assessment is extensive and provides a good amount of detail on the potential cumulative effects, it is unclear how the synergistic and secondary effects have been considered within the SEA. The potential cumulative effects included are also not linked back to the objectives of the SEA.</p> <p>The omission of synergistic and secondary effects within the SEA could risk some effects not being identified, posing a risk to the environment.</p> <p>There is also the potential for legal challenge to the adoption of the company's plan if it is found not to have identified all likely significant cumulative effects associated with the plans' implementation as is required by the SEA Regulation.</p> <p>The company should:</p>	<p>The SEA Environmental Report of United Utilities revised draft WRMP24 has been amended. Section 6.7 of the SEA Environmental Report has been reviewed to ensure appropriate identification, description and assessment of likely significant cumulative, secondary and synergistic effects. A summary RAG assessment has also been provided to supplement the detailed analysis with a high-level overview of the likely significant effects using the framework of the SEA objectives.</p>

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Consultation Question	Section	Consultee Response	Response/Action
		<ul style="list-style-type: none"> review Section 6.5 to ensure that all synergistic, cumulative, and secondary effects have been correctly identified and are clearly explained <p>the potential cumulative effects included within Section 6.5 should be linked to the objectives of the SEA. The company should consider presenting this information in a table similar to Table 6.9 in Section 6.3 of the SEA</p>	
N/A	Section 7.4 (Paragraph 7.4.3)	<p>Issue 9.6: Reporting on monitoring</p> <p>The indicative monitoring proposals appear to be appropriate, however it is unclear how monitoring would be reporting on. In Section 7.4.3 of the SEA the company states that they expect to monitor the effects of the WRMP24 alongside the other impacts of its operations. However, due to differences in timescales between operations it is unknown when the reporting would occur.</p> <p>The lack of clarity for how monitoring both the SEA and WRMP would be reported on, poses a risk to the environment.</p> <p>The company should provide a clear outline of the reporting timescales involved with the monitoring required in both the SEA and the WRMP.</p>	<p>The SEA Environmental Report of United Utilities revised draft WRMP24 has been amended. Table 7.1 which outlines the potential indicators to monitor effects has been supplemented. Note that this list is provisional; monitoring proposals will be considered further and a final monitoring framework that satisfies the requirements of the SEA Regulation will be presented in the Post Adoption Statement.</p>
N/A	Appendix B (Tables B.1 – B.4)	<p>Issue 9.7: SEA Scoping Report</p> <p>Tables B.1 to B.4 within Appendix B of the SEA detail the consultation responses on the SEA Scoping Report, and how the company has addressed the comments within the SEA. The responses are thorough and address all the points covered in the comments, however, the</p>	<p>The SEA Environmental Report of United Utilities revised draft WRMP24 has been amended. Appendix B of the SEA which contains the ‘Summary of Responses’ Tables has been updated to signpost to where comments received from the statutory consultees have been addressed.</p>

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Consultation Question	Section	Consultee Response	Response/Action
		<p>company has stated for some comments that their action or response will be included in the SEA. It is unclear where these actions and responses have been included within the SEA, the tables should signpost to the location of the actions and responses as described.</p> <p>The lack of clarity on where statutory consultee comments have been addressed within the report, reduces the confidence that the comments received have been adequately addressed.</p> <p>The 'Summary of Responses' Tables in Appendix B of the SEA should be updated to signpost to where comments received from the statutory consultees have been addressed, to ensure all comments have been adequately addressed.</p>	
N/A	Appendix D	<p>Issue 2.2: Determine changes to abstractions to protect or improve locally important sites</p> <p>The SEA includes a section on non-statutory protected sites and other biodiversity on page 435, where the number of protected sites and species are listed. However, there is insufficient information given about whether the company has considered if any changes are required to protect or improve these sites or species.</p> <p>The lack of information on the changes required to protect or improve locally important sites, makes it unclear how the plan might affect locally important sites.</p> <p>The company should provide a clear assessment to determine if any changes are needed to abstractions to protect or improve locally</p>	<p>Table 4.2 of the SEA Environmental Report presents the assessment framework. Against the SEA objective for biodiversity, flora and fauna, there is a guide question regarding the locally important (non-designated) sites "Will it [the water resource option] protect, restore and enhance non-designated sites and local biodiversity?". Guidance on determining whether such an effect is positive or negative and minor, moderate or significant is presented in Appendix E 'Definitions of Significance'. For example, a minor positive effect is defined as "The option would result in a minor enhancement of the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat creation and enhancement measures." Appendix F and G present the findings of the individual revised feasible and preferred option assessments. These include reference to LNRs e.g. for WR015, there are "3 [LNRs] within 1km of the option (Chapelfield, approximately 0.3km from the works, Clifton Country Park, approximately 0.5km from the pipeline works and Moses Gate approximately 1km from the works.) whilst the remaining LNRs would be situated 1.1km or more from the works. It is not</p>

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Consultation Question	Section	Consultee Response	Response/Action
		important sites (undesigned sites), including those supporting priority habitats and species.	anticipated that there will be any significant effects from construction on any of the SSSIs due to the distance between the works and the closest sites, however, where the works are situated in close proximity to the LNRs highlighted above there is potential for disturbance (e.g. noise/vibration/dust deposition/air quality impacts." Where relevant, the SEA of United Utilities revised preferred options has been amended.
N/A		Issue 2.4: Eels Regulations implications on the supply forecast	Comment noted.
		<p>The Eels Regulations are referred to in the National Plans and Programmes and Sub-regional/local plans and programmes sections of the SEA, outlining how the WRMP should take account of eel management plans. There is insufficient information provided to demonstrate how the measures needed under the Eels Regulations have been incorporated into the plan and any implications the measures have on the supply forecast.</p>	
		<p>The lack of information surrounding the measures required for the Eels Regulations and any implications on the supply forecast poses a risk to the accuracy of the supply forecast.</p>	
		<p>The company should:</p>	
		<ul style="list-style-type: none"> • provide a clear explanation on whether any measures are required for the Eels Regulations within the plan 	
		<ul style="list-style-type: none"> • clearly identify within the plan any implications the measures may cause on the supply forecast 	
		<ul style="list-style-type: none"> • provide a clear explanation within the plan about how the implications have been considered and mitigated 	



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Table B.6 Responses to NRW comments on the draft SEA Environmental Report

Consultation Question	Section	Consultee Response	Response/Action
		<p>Environmental assessment of options</p> <p>The company's preferred draft plan includes supply schemes that could affect the environment within Wales.</p> <p>With regards to the Severn Thames Transfer Strategic Resource Option (STT SRO) scheme we consider that the Habitats Regulations Assessment (HRA) work undertaken to date, cannot rule out Likely Significant Effects on the features of the Severn Estuary / Môr Hafren Special Area of Conservation (SAC) and the Severn Estuary RAMSAR. Additional water released from Lake Vyrnwy will impact the Afon Vyrnwy, and the mobile species from the Severn Estuary SAC which utilise these habitats, during a critical life stage for these species (i.e. this waterbody is functionally-linked to the SAC). The company will have to incorporate the impacts to the designated features whilst utilising these waterbodies within their appropriate assessment and site integrity test.</p>	<p>The revised preferred options selected in United Utilities revised draft WRMP24 do not include the Severn to Thames Transfer Strategic Resource Option (STT SRO) as this is considered as an alternative scenario as part of Severn Trent Water's WRMP24. The STT SRO is also subject to the separate RAPID Gated decision making process which includes separate environmental assessment. Severn Trent will however be taking 25 MI/d from Vyrnwy raw water via the Afon Vyrnwy starting in 2030 and this is included in the Severn Trent Water's revised draft WRMP24 and as enabling works in the United Utilities revised draft WRMP24 and so will be subject to SEA, HRA and WFD assessment. The HRA of the revised draft WRMP24 has considered this option and has not identified any likely significant effects. The WFD assessment has identified it as a compliant option.</p>
		<p>In addition, we are also concerned that this option is not fully compliant with the Water Framework Directive Regulations (WFD Regs). All necessary permits including full HRA and WFD Regs assessments of all likely impact pathways must be undertaken prior to the scheme becoming operational, including the impacts from the proposed increase in releases from Lake Vyrnwy.</p>	<p>The revised preferred options selected in United Utilities revised draft WRMP24 do not include the Severn to Thames Transfer Strategic Resource Option (STT SRO) as this is considered as an alternative scenario as part of Severn Trent Water's WRMP24. The STT SRO is also subject to the separate RAPID Gated decision making process which includes separate environmental assessment. Severn Trent will however be taking 25 MI/d from Vyrnwy raw water via the Afon Vyrnwy starting in 2030 and this is included in the Severn Trent Water's revised draft WRMP24 and as enabling works in the United Utilities revised draft WRMP24 and so will be subject to SEA, HRA and WFD assessment. The HRA of</p>

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the revised draft WRMP24 has considered this option and has not identified any likely significant effects. The WFD assessment has identified it as a compliant option.

There could also be potential impacts to the environment in respect to the preferred option for a release from Vyrnwy to the River Severn as part of a trade agreement with Severn Trent Water. The final plan must clarify the volume of water which is to be traded with Severn Trent Water as the United Utilities dWRMP states 75 Megalitres per day and the Severn Trent dWRMP states 25 megalitres per day. The company must also ensure that prior to this becoming operational a full HRA and WFD Regs assessment must be completed, and all required permits obtained.

Severn Trent will be taking 25 MI/d from Vyrnwy raw water via the Afon Vyrnwy starting in 2030 and this is included in the Severn Trent Water's revised draft WRMP24 and as enabling works in the United Utilities revised draft WRMP24 and so will be subject to SEA, HRA and WFD assessment. The HRA of the revised draft WRMP24 has considered this option and has not identified any likely significant effects. The WFD assessment has identified it as a compliant option.

Appendix C

Review of Plans and Programmes

International / European Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
Conservation of Migratory Species (CMS) (1979) <i>The Bonn Convention on the Conservation of Migratory Species of Wild Animals</i>	
<p>The Convention on the Conservation of Migratory Species of Wild Animals (also known as the Bonn Convention or CMS) is an intergovernmental treaty under the United Nations Environment Programme. The convention was signed in 1979 ratified in the UK in 1985.</p> <p>The convention aims to ensure contracting parties work together to conserve terrestrial, marine and avian migratory species and their habitats (on a global scale) by providing strict protection for endangered migratory species.</p> <p>Overarching objectives set for the Parties are:</p> <ul style="list-style-type: none"> • Should promote, co-operate in and support research relating to migratory species; • Shall endeavour to provide immediate protection for migratory species; • Shall endeavour to conclude Agreements covering the conservation and management of migratory species included in Appendix II. <p>Setting targets is the responsibility of member states.</p>	<p>The WRMP should take into account the habitats and species that have been identified under this directive, and should include provision for their protection, preservation and improvement.</p> <p>The SEA assessment framework should include biodiversity, incorporating the importance of conserving migratory species.</p>
Council of Europe (1979) <i>The Convention on the Conservation of European Wildlife and Natural Habitats (The Bern Convention)</i>	
<p>The Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention) was adopted in Bern, Switzerland in 1979, and came into force in 1982.</p> <p>The principal objectives are:</p>	<p>The WRMP should take into account the habitats and species that have been identified under the</p>

International / European Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<ul style="list-style-type: none"> To conserve wild flora and fauna and their natural habitats, especially those species and habitats whose conservation requires the co-operation of several States; To promote such co-operation. Particular emphasis is given to endangered and vulnerable species, including endangered and vulnerable migratory species; In order to achieve this the Convention imposes legal obligations on contracting parties, protecting over 500 wild plant species and more than 1000 wild animal species. <p>Targets for Contracting Parties are:</p> <ul style="list-style-type: none"> Promoting national policies for the conservation of wild flora, wild fauna and natural habitats, with particular attention to endangered and vulnerable species, especially endemic ones, and endangered habitats, in accordance with the provisions of this Convention; Undertaking in its planning and development policies, and in its measures against pollution, to have regard to the conservation of wild flora and fauna; <p>Promoting education and disseminating general information on the need to conserve species of wild flora and fauna and their habitats.</p>	<p>Convention, and should include provision for the preservation, protection and improvement of the quality of the environment as appropriate.</p> <p>The SEA assessment framework should incorporate the conservation provisions of the Convention particularly the protection of wild flora, fauna and natural habitats.</p>
Council of Europe (1985) <i>The Convention for the Protection of the Architectural Heritage of Europe (The Granada Convention)</i>	
<p>The main purpose of the convention is to reinforce and promote policies for the conservation and enhancement of Europe’s heritage and to foster closer European co-operation in defence of heritage. Recognition that conservation of heritage is a cultural purpose and integrated conservation of heritage is an important factor in the improvement of quality of life.</p>	<p>The SEA assessment framework should include an objective on the conservation and enhancement of heritage and decision making criteria on architectural heritage.</p>
Council of Europe (1992) <i>Convention on the Protection of Archaeological Heritage (The Valetta Convention)</i>	
<p>Agreement that the conservation and enhancement of an archaeological heritage is one of the goals of urban and regional</p>	<p>The SEA assessment framework should</p>

International / European Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<p>planning policy. It is concerned in particular with the need for co-operation between archaeologists and planners to ensure optimum conservation of archaeological heritage.</p>	<p>include an objective on the conservation and enhancement of heritage and decision making criteria on archaeological heritage.</p>
Council of Europe (2000), <i>The European Landscape Convention (The Florence Convention)</i> (became binding March 2007)	
<p>The European Landscape Convention was adopted on 20 October 2000 in Florence and came into force on 1 March 2004 (Council of Europe Treaty Series no. 176). It is open for signature by member states of the Council of Europe and for accession by the European Community and European non-member states. The UK Government signed the European Landscape Convention in 2006 and it became binding from March 2007.</p> <p>The aims of the Convention are to promote landscape protection, management and planning, and to organise European co-operation on landscape issues.</p> <p>Responsibility for implementation has been deferred to the signatories. Articles 5 (general measures) and 6 (specific measures) set out measures that the signatories will undertake, e.g. integrating landscape into policies with possible direct or indirect impact on landscape and to introduce instruments aimed at protecting, managing and/or planning the landscape.</p>	<p>The WRMP should take landscape into account.</p> <p>The SEA assessment framework should include an objective on landscape.</p>
Council of Europe (2003) <i>European Soils Charter</i>	
<p>Sets out common principles for protecting soils across the European Union area.</p>	<p>The WRMP should take soils into account.</p> <p>The SEA assessment framework should include an objective on soils.</p>
European Commission (1991) <i>The Nitrates Directive 91/676/EEC</i>	
<p>The Nitrates Directive is designed to reduce water pollution caused by nitrate from agriculture. The directive requires Defra and the Welsh</p>	<p>The WRMP should be consistent with the aim</p>

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International / European Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<p>Government to identify surface or ground waters 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>to reduce water pollution caused by nitrates from agriculture.</p> <p>The SEA assessment framework should include water quality.</p>
European Commission (1991) <i>Urban Waste Water Treatment Directive 1991/271/EEC</i>	
<p>The aim of the Urban Waste Water Directive is to protect the environment from the adverse effects of waste water discharges. It sets out guidelines and legislation for the collection, treatment and discharge of urban waste water. The Directive was adopted by member states in May 1991 and is transposed into law in England and Wales by The Urban Waste Water Treatment (England & Wales) Regulations 1994 (as amended*). The Regulations require that all significant discharges are treated to at least secondary treatment. They also set standards and deadlines for the provision of sewage systems, the treatment of sewage according to the size of the community served by the sewage treatment works and the sensitivity of receiving waters to their discharges.</p>	<p>The WRMP will need to reflect the guidelines and legislation set out in the directive.</p> <p>The SEA assessment framework should include water quality.</p>
European Commission (1992) <i>The Habitats Directive 1992/43/EEC</i>	
<p>The Habitats Directive seeks to conserve natural habitats. Conservation of natural habitats requires member states to identify special areas of conservation and to maintain where necessary landscape features of importance to wildlife and flora.</p> <p>It is required that each Member State propose a list of sites indicating which natural habitat types and which species the sites host. The information would include a map of the site, its name, location and its extent. The Commission will then establish, in agreement with each Member State, a draft list of sites of Community importance drawn from the Member States' lists identifying those which host one or more priority natural habitat types or priority species.</p>	<p>The WRMP should take into account the habitats and species that have been identified under this Directive, and include provision for the preservation, protection and improvement of the quality of the environment as appropriate.</p> <p>The SEA assessment framework should</p>

International / European Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
	incorporate sites protected for their nature conservation importance.
European Commission (1998) <i>Drinking Water Directive 1998/83/EC</i>	
<p>The Drinking Water Directive (DWD) concerns the quality of water intended for human consumption. The objective of the DWD is to protect the health of the consumers in the EU and to make sure the water is wholesome and clean. To do this, the DWD sets standards for 48 (microbiological and chemical) parameters that can be found in drinking water. The parameters must be monitored and tested regularly. In principle WHO guidelines for drinking water are used as a basis for the standards in the DWD. While translating the DWD into their own national legislation (transposition of the DWD), the Member States of the European Union can include additional requirements e.g. regulate additional substances that are relevant within their territory or set higher standards. However, Member States are not allowed to set lower standards as the level of protection of human health should be the same within the whole EU. Member States have to monitor the quality of the drinking water supplied to their citizens and of the water used in the food production industry. Member States report at three yearly intervals the monitoring results to the European Commission.</p> <p>Standards constitute legal limits. Sets limits for microbiological and chemical parameters in drinking water. Also gives indicator parameters.</p>	<p>The WRMP should seek to ensure the continuity of a safe and secure drinking water supply and protect or improve drinking water quality where possible.</p> <p>The SEA assessment should consider the effects on water and human health.</p>
European Commission (1999) <i>Directive on the Landfill of Waste 99/31/EC</i>	
<p>The Directive aims at reducing the amount of waste landfilled; promoting recycling and recovery; establishing high standards of 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 land-filling of</p>	<p>The WRMP should take the effects on waste to landfill into account.</p> <p>The SEA assessment should consider the</p>

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<p>waste, by introducing stringent technical requirements for waste and landfills.</p> <p>The Directive requires the reduction of the amount of biodegradable municipal waste sent to landfill to 75% of the total generated in 1995 by 2006, 50% by 2009 and 35% by 2016.</p>	<p>effects on water, soil, air, human health and waste</p>
European Commission (2000) <i>The Water Framework Directive 2000/60/EC</i>	
<p>The purpose of this Directive is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater and to achieve good qualitative and quantitative status of all water bodies (including marine waters up to one nautical mile from shore). The framework aims to:</p> <ul style="list-style-type: none"> • Protect any further deterioration and enhance the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems; • Promote sustainable water use based on a long-term protection of available water resources; • Enhance protection and improvement of the aquatic environment, inter alia, through specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing-out of discharges, emissions and losses of the priority hazardous substances; • Ensure the progressive reduction of pollution of groundwater and prevent its further pollution; • Contribute to mitigating the effects of floods and droughts. <p>Key targets and indicators relevant to the WRMP and SEA are:</p> <ul style="list-style-type: none"> • Achievement of good ecological status and good surface water chemical status by 2015 unless alternative objectives have been identified; 	<p>The WRMP needs to consider the implication of the Directive in terms of sustainable water use, protection and improvement of the aquatic environment, reducing and preventing pollution and mitigating the effects of flood and droughts.</p> <p>The SEA assessment framework should include water quality, water resources, sustainable water use, and biodiversity.</p>

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<ul style="list-style-type: none"> • Achievement of good ecological potential and good surface water chemical status for heavily modified water bodies and artificial water bodies; • Prevention of deterioration, including of each element, from one status class to another; • Achievement of water-related objectives and standards for protected areas; • Achievement of good groundwater quantitative and chemical status by 2015; • Reversal of any significant and sustained upward trends in pollutant concentrations and prevent or limit input of pollutants to groundwater; • Achievement of water related objectives and standards for protected areas and contributes to mitigating the effects of flood and droughts. 	
European Commission (2001) <i>Directive on the Assessment of the Effects of Certain Plans and Programmes on the Environment (The SEA Directive) 2001/42/EC</i>	
<p>The objective of the SEA Directive 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 and programmes with a view of contributing towards sustainable development”.</p> <p>Throughout the course of the development of the plan, policy or programme, the aim of SEA is to identify the potential impact of options proposed in the plan in terms of their environmental, economic and social effects. If any adverse effects are identified, these options can then be avoided or proposals modified to manage or mitigate adverse effects.</p>	<p>This directive is the driver for SEA. All topics identified in the SEA Directive should be considered within the scope of the assessment. Need to ensure that the subsequent Environmental Report meets the requirements of Annex I of the SEA Directive.</p>
European Commission (2002) <i>Directive on the Energy Performance of Buildings 2002/91/EC</i>	

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<p>The European Union Energy Performance of Buildings Directive was published in the Official Journal on the 4th January 2003. The overall objective of the Directive is to <i>promote the improvement of energy performance of buildings within the Community taking into account outdoor climate and local conditions as well as indoor climate requirements and cost effectiveness.</i></p> <p>The Directive highlights how the residential and tertiary sectors, the majority of which are based in buildings, accounts for 40% of EU energy consumption.</p>	<p>The SEA should highlight any opportunities for new buildings associated with the WRMP to contribute to improved energy performance.</p>
European Commission (2002) <i>The Environment Noise Directive (END) 2002/49/EC</i>	
<p>The END aims to “define a common approach intended to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to the exposure to environmental noise”. For that purpose several actions are to be progressively implemented. It furthermore aims at providing a basis the harmful effects, including annoyance, due to the exposure to environmental noise”. For that purpose several actions are to be progressively implemented. It furthermore aims at providing a basis for developing EU measures to reduce noise emitted by major sources, in particular road and rail vehicles and infrastructure, aircraft, outdoor and industrial equipment and mobile machinery.</p> <p>The underlying principles of the Directive are similar to those underpinning other overarching environment policies (such as air or waste), i.e.:</p> <ul style="list-style-type: none"> • Monitoring the environmental problem; by requiring competent authorities in Member States to draw up "strategic noise maps" for major roads, railways, airports and agglomerations, using harmonised noise indicators Lden (day-evening-night equivalent level) and Lnight (night equivalent level). These maps will be used to assess the number of people annoyed and sleep-disturbed respectively throughout Europe. • Informing and consulting the public about noise exposure, its effects, and the measures considered to address noise, in line with the principles of the Aarhus Convention. 	<p>The WRMP will need to have regard to the requirements of the END.</p> <p>The SEA assessment framework should include for the protection against excessive noise.</p>

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<ul style="list-style-type: none"> Addressing local noise issues by requiring competent authorities to draw up action plans to reduce noise where necessary and maintain environmental noise quality where it is good. The directive does not set any limit value, nor does it prescribe the measures to be used in the action plans, which remain at the discretion of the competent authorities. Developing a long-term EU strategy, which includes objectives to reduce the number of people affected by noise in the longer term, and provides a framework for developing existing Community policy on noise reduction from source. With this respect, the Commission has made a declaration concerning the provisions laid down in article 1.2 with regard to the preparation of legislation relating to sources of noise. 	
European Commission (2004) <i>Environmental Liability Directive 2004/35/EC</i>	
<p>The Directive establishes a framework for environmental liability based on the "polluter pays" principle, with a view to preventing and remedying environmental damage.</p>	<p>The SEA should take account of the need to ensure that proposals in the WRMP avoid causing direct or indirect damage to the aquatic environment or contamination of land that creates a significant risk to human health.</p>
European Commission (2005) <i>Thematic Strategy on Air Pollution</i>	
<p>This strategy supplements legislation. It sets out objectives for air pollution and proposes measures for achieving them by 2020.</p>	<p>The WRMP should be in accordance with the requirements of the strategy.</p> <p>The SEA should take into account the need to improve air quality.</p>
European Commission (2006) <i>The Bathing Waters Directive 2006/7/EC</i>	

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<p>The Bathing Waters Directive applies to surface waters that can be used for bathing except for swimming pools and spa pools, confined waters subject to treatment or used for therapeutic purposes and confined waters artificially separated from surface water and groundwater.</p> <p>The Directive is intended to:</p> <ul style="list-style-type: none"> • Be based on scientific knowledge on protecting health and the environment, as well as environmental management experience, • Provide better and earlier information of citizens about quality of their bathing waters, including logos, • Move from simple sampling and monitoring of bathing waters to bathing quality management, and • Be integrated into all other EU measures protecting the quality of all our waters (rivers, lakes, ground waters and coastal waters) through the Water Framework Directive. <p>Two main parameters for analysis (intestinal enterococci and escherichia coli) are defined, instead of nineteen in the previous Directive. These parameters will be used to monitor and assess the quality of bathing waters and to classify them. Other parameters could be taken into account, such as the presence of cyanobacteria or microalgae.</p> <p>Member States must monitor the bathing waters every year. The monitoring calendar should provide for at least four samples to be taken per season (except where the season is very short or where there are special geographic constraints). The sampling interval should not be longer than one month. Upon the monitoring results gathered in four years, Member States should assess the bathing waters at the end of every season. A shorter period may be acceptable in some cases.</p>	<p>The WRMP will need to comply with set limits.</p> <p>The SEA assessment should include a guide question relating to the effects of options on the water quality at designated bathing waters.</p>

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<p>The waters are classified according to their level of quality: poor, sufficient, good or excellent, linked to clear numerical quality standards for bacteriological quality. The category "sufficient" is the minimum quality threshold that all Member States should attain by the end of the 2015 season at the latest. Where water is classified as "poor", Member States should take certain management measures, e.g. banning bathing or posting a notice advising against it, providing information to the public, and suitable corrective measures.</p>	
European Commission (2006) <i>Directive on animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals 2006/88/EC</i>	
<p>The Directive establishes:</p> <ul style="list-style-type: none"> • Animal health requirements for the placing on the market, importation and transit of aquaculture animals and their products; • Minimum measures to prevent diseases in aquaculture animals; • Minimum measures to be taken in response to suspected or established cases of certain diseases in aquatic animals. 	<p>The SEA should take account of the need to maintain or enhance the quality of habitats and biodiversity.</p>
European Commission (2006) <i>Directive on the protection of groundwater against pollution and deterioration 2006/118EC</i>	
<p>This Directive establishes specific measures as provided for in Article 17(1) and (2) of Directive 2000/60/EC (Water Framework Directive) in order to prevent and control groundwater pollution. This Directive is designed to prevent and combat groundwater pollution.</p>	<p>The SEA should take account of the need to maintain, protect and improve water quality across the WRMP area.</p>
European Commission (2006) <i>Fresh Water Fish Directive 2006/44/EC</i>	

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<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. The Directive is designed to protect and improve the quality of rivers and lakes to encourage healthy fish populations.</p>	<p>The SEA should take account of the need to promote the protection of river and lake water quality in order to maintain and develop suitable environments that will sustain freshwater fish populations.</p>
European Commission (2006) <i>Mining Waste Directive 2006/21/EC</i>	
<p>The Directive aims to prevent or reduce as far as possible any adverse effects on the environment, and any resultant risks to human health, brought about as a result of the management of waste from the extractive industries. The Directive covers the management of waste resulting directly from prospecting, extraction, treatment and storage of mineral resources and from quarrying. Operators are required to use Best Available Techniques in the management of waste facilities and the prevention of major accidents.</p>	<p>The WRMP should have regard to the aim to avoid adverse effects from extractive waste.</p> <p>The SEA assessment framework should include consideration of waste.</p>
European Commission (2006) <i>Thematic Strategy for Soil Protection</i>	
<p>The <i>Thematic Strategy for Soil Protection</i> 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>It sets out an EU strategy for soil protection with an overall objective of the protection and sustainable use of soil, based on the following guiding principles:</p> <p>(1) Preventing further soil degradation and preserving its functions:</p> <ul style="list-style-type: none"> when soil is used and its functions are exploited, action has to be taken on soil use and management patterns; and 	<p>The WRMP should take potential effects on soil into account.</p> <p>The SEA assessment framework should include soils.</p>

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<ul style="list-style-type: none"> when soil acts as a sink/receptor of the effects of human activities or environmental phenomena, action has to be taken at source. <p>(2) Restoring degraded soils to a level of functionality consistent at least with current and intended use, thus also considering the cost implications of the restoration of soil.</p> <p>The strategy proposes introducing a framework Directive setting out common principles for protecting soils across the EU, with Member States deciding how best to protect soil and how use it in a sustainable way on their own territory.</p>	
European Commission (2007) <i>The Eel Directive 2007/1100/EC</i>	
<p>The Eel Directive establishes measures for the recovery of the stock of European eel and requires member states to produce Eel management plans for each catchment.</p>	<p>The WRMP should ensure that there are no adverse impacts on eel as a result of water resource measures taken.</p>
European Commission (2007) <i>Floods Directive 2007/60/EC</i>	
<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 Water Framework Directive, 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 WRMP should take account of the flood risk management plans.</p> <p>The SEA assessment framework should include flood risk.</p>
European Commission (2008) <i>Ambient Air Quality and Cleaner Air for Europe Directive 2008/50/EC Air Quality Framework Fourth Daughter Directive 2004/107/EC and previous directives (96/62/EC; 99/30/EC; 2000/69/EC & 2002/3/EC)</i>	

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<p>The Directive:</p> <ul style="list-style-type: none"> • defines and establishes objectives for ambient air quality to avoid, prevent or reduce harmful effects on human health and the environment as a whole; • assesses the ambient air quality in Member States using common methods and criteria; • obtains information on ambient air quality in order to help combat air pollution and nuisance and to monitor long-term trends and improvements resulting from national and Community measures; • ensures that such information on ambient air quality is made available to the public; • seeks to maintain air quality where it is good and improving it in other cases; and • promotes increased cooperation between the Member States in reducing air pollution. 	<p>The WRMP should contribute towards achieving air quality standards set out in the Directive.</p> <p>The SEA assessment framework should include air quality.</p>
European commission (2008) <i>Directive on Waste (Directive 75/442/EEC, 2006/12/EC 2008/98/EC as amended)</i>	
<p>The essential objective of all provisions relating to waste management should be the protection of human health and the environment against harmful effects caused by the collection, transport, treatment, storage and tipping of waste. Some key objectives include:</p> <ul style="list-style-type: none"> • The recovery of waste and the use of recovered materials as raw materials should be encouraged; • Member States should, in addition to taking responsible action to ensure the disposal and recovery of waste, take measures to restrict the production of waste; • It is important for the Community as a whole to become self-sufficient in waste disposal and desirable for Member States individually to aim at such self-sufficiency; • Waste management plans should be drawn up in the Member States; 	<p>The WRMP should seek to ensure the protection of human health and the environment in relation to waste management.</p> <p>The SEA assessment should include objectives on the protection of human health and the environment.</p>

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<ul style="list-style-type: none"> • Movements of waste should be reduced; • Ensure a high level of protection and effective control; • Subject to certain conditions, and provided that they comply with environmental protection requirements, some establishments which process their waste themselves or carry out waste recovery may be exempted from permit requirements; • That proportion of the costs not covered by the proceeds of treating the waste must be defrayed in accordance with the 'polluter pays' principle. 	
European Commission (2008) <i>Environmental Quality Standards Directive 2008/105/EC</i>	
<p>The Directive aims to control the concentration of certain substances which pose a risk to the aquatic environment. The 33 'priority substances' addressed by the Directive are defined by the Water Framework Directive (2000/60/EC), including cadmium, lead, mercury, nickel, benzene and polyaromatic hydrocarbons.</p> <p>The Directive sets thresholds of concentration that must not be exceeded, with limits to average values over a year to ensure long-term water quality and maximum allowable concentrations to limit short term pollution peaks. Member States must comply with the water quality standards and record an inventory of emissions and discharges of all substances in the Directive.</p>	<p>The assessment framework should include assessment criteria relating to water quality.</p>
European Commission (2008) <i>Marine Strategy Framework Directive 2008/56/EC</i>	
<p>The Directive sets out a framework for an ecosystem-based approach to the management of human activities which supports the sustainable use of marine goods and services. The overarching goal of the Directive is to achieve 'Good Environmental Status' (GES) by 2020 across Europe's marine environment. The Directive establishes four European Marine Regions, based on geographical and environmental criteria. The North East Atlantic Marine Region is divided into four</p>	<p>The SEA assessment framework should incorporate assessment criteria relating to the quality of the marine environment.</p>

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<p>subregions, with UK waters lying in two of these (the Greater North Sea and the Celtic Seas).</p> <p>Each Member State is required to develop a marine strategy for their waters, in coordination with other countries within the same marine region or subregion. Marine strategies must be implemented to protect and conserve the marine environment, prevent its deterioration, and, where practicable, restore marine ecosystems in areas where they have been adversely affected. The marine strategies must contain:</p> <ul style="list-style-type: none"> • An initial assessment of the current environmental status of that Member State’s marine waters; • A determination of what Good Environmental Status means for those waters; • Targets and indicators designed to show whether a Member State is achieving GES; • A monitoring programme to measure progress towards GES; • A programme of measures designed to achieve or maintain GES. <p>The Directive also requires Marine Protected Areas (MPAs) to be established to support the achievement of GES.</p>	
European Commission (2009) <i>Directive on the Conservation of Wild Birds 2009/147/EC (codified version of Council Directive 79/409/EEC as amended)</i>	
<p>The Directive provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. The main provisions of the Directive include:</p> <ul style="list-style-type: none"> • The maintenance of the populations of all wild bird species across their natural range (Article 2) with the encouragement of various activities to that end (Article 3). • The identification and classification of Special Protection Areas (SPAs) for rare or vulnerable species listed in Annex I of the Directive, as well as for all regularly occurring migratory 	<p>The WRMP should seek to protect and enhance biodiversity, particularly designated sites.</p> <p>The SEA assessment framework should include objectives, indicators and targets that cover biodiversity.</p>

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<p>species, paying particular attention to the protection of wetlands of international importance (Article 4). (Together with Special Areas of Conservation designated under the Habitats Directive, SPAs form a network of European protected areas known as Natura 2000).</p> <ul style="list-style-type: none"> • The establishment of a general scheme of protection for all wild birds (Article 5). • Restrictions on the sale and keeping of wild birds (Article 6). • Specification of the conditions under which hunting and falconry can be undertaken (Article 7). (Huntable species are listed on Annex II of the Directive). • Prohibition of large-scale non-selective means of bird killing (Article 8). • Procedures under which Member States may derogate from the provisions of Articles 5-8 (Article 9) — that is, the conditions under which permission may be given for otherwise prohibited activities. • Encouragement of certain forms of relevant research (Article 10 and Annex V). <p>Requirements to ensure that introduction of non-native birds do not threatened other biodiversity (Article 11).</p>	
European Commission (2009) <i>Promotion of the use of energy from renewable sources Directive 2009/28/EC</i>	
<p>This Directive establishes a common framework for the use of energy from renewable sources in order to limit greenhouse gas emissions and to promote cleaner transport. It encourages energy efficiency, energy consumption from renewable sources and the improvement of energy supply.</p> <p>The Member States are to establish national action plans which set the share of energy from renewable sources consumed in transport, as well as in the production of electricity and heating, for 2020. These action plans must take into account the effects of other energy</p>	<p>The WRMP should seek to contribute towards increasing the proportion of energy from renewable energy sources.</p> <p>The SEA assessment framework should include consideration of</p>

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<p>efficiency measures on final energy consumption (the higher the reduction in energy consumption, the less energy from renewable sources will be required to meet the target). These plans will also establish procedures for the reform of planning and pricing schemes and access to electricity networks, promoting energy from renewable sources.</p> <p>Each Member State has a target calculated according to the share of energy from renewable sources in its gross final consumption for 2020. The UK is required to source 15 per cent of energy needs from renewable sources, including biomass, hydro, wind and solar power by 2020. From 1 January 2017, biofuels and bioliquids share in emissions savings should be increased to 50%.</p>	<p>use of energy from renewable energy sources.</p>
European Commission (2010) <i>Industrial Emissions Directive (integrated pollution prevention and control) 2010/75/EU</i>	
<p>This Directive brings together the IPPC Directive (2008/1/EC) and six other Directives on titanium dioxide, VOCs and waste incineration, with the aim of reducing pollutant emissions. It covers industries with high polluting potential such as energy, production and processing of metals, minerals, chemicals, waste management and rearing of animals. It defines the obligations to be met by industrial activities with a major pollution potential. This includes establishing a permit procedure, requirements for Best Available Techniques (BAT) and setting out requirements for discharges.</p>	<p>The SEA assessment framework should include criteria that ensure the protection of the environment through the prevention of pollution.</p>
European Commission (2011) <i>Directives on Environmental Impact Assessment (Codified Directive 2011/92/EU and Revised Directive 2014/52/EU)</i>	
<p>The Directive, as enacted in 1985, amended, codified in 2011 and revised in 2014, sets out procedural requirements for certain development proposals to undergo an Environmental Impact Assessment (EIA) before being granted consent through the town and country planning or other consenting regimes. The UK Government is obliged to transpose the Revised EIA Directive by May 2017.</p>	<p>The SEA should recognise that certain development proposals require an EIA to be undertaken, resulting in the identification of any likely significant environmental effects and associated mitigation measures.</p>

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European Commission (2011) <i>A Roadmap for Moving to a Competitive Low Carbon Economy in 2050</i>	
<p>The EU already has short term targets in place to reduce its emissions to 20% below 1990 levels by 2020; to increase the share of renewable energy to 20%; and to make a 20% improvement in energy efficiency. The 2050 roadmap looks beyond 2020 at longer term objectives.</p> <p>The roadmap suggests that by 2050, the EU should cut its emissions to 80% below 1990 levels through domestic reductions alone. It sets out milestones which form a cost-effective pathway to this goal - reductions of 40% by 2030 and 60% by 2040. It also shows how the main sectors responsible for Europe's emissions - power generation, industry, transport, buildings and construction, as well as agriculture - can make the transition to a low-carbon economy most cost-effectively.</p>	<p>The WRMP should seek to contribute to the reduction of the amount of carbon produced as much as possible and help towards achievement of the carbon reduction objectives.</p> <p>The SEA should have an objective relating to the need to reduce greenhouse gas emissions.</p>
European Commission (2012) <i>A Blueprint to Safeguard Europe's Water Resources</i>	
<p>This strategy aims to ensure that enough good quality water is available to meet the needs of people, the economy and the environment. The strategy includes: Improving implementation of current EU water policy; Increasing the integration of water policy objectives into other relevant policy areas such as agriculture, fisheries, renewable energy, transport and the Cohesion and Structural Funds; and Filling the gaps of the current framework, particularly in relation to the tools needed to increase water efficiency.</p>	<p>The commitment to conserving biological diversity must be considered in any options and the SEA should seek to promote the protection and enhancement of biodiversity</p>
European Commission (2012) <i>Energy Efficiency Directive 2012/27/EU as amended by Directive (EU) 2018/2002</i>	
<p>The 2012 Directive establishes a set of binding measures to help the EU reach its 20% energy efficiency target by 2020. Under the Directive, all EU countries are required to use energy more efficiently at all stages of the energy chain from its production to final consumption.</p> <p>Specific measures relate to:</p>	<p>The WRMP should seek to contribute towards targets for energy efficiency.</p> <p>The SEA assessment framework should</p>

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<ul style="list-style-type: none"> • energy distributors achieving 1.5% energy savings per year through energy efficiency measures; • improving the efficiency of heating systems, installing double glazed windows or insulating roofs; • purchasing energy efficient buildings, products and services, and performing energy efficient renovations; • access to data on consumption; • large companies to audit energy consumption (implemented in the UK through the Energy Savings Opportunity Scheme Regulations 2014); • national incentives for SMEs to undergo energy audits; and • monitoring efficiency levels in new energy generation capacities. <p>The new amending Directive on Energy Efficiency (2018/2002) was agreed to update the policy framework to 2030 and beyond.</p> <p>The key element of the amended directive is a headline energy efficiency target for 2030 of at least 32.5%. The target, to be achieved collectively across the EU, is set relative to the 2007 modelling projections for 2030.</p> <p>In absolute terms, this means that EU energy consumption should be no more than 1273 Mtoe (million tonnes of equivalent) of primary energy and/or no more than 956 Mtoe of final energy. After the UK no longer applies EU law (following its withdrawal from the EU), the equivalent target should be no more than 1128 Mtoe of primary energy and no more than 846 Mtoe of final energy.</p> <p>The directive allows for a possible upward revision in the target in 2023, in case of substantial cost reductions due to economic or technological developments. It also includes an extension to the energy savings obligation in end use, introduced in the 2012 directive. Under the amending directive, EU countries will have to achieve new energy savings of 0.8% each year of final energy consumption for the 2021-2030 period</p> <p>Other elements in the amended directive include:</p>	<p>include consideration of energy consumption and efficiency.</p>

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<ul style="list-style-type: none"> • stronger rules on metering and billing of thermal energy by giving consumers - especially those in multi-apartment building with collective heating systems – clearer rights to receive more frequent and more useful information on their energy consumption, also enabling them to better understand and control their heating bills • requiring Member States to have in place transparent, publicly available national rules on the allocation of the cost of heating, cooling and hot water consumption in multi-apartment and multi-purpose buildings with collective systems for such services • monitoring efficiency levels in new energy generation capacities • updated primary energy factor (PEF) for electricity generation of 2.1 (down from the current 2.5) • a general review of the Energy Efficiency Directive (required by 2024). 	
European Commission (2013) <i>Towards Social Investment for Growth and Cohesion 2014-2020</i>	
<p>The Communication aims to directing Member States' policies towards social investment throughout life, with a view to ensuring the adequacy and sustainability of budgets for social policies. It also provides guidance to help reach the Europe 2020 targets by establishing a link between social policies, the reforms to reach the Europe 2020 targets and the relevant EU funds.</p>	<p>The WRMP should have regard of the Europe 2020 targets.</p>
European Commission (2014) <i>The EU Regulation on invasive alien (non-native) species 1143/2014/EU</i>	
<p>This Regulation seeks to address the problem of invasive alien species in a comprehensive manner so as to protect native biodiversity and ecosystem services, as well as to minimize and mitigate the human health or economic impacts that these species can have.</p>	<p>The SEA assessment framework should include guide questions relating to invasive species</p>
European Commission (2014) <i>A Policy Framework for Climate and Energy in the Period from 2020 to 2030</i>	

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<p>The 2030 climate and energy framework was adopted in 2014 and builds on the 2020 targets. It sets three key targets for 2030:</p> <ul style="list-style-type: none"> • at least 40% cuts in greenhouse gas emissions (from 1990 levels); • at least 27% share for renewable energy; and • at least 27% improvement in energy efficiency. <p>The greenhouse gas emissions and renewable energy targets are binding, while the energy efficiency target will be reviewed in 2020.</p>	<p>The WRMP should support longer term targets for reducing greenhouse gas emissions, increasing renewable energy and energy efficiency.</p> <p>The SEA assessment framework should include the consideration of energy and greenhouse gas emissions.</p>
European Commission (2015) 'Closing the loop - An EU Action Plan for the Circular Economy' policy package	
<p>This document sets out actions to implement the European Commission's long-term vision of significantly reducing waste landfilling and increasing recycling.</p>	<p>The SEA should consider opportunities for the WRMP to contribute/enable the circular economy.</p> <p>The SEA assessment framework should contain an objective/guide question relating to material/resource use and waste.</p>
European Commission (2016) National Emissions reduction Commitments (NEC) Directive 2016/2284/EU	
<p>The National Emission reduction Commitments Directive sets national emission reduction commitments for Member States and the EU for five important air pollutants: nitrogen oxides (NOx), non-methane volatile organic compounds (NMVOCs), sulphur dioxide (SO2), ammonia (NH3) and fine particulate matter (PM2.5).</p>	<p>The WRMP should seek to reduce the emissions of the pollutants listed under the directive, where possible.</p>

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<p>The NEC Directive highlights the importance of Member States regularly reporting air pollutant emission inventories for assessing progress in reducing air pollution in the EU and for ascertaining whether Member States are in compliance with their commitments.</p> <p>The directive introduces a number of new reporting requirements for Member States. These include annual information on emissions of a number of pollutants:</p> <ul style="list-style-type: none"> • the five main air pollutants NO_x, NMVOCs, SO₂, NH₃ and PM_{2.5} as well as carbon monoxide (CO); • in addition to PM_{2.5}, also PM₁₀ particulate matter and, if available, black carbon (BC) and total suspended particulate matter (TSP); • heavy metals cadmium (Cd), lead (Pb) and mercury (Hg) and, if available, the additional heavy metals arsenic, chromium, copper, nickel, selenium and zinc); <p>persistent organic pollutants (POPs) including selected polycyclic aromatic hydrocarbons (PAHs), dioxins and furans, polychlorinated biphenyls (PCBs) and hexachlorobenzene (HCB).</p>	<p>The SEA assessment framework should include an objective and guide questions relating to air pollution/pollutant emissions.</p>
European Commission (2020) <i>Biodiversity strategy for 2030</i>	
<p>The EU’s biodiversity strategy for 2030 is a comprehensive, ambitious and long-term plan to protect nature and reverse the degradation of ecosystems. The strategy aims to put Europe’s biodiversity on a path to recovery by 2030, and contains specific actions and commitments.</p> <p>The strategy contains specific commitments and actions to be delivered by 2030.</p> <ul style="list-style-type: none"> • Establishing a larger EU-wide network of protected areas on land and at sea • Launching an EU nature restoration plan • Introducing measures to enable the necessary transformative change • Introducing measures to tackle the global biodiversity challenge. 	<p>The WRMP should seek to protect and enhance biodiversity, particularly designated sites.</p> <p>The SEA assessment framework should include objectives, indicators and targets that cover biodiversity.</p>

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European Commission (2022) <i>Eighth Environmental Action Programme</i>	
<p>The 8th EAP anchors the Member States’ and Parliament’s commitment to environmental and climate action until 2030, guided by a long-term vision to 2050 of wellbeing for all, while staying within the planetary boundaries.</p> <p>The agreed 8th EAP has six priority objectives related to climate neutrality, climate adaptation, circular economy, zero pollution, protecting and restoring biodiversity, and reducing environmental and climate pressures related to production and consumption. In addition, the programme sets out an enabling framework and a monitoring framework to measure progress towards the required systemic change.</p>	<p>The SEA assessment framework should, where relevant, reflect the objectives of the proposal for the programme.</p>
European Commission (2021) <i>EU strategy on adaptation to climate change</i>	
<p>The strategy sets out how the European Union can adapt to the unavoidable impacts of climate change and become climate resilient by 2050.</p> <p>The Strategy has four principle objectives:</p> <ul style="list-style-type: none"> • to make adaptation smarter; • to make adaption swifter; • to make adaption more systemic, and; • to step up international action on adaptation to climate change. 	<p>The WRMP should seek to contribute towards climate change adaption.</p> <p>The SEA assessment framework should include an objective relating to climate change and consideration of climate change adaption.</p>
ICOMOS (2011) <i>Guidance on Heritage Impact Assessments for Cultural World Heritage Properties</i>	
<p>This document provides guidance on the process of Commissioning Heritage Impact Assessments (HIAs) for World Heritage properties in order to evaluate effectively the impact of potential development on the Outstanding Universal Value (OUV) of properties. The guidance is addressed at managers, developers, consultants and decision-makers and is also intended to be relevant to the World Heritage Committee and States Parties. The concept of OUV</p>	<p>The SEA Framework should include an objective on the conservation and enhancement of heritage.</p>

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underpins the whole World Heritage Convention and all activities associated with properties inscribed on the List.	
IUCN (2013) <i>World Heritage Advice Note: Environmental Assessment</i>	
This Advice Note provides States Parties and other stakeholders with guidance on how to identify, evaluate, avoid and mitigate potential impacts of development proposals on World Heritage values, before decisions are taken. It provides guidance on integrating natural World Heritage Sites within Environmental Assessments. It includes a set of World Heritage Impact Assessment Principles that can be applied to all types of environmental Assessments, a list of key questions to ask concerning World Heritage during the assessment as well as step-by-step guidance.	<p>The WRMP should seek to contribute towards the protection of World Heritage Sites.</p> <p>The SEA assessment framework should include objectives and guide questions relating to the conservation of World Heritage Sites. The SEA assessment should also reflect/incorporate the principles of the guidance, where relevant.</p>
UNEP (1973) <i>Convention on International Trade in Endangered Species of Wild Fauna and Flora</i>	
CITES is an international agreement between governments which aims to ensure that international trade in wild animals and plants does not threaten their survival. It subjects international trade to certain controls, and all import, export, re-export and introduction (by sea) of species covered by the Convention has to be authorized through a licensing system. Species are listed in three Appendices according to the degree of protection needed, with differing controls for each.	<p>The WRMP should seek to ensure the protection of vulnerable species.</p> <p>The SEA assessment framework should incorporate the protection of animal and plant species.</p>
UNESCO (1971) <i>Ramsar Convention on Wetlands of International Importance</i>	
The Convention on Wetlands of International Importance was signed in Ramsar, Iran in 1971. It is an intergovernmental treaty which provides the framework for national action and international co-	The WRMP should ensure the protection

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<p>operation for the conservation and wise use of wetlands and their resources, as a means to achieving sustainable development throughout the world.</p> <p>The original emphasis was on the conservation and wise use of wetlands primarily to provide habitat for water birds, however over the years the Convention has broadened its scope to incorporate all aspects of wetland conservation and wise use, recognising wetlands as ecosystems that are extremely important for biodiversity conservation and for the well-being of human communities.</p> <p>‘The Convention’s mission is the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world’ (Ramsar COP8, 2002).</p> <p>The Fourth Ramsar Strategic Plan 2016-2024 has been adopted to provide guidance on how efforts for implementing the Convention on Wetlands should be focussed. The strategy has three strategic goals and one operational goal:</p> <ul style="list-style-type: none"> • Strategic Goal 1: Addressing the Drivers of Wetland Loss and Degradation • Strategic Goal 2: Effectively Conserving and Managing the Ramsar Site Network • Strategic Goal 3: Wisely Using All Wetlands • Operational Goal 1: Enhancing Implementation <p>The plan also contains 19 targets which fall under each of the goals. Implementing each of these will also contribute to the achievement of the Sustainable Development Goals (SDGs) and targets.</p>	<p>and wise use of wetlands.</p> <p>The SEA assessment framework should incorporate the protection of wetland sites listed under the Ramsar convention.</p>
UNESCO (1972) Convention Concerning the Protection of the World Cultural and Natural Heritage	
<p>The Convention defines the kind of natural or cultural sites which can be considered for inscription on the World Heritage List. In addition to this, countries are required to:</p> <ul style="list-style-type: none"> • Ensure that measures are taken for the protection, conservation and presentation of cultural and natural heritage 	<p>The WRMP should seek to protect cultural heritage sites.</p> <p>The SEA assessment framework should</p>

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<ul style="list-style-type: none"> • Adopt a general policy that gives cultural and natural heritage a function in the life of the community • Integrate the protection of heritage into comprehensive planning programmes 	include an objective on heritage and archaeological issues.
UNESCO (2001) <i>Convention on the Protection of Underwater Cultural Heritage</i>	
The Convention sets a common standard for the protection of submerged cultural heritage, with a view to preventing its being looted or destroyed. The Convention sets out basic principles for the protection of underwater cultural heritage; provides a detailed State cooperation system; and provides widely recognised practical rules for the treatment and research of underwater cultural heritage. This includes obligations to preserve such heritage, a preference for in situ preservation, and no commercial exploitation.	<p>The WRMP should seek to protect cultural heritage sites.</p> <p>The SEA assessment framework should include an objective relating to cultural heritage.</p>
United Nations (1992) <i>Convention on Biological Diversity (The Rio Convention)</i>	
The Convention on Biodiversity called for the development and enforcement of national strategies and associated action plans to identify, conserve and protect existing biological diversity, and to enhance it wherever possible. In the UK, the UK Biodiversity Action Plan was then established to conserve and enhance biodiversity in the UK through the use of Habitats and Species Action Plans to help the most threatened species and habitats to recover and to contribute to the conservation of global biodiversity.	<p>The WRMP should seek to protect and enhance biodiversity.</p> <p>The SEA assessment framework should include protection and enhancement of biodiversity</p>
United Nations (1997) <i>The Kyoto Protocol to the UN Framework Convention on Climate Change</i>	
The Kyoto Protocol was adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005. It is an international agreement linked to the United Nations Framework Convention on Climate Change. The major feature of the Kyoto Protocol is that it sets binding targets for industrialized countries for reducing greenhouse gas (GHG) emissions. These amounted to an average of five per cent against 1990 levels in the first commitment period (2008 to 2012). The Protocol is planned to be extended to	<p>The WRMP should aim to reduce greenhouse gas emissions.</p> <p>The SEA assessment framework should include objectives/guide questions related to</p>

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2020 (the Kyoto second commitment period), pending ratification of the Doha Agreement.	reducing greenhouse gas emissions.
United Nations Economic Commission for Europe (1998), Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (The Aarhus Convention)	
<p>To contribute to the protection of present and future generations to live in an environment adequate to his or her health and well-being. This will be achieved through each Party subject to the convention guaranteeing the rights of access to information, public participation in decision-making, and access to justice in environmental matters in accordance with the provisions of this Convention.</p> <p>To establish and maintain a clear, transparent and consistent framework to implement the provisions of this Convention. This will be achieved through each Party taking the necessary legislative, regulatory and other measures, including measures to achieve compatibility between the provisions implementing the information, public participation and access-to-justice provisions in this Convention, as well as proper enforcement measures. Responsibility for implementation is deferred to the member states.</p>	<p>The development of the WRMP needs to be a transparent process.</p> <p>The SEA should show a strong sense of safeguarding the lives of future generations and ensure that enough time is provided for consultation on the SEA documents in line with the Aarhus convention of establishing and maintaining a transparent clear framework.</p>
United Nations (2002) The World Summit on Sustainable Development	
<p>The World Summit resulted in the Johannesburg Declaration on Sustainable Development and a Plan of Implementation. The declaration reaffirms principles already agreed upon at the Rio Earth Summit UNCED in 1992 and the UN Millennium Summit in 1999. It recognises that poverty eradication is a key condition for sustainable development and addresses issues such as cultural diversity, patterns of production and consumption, health issues, armed conflicts, the new dimension created by globalisation, gender issues and financing for development.</p> <p>The implementation plan sets out actions to achieve sustainable development such as poverty eradication, changing unsustainable patterns of consumption and production, protecting and managing</p>	<p>The WRMP should promote sustainable development.</p> <p>The SEA should help to deliver sustainable development through the balanced assessment of the WRMP.</p>

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<p>the natural resource base of economic and social development, sustainable development in a globalizing world and health and sustainable development.</p> <p>Sustainable development in England is delivered through the sustainable development strategy, <i>Securing the Future</i>, and in Wales through <i>One Wales: One Planet, The Sustainable Development Scheme</i> of the Welsh Assembly Government.</p>	
United Nations (2016) <i>The Paris Agreement</i>	
<p>The Paris Agreement was adopted at the 2015 UN Climate Change Conference, which aims to limit global temperature rises to 2 degrees, and to pursue efforts to limit the temperature increase even further to 1.5 degrees. It was adopted by 195 countries at the Conference, and came into force in November 2016, following ratification by sufficient parties.</p>	<p>The WRMP should aim to reduce greenhouse gas emissions.</p> <p>The SEA assessment framework should include greenhouse gas emissions.</p>
United Nations Framework Convention on Climate Change (UNFCCC) (2011) <i>The Cancun Agreements</i>	
<p>The Cancun Agreements were a set of significant decisions by the international community to address the long-term challenge of climate change collectively and comprehensively over time, and to take concrete action immediately to speed up the global response to it.</p> <p>The agreements, reached on December 11 in Cancun, Mexico, at the 2010 United Nations Climate Change Conference, represented 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.</p> <p>The Cancun Agreements' main objectives cover:</p> <ul style="list-style-type: none"> • Mitigation • Transparency of actions • Technology • Finance 	<p>The WRMP should aim to reduce greenhouse gas emissions and support climate change mitigation and adaptation.</p> <p>The SEA assessment framework should include greenhouse gas emissions and climate change.</p>

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<ul style="list-style-type: none"> • Adaptation • Forests • Capacity building 	
World Commission on Environment and Development (1987) <i>Our Common Future (The Brundtland Report)</i>	
<p>The Brundtland Report is concerned with the world's economy and its environment. The objective is to provide an expanding and sustainable economy while protecting a sustainable environment. The Report was a call by the United Nations:</p> <ul style="list-style-type: none"> • to propose long-term environmental strategies for achieving sustainable development by the year 2000 and beyond; • to strengthen co-operation among developing countries and between countries at different stages of economic and social development to achieve common and mutually supportive objectives which take account of the interrelationships between people, resources, environment and development; • to consider ways and means by which the international community can deal more effectively with environment concerns; and • to help define shared perceptions of long-term environmental issues and the appropriate efforts needed to deal successfully with the problems of protecting and enhancing the environment, a long term agenda for action during the coming decades, and aspirational goals for the world community. 	<p>The SEA and WRMP should seek to contribute to sustainable development.</p>
World Health Organisation (2004) <i>Children's Environment and Health Action Plan for Europe</i>	
<p>The action plan aims to address the causes of environment-related diseases in children, including the state of the physical environment, socio-economic conditions and behaviour. Key actions include:</p> <ul style="list-style-type: none"> • primary prevention, i.e. policies, programmes and plans aimed at improving the state of the physical environment (air, water, 	<p>The WRMP should have regard to the requirements of the Action Plan.</p> <p>The SEA assessment framework should</p>

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<p>soil, noise), in particular through the integration of children’s needs into housing, transport, infrastructure and planning;</p> <ul style="list-style-type: none"> • equity, i.e. giving priority to protection of children at highest risk, and particularly of children who are neglected, abandoned, disabled, institutionalized or exploited, by improving access to preventive health and social protection services; • poverty reduction, i.e. policies addressing the multidimensional aspects of poverty among children; • health promotion, i.e. actions aimed at preventing and reducing exposures to environmental health hazards by adopting healthy lifestyles, achieving sustainable consumption patterns and helping to create healthy and enabling human settlements. 	<p>include for the protection of human health and vulnerable members of the community.</p>

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BEIS (2011) National Policy Statements for Energy Infrastructure	
<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 following six NPSs have been designated:</p> <ul style="list-style-type: none"> Overarching NPS for Energy (EN1); Fossil Fuel Electricity Generating Infrastructure NPS (EN2); Renewable Energy Infrastructure NPS (EN3) ; Gas Supply Infrastructure & Gas and Oil Pipelines NPS (EN4); Electricity Networks Infrastructure NPS (EN5); Nuclear Power Generation NPS (EN6). <p>The Overarching NPS for Energy sets out that 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. The NPS highlights that the construction, operation and decommissioning of this 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. The NPSs expect applicants to undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment.</p> <p>The NPSs reiterate and are underpinned by the target to cut greenhouse gas emissions by at least 80% by 2050, compared to 1990 levels.</p>	<p>The WRMP may need to consider the potential impact of major energy proposals water resources in the plan area.</p> <p>The SEA should consider the cumulative effects of the WRMP and any major energy proposals.</p>
BEIS (2013) UK Renewable Energy Roadmap	

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<p>The Renewable Energy Roadmap outlines the UK’s framework for delivering 15% of energy demand from renewable sources by 2020 (as mandated by the EU Renewable Energy Directive). Although starting from a low-level of renewable generation, eight technologies were identified that have the potential to generate 90% of the renewable target by 2020. These are: onshore wind, offshore wind, marine energy, biomass electricity, biomass heat, ground source and air source heat pumps and renewable transport.</p> <p>The Roadmap includes an indication from the Welsh Government that it has the potential to double the amount of renewable energy consumption by 2025, and to deliver 4GW of power from marine energy.</p> <p>The 2013 update highlights that offshore wind and marine energy have the potential to make significant contributions to meeting the UK’s future energy needs</p>	<p>The WRMP should contribute towards increasing the proportion of energy from renewable energy sources.</p> <p>The SEA assessment framework should include consideration of the use of energy from renewable energy sources.</p>
BEIS (2015) Future Electricity Networks	
<p>Overall aims:</p> <ul style="list-style-type: none"> ensure the timely, cost-effective and reliable connection of electricity generation to demand support a low-carbon, secure and affordable national system <p>Specific objectives for future electricity networks:</p> <ul style="list-style-type: none"> maintain electricity network reliability ensure new generation (renewables, nuclear and fossil fuels) and new demand (including electric vehicles and heat pumps) receive timely and affordable connection to the network use regulation to make sure networks are cost effective, competitive and using smarter technology 	<p>The WRMP should consider if it can support the delivery of the aims of the strategy.</p> <p>The SEA should include objectives and guide questions relating to energy use.</p>
BEIS (2021) Heat and buildings strategy	

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<p>This strategy sets out how the UK will decarbonise our homes, and our commercial, industrial and public sector buildings, as part of setting a path to net zero by 2050.</p> <p>The heat and buildings strategy sets out the government’s plan to significantly cut carbon emissions from the UK’s 30 million homes and workplaces in a simple, low-cost and green way whilst ensuring this remains affordable and fair for households across the country. Like the transition to electric vehicles, this will be a gradual transition which will start by incentivizing consumers and driving down costs.</p> <p>There are about 30 million buildings in the UK. Heating these buildings contributes to almost a quarter of all UK emissions. Addressing the carbon emissions produced in heating and powering our homes, workplaces and public buildings can not only save money on energy bills and improve lives, but can support up to 240,000 skilled green jobs by 2035, boosting the economic recovery, levelling up across the country and ensuring we build back better.</p>	<p>The WRMP should consider the impact of water supply and usage on carbon emissions from buildings.</p> <p>The SEA should include objectives and guide questions relating to energy use and carbon emissions.</p>
BEIS (2021) <i>Net Zero Strategy: Build Back Greener</i>	
<p>The Net Zero Strategy sets out policies and proposals for keeping the UK on track for carbon budgets, the Nationally Determined Contribution (NDC), and sets out our vision for a decarbonised economy in 2050. The Strategy sets out a delivery pathway showing indicative emissions reductions across sectors to meet targets up to the sixth carbon budget (2033-2037).</p>	<p>The WRMP should consider if it can support the delivery of the aims of the strategy.</p> <p>The SEA should include objectives and guide questions relating to energy use and carbon emissions.</p>
Canal & River Trust (2015) <i>Living Waterways Transform Places & Enrich Lives: Our 10 Year Strategy</i>	
<p>The strategy sets out goals for the organisation for the next ten years. These are themed under:</p> <ul style="list-style-type: none"> • Waterways, including: ‘To encourage and grow the number of people boating, using and enjoying the waterways’ and ‘To 	<p>The WRMP should avoid causing detrimental effects on canals and rivers.</p>

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<p><i>look after the heritage and wildlife on our canals and rivers for people to enjoy now and in the future’;</i></p> <ul style="list-style-type: none"> • Place, including: <i>‘To provide havens for people to escape to away from the pressures of modern life’ and ‘Enhance wildlife habitats and the natural landscape’;</i> • Prosperity, including: <i>‘Our waterways to drive and be a catalyst for regeneration and developments that make a difference to the local area’ and ‘To contribute to local economies and to provide opportunities and livelihoods for local people’;</i> and • People, including: <i>‘Communities to feel ownership of, and get involved with caring for, their local waterway’ and ‘To offer something for everyone to enjoy’.</i> <p>These are in addition to goals relating to Influence and Resources.</p>	<p>The SEA assessment framework should include objectives which take into account the goals of the strategy and the protection of rivers and canals.</p>
Canal and River Trust (2015) Water Resources Strategy 2015 – 2020	
<p>The Strategy sets out the Canal and River Trust’s overarching vision for the period 2015 – 2020 for how it intends to manage water resources across the inland waterway network that it manages. The strategy is focused on delivering long-term security of water supply for the Canal & River Trust to achieve its vision of living waterways that transform places and enrich lives.</p>	<p>The WRMP should take into consideration the potential impact on the supply of water to the inland waterway network within the U UW operational area.</p> <p>The SEA should consider the effects of the WRMP on the long-term supply of water to the canal network.</p>
Centre for Environment Fisheries and Aquaculture Science and Natural Resources Wales (2021) Assessment of Salmon Stocks and Fisheries in England and Wales 2020	

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<p>Annual reports on the status of salmon stocks and fisheries in England and Wales have been produced since 1997. These reports present a preliminary assessment for the most recent year to assist the International Council for the Exploration of the Sea (ICES) in providing scientific advice to the North Atlantic Salmon Conservation Organisation (NASCO) and to provide early feedback to fishery managers and anglers.</p>	<p>The WRMP should consider the information on salmon stocks and fisheries and the potential effects of WRMP measures on stocks and fisheries.</p> <p>The SEA should consider the effects of the WRMP on salmon stocks and fisheries and should include objectives and guide questions relating to the protection of salmon stocks and fisheries.</p>
Climate Change Committee (2020) <i>The path to Net Zero and progress on reducing emissions in Wales</i>	
<p>These documents are a series of reports on Wales’s net zero carbon targets and ways in which Wales will achieve these targets. The December 2020 Advice Report: The path to a net zero Wales recommends that the Welsh Government revise targets and seek to reduce all greenhouse gas emissions to net zero by 2050.</p> <p>One of the reports looks into how Wales is progressing against previous requirements to reduce its carbon footprint. Key to achieving these targets is:</p> <ul style="list-style-type: none"> • Adopting low-carbon solutions; • Expanding low-carbon energy supplies; • Reduce demand for high-carbon activities; and • Transforming land away from agriculture. 	<p>The WRMP should seek to contribute to the reduction of the amount of carbon produced as much as possible and help towards achievement of net zero greenhouse gas emissions by 2050.</p> <p>The SEA should have an objective relating to sustainable development that references the need to reduce greenhouse gas emissions.</p>

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Department for Culture, Media and Sport (DCMS) (2001) <i>The Historic Environment – A Force for the Future</i>	
This strategy outlines the Governments 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.	The WRMP and the SEA should seek to ensure any adverse effects on heritage assets are minimised or avoided.
DCMS and Welsh Government (2007) <i>Heritage Protection for the 21st Century</i>	
The document has three core principles: <ul style="list-style-type: none"> Developing a unified approach to the historic environment; Maximising opportunities for inclusion and involvement; and Supporting sustainable communities by putting the historic environment at the heart of an effective planning system. 	The assessment framework should include objectives which take into account the White Paper’s principles.
DCMS (2013) <i>Scheduled Monuments & Nationally Important but Non-Scheduled Monuments</i>	
This policy statement sets out Government policy on the identification, protection, conservation and investigation of nationally important ancient monuments, under the provisions of the Ancient Monuments and Archaeological Areas Act 1979. It includes principles relating to the selection of scheduled monuments and the determination of applications for scheduled monument consent.	The WRMP should seek to avoid adverse impacts on scheduled and non-scheduled monuments. The SEA assessment framework should include specific objectives relating to cultural heritage
DCMS (2016) <i>The Culture White Paper</i>	
This white paper sets out how the government will support the cultural sectors over the coming years and how culture will play an active role in building a fairer and more prosperous nation. It includes four key themes: <ul style="list-style-type: none"> everyone should enjoy the opportunities culture offers, no matter where they start in life; 	The WRMP should seek to protect cultural heritage assets. The SEA assessment framework should include an objective

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<ul style="list-style-type: none"> the riches of our culture should benefit communities across the country; and the power of culture can increase our international standing. <p>The white paper includes objectives relating to the development of the historic environment sector, and the protection of world heritage.</p>	<p>relating to cultural heritage.</p>
Defra (2004) Rural Strategy	
<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 Plan options may have an effect upon rural communities and the countryside.</p> <p>The SEA should also seek to ensure that the quality of the region’s landscapes, natural resources and biodiversity are maintained or enhanced.</p>
Defra (2005) Making space for water: taking forward a new government strategy for flood and coastal erosion risk management in England	
<p>The programme seeks to embed flood and coastal erosion risk management across a range of Government policies, including planning, urban and rural development, agriculture, transport, nature conservation and conservation of the historic environment.</p> <p>The main objectives of the strategy are:</p> <ul style="list-style-type: none"> 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>There are no formal targets or indicators.</p>	<p>The WRMP should seek to support the objectives of the strategy, where possible.</p> <p>The SEA should seek to ensure that coastal erosion in the region is not adversely affected by the implementation of the WRMP.</p>
Defra (2006) Shoreline Management Plan Guidance	

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<p>A shoreline management plan (SMP) is a coastal defence management tool. It is a large-scale assessment of the risks associated with coastal processes and helps to reduce these risks to people and the developed, historic and natural environment. This guidance document sets out Defra’s and the Welsh Government’s strategy for managing flooding and coastal erosion.</p> <p>The guidance includes the following objectives:</p> <ul style="list-style-type: none"> • set out the risks from flooding and erosion to people and the developed, historic and natural environment within the SMP area; • identify opportunities to maintain and improve the environment by managing the risks from floods and coastal erosion; • identify the preferred policies for managing risks from floods and erosion over the next century; • identify the consequences of putting the preferred policies into practice; • set out procedures for monitoring how effective these policies are; • inform others so that future land use, planning and development of the shoreline takes account of the risks and the preferred policies; • discourage inappropriate development in areas where the flood and erosion risks are high; and, • meet international and national nature conservation legislation and aim to achieve the biodiversity objectives. 	<p>The WRMP should seek to align with the objectives of the guidance where appropriate.</p> <p>The SEA should take into account the effects of the WRMP on areas with a SMP.</p>
Defra (2007) <i>The Air Quality Strategy for England, Scotland, Wales and Northern Ireland</i>	
<p>The Air Quality Strategy sets out air quality objectives and policy options to further improve air quality in the UK to benefit public health, quality of life and help to protect our environment. The strategy sets out objectives relating to particles, nitrogen dioxide, ozone, sulphur dioxide, polycyclic aromatic hydrocarbons, benzene, 1,3- butadiene, carbon monoxide, lead, nitrogen oxides and sulphur dioxide.</p>	<p>The WRMP should take account of air quality objectives in the strategy.</p> <p>The SEA should include objectives and guide questions relating to air</p>

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	quality, human health and environmental protection.
Defra (2009) <i>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 Government’s 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>	The SEA should seek to ensure that the quality of the region soils and their management is protected or enhanced.
Defra, Department of the Environment (NI), Scottish Government and Welsh Assembly Government (2010) <i>Air Pollution: Action in a Changing Climate</i>	
<p>This document highlights the health benefits that can be achieved through closer integration of air quality and climate change policies. Air pollution often originates from the same activities that contribute to climate change (notably transport and electricity generation), so linkages between these policy areas could help ensure that they are managed most effectively. Air quality/climate change co-benefits can be realised through actions such as promoting low-carbon vehicles and renewable sources of energy that do not involve combustion.</p> <p>The document aims to set ambitious but realistic air quality targets, and to ensure that climate and air quality targets are better aligned in future.</p>	<p>The WRMP should seek to ensure that air quality, climate change and human health are not adversely affected by the options/measures set out in the plan.</p> <p>The SEA should include guide questions relating to the effects of options on human health and the environment.</p>
Defra (2010) <i>Making Space for Nature: A Review of England’s Wildlife Sites and Ecological Network</i>	
This independent review of England’s wildlife sites and the connections between them sets objectives and recommendations to	The SEA should seek to maintain and enhance the quality of habitats

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help achieve a healthy natural environment that will allow our plants and animals to thrive.	and biodiversity, where possible.
Defra (2011) UK National Ecosystem Assessment and Defra (2014) UK National Ecosystems Assessment Follow on, Synthesis of Key Findings	
Ecosystems services from natural capital contribute to the economic performance of the nation. Information and tools to enable decision makers to understand the wider value of ecosystems and their associated services.	<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 WRMP can be considered through the objectives and guide 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

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	<p>The SEA should ensure the WRMP affects the related provisioning services in the least damaging way through informing the WRMP formulation and selection of options.</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>
Defra (2011) <i>Water for Life - Water White Paper</i>	
<p>Water for Life describes a vision for future water management in which the water sector is resilient, in which water companies are more efficient and customer focused, and in which water is valued as the precious and finite resource it is.</p> <p>The White Paper includes several proposals for deregulating and simplifying legislation, to reduce burdens on business and stimulate growth. Ofwat’s proposals for reducing its regulatory burdens complement these.</p>	<p>The WRMP should ensure that future water resources are resilient, efficient and customer focused</p> <p>The SEA should consider resilience to climate change and should consider the human environment to ensure the WRMP remains customer focused.</p>
Defra (2011) <i>Biodiversity 2020: A Strategy for England’s Wildlife and Ecosystem Services</i>	
<p>This new biodiversity strategy for England provides a comprehensive picture of how we are implementing our international and EU commitments. It sets out the strategic direction for biodiversity policy for the next decade on land (including rivers and lakes) and at sea.</p> <p>The strategy sets 20 targets across 5 strategic goals:</p>	<p>The WRMP should contribute towards meeting the targets and objectives within the strategy where possible.</p>

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<ul style="list-style-type: none"> • Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society; • Reduce the direct pressures on biodiversity and promote sustainable use; • Improve status of biodiversity by safeguarding ecosystems, species and genetic diversity; • Enhance the benefits to all from biodiversity and ecosystem services; and <p>Enhance implementation through participatory planning, knowledge management and capacity building.</p>	<p>The SEA should include objectives to improve status of biodiversity and enhance benefits of biodiversity and its ecosystem services, and reduce pressures on ecosystems.</p>
Defra (2011) <i>Mainstreaming Sustainable Development</i>	
<p>This document sets out the Government’s vision for mainstreaming sustainable development in relation to the operation of its buildings and estates, including the goods and services that it buys and the policies it makes. It builds on the principles that underpinned the UK’s 2005 sustainable development strategy, and highlights that long term economic growth relies on protecting and enhancing the environmental resources that underpin it, and paying due regard to social needs.</p> <p>It sets out measures to achieve the mainstreaming of sustainable development, which include ministerial leadership and oversight; leading by example; embedding sustainable development in government policy; and transparency and independent scrutiny.</p>	<p>The WRMP should seek to be aligned with the principles of sustainable development.</p> <p>The SEA assessment framework should include objectives relating to the principles of sustainable development, including communities, economy and environment.</p>
Defra (2011) <i>The Natural Choice: Securing the Value of Nature</i>	
<p>The paper 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: Facilitating greater local action to protect and improve nature; Creating a green economy, in which economic growth and the health of our natural</p>	<p>Ecosystem services may include: Provisioning Services: Biodiversity Regulating Services: Water Regulation Cultural services: Recreation and ecotourism Cultural services: Cultural heritage values Cultural</p>

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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 Showing leadership in the European Union and internationally, to protect and enhance natural assets globally.	services: Aesthetic. The SEA should ensure the WRMP meets provisioning services in the least damaging way through WRMP options.
Defra (2011) <i>Natural Environment White Paper</i>	
<p>The Natural Environment White Paper (2011) recognises that nationally, the fragmentation of natural environments is driving continuing threats to biodiversity. It sets out the Government's policy intent to:</p> <ul style="list-style-type: none"> • improve the quality of the natural environment across England; • move to a net gain in the value of nature; • arrest the decline in habitats and species and the degradation of landscapes; • protect priority habitats; • safeguard vulnerable non-renewable resources for future generations; • support natural systems to function more effectively in town, in the country and at sea; and • create an ecological network which is resilient to changing pressures. <p>By 2020, the Government wants to achieve an overall improvement in the status of the UK's wildlife including no net loss of priority habitat and an increase of at least 200,000 hectares in the overall extent of priority habitats. Under the White Paper, the Government has also put in place a clear institutional framework to support nature restoration which includes Local Nature Partnerships creating new Nature Improvement Areas (NIAs).</p>	<p>The WRMP should reflect the Government's policy intent set out in the White Paper.</p> <p>The SEA assessment framework should include objectives, indicators and targets that reflect the Government's policy intent set out in the White Paper.</p>
Defra (2012) <i>National Policy Statement for Waste Water</i>	
This National Policy Statement (NPS) sets out Government policy for the provision of major waste water infrastructure. It will be used by the Infrastructure Planning Commission (IPC) to guide its decision	The WRMP should be compliant with the policies set out within

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<p>making on development consent applications for waste water developments that fall within the definition of Nationally Significant Infrastructure Project (NSIP) as defined in the Planning Act 2008. As well as considering the general need for new waste water infrastructure, this NPS covers two NSIPs which have been assessed as required to meet this need although these do not fall within the UUW operational area or neighbouring areas.</p>	<p>the National Policy Statement. The WRMP should also consider any unforeseen NSIP proposals that come forward prior to adoption which may affect water resource management in UUW area.</p> <p>The SEA should consider the cumulative effects of the WRMP and any unforeseen NSIP proposals that come forward which may affect water resource management in the UUW area.</p>
Defra (2013) <i>The National Adaptation Programme – Making the Country Resilient to a Changing Climate</i>	
<p>This Programme contains a mix of policies and actions to help adapt successfully to future weather conditions, by dealing with the risks and making the most of the opportunities.</p> <p>It sets out a number of objectives, including:</p> <ul style="list-style-type: none"> • To provide a clear local planning framework to enable all participants in the planning system to deliver sustainable new development, including infrastructure that minimises vulnerability and provides resilience to the impacts of climate change. • To increase the resilience of homes and buildings by helping people and communities to understand what a changing climate could mean for them and to take action to become resilient to climate risks. 	<p>The WRMP should ensure that proposals are resilient to the effects of climate change. Where possible, options should be considered that enhance resilience.</p> <p>The SEA should consider the effects of options on climate change resilience.</p>

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<p>To ensure infrastructure is located, planned, designed and maintained to be resilient to climate change, including increasingly extreme weather events.</p>	
Defra (2013) <i>What nature can do for you</i>	
<p>This guide is designed to help policy makers across Government to understand:</p> <ul style="list-style-type: none"> • The value of what nature does for you now, • The costs and risks we are leaving ourselves open to if we fail to take the value of its services into account in our decisions, • How you can work with natural systems to help you deliver efficiently in the future. <p>The guide is focussed on helping policy makers to put this into practice and includes:</p> <ul style="list-style-type: none"> • A clear explanation of the principles of an ecosystems approach • Details on how an ecosystems approach can help policy makers to take account of the value of the natural environment at every stage of the policy making process • 1 hour of essential reading to help readers quickly get up to speed on this issue • A 'self-assessment' to help policy makers to see how they are doing already and what could be gained by doing more to understand how the natural environment interacts with their policy issue • Sign-posting to a range of detailed resources, case-studies and further reading on specific topics such as valuation and systematic thinking. 	<p>The WRMP should consider how to work with natural systems to provide efficient solutions with multiple benefits where possible, aiming to implement an ecosystems approach.</p> <p>The SEA should consider the effects of the WRMP on nature.</p>
Defra (2015) <i>The government's response to the Natural Capital Committee's Third State of Natural Capital report</i>	
<p>This provides a number of recommendations such as:</p> <p>Agreement for the development of a 25 year plan for a healthy natural economy. This includes helping organisations understand the</p>	<p>Outputs from the SEA process will help to inform any future</p>

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<p>economic, social and cultural value the impact their actions have on it and how to use the knowledge for better decisions; identify most important and threatened environmental assets; protection of designated areas; address outstanding monitoring and data issues to enable better decisions about strategic investments in natural capital.</p> <p>Assigning institutional responsibility for monitoring the state of natural capital.</p> <p>Organisations that manage land and water assets should create a register of natural capital for which they are responsible.</p>	<p>potential development by UUK of Natural Capital Accounting (NCA) approaches to assessing environmental asset performance. Government (led by HM Treasury and Defra) is increasingly using NCA to support future environmental policy and decision making, and there may be future expectations on water companies to follow suit.</p>
Defra (2015) <i>The Great Britain Invasive Non-native Species Strategy</i>	
<p>The strategy sets out key aims and actions for addressing the threats posed by invasive non-native species, including the prevention of invasive species arriving in Britain, early detection and monitoring, eradication and control. It also aims to:</p> <ul style="list-style-type: none"> • get people to work better together, including the government, stakeholders, land managers and the general public; and • improve co-ordination and co-operation on issues at a European and international level. <p>The strategy covers the period 2015 to 2020.</p>	<p>The WRMP should seek to avoid the spread of invasive species.</p> <p>The SEA should consider the effects of the WRMP on biodiversity.</p>
Defra (2016) <i>Guiding principles for water resources planning for water companies operating wholly or mainly in England</i>	
<p>The document sets out the key policy priorities the government expects water resources management plans (WRMP) to address. The four key principles are:</p> <ul style="list-style-type: none"> • Take a long term, strategic approach to protecting and enhancing resilient water supplies; • Consider every option to meet future public water supply needs; 	<p>The WRMP should consider the guiding principles.</p>

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<ul style="list-style-type: none"> • Protect and enhance our environment, acting collaboratively; and • Promote efficient water use and reduce leakage. 	
Defra (2017) Air Quality Plan for Nitrogen Dioxide (NO2) in UK	
<p>This plan sets out how the Government will improve air quality in the UK by reducing nitrogen dioxide emissions in towns and cities. The air quality plans set out targeted local, regional and national measures across 37 zone plans (areas which have identified air quality issues with nitrogen dioxide), a UK overview document and a national list of measures. Measures relate to freight, rail, sustainable travel, low emission vehicles and cleaner transport fuels, among others.</p>	<p>The WRMP should have regard to the air quality plans and specific local measures.</p> <p>The SEA should consider the effects of the WRMP on air quality.</p>
Defra (2018) The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting	
<p>The National Adaptation Programme (NAP) sets the actions that government and others will take to adapt to the challenges of climate change in the UK. It sets out key actions for the next 5 years. Flooding and pressure on water services are considered to be cross cutting risks. The report also details how the third cycle of adaptation reporting will be managed, forming part of the five-yearly cycle of requirements laid down in the Climate Change Act 2008.</p>	<p>The WRMP should ensure that proposals are resilient to the effects of climate change. Where possible, options should be considered that enhance resilience.</p> <p>The SEA should consider the potential to include adaptive measures for climate change.</p>
Defra (2020) Drought Plan Direction 2020	
<p>Sets out the timescales for water companies to develop and consult on Drought Plans.</p>	<p>The WRMP SEA will take account of the statutory requirements of this Direction, where relevant.</p>
Defra (2020) National food strategy for England	

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<p>This independent report looks at the entire food chain, from field to fork. This includes production, marketing, processing, sale and purchase of food (for consumption in the home and out of it). It also looks at the consumer practices, resources and institutions involved in these processes.</p> <p>The report makes recommendations for government, which has promised to respond formally with a White Paper within 6 months.</p>	<p>The implementation of the WRMP may have some indirect links with the food industry, through ensuring the availability of water for food based activities.</p> <p>The SEA should also seek to promote the most effective use of the region's natural resources</p>
Defra (2020) <i>Natural Capital Committee's Seventh Annual Report</i>	
<p>The government published its 25 Year Environment Plan (25 YEP) in 2018, setting out how it will deliver on its commitment to leave the environment in a better state for the next generation: as first made in the 2011 White Paper, <i>The Natural Choice</i>. Progress on the Agriculture and Fisheries Bills has been limited, but the Natural Capital Committee (NCC) welcomes the legislation for a target of net-zero greenhouse gas emissions by 2050. Nature based interventions will be critical in meeting this target.</p>	<p>Outputs from the SEA process will help to inform any future potential development by UUK of Natural Capital Accounting (NCA) approaches to assessing environmental asset performance.</p> <p>Government (led by HM Treasury and Defra) is increasingly using NCA to support future environmental policy and decision making, and there may be future expectations on water companies to follow suit.</p>
Defra (2020) <i>The Path to Sustainable Farming: An Agricultural Transition Plan 2021 to 2024</i>	
<p>The path to sustainable farming is aiming to achieve:</p>	<p>The implementation of the WRMP may have some indirect links with the food industry,</p>

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<ul style="list-style-type: none"> • a renewed agricultural sector, producing healthy food for consumption at home and abroad, where farms can be profitable and economically sustainable without subsidy • farming and the countryside contributing significantly to environmental goals including addressing climate change 	<p>through ensuring the availability of water for food based activities.</p> <p>The SEA should also seek to promote the most effective use of the region’s natural resources, including soil, biodiversity and energy resources.</p>
Defra (2020) <i>Water abstraction plan: Environment</i>	
<p>This document sets out how the government will reform water abstraction management over the coming years and how this will protect the environment and improve access to water.</p> <p>The plan states that the current approach to managing abstraction has three main issues:</p> <ul style="list-style-type: none"> • some older licences allow abstraction that can damage the environment; • the current approach is not flexible enough to cope with the pressures of increasing demand for water and climate change in the long term, or to allow abstractors access to additional water when it is available; and, • the abstraction service is outdated and paper-based. <p>The plan explains how approaches identified to address these issues will be implemented. The Government’s approach to addressing these issues has three main elements:</p> <ul style="list-style-type: none"> • making full use of existing regulatory powers and approaches to address unsustainable abstraction and move around 90% of surface water bodies and 77% of groundwater bodies to the required standards by 2021 • developing a stronger catchment focus – bringing together the Environment Agency, abstractors and catchment groups to 	<p>The WRMP should consider if it can help to address the issues set out in the plan.</p> <p>The SEA should consider the effects of the WRMP on the environment, climate change and the sustainability of options.</p>

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<p>develop local solutions to existing pressures and to prepare for the future. These local solutions will:</p> <ul style="list-style-type: none"> ○ protect the environment by changing licences to better reflect water availability in catchments and reduce the impact of abstraction ○ improve access to water by introducing more flexible conditions that support water storage, water trading and efficient use <ul style="list-style-type: none"> • supporting these reforms by modernising the abstraction service, making sure all significant abstraction is regulated and bringing regulations in line with other environmental permitting regimes <p>The supplementary <i>Environment</i> provides further information on the work to address unsustainable abstraction set out in the abstraction plan.</p> <p>The supplementary <i>Catchment Focus</i> document provides further information on proposals set out in the abstraction plan to develop a stronger catchment focus. This is about bringing together the Environment Agency, abstractors and catchment partnerships to identify and implement local solutions to existing pressures and to prepare for the future.</p> <p>The supplementary <i>Abstraction Licencing Service</i> document provides further information on the planned reforms to the abstraction licencing service set out in the abstraction plan.</p>	
Defra (2021) Waste Management Plan for England	
<p>The Waste Management Plan for England is an analysis of the current waste management situation in England. The plan does not introduce new policies or change how waste is managed in England. Its aim is to bring current waste management policies together under one national plan.</p>	<p>The WRMP may involve the generation of waste (e.g. either through construction requirements or operation of options).</p> <p>The SEA should seek to enhance recycling and minimise the amount of waste going to landfill.</p>

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Defra and the Environment Agency (2018) <i>Resources and Waste Strategy for England</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>	<p>The implementation of the WRMP may have an influence upon UuW' 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>
Defra, Environment Agency, Natural England, Forestry Commission England (2016) <i>Creating a great place for living</i>	
<p>In 2016 Defra produced a report that set out objects to great 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 plan 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>
Defra and the Law Commission (2018) <i>Draft National Policy Statement for Water Resources Infrastructure</i>	

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<p>The Government has laid before Parliament a draft National Policy Statement for water resources infrastructure. The NPS summarises the water infrastructure funding process. This would streamline the planning process for certain types of large-scale water supply project, under the regime for nationally significant infrastructure established in the Planning Act 2008.</p> <p>The draft NPS proposes that, if a nationally significant infrastructure project is identified in a company’s final water resources management plan (WRMP), then the need for that project will have been established as part of a fast-tracked development consent application.</p>	<p>The draft NPS will influence implementation of large scale options identified by the WRMP.</p> <p>The SEA should consider the impacts of these large scale options on various environmental criteria.</p>
Defra, Scottish Government, Welsh Government (2015) <i>The Great Britain Invasive Non-native Species Strategy</i>	
<p>The strategy sets out key aims and actions for addressing the threats posed by invasive non-native species, including the prevention of invasive species arriving in Britain, early detection and monitoring, eradication and control. It also aims to:</p> <ul style="list-style-type: none"> • get people to work better together, including the government, stakeholders, land managers and the general public; and • improve co-ordination and co-operation on issues at a European and international level. <p>The strategy covers the period 2015 to 2020.</p>	<p>The WRMP should seek to avoid the spread of invasive species.</p> <p>The SEA should consider the effects of the WRMP on biodiversity.</p>
Defra and Welsh Government (2014) <i>River Basin Planning Guidance</i>	
<p>Aims to give guidance on practical implementation of the Water Framework Directive (WFD).</p> <p>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.</p>	<p>The WRMP should take into account the contents of this statutory guidance</p>
Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government) (2014) <i>National Planning Policy for Waste</i>	

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<p>Sets out detailed waste planning policies for local authorities. States that planning authorities need to:</p> <ul style="list-style-type: none"> • Need to use a proportionate evidence base in preparing Local Plans • Identify sufficient opportunities to meet the identified needs of their area for the management of waste streams • Identify suitable sites and areas for waste facilities. 	<p>The WRMP may need to consider the potential impact of options on waste generation and on waste management facilities in the WRMP area.</p> <p>The SEA should consider the effects of the WRMP on waste generation and management capacity.</p>
Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2015) <i>Renewable and Low Carbon Energy</i>	
<p>Increasing the amount of energy from renewable and low carbon technologies will help to make sure the UK has a secure energy supply, reduce greenhouse gas emissions to slow down climate change and stimulate investment in new jobs and businesses. Planning has an important role in the delivery of new renewable and low carbon energy infrastructure in locations where the local environmental impact is acceptable.</p>	<p>The WRMP should, where possible, contribute towards increasing the proportion of energy from renewable energy sources.</p> <p>The SEA assessment framework should include consideration of the use of energy from renewable energy sources.</p>
Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2015) <i>Strategic environmental assessment and sustainability appraisal</i>	
<p>This guidance provides clarity on the need for sustainability appraisal and strategic environmental assessment in relation to plan development.</p> <p>Strategic environmental assessment considers only the environmental effects of a plan, whereas sustainability appraisal considers the plan’s wider economic and social effects in addition to its potential environmental impacts. Sustainability appraisal should</p>	<p>The SEA should consider the environmental effects of the WRMP.</p>

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<p>meet all of the requirements of the Environmental Assessment of Plans and Programmes Regulations 2004, so a separate strategic environmental assessment should not be required.</p>	
Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local (2021) <i>National Planning Policy Framework 2021</i>	
<p>The National Planning Policy Framework (NPPF) sets out the Government’s planning policies for England and how these are expected to be applied. The National Planning Policy Framework constitutes guidance for local planning authorities and decision-takers both in drawing up plans and as a material consideration in determining applications.</p> <p>At the heart of the NPPF is a presumption in favour of sustainable development, which should be seen as a golden thread running through both plan-making and decision-taking. The NPPF requires that the planning system should be genuinely plan-led and that plans should:</p> <ul style="list-style-type: none"> a) be prepared with the objective of contributing to the achievement of sustainable development b) be prepared positively, in a way that is aspirational but deliverable; c) be shaped by early, proportionate and effective engagement between planmakers and communities, local organisations, businesses, infrastructure providers and operators and statutory consultees; d) contain policies that are clearly written and unambiguous, so it is evident how a decision maker should react to development proposals; e) be accessible through the use of digital tools to assist public involvement and policy presentation; and f) serve a clear purpose, avoiding unnecessary duplication of policies that apply to a particular area (including policies in this Framework, where relevant). 	<p>The WRMP and SEA should take account of the key components of sustainable development and consider the three dimensions to sustainable development: economic, social and environmental.</p>

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Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local (various) Planning Practice Guidance	
<p>Planning Practice Guidance (PPG) is designed to support the NPPF. It reflects the objectives of the NPPF which are not repeated here. PPG provides additional planning guidance on a number of topics. Those that are particularly relevant to the WRMP24 include:</p> <ul style="list-style-type: none"> • Air quality; • appropriate assessment; • climate change; • effective use of land; • flood risk and coastal change; • healthy and safe communities; • historic environment; • natural environment; • open space, sports and recreation facilities, public rights of way and local green space; • strategic environmental assessment and sustainability appraisal; and, • water supply, wastewater and water quality. 	<p>The WRMP should take into consideration guidance set out in the PPG insofar as it relates to the area covered by the WRMP.</p>
Department for Transport (2022) UK Electric Vehicle Infrastructure Strategy	
<p>This strategy sets out the Department for Transport’s vision and action plan for the rollout of electric vehicle charging infrastructure in the UK, ahead of the phase out dates. They intend:</p> <ul style="list-style-type: none"> • to end the sale of new petrol and diesel petrol and diesel vehicles by 2030 • for all new cars and vans to be fully zero emission at the tailpipe by 2035 	<p>The WRMP should consider use of zero emission vehicles when delivering options where applicable.</p> <p>The SEA should also promote the use of renewable energy, where relevant.</p>

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Environment Agency (2004) <i>Catchment Flood Management Plans: Guidelines – Volume 1 Policy</i>	
<p>These guidelines support the Environment Agency’s strategy for flood risk management and work towards achieving the government’s strategy for flood and coastal erosion flood risk management. The aims of Catchment Flood Management Planning are:</p> <ul style="list-style-type: none"> • To promote sustainable flood risk management measures • To reduce the sources of flooding and harm to people, and the natural, built and historic environment caused by floods • To support the delivery of the Government’s and others’ policies and targets, and the Environment Agency’s environmental vision. 	<p>The WRMP should seek to support the aims of the plan.</p> <p>The SEA should consider how the WRMP may affect flood risk across the region.</p>
Environment Agency (2007) <i>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.</p> <p>The strategy also outlines the part managing soils can play in mitigating climate change.</p>	<p>The WRMP should ensure the sustainable management of soil resources.</p> <p>SEA objectives should reflect and consider relevant priorities from the Soil: A Precious Resource publication.</p>
Environment Agency (2008) <i>Better Sea Trout and Salmon Fisheries: Our Strategy for 2008-2021</i>	
<p>The strategy has the goal of more sea trout and more salmon in more rivers bringing more benefit. This goal is to be brought about through achieving three broad targets:</p> <ol style="list-style-type: none"> 1. Self-sustaining sea trout and salmon in abundance in more rivers 2. Economic and social benefits optimised for sea trout and salmon fisheries 	<p>The WRMP should take the strategy into account where it may have an effect on salmon and trout, e.g. where an option may involve inserting or removing a barrier to fish.</p>

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMPs and the SEA
<p>3. Widespread and positive partnerships, producing benefits</p> <p>There are twelve more detailed targets lying below these broad goals which relate to salmon and fisheries.</p>	<p>The SEA should include a guide question in relation to the effects of options on recreation (i.e. recreational angling) and also appropriate targets in monitoring proposals.</p>
Environment Agency (2009) <i>Water for People and the Environment - Water Resources Strategy for England and Wales</i>	
<p>Environment Agency’s water resources strategy sets out how Environment Agency believe water resources should be managed England and Wales to 2050 and beyond to ensure that there will be enough water for people and the environment. It sets out how water resources should be managed within Defra frameworks in its water strategy for England ‘Future Water’, and in Wales, the Welsh Government’s ‘Environment Strategy for Wales’.</p> <p>Objectives in the strategy are set out under four broad themes: adapting to and mitigating climate change; a better water environment; sustainable planning and management of water resources; and, water and the water environment are valued.</p> <p>This strategy sets out the following objectives:</p> <ul style="list-style-type: none"> • Ecology is more resilient to climate change because abstraction pressures have been reduced and a diverse network of habitats has been allowed to develop; • The resilience of supplies and critical infrastructure is increased to reduce the impacts of climate change; • Flexible and incremental solutions in water resources management allow adaptation to climate change as it happens; • Everyone is able to make more informed decisions and choices about managing water resources, protecting the environment and choosing options to avoid security of supply problems; • Greenhouse gas emissions from using water resources are minimised and properly considered in future decisions; 	<p>The objectives for the WRMP should reflect these objectives, where relevant.</p> <p>The SEA should seek to promote the protection and enhancement of water resources and to encourage sustainable management of the resource.</p>

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<ul style="list-style-type: none"> • Measures will be in place to make sure that water bodies achieve Water Framework Directive objectives; • Abstraction is sustainable, the environment is protected and improved, and supplies remain secure; • Environmental problems caused by historic unsustainable abstractions are resolved; • Catchment management is integrated so that impacts on water resources and the water environment are managed together; • The twin track approach of resource development with demand management is adopted in all sectors of water use; • In England, the average amount of water used per person in the home is reduced to 130 litres each day by 2030; • The Environment Agency targets and adapts its approach to reflect the location and timing of pressures on water resources; • In England, water companies implement near-universal metering of households, starting in areas of serious water stress; • Leakage from mains and supply pipes is reduced; • New and existing homes and buildings are more water efficient; • Water resources are allocated efficiently and are shared within regions where there are areas of surplus; • Water pricing for the abstraction and use of water acts as an incentive for the sustainable use of water resources; • Abstractors and users make informed choices to use water more efficiently; • Innovative tariffs are adopted by water companies to maximise savings and minimise issues of affordability; • The needs of wildlife, fisheries, navigation and recreation, as well as the environment and abstractors, are fully taken into account when allocating water resources; • Innovative technology is developed to improve water efficiency by all water users. 	

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The strategy includes a number of actions for Environment Agency and others to develop targets for water reduction and efficiency.	
Environment Agency (2010) <i>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. 	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.
Environment Agency (2013) <i>Areas of Water Stress: Final Classification</i>	
The report is the Environment Agency’s formal advice on which areas in England are of serious water stress.	<p>The WRMP should seek to contribute to addressing the requirements of water stressed areas.</p> <p>The SEA assessment framework should consider the effects of the WRMP on water resources and the associated socio-economic and environmental receptors.</p>
Environment Agency (2013) <i>Climate Change Approaches in Water Resources Planning: New Methods</i>	
This research paper examines how climate change has been built into water resource management plans and recommends best and appropriate practice for the future, with reference to the use of the detailed tools and probabilistic climate data in UKCP09.	The WRMP should take into account climate projections and suggestions for best practice.

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	The SEA should consider the effects of the WRMP on climate change
Environment Agency (2013) <i>Managing Water Abstraction</i>	
Managing Water Abstraction sets out how the Environment Agency manage water resources in England and Wales. It is the overarching document that links together the abstraction licensing strategies. The availability of water resources for abstraction is assessed through a Catchment Abstraction Management Strategy (CAMS) approach.	The SEA should include a guide question relating to the sustainable use of water resources.
Environment Agency (2017) <i>Drought response: our framework for England</i>	
<p>This policy paper outlines how the Environment Agency works with government, water companies and others to manage water resources during a drought in England.</p> <p>It does this by setting out:</p> <ul style="list-style-type: none"> • how drought affects different parts of England in different ways • which organisations are involved in managing drought and how they work together • how the Environment Agency and others make decisions and decide on actions to take • how the Environment Agency monitors and measures the impacts of drought • how the Environment Agency reports on drought and communicates with others 	<p>The WRMP should consider how drought affects different areas and how it can act to mitigate the impacts of drought.</p> <p>The SEA should outline the impacts of potential WRMP options on drought.</p>
Environment Agency (2017) <i>Groundwater Protection Technical Guidance</i>	
<p>This guidance is for planners, applicants for environmental permits and abstraction licences, and landowners concerned with the quality and quantity of groundwater.</p> <p>The guidance helps to understand:</p> <ul style="list-style-type: none"> • inputs of substances and pollutants to groundwater • discernibility of hazardous substances 	<p>The WRMP should follow the guidance where groundwaters/abstraction are concerned.</p> <p>The SEA should consider the impact of the WRMP</p>

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<ul style="list-style-type: none"> when geological formations can be determined permanently unsuitable for other purposes 	on groundwater quality and quantity.
Environment Agency (2018) <i>The Environment Agency’s Approach to Groundwater Protection</i>	
<p>This document updates Groundwater protection: Principles and practice (GP3). It contains position statements which provide information about the Environment Agency’s approach to managing and protecting groundwater. They detail how the Environment Agency delivers government policy for groundwater and adopts a risk-based approach where legislation allows. Many of the approaches set out in the position statements are not statutory but may be included in, or referenced by, statutory guidance and legislation.</p> <p>This document will be of interest to developers, planners, environmental permit applicants and holders, abstractors, operators and anyone whose current or proposed activities have an impact on, or are affected by groundwater. Each section is focused on different activities or sectors.</p> <p>Environment Agency staff will use these position statements as a framework to make decisions. This clear approach aims to remove uncertainty and potentially inconsistent decision-making.</p> <p>The Environmental Permitting (England and Wales) Regulations 2016 (EPR) require permitting of activities that may lead to the input into groundwater of hazardous substances or non-hazardous pollutants. Groundwater resources are primarily managed by abstraction licensing.</p> <p>The primary aim of all of the position statements is the prevention of pollution of groundwater and protection of it as a resource. Groundwater protection is long term, so these principles and position statements aim to protect and enhance this valuable resource for future generations</p>	<p>The WRMP should aim to protect groundwater resources and use the document to aid decision making where groundwaters are concerned.</p> <p>The SEA should consider the impact of the WRMP on groundwater quality and quantity.</p>
Environment Agency (2020) <i>EA2025 creating a better place</i>	

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<p>The plan sets out the Environment Agency’s ambition for how they plan to create better places for people, wildlife and the environment, up to 2025.</p> <p>This document includes the Environment Agency’s purpose, priorities, culture and values as well as how they will help to deliver the 25 year environment plan. It includes the metrics that the Environment Agency will be measured against so they know when they are succeeding in our ambitions. The plan sets out 3 long term goals:</p> <ul style="list-style-type: none"> • A nation resilient to climate change • Healthy air, land and water • Green growth and a sustainable future 	<p>The SEA and the WRMP should consider the Environment Agency’s priorities.</p>
Environment Agency (2020) <i>Meeting our future water needs: a national framework for water resources</i>	
<p>The national framework report marks a move to strategic regional planning. It sets out the principles, expectations and challenges for 5 regional groups (including Water Resources West, which the UuW area forms part of) made up of the 17 English water companies and other water users. The framework explores England’s long term water needs for:</p> <ul style="list-style-type: none"> • public water supplies • agriculture • the power and industry sectors • environmental protection <p>For the Water Resources West Region the framework estimates that additional public water supply needs between 2025 and 2050 are 639 MI/d.</p> <p>The framework states that the Water Resources West Region will face pressures in the future. However, it has a significant surplus, the potential to reduce demand further and options to supply more water. The framework states that the options identified in the water company WRMPs are enough to meet the higher need estimate. If</p>	<p>The WRMP should seek to support the achievement of the aims of the framework.</p> <p>The SEA should include an objective/guide question relating to water resources.</p>

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<p>greater reductions in water use can be achieved or further options identified, there is potential to transfer more water to other regions.</p> <p>The plan sets out that the regional groups will each produce one plan and states that it must consider how the region will be resilient to a range of uncertainties and future scenarios. It must identify a set of options that provide the best value to customers, society and the environment rather than simply the least cost. Together the 5 plans must meet the national need.</p> <p>The plans need to address the following:</p> <ul style="list-style-type: none"> • Increasing resilience to drought • Greater environmental improvement • Reducing long term water usage • Reducing leakage • Reducing the use of drought permits and orders • Increasing supplies. <p>The framework states that plans must include:</p> <ul style="list-style-type: none"> • an initial resource position – a resource assessment which looks at future scenarios and explores the main challenges and sensitivities • a statement of ambition, including the regional policies and principles • a list of the options considered – to meet the regional need and contribution to the national need • the preferred plan – identifying the best value options to meet all future water needs across multiple sectors and users. <p>The framework also sets out a number of criteria that the plans must fulfil as well as things that the plans should or could achieve or include.</p>	

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Environment Agency (2020) <i>National Flood and Coastal Erosion Risk Management Strategy for England</i>	
<p>This strategy describes what needs to be done by all organisations involved in flood and coastal erosion risk management. These include local authorities, internal drainage boards, water and sewerage companies, highways authorities, and the Environment Agency. They all act to reduce the risk of flooding and coastal erosion and manage its consequences.</p> <p>The strategy sets out a statutory framework that will help communities, the public sector and other organisations to work together to manage flood and coastal erosion risk. It supports local decision-making and engagement in FCERM, making sure that risks are managed in a co-ordinated way across catchments and along each stretch of coast. This includes the development of local flood risk management strategies by lead local flood authorities, as well as our strategic overview of all sources of flooding and coastal erosion.</p> <p>This strategy’s long-term vision is for: a nation ready for, and resilient to, flooding and coastal change – today, tomorrow and to the year 2100.</p> <p>It has 3 long-term ambitions, underpinned by evidence about future risk and investment needs.</p> <p>They are:</p> <ul style="list-style-type: none"> • climate resilient places: working with partners to bolster resilience to flooding and coastal change across the nation, both now and in the face of climate change • today’s growth and infrastructure resilient in tomorrow’s climate: making the right investment and planning decisions to secure sustainable growth and environmental improvements, as well as infrastructure resilient to flooding and coastal change • a nation ready to respond and adapt to flooding and coastal change: ensuring local people understand their risk to flooding and coastal change, and know their responsibilities and how to take action. 	<p>The WRMP should be prepared in line with the strategy.</p> <p>The SEA framework should consider flooding and coastal erosion.</p>

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Environment Agency (2020) <i>Water Company Drought Plan guideline</i>	
This guidance, written in conjunction with Defra, outlines the legislative requirements for a drought plan. This document also provides a timeline for the drought planning process.	The WRMP and the SEA should consider the guideline, where relevant.
Environment Agency (2022) <i>Water resources planning guideline supplementary guidance – Environment and society in decision-making</i>	
<p>This document supports the water resources planning guideline. It provides guidance on how to consider the environment and society in decision-making for water resources management plans and regional plans. It is applicable to England only. There is separate guidance for Wales available from Natural Resources Wales.</p> <p>This supplementary guidance sets out how the environment and society should be considered through:</p> <ul style="list-style-type: none"> • Strategic Environmental Assessment (SEA) • biodiversity net gain assessment • natural capital assessments 	The WRMP and SEA should take into account the supplementary guidance.
Environment Agency (undated) <i>Hydroecology: Integration for modern regulation</i>	
This paper describes clear way forward in terms of hydroecology and a strategic direction to its development and application.	The WRMP should ensure relevant ecological considerations are integral to water resource management decisions across the range of temporal and spatial scales.
Environment Agency (undated) <i>Restoring Sustainable Abstraction Programme</i>	
Environment Agency note that there is evidence to suggest that unsustainable abstraction of groundwater and surface water could be contributing to environmental damage of rivers and wetlands in	The WRMP should aim to maintain and

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<p>England and Wales, including sites of national and international conservation importance. In May 1997, at the Government's Water Summit, a commitment was made to reverse the damage caused by past decisions. Environment Agency investigates where over-abstraction has occurred and work with local people to restore sustainable supplies.</p>	<p>implement sustainable abstraction practises.</p> <p>The SEA will assess the impacts of the WRMP and any associated abstraction on water quality and quantity.</p>
Environment Agency (undated) <i>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>	<p>Implementation of the WRMP may impact river water quality.</p> <p>The SEA should seek to promote the protection and enhancement of biodiversity and river water quality across the region.</p>
Environment Agency, Natural Resources Wales and The Water Services Regulation Authority (2021) <i>Water Resources Planning Guideline</i>	
<p>The water resources planning guideline provides an update to the framework for water companies to follow in developing and presenting their water resources plans. It sets out good practice behind the composition of a plan, the approaches to developing a plan and the information that a plan should contain.</p> <p>The guideline states that where feasible water and sewerage companies should ensure that their long-term planning for wastewater and water supply are aligned. Along with highlighting any linkages and, or interdependencies (or both). The guideline states that water/sewerage companies should consider alignment in their growth forecasts, climate change scenarios and timetable for delivering solutions.</p>	<p>The WRMP should align with the WRMP as suggested in the guideline.</p> <p>The SEA should seek to ensure that water supplies and resources are maintained or enhanced in line with the Water Resources Planning Guidelines.</p>
English Heritage (2008) <i>Climate Change and the Historic Environment</i>	

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<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 WRMP in combination with climate change and the potential impacts on heritage and the historic environment.</p>
English Heritage (2010) <i>Heritage at Risk</i>	
<p>Heritage at Risk is a national project 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 2017.</p>	<p>The SEA should seek to protect and enhance heritage and landscape and the assessment framework should include an objective relating to cultural heritage.</p>
Historic England (2015) <i>The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning 3</i>	
<p>This document sets out guidance, against the background of the NPPF, on managing change within the settings of heritage assets, including archaeological remains and historic buildings, sites, areas, and landscapes. It gives general advice on understanding setting, and how it may contribute to the significance of heritage assets and allow that significance to be appreciated, as well as advice on how views contribute to setting.</p>	<p>The WRMP and SEA should take account of the need to protect and enhance the setting of heritage assets.</p>
Historic England (2016) <i>Historic England Advice Note 8: Sustainability Appraisal and Strategic Environmental Assessment</i>	
<p>This Historic England Advice Note supersedes previous advice issued on this subject in 2013. It seeks to provide advice on historic environment considerations as part of the Sustainability Appraisal/Strategic Environmental Assessment process. This document is aimed at all relevant local planning authorities, neighbourhood groups, developers, consultants, landowners and other interested parties. It identifies the recommended list of plans,</p>	<p>The SEA should consider the potential effects of the WRMP on the historic environment, particularly designated assets and their settings, and to important wetland areas</p>

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programmes and policies for review, approach to baseline review, potential sustainability issues.	<p>with potential for paleo-environmental deposits.</p> <p>Historic characterisation can supplement information about designations.</p> <p>Sustainability issues, objectives and indicators identified in this document should be taken into account in the SEA.</p>
The Historic Environment Group (2018) <i>Historic Environment and Climate Change Sector Adaption Plan</i>	
The sector adaptation plan (SAP) is a high-level, strategic document intended to identify climate change risks, opportunities and adaptation needs for the historic environment. Its aim is to stimulate action through strategies, programmes and partnerships.	<p>The WRMP should seek to reduce its contribution to climate change and aim to assist in the protection of the historic environment within the operational area.</p> <p>The SEA assessment framework should consider the effects of the WRMP on climate change and associated effects on the historic environment.</p>
HM Government (1975) <i>Salmon and Freshwater Fisheries Act 1975</i>	
The act encompasses fishing regulation, as well as illegal obstruction of migratory pathways and prohibited modes of destroying fish. The act allows the salmon to maintain an environmentally stable population and support the fishing industry.	The SEA and WRMP should consider the protection of salmon and freshwater fish.

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HM Government (1975) <i>Reservoirs Act</i>	
<p>The Reservoirs Act 1975 provides a legal framework to ensure the safety against failure of large raised reservoirs.</p> <p>The act applies to reservoirs that hold at least 25,000 cubic metres of water above natural ground level.</p> <p>Safety legislation for reservoirs in the United Kingdom was introduced in 1930 after several reservoir disasters had resulted in loss of life. This law was superseded by the Reservoirs Act 1975.</p> <p>Under the Reservoirs Act 1975 reservoir owners (undertakers) have ultimate responsibility for the safety of their reservoirs.</p> <p>Reservoir owners must appoint a panel engineer (a specialist civil engineer who is qualified and experienced in reservoir safety) to supervise the design and construction of the reservoir, to continuously supervise the reservoir when built (supervising engineer) and to carry out periodic inspections (inspecting engineer).</p>	<p>The WRMP should consider any effects of options on reservoirs capacity, functioning and downstream flows.</p>
HM Government (1979) <i>Ancient Monuments and Archaeological Areas Act 1979</i>	
<p>The Act defines sites that warrant protection as ancient monuments. They can be a Scheduled Monuments or "any other monument which in the opinion of the Secretary of State is of public interest by reason of the historic, architectural, traditional, artistic or archaeological interest attaching to it".</p>	<p>The WRMP should consider if there are ways in which they can contribute to the protection of Scheduled Monuments.</p> <p>The SEA assessment framework should include consideration of Scheduled Monuments.</p>
HM Government (1981) <i>Wildlife and Countryside Act 1981</i>	
<p>The Act makes it an offence (with exceptions) to;</p> <ul style="list-style-type: none"> Intentionally kill, injure or take any wild bird or their eggs or nests; 	<p>The WRMP must ensure full compliance with the Act.</p>

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<ul style="list-style-type: none"> • Intentionally kill, injure, or take, possess, or trade in any wild animal listed in Schedule 5; • Prohibits interference with places used for shelter or protection, or intentionally disturbing animals; and • Pick, uproot, trade in, or possess (for the purposes of trade) and wild plant listed in Schedule 8. <p>The Act also provides for the notification of Sites of Special Scientific Interest (SSSI) and require surveying authorities to maintain up to date definitive maps and statements, for the purpose of clarifying public rights of way.</p>	<p>The SEA should ensure a positive contribution to the wildlife within the operational area.</p>
HM Government (1990) <i>Environmental Protection Act</i>	
<p>The Act defines the legal framework for England, Wales and Scotland regarding environmental protection, including the duty of care for waste, contaminated land, and statutory nuisance. Under the Act, Local Authorities or private individuals may take action to secure abatement of any such nuisance, such as noise, and only one person need be affected for action to be possible. It also specifies offences related to the storage, movement, treatment or disposal of controlled waste, and sets out the regime for identifying and remediating contaminated land.</p>	<p>The WRMP must ensure compliance with the Act.</p> <p>The SEA assessment framework should include waste and nuisance.</p>
HM Government (1990) <i>Planning (Listed Buildings and Conservation Areas) Act 1990</i>	
<p>The Planning (Listed Buildings and Conservation Areas) Act 1990 provides specific protection for buildings and areas of special architectural or historic interest. The Act introduced the listing of buildings for buildings which possess special architectural or historic interest and the designation of conservation areas for areas of special architectural or historic interest the character or appearance of which it is desirable to preserve or enhance.</p>	<p>The WRMP should seek to avoid adverse impacts on cultural heritage assets.</p> <p>The SEA assessment framework should include specific objectives relating to cultural heritage.</p>
HM Government (1990) <i>Town and Country Planning Act 1990</i>	

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<p>The Town and Country Planning Act controls and consents development, which is defined as building, engineering, mining or other operations in, on, over or under land, or the making of any material change in the use of any building or land.</p>	<p>The WRMP must ensure full compliance with the Act.</p> <p>The SEA should include objectives and guide questions relating to biodiversity, land use, and landscape.</p>
HM Government (1991 and 1994) Land Drainage Act	
<p>The Land Drainage Act 1991 requires that a watercourse be maintained by its owner in such a condition that the free flow of water is not impeded. The riparian owner must accept the natural flow from upstream but need not carry out work to cater for increased flows resulting from some types of works carried out upstream, for example a new housing development.</p> <p>If a riparian owner fails to carry out his responsibilities under the Land Drainage Act, or if anyone else causes a watercourse to become blocked or obstructed, the County and District Councils have powers of enforcement by serving a notice under the Act. If this is ignored, the Council concerned may carry out the necessary itself and then recharge the person responsible for the full cost incurred. The District Council normally implements these powers but the County Council will deal with problems that affect the highway. The person responsible may also be prosecuted for nuisance under the Public Health Act 1936.</p> <p>The 1994 Act amends the Land Drainage Act of 1991 in relation to the functions of internal drainage boards and local authorities.</p>	<p>The WRMP should be prepared in accordance with the act.</p>
HM Government (1991) <i>Water Industry Act 1991 (as amended by the Flood and Water Management Act 2010)</i>	
<p>The Water Industry Act sets out the regulatory, competition and consumer representation frameworks for the water sector in England</p>	<p>The WRMP should be prepared in accordance</p>

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and Wales including the duty for water companies to prepare WRMPs.	with the Water Industry Act 1991, where relevant.
HM Government (1991) <i>Water Resources Act 1991</i>	
The Water Resources Act applies to England and Wales and established the National Rivers Authority (now the Environment Agency) to regulate water pollution, water resources, flood defence, fisheries and navigation. The Act covers water abstraction and impounding and discharges to surface and ground waters and coastal waters.	The WRMP must ensure full compliance with the Act
HM Government (1994) <i>The Conservation (Natural Habitats, &c.) Regulations 1994</i>	
These regulations transposed European Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) into national law. The Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites.	<p>The WRMP should seek to protect European sites and species.</p> <p>The SEA assessment framework should include objectives and guide questions relating to the protection of European sites and species, as well as biodiversity more generally.</p>
HM Government (1994) <i>UK Biodiversity Action Plan</i>	
<p>The aim of the action plan is to conserve and enhance biological diversity in the UK and to contribute to the conservation of national and global biodiversity and include the follow aims to maintain and, where practicable, to enhance:</p> <ul style="list-style-type: none"> • The overall populations and natural ranges of native species and the quality and range of wildlife habitats and ecosystems; 	Ensure that the WRMP and SEA encourage conservation and offer protection to areas and species of high conservation importance as identified in this action plan.

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMPs and the SEA
<ul style="list-style-type: none"> • Internationally and nationally important and threatened species, habitats and ecosystems; • Species, habitats and natural and managed ecosystems that are characteristic of Kent; • The biodiversity of natural and semi-natural habitats, where this has diminished over 3 recent decades, and • Public awareness of, and involvement in, conserving biodiversity. 	
HM Government (1994) <i>Urban Waste Water Treatment (England and Wales) Regulations 1994</i>	
<p>The Regulations transposed the requirements of the Urban Waste Water Treatment Directive 91/271/EEC (as amended). The Regulations impose requirements for: collection systems for treated urban waste water; discharges from treatment plants, and sets out methods for monitoring; and makes provisions with regard to discharges of industrial wastewater and the dumping of sludge from ships.</p>	<p>The WRMP should reflect the requirements set out in the regulations.</p>
HM Government (1995) <i>Environment Act 1995</i>	
<p>The Act seeks to protect and preserve the environment and guard against pollution to air, land or water. The Act adopts an integrated approach to environmental protection and outlines where authorisation is required from relevant authorities to carry out certain procedures as well as outlining the responsibilities of the relevant authorities. It established the Environment Agency, the Scottish Environment Protection Agency and the National Park authorities. The Act also includes provisions relating to remediation of contaminated land, waste and the designation of Air Quality Management Areas.</p>	<p>The WRMP must ensure compliance with the Act.</p> <p>The SEA assessment framework should include waste and air quality.</p>
HM Government (2000) <i>The Countryside and Rights of Way (CROW) Act 2000</i>	
<p>This act extends the public’s ability to enjoy the countryside and safeguards landowners and occupiers. The Act creates a new statutory right of access to open county and registered common</p>	<p>The SEA must make sure that the Act is supported and that public rights of</p>

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land, modernise the right of way system, give greater protection to Sites of Special Scientific Interest (SSSIs), provide greater protection arrangements for Areas of Outstanding Natural Beauty (AONBs) and strengthen wildlife enforcement legislation.	way and access to the countryside are maintained and where possible enhanced.
HM Government (2002) <i>The National Heritage Act 2002</i>	
This Act builds on the preceding National Heritage Acts of 1980, 1983 and 1997. All four Acts define the way in which National heritage assets are managed and protected. The 2002 Act extended the powers of the Historic Buildings and Monuments Commission to include underwater archaeology within the territorial waters of the United Kingdom.	The WRMP should be compliant with the Act. The SEA should include objectives relating to the protection of heritage features.
HM Government (2003) <i>The Water Act 2003</i>	
<p>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; and • the promotion of water conservation. <p>It amends the Water Industry Act 1991 so that water companies:</p> <ul style="list-style-type: none"> • are given a duty to prepare and publicise drought plans; • are placed under a duty to agree and publicise water resource management plans; and • are placed under an enforceable duty to further water conservation. <p>As part of the Act the Water Services Regulation Authority (Ofwat) became the economic regulator of the water and sewage industry in England and Wales.</p>	<p>The WRMP should support the achievement of the aims of the act, where possible.</p> <p>The SEA should include objectives relating to water quality, water resources and sustainable water use.</p>
HM Government (2004) <i>The Environmental Assessment of Plans and Programmes Regulations 2004</i>	

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<p>These regulations only apply to plans and programmes within England and set out the procedures required when undertaking an environmental assessment.</p>	<p>The SEA should take the regulations into account when assessing the WRMP.</p>
HM Government (2005) <i>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 WRMP</p>
HM Government (2006) <i>Climate Change and Sustainable Energy Act 2006</i>	
<p>The Act was enacted after the publication of the UK Climate Change Programme (2006). It places an obligation on the government to report to Parliament on greenhouse gas emissions in the UK and action taken by Government to reduce these emissions.</p>	<p>The WRMP should take into account carbon emissions associated with the measures.</p> <p>The SEA could include an objective/guide question in the assessment framework to reduce greenhouse gas/carbon dioxide emissions. Consider whether the monitoring arrangements can be utilised to monitor the effects of the WRMP.</p>
HM Government (2006) <i>Natural Environment and Rural Communities Act 2006</i>	

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMPs and the SEA
<p>The Act:</p> <ul style="list-style-type: none"> • makes provision about bodies concerned with the natural environment and rural communities; • makes provision in connection with wildlife, sites of special scientific interest, National Parks and the Broads; • amends the law relating to rights of way; • makes provision as to the Inland Waterways Amenity Advisory Council; and <p>provides for flexible administrative arrangements in connection with functions relating to the environment and rural affairs and certain other functions; and for connected purposes.</p>	<p>The WRMP and SEA should have regard to protected wildlife sites and species, landscapes and rights of way.</p>
HM Government (2007) <i>Water Resources Management Plan Regulations 2007</i>	
<p>These Regulations set out the process for the preparation of WRMPs.</p>	<p>The WRMP should consider these regulations, where relevant.</p>
HM Government (2008) <i>The Climate Change Act 2008 and The Climate Change Act 2008 (2050 Target Amendment) Order 2019</i>	
<p>This Act aims:</p> <ul style="list-style-type: none"> • to improve carbon management and help the transition towards a low carbon economy in the UK; and • to demonstrate strong UK leadership internationally, signalling that the UK is committed to taking its share of responsibility for reducing emissions in the context of ratifying the global Paris Agreement. <p>The UK Climate Change Act 2008 sets 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, against a 1990 baseline.</p> <p>Further the Act provides for a carbon budgeting system which caps emissions over five year periods to set out our trajectory to 2050. Budgets have been set covering the periods 2008-12, 2013-17, 2018-</p>	<p>The WRMP should seek contribute towards increasing the proportion of energy from renewable energy sources.</p> <p>The SEA assessment framework should include consideration of greenhouse gas emissions and use of energy from renewable energy sources.</p>

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<p>22, 2023-27 and 2028-32, equivalent to 22%, 28%, 34%, 50% and 57% reductions in carbon emissions compared to 1990 levels respectively.</p>	
HM Government (2008) <i>The Energy Act 2008</i>	
<p>The Energy Act 2008 contains the legislative provisions required to implement UK energy policy following the publication of the Energy Review 2006 and the Energy White Paper 2007.</p> <p>The key elements of the Act:</p> <ul style="list-style-type: none"> • Strengthens the regulatory framework for offshore gas supply infrastructure to enable private sector investment; • Creates a regulatory framework to enable private sector investment in Carbon Capture and Storage projects; • Strengthens the Renewables Obligation to drive greater and more rapid deployment of renewables in the UK; • Strengthens statutory decommissioning provisions for offshore renewables and oil and gas installations to minimise the risk of liabilities falling to the Government; • Improves the offshore oil and gas licensing regime in response to changes in the commercial environment and enable the Department for Business Enterprise and Regulatory Reform to carry out its regulatory functions more effectively; • Ensures the operators of new nuclear power stations accumulate funds to meet the full costs of decommissioning and their full share of waste management costs; and • Introduces amending powers such that Ofgem is able to run the offshore electricity transmission licensing regime more effectively. <p>The subsequent Energy Acts (2010, 2011, 2013, 2016) contain provisions relating to carbon capture and storage, decarbonisation, fuel poverty, reductions in carbon emissions, security of energy</p>	<p>The WRMP should have regard to the provisions in the Act.</p> <p>The SEA should include objectives relating to energy and resource use.</p>

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supply, nuclear regulation and the Oil and Gas Authority, amongst others.	
HM Government (2008) <i>Planning Act 2008</i>	
This Act introduced a new system for nationally significant infrastructure planning, alongside further reforms to the Town and Country Planning system.	<p>The WRMP should consider any unforeseen NSIP proposals that come forward prior to adoption which may affect water resources in the region.</p> <p>The SEA should consider the cumulative effects of the WRMP and any unforeseen NSIP proposals that come forward which may affect water resources in the region.</p>
HM Government (2009) <i>The Eels (England and Wales) Regulations 2009 (as amended 2011)</i>	
These regulations were introduced in 2009 and amended in 2011. They afford powers to the Environment Agency to implement measures for the recovery of European eel stocks and have important implications for operators of abstractions and discharges.	The SEA and WRMP should have regard to eel populations.
HM Government (2009) <i>The Groundwater (England and Wales) Regulations 2009</i>	
<p>The Groundwater Regulations are designed to implement a daughter directive to the European Water Framework Directive and prevent or limit the inputs of polluting substances into groundwater.</p> <p>Substances controlled under these regulations fall into two categories:</p> <p>a) Hazardous substances, defined as those which are toxic, persistent or liable to bioaccumulate must be prevented from entering groundwater. Substances in this list may be disposed</p>	<p>The WRMP will need to comply with the requirements of the Regulations where appropriate.</p> <p>The SEA assessment should include an objective relating to the</p>

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<p>of to the ground, under a permit, but must not reach groundwater. They include pesticides, sheep dip, solvents, hydrocarbons, mercury, cadmium and cyanide.</p> <p>b) Non-hazardous pollutants are less dangerous, and can be discharged to groundwater under a permit, but must not cause pollution. Examples include sewage, trade effluent and most wastes. Non-hazardous pollutants include any substance capable of causing pollution and the list is much wider than the previous List 2 substances.</p>	<p>effects of options on groundwater quality.</p>
HM Government (2009) <i>Marine and Coastal Access Act 2009</i>	
<p>The Marine and Coastal Access Act sets out a number of measures including the establishment of Marine Conservation Zones (MCZs) and Marine Spatial Plans. It also includes amendments to the Salmon and Freshwater Fisheries Act, 1975.</p>	<p>The WRMP should take into account its effects on coastal areas, where appropriate.</p> <p>The SEA assessment should take into account the effects of the actions on the coast where relevant.</p>
HM Government (2009) <i>Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 SI 3104</i>	
<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>
HM Government (2009) <i>The UK Renewable Energy Strategy</i>	
<p>The Strategy sets out to:</p>	<p>The WRMP should contribute towards increasing the proportion of energy</p>

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<ul style="list-style-type: none"> Put in place the mechanisms to provide financial support for renewable electricity and heat worth around £30 billion between up to 2020; Drive delivery and clear away barriers; Increase investment in emerging technologies and pursue new sources of supply; and <p>Create new opportunities for individuals, communities and business to harness renewable energy.</p>	<p>from renewable energy sources, where possible.</p> <p>The SEA assessment framework should include consideration of the use of energy from renewable energy sources.</p>
HM Government (2010) <i>Flood and Water Management Act 2010</i>	
<p>The Flood and Water Management Act 2010 aims to provide better, more sustainable management of flood risk for people, homes and businesses, help safeguard community groups from unaffordable rises in surface water drainage charges and protect water supplies to the consumer. The Act will also implement recommendations made by Sir Michael Pitt in his review of the 2007 floods. This will include giving water companies new powers to better control non-essential domestic uses of water during periods of water shortage.</p> <p>The Act places a number of statutory duties on water companies including:</p> <ul style="list-style-type: none"> a duty to act consistently with the National Strategy; and <p>a duty to have regard to the content of the Local Flood Risk Management Strategies. Does not contain any targets.</p>	<p>The WRMP should be in conformity with the Act.</p> <p>The SEA should include objectives relating to flood risk and water use.</p>
HM Government (2011) <i>Localism Act 2011</i>	
<p>The Localism Act provides greater devolved powers to councils and neighbourhoods and gives local communities more control over housing and planning decisions.</p>	<p>The WRMP and the SEA Environmental Report will be subject to public consultation.</p>
HM Government (2011) <i>UK Marine Policy Statement</i>	
<p>The Marine Policy Statement (MPS) sets out the framework for preparing Marine Plans and taking decisions affecting the marine environment, supporting the delivery of the following high-level marine objectives:</p>	<p>The WRMP should take into account its effects on coastal areas.</p>

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<ul style="list-style-type: none"> • Achieving a sustainable marine economy; • Ensuring a strong, healthy and just society; • Living within environmental limits; • Promoting good governance; • Using sound science responsibly. <p>Does not contain any targets.</p>	<p>The SEA assessment should take into account the effects of the actions on the coast/marine environment where relevant.</p>
HM Government (2011) <i>Water for Life: White Paper</i>	
<p>Water for Life describes a vision for future water management in which the water sector is resilient, in which water companies are more efficient and customer focused, and in which water is valued as the precious and finite resource it is.</p> <p>Water for Life includes several proposals for deregulating and simplifying legislation, to reduce burdens on business and stimulate growth. Ofwat’s proposals for reducing its regulatory burdens complement these.</p>	<p>The WRMP should help to contribute to the resilient and efficient management of water.</p> <p>In order to ensure future water management is resilient SEA should consider resilience to climate change and should consider the human environment.</p>
HM Government (2013) <i>The Energy Act 2013</i>	
<p>The Act established a legislative framework for delivering secure, affordable and low carbon energy. At its core is the need to ensure that, as older power plants are taken offline, the United Kingdom remains able to generate enough energy to meet its needs even if demand increases. The Act sets out provisions for:</p> <ul style="list-style-type: none"> • Decarbonisation • Electricity Market Reform (EMR) • Nuclear Regulation • Government Pipeline and storage system • Strategy and policy statement 	<p>The WRMP should comply with the act, where relevant.</p> <p>The SEA should include guide questions relating to energy use and carbon emissions.</p>

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<ul style="list-style-type: none"> • Customer protection 	
HM Government (2014) <i>Water Act 2014</i>	
<p>The purpose of the Act was to make provision about the water industry; about compensation for modification of licences to abstract water; about main river maps; about records of waterworks; for the regulation of the water environment; about the provision of flood insurance for household premises; about internal drainage boards; about Regional Flood and Coastal Committees; and for connected purposes.</p>	<p>The WRMP help to ensure that future water management is resilient, efficient and customer focused</p>
HM Government (2015) <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> <ul style="list-style-type: none"> • Contamination of land that results in a significant risk of adverse effects on human health • Adverse effects on surface water or groundwater consistent with a deterioration in the water's status • Adverse effects on the integrity of a Site of Special Scientific Interest (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 provided by the regulations is considered when assessing the WRMP.</p>
HM Government (2015) <i>Infrastructure Act 2015</i>	
<p>The Infrastructure Act (inter alia) gives environmental authorities new powers to require landowners to take action on invasive non-native species or permit others to enter the land and carry out those operations.</p>	<p>The SEA assessment framework should include guide questions relating to invasive species.</p>

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HM Government (2015) <i>The Nitrate Pollution Prevention Regulations 2015</i>	
<p>These regulations consolidate and revoke previous regulations on Nitrate Pollution Prevention (namely the 2008 Nitrate Pollution Prevention Regulations and subsequent amendments).</p> <p>The continue to provide for the implementation of EU Directive 91/676/EEC on the protection of waters against pollution by nitrates from agricultural sources, and Decision 2009/431/EC granting a derogation under that directive, in England.</p> <p>The regulations: provide for the designation of land as nitrate vulnerable zones; impose annual limits on the quantity of nitrogen from organic manure that may be applied or spread in a holding in a nitrate vulnerable zone; establish requirements relating to the amount of nitrogen to be spread on a crop, and requires an occupier to plan in advance how much nitrogen fertiliser will be spread; require an occupier to provide a risk map of the holding; impose conditions on the spreading of nitrogen fertiliser; establish closed periods during which the spreading of nitrogen fertiliser is prohibited; and, makes provision for requirements for storage of nitrogen fertiliser and the keeping of records.</p>	<p>The WRMP should have regard to the requirements of the regulations.</p> <p>The WRMP and the SEA should consider potential effects of WRMP plan measures on Nitrate Vulnerable Zones (NVZs).</p>
HM Government (2015) <i>Ozone-Depleting Substances Regulations 2015</i>	
<p>The 2015 ODS Regulations implementation of EU Ozone Depleting Substances Regulations (1005/2009). The principle objective is to phase out and control remaining uses of ozone depleting substances (ODS). ODSs commonly include chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and halons, which were typically used as refrigerants, air-conditioning systems, and fire-fighting equipment. The Regulations place controls and phase-out dates on the manufacture and supply of ODSs. The Regulations also require ODSs to be removed from refrigeration equipment before such appliances are scrapped. The Regulations specify minimum</p>	<p>The WRMP should have regard to the requirements of the regulations.</p> <p>The SEA assessment framework should include emissions to air.</p>

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<p>qualifications for those working on the recovery, recycling, reclamation or destruction of ODS.</p>	
<p>HM Government (2016) <i>Environmental Permitting (England and Wales) Regulations 2016 (as amended 2018)</i></p>	
<p>Provides a system for environmental permits and exemptions for industrial activities, mobile plant, waste operations, mining waste operations, water discharge activities, groundwater activities and radioactive substances activities. It also sets out the powers, functions and duties of the regulators.</p>	<p>The WRMP should accord with these Regulations.</p>
<p>HM Government (2017) <i>Conservation of Habitats and Species Regulations 2017 and the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019</i></p>	
<p>These regulations consolidate all the various amendments made to the Conservation (Natural Habitats) Regulations 1994 in respect of England and Wales. The 1994 Regulations transposed Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into national law.</p> <p>The Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites. Under the Regulations, competent authorities i.e. any Minister, government department, public body, or person holding public office, have a general duty, in the exercise of any of their functions, to have regard to the EC Habitats Directive.</p> <p>New provisions implement aspects of the Marine & Coastal Access Act 2009. These provisions provide for:</p> <ul style="list-style-type: none"> • the transfer of certain licensing functions from Natural England to the Marine Management Organisation (MMO); • Marine Enforcement Officers to use powers under the Marine Act to enforce certain offences under the Habitats Regulations. <p>The 2019 (EU Exit) amendment to the Regulations ensures that the habitat and species protection and standards derived from EU law will continue to apply after Brexit.</p>	<p>The WRMP must ensure full compliance with the Regulations.</p> <p>The SEA should take into account the effects of the actions on biodiversity.</p>

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HM Government (2017) <i>The Water Environment (WFD) (England and Wales) Regulations 2017</i>	
<p>These regulations transpose the Water Framework Directive into law in England and Wales (see Water Framework Directive 2000/60/EC above).</p>	<p>The WRMP should be aligned with the requirements of the Water Framework Directive.</p> <p>The SEA should include objectives relating to water quality, water resources, sustainable water use, and biodiversity.</p>
HM Government (2017, updated 2019) <i>UK Clean Growth Strategy: Leading the way to a low carbon future</i>	
<p>This document affirms the UK’s need to pursue de-carbonisation and provides information on how the UK is performing against its targets to become carbon neutral. The document highlights that continued emission reduction needs to continue in the fields of:</p> <ul style="list-style-type: none"> • Power Sector; • Buildings; • Industry; • Natural Resources; • Transport; and, • Devolved Administrations. 	<p>The SEA should have an objective/guide questions relating to sustainable development that references the need to reduce carbon emissions across all sectors.</p>
HM Government (2018) <i>A Green Future: Our 25 Year Plan to Improve the Environment</i>	
<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>The WRMP may influence the environmental benefits and pressures identified</p>

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<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 • Securing clean, productive and biologically diverse seas and oceans • Protecting and improving the global environment 	<p>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 <p>The SEA should ensure that the impacts of any options on the 25-year goals set out in the Environment Plan are fully considered, whilst</p>

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	taking into account environmental net gain and natural capital approach, which the government have identified as principle themes.
HM Government (2018) <i>The Water Supply (Water Quality) Regulations 2018</i>	
<p>These regulations address the quality of water supplied by water undertakers, who supply areas mainly or wholly in England. The new Regulations implement Directive 98/83/EC on the quality of water intended for human consumption.</p> <p>Under these Regulations, water undertakers are required to identify the areas that are to be water supply zones on an annual basis. A water supply zone cannot exceed 100,000 in terms of population before the beginning of each year of the supply.</p> <p>The standards of wholesomeness are set out, in respect of water for human consumption, be that through drinking, washing, food preparation or cooking and food production. In order to qualify as wholesome, the water cannot contain any:</p> <ul style="list-style-type: none"> • micro-organism, other than those listed in the full text of Schedule 1 to the Regulations, or parasite; or • substances, other than those listed in the full text of Schedule 1 to the Regulations. 	<p>The WRMP should consider the Regulations.</p> <p>The SEA should take into account potential effects of the measures on drinking water quality.</p>
HM Government (2019) <i>the Invasive Alien species (Enforcement and Permitting) Order 2019</i>	
<p>This Order allows for the enforcement of the EU Invasive Alien Species Regulation 1143/2014 on the prevention and management of invasive alien plant and animal species in England and Wales, including the relevant licenses, permits and rules for keeping invasive alien species.</p>	<p>The SEA should seek to address any potential issues or effects on existing measures to address invasive alien species.</p>
HM Government (2020) <i>The Agriculture Act 2020</i>	

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<p>The Bill provides the legislative framework for replacement agricultural support schemes to replace the European schemes after UK's exit from the EU and the EU's Common Agricultural Policy (CAP). The Bill provides powers to implement new approaches to farm payments and land management. In England, farmers will be paid to produce 'public goods' such as environmental or animal welfare improvements. The Bill also includes wider measures, including on improving fairness in the agricultural supply chain and on the operation of agricultural markets.</p>	<p>The WRMP should consider the implications of the act.</p>
HM Government (2020) <i>Energy White Paper: Powering our Net Zero Future</i>	
<p>The White Paper follows on from the Prime Minister's Ten Point Plan and the National Infrastructure Strategy. The Energy White Paper provides further clarity on the Prime Minister's measures and puts in place a strategy for the wider energy system that:</p> <ul style="list-style-type: none"> • Transforms energy, building a cleaner, greener future for the country, its people and the planet • Supports a green recovery, growing the economy, supporting 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, providing opportunities to save money on bills, providing warmer, more comfortable homes and balancing investment against bill impacts 	<p>The WRMP should consider if it can support the delivery of the aims of the white paper.</p> <p>The SEA should include objectives and guide questions relating to energy use and carbon emissions.</p>
HM Government (2021) <i>The Environment Act</i>	
<p>The Act seeks to set legislation to improve air and water quality, tackle waste, increase recycling, halt the decline of species, and improve the natural environment. Amongst its provisions, The Act places a duty enshrined in law to ensure water companies secure a progressive reduction in the adverse impacts of discharges from storm overflows. New duties will also require the government to publish a plan to reduce sewage discharges from storm overflows by September 2022 and report to Parliament on the progress towards implementing the plan. The Environment Act also includes a legally</p>	<p>The WRMP should seek to protect and enhance the natural environment, taking into consideration the principals and guidance set out through the Environment Bill.</p>

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binding target on species abundance for 2030, to help reverse declines of species like the hedgehog, red squirrel and water vole.	
HM Government (2022) UK Climate Change Risk Assessment 2022	
<p>This report outlines the UK government and devolved administrations' position on the key climate change risks and opportunities that the UK faces today.</p> <p>As required by the Climate Change Act 2008, the UK government has undertaken the third five-year assessment of the risks of climate change on the UK. This is based on the Independent Assessment of UK Climate Risk, the statutory advice provided by the Climate Change Committee (CCC), commissioned by the UK government and devolved administrations.</p> <p>The risk assessment considers sixty-one UK-wide climate risks and opportunities cutting across multiple sectors of the economy and prioritises eight risk areas for action in the next two years.</p>	<p>The WRMP and the SEA should take into consideration the climate risks identified by the assessment.</p>
HM Treasury (2016) National Infrastructure Delivery Plan	
<p>This document is the Government's updated National Infrastructure Delivery Plan. It sets out the plan to 2021 and beyond and takes a targeted approach to infrastructure investment and delivery across different sectors. It contains major commitments to improve the UK's transport, energy, communications, waste, water, housing and flood and coastal erosion, as well as steps to attract new private sector investment. It includes reference to the production of Water Resources Management Plans and the Ofwat price review.</p>	<p>The WRMP should consider the content and commitments of the plan.</p>
JNCC and Defra (2012) UK Post-2010 Biodiversity Framework	
<p>The framework sets out UK priorities for work on the Convention on Biological Diversity, and follows on from the 1994 UK Biodiversity Action Plan. It sets out a vision that, 'by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people'. The goals and activities to meet this aim are grouped under the categories of International / European context; facilitating and</p>	<p>The WRMP should support the protection and enhancement of biodiversity.</p> <p>The SEA assessment should include criteria relating to the</p>

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMPs and the SEA
contributing to common country approaches and solutions; evidence provision; and reporting.	protection of species and habitats.
National Assembly for Wales (2015) <i>Well-being of Future Generations Act (2015)</i>	
<p>The Well-being of Future Generations Act requires public bodies in Wales to think about the long-term impact of their decisions, to work better with people, communities and each other, and to prevent persistent problems such as poverty, health inequalities and climate change.</p> <p>The Act puts in place seven well-being goals and makes it clear that public bodies must seek to achieve all seven of the goals:</p> <ul style="list-style-type: none"> • A prosperous Wales • A resilient Wales • A more equal Wales • A healthier Wales • A Wales of cohesive communities • A Wales of vibrant culture and thriving Welsh language • A globally responsive Wales 	<p>The WRMP should seek to contribute towards the achievement of the seven wellbeing goals, where relevant.</p> <p>The SEA assessment framework should include objectives and guide questions relating to the economic effects, human health and wellbeing and climate change.</p>
National Assembly for Wales (2016) <i>Environment (Wales) Act 2016</i>	
<p>The Environment (Wales) Act 2016 introduced a new legislative approach for the Sustainable Management of Natural Resources (SMNR). The Act seeks to maintain and enhance the resilience of Wales’ ecosystems and the services and benefits they provide and, in so doing, meet the needs of the present generation without compromising the ability of future generations to meet their needs.</p> <p>The overarching aims of the Act are to enable Wales’ resources to be managed in a more proactive, sustainable and joined-up way and to establish the legislative framework necessary to tackle climate change.</p>	<p>The WRMP should seek to enhance biodiversity, promote resilience in ecosystems and maintain and enhance biodiversity</p> <p>The SEA framework should include consideration of resilience in ecosystems and the maintenance and enhancement of</p>

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<p>Some of the specific provisions in the Act include:</p> <ul style="list-style-type: none"> • Helping to plan and manage Wales’ natural resources at a national and local level, through a State of Natural Resources Report, a National Natural Resources Policy and area statements. • Providing Natural Resources Wales (NRW) with a general purpose that aligns fully with the statutory principles for the sustainable management of natural resources. • Providing NRW with powers to undertake land management agreements and experimental schemes. • Providing public authorities with a reshaped requirement to seek to maintain and enhance biodiversity and promote resilience of ecosystems. • Placing statutory emission reduction targets and carbon budgeting to support their delivery. • Enabling improvements to the existing scheme for single use carrier bags. • Providing the Welsh Ministers with powers to take action to achieve higher levels of recycling for business waste, food waste treatment and energy recovery. • Clarifying the law for a number of existing environmental regulatory regimes including marine licensing, shellfisheries management, land drainage and flood risk management. 	<p>biodiversity and resource use.</p>
National Infrastructure Commission (2018) <i>Preparing for a Drier Future, England’s Water Infrastructure Needs</i>	
<p>This paper sets out a range of measures that the NIC believe government, water companies and the regulator should take to increase investment in supply infrastructure and encourage more efficient use of water, with the aim to halve leakage by 2050, extend metering and develop plans for a national water network.</p>	<p>The WRMP should take these measure into account where possible and aim to improve water efficiency.</p>
Natural England (2011) <i>UK Geodiversity Action Plan</i>	

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<p>The UKGAP sets out a framework for enhancing the importance and role of geodiversity across the UK, and provides a shared context and direction for geodiversity action through a common aim, themes, objectives and targets which link national, regional and local activities.</p> <p>The themes (on which the plan’s objectives are based) include: furthering our understanding of geodiversity; gathering and maintaining information on our geodiversity; conserving and managing our geodiversity; inspiring people to value and care for our geodiversity; and sustaining resources for our geodiversity. It also aims to influence planning policy, legislation and development design.</p>	<p>The WRMP should take into account the aims of the UKGAP.</p> <p>The SEA assessment should consider effects of options on geodiversity and outline enhancement and mitigation opportunities where these are identified.</p>
Natural England (2016) <i>A narrative for conserving freshwater and wetland habitats in England</i>	
<p>This narrative provides an overview of circumstances relating to the conservation of freshwater and wetland habitats in England, considering their ecological function, the natural and anthropogenic factors affecting them, the principles that should be applied to their management, and the respective roles of the main policy mechanisms involved in their conservation. It covers all running and standing water habitats, of whatever size, and terrestrial wetland habitats including bogs, fens, swamp and wet woodland.</p>	<p>The WRMP should take into account the findings of the narrative relating to conservation.</p> <p>The SEA should note the impact of the WRMP on various habitats.</p>
Natural England (2016) <i>Conservation 21: Natural England’s conservation strategy for the 21st century</i>	
<p>Conservation 21 sets out how Natural England will work to protect England’s nature and landscapes for people to enjoy and for the services they provide, in support of Defra’s ambitions for the environment.</p>	<p>The WRMP24 should take into account the contents of this strategy.</p>
Natural England and the Environment Agency (2014) <i>Protected Species and Development: Advice for Local Planning Authorities</i>	
<p>This guidance from Natural England and Defra outlines how to assess a planning application when there are protected species on or near a proposed development site. Natural England must be consulted if a development proposal:</p>	<p>The WRMP and SEA should consider the impact of any proposed developments on protected species.</p>

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMPs and the SEA
<ul style="list-style-type: none"> • might affect a site of special scientific interest (SSSI) • needs an environmental impact assessment • needs an appropriate assessment under the Habitats Regulations 	
Natural Resources Wales (2020) <i>The State of Natural Resources Report (SoNaRR) for Wales 2020</i>	
<p>SoNaRR2020 builds on a number of Welsh, UK and global assessments of the status and trends of natural resources. It looks at the risks those trends pose to Welsh ecosystems and to the long-term social, cultural and economic well-being of Wales, in terms defined by the Well-Being of Future Generations (Wales) Act 2015 and opportunities for integrated solutions that provide multiple benefits (social, cultural, environmental and economic).</p>	<p>The WRMP should have regard to opportunities to address risks and threats identified in the report and identify integrated solutions.</p> <p>The SEA should have regard to the risks, threats and opportunities identified in the report and the extent to which opportunities for integrated solutions can be incorporated in the WRMP.</p>
Ofwat (2016) <i>Water 2020</i>	
<p>This document sets out Ofwat’s decisions on the design of its water and wastewater services regulatory framework in England and Wales. The approach aims to deliver the following benefits:</p> <ul style="list-style-type: none"> • Greater customer engagement and understanding • A sustainable investment model and a fair balance of risk and reward • Choice where possible, and ensuring markets are effective for customers • A focus on the long-term, targeted and risk-based 	<p>The WRMP should take account of the regulatory framework.</p> <p>The SEA assessment should include criteria relating to the provision of water to customers and environmental protection.</p>

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<ul style="list-style-type: none"> • Support for sustainable improvements in the environment. 	
Ofwat (2017) Resilience in the Round	
<p>The report identifies that the water sector has historically invested in options which enhance capacity, especially operational capacity and that whilst additional capacity has an important role in delivering resilience against some threats, companies should start looking at a wider set of factors in order to deliver “smarter” options for the future, including:</p> <ul style="list-style-type: none"> • Addressing multiple threats through a single intervention. For example, enhancing network connectivity to reduce the number of customers reliant on a single source of supply. This type of approach can provide water supply resilience to multiple threats such as outages, drought and contamination. • Recognising that any intervention will have its own embedded vulnerabilities to future threats. Understanding the vulnerabilities of option types will be critical to planning respective roles in delivering the planned level of resilience. For example, water transfers between areas of surplus and deficit can be a good option but might be vulnerable to wider scale drought impacts and/or contamination. 	<p>The WRMP should consider the content of the report.</p>
UKCP (2018) UK Climate Projections UKCP18	
<p>The UKCP18 Projections provide a basis for studies of impacts and vulnerability and decisions on adaptation to climate change in the UK over the 21st century. Projections are given of changes to climate, and of changes in the marine and coastal environment; recent trends in observed climate are also discussed.</p> <p>The methodology gives a measure of the uncertainty in the range of possible outcomes; a major advance beyond previous national scenarios.</p> <p>The Projections will allow planners and decision-makers to make adaptations to climate change. In order to do so they need as much good information as possible on how climate change will evolve. They are one part of a UK government programme of work to put in</p>	<p>The WRMP should take account of UKCP18 projections in its formulation, taking account of climate change in its projections. The SEA should also use UKCP18 projections in the broader assessment of climate change effects and any potential cumulative effects. For example, the ecological requirements of aquatic habitats that may be</p>

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place a new statutory framework on, and provide practical support for, adaptation.	affected by the WRMP will also be influenced by climate change.
UKTAG: Phase 3 Review of Environmental Standards	
<p>UKTAG prepares technical guidance designed to facilitate consistent implementation of the WFD in the UK.</p> <p>This report identifies standards for certain chemicals known as specific pollutants, developments in assessments of risk to groundwater, non-native species, standards for flows in rivers, standards for levels in lakes, standards for acidity in rivers and standards in intermittent discharges.</p>	<p>The SEA should seek to ensure that the guidance provided by the plan are considered when assessing the WRMP, especially with respect to objectives relating to ecology, water quality and water quantity. The SEA should also ensure the guidance in the plan is used in relation to other related regulations for example the Habitats Directive. The guidance could contribute to the formulation of any criteria for assessing significance of effects.</p>
Waterwise (2017) Water Efficiency Strategy for the UK	
<p>The document sets out a strategy for achieving the vision of a water efficient UK. It suggests policy, regulatory and practical actions that can help in the process of achieving water efficiency.</p>	<p>The WRMP should take into account their possible impacts on water efficiency and aim to improve water efficiency.</p> <p>The SEA objectives should reflect the need improve water efficiency.</p>
Water UK (2016) Water Resources Long-term Planning Framework (2015 – 2065)	

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<p>This research modelled the possible effects of climate change, population growth, environmental protection measures and trends in water use to produce a wide range of future scenarios. The results suggest that, in some scenarios, the United Kingdom is facing longer, more frequent and more acute droughts than previously thought.</p> <p>To contain the risk of drought extensive measures to manage demand and enhance supplies of water are needed such as (pp. 194-195):</p> <ul style="list-style-type: none"> • promoting more efficient water use in homes and businesses, through improved building standards and widespread use of smart metering, as well as more ambitious reduction in leakage from water mains; • moving more water from one region to another through existing waterways and new pipelines, building new reservoirs, treating more water for re-use and building desalination plants to make use of sea water. 	<p>Measures identified in the framework should be considered as part of the WRMP.</p> <p>The SEA should assess the impact of the WRMP on water resource and availability.</p>
Welsh Government (2017) <i>Technical Advice Note 24 the Historic Environment</i>	
<p>This technical advice note sets out guidance on how to consider the historic environment in development plans and planning decisions. It includes guidance on the following:</p> <ul style="list-style-type: none"> • world heritage sites • scheduled monuments • archaeological remains • listed buildings • conservation areas • historic parks and gardens • historic landscapes • historic assets of special local interest 	<p>The WRMP and SEA should consider the impact of any proposed developments on the historic environment of Wales.</p>
Welsh Government (2018) <i>Priorities for the Historic Environment of Wales</i>	

National Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMPs and the SEA
<p>This document outlines Welsh Government’s plans to protect our unique historic sites, in partnership with others, and to encourage more people to visit them.</p>	<p>The WRMP and SEA should consider the impact of any proposed developments on the historic environment of Wales.</p>
Welsh Government (2020) <i>Historic Environment and Climate Change in Wales</i>	
<p>Some of Wales’ most iconic historic sites and landscapes are threatened by warmer temperatures, rising sea levels, changing rainfall patterns and more frequent extreme weather events.</p> <p>The plan highlights the need for collaboration and action across all sectors that will improve understanding; build adaptive capacity and increase the resilience of the historic environment – so that it can be enjoyed by future generations.</p>	<p>The WRMP and SEA should consider the impact of any proposed developments on climate change and the historic environment of Wales.</p>
Welsh Government (2024) <i>Planning Policy Wales (Edition 12)</i>	
<p>Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. PPW, the TANs, MTANs and policy clarification letters comprise national planning policy.</p> <p>The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, as required by the Planning (Wales) Act 2015, the Well-being of Future Generations (Wales) Act 2015 and other key legislation and resultant duties such as the Socio-economic Duty.</p>	<p>Measures recommended in the WRMP will need to confirm to LDPs and the policies of the PPW.</p> <p>The SEA objectives should reflect the Welsh Government’s commitments to sustainable development.</p>

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Regional Plans and Programmes	
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Canal & Rivers Trust (2015) <i>North West Waterway Fisheries & Angling Action Plan</i>	
<p>The action plan identifies the priority issues that need to be addressed locally in the North West to improve the angling experience, fish stocks and the water environment. The actions are grouped under 10 themes, which include:</p> <ul style="list-style-type: none"> • Develop & improve access to the fishery. • Fish passage and migration. • Predation & non native species. • Fisheries and water quality and quantity. 	<p>The WRMP should seek to avoid harm to fisheries.</p> <p>The SEA assessment framework should include the protection or enhancement of factors affecting fisheries.</p>
Environment Agency (2020) <i>North West Operational Drought Plan</i>	
<p>The document sets out how the Cumbria and Lancashire and Greater Manchester Merseyside and Cheshire areas will jointly plan for and manage drought in the North West Area.</p> <p>The drought plan’s main aims are to:</p> <ul style="list-style-type: none"> • Give a structured and flexible framework to manage droughts of different types (for example, groundwater or surface-water) and severity; • Set out a system of monitoring and reporting to identify and track the onset and progress of drought; • Provide a communication plan and arrangements for working with partner organisations, such as UUW, during drought periods. 	<p>The SEA assessment framework should include a guide question on the effects of the WRMP on water resources and commentary on whether they affect the ability to manage drought.</p>
English Heritage, now known as Historic England, <i>Heritage at Risk Register: North West (2021) and Midlands (2021)</i>	
<p>Heritage at Risk is a national project 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.</p> <p>Historic England Corporate Plan 2015-2018 is reducing the risk to heritage assets.</p>	<p>The SEA should seek to protect and enhance heritage and landscape.</p>

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<p>In order to achieve this aim Historic England are working to:</p> <ul style="list-style-type: none"> • Better understand the nature and extent of risk • Encourage others to save and re-use heritage at risk • Build the capacity of the sector to deliver solutions for heritage at risk • Provide advice and grants to help remove heritage from the register <p>Within the U UW area the following regional Heritage at Risk Registers are relevant:</p> <ul style="list-style-type: none"> • North West (2018) • West Midlands (2018) 	
Natural Resources Wales (2017) Drought Plan	
<p>Natural Resources Wales produces a drought plan which describes the indicators currently used to classify the different stages of drought.</p>	<p>The SEA assessment framework should include a guide question on the effects of the WRMP on water resources and commentary on whether they affect the ability to manage drought.</p>
Transport for the North (2019) Strategic Transport Plan	
<p>The Strategic Transport Plan outlines the need for investment in transport across the North and identifies the priority areas for improved connectivity and outlines Transport for the North’s vision for the future.</p> <p>The objectives of the Strategic Transport Plan are:</p> <ul style="list-style-type: none"> • Transforming economic performance • Increasing efficiency, reliability, integration, and resilience in the transport system • Improving inclusivity, health, and access to opportunities for all 	<p>The WRMP should seek to contribute to the objectives of the plan, where possible and appropriate to do so.</p> <p>The SEA should consider the potential effects of the WRMP on transport and infrastructure.</p>

Regional Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<ul style="list-style-type: none"> Promoting and enhancing the built, historic, and natural environment 	
United Utilities (2018) Final Drought Plan 2018	
<p>Drought Plans set out the steps that each water company will take through the stages of developing drought, drought, severe drought and recovery from drought to ensure their supply of water resources. Drought Plans must be produced by all water companies to fulfil their requirements under the Water Act 2003. United Utilities published its Final Drought Plan in June 2018. The Drought Plan provides a comprehensive statement of the actions that UUW will consider implementing during drought conditions in order to protect essential water supplies for customers and to minimise environmental impact. The Plan includes a range of drought management actions (linked to drought triggers), that can be broadly categorised as:</p> <ul style="list-style-type: none"> operational actions; communication actions; demand side actions (water efficiency campaigns, campaign for voluntary water use restraint, Temporary Use Ban, drought order to ban non-essential use); leakage control actions; resource management actions (non-commissioned sources; tankering); and drought permit/order actions. 	<p>The WRMP will need to be in accordance with UUW' Drought Plan.</p> <p>The SEA assessment framework should include a guide question on the effects of the WRMP on water resources and commentary on whether they affect the water resource zones' ability to manage drought.</p>
United Utilities (2019) Final Water Resources Management Plan 2019	
<p>Water Resources Management Plans (WRMPs) have been produced by all water companies to fulfil their requirements under the Water Act 2003. WRMPs set out how companies will manage the balance between supply and demand for water. Where supply demand deficits occur, water companies are required to identify options to address these deficits to ensure security of supply.</p>	<p>The SEA should include an objective/guide question relating to water resources.</p>

Regional Plans and Programmes	
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<p>Following on from the U UW 2015 WRMP, the U UW 2019 WRMP (covering the period 2020-2045), reflected the merging of the former West Cumbria and Integrated Resource Zones into the Strategic Resource Zone from 2022 onwards, through the construction of the new water treatment works and a pipeline between West Cumbria and Thirlmere Reservoir in order to use some of the spare water available in the Integrated Resource Zone. As such the WRMP19 identified that across all of the resource zones within the U UW operational area (Barepot, North Eden, Carlisle and Strategic Resource Zones), there would be surplus of water available for supply up to 2045.</p>	
United Utilities (2020) Revised Business Plan 2020-2025	
<p>The revised business plan sets various pledges from U UW for the period 2020-2025. The commitments and targets relate to; provision of water, disposal of wastewater, value for money, customer service and environmental protection.</p>	<p>The WRMP should seek to support the delivery of the Business Plan.</p> <p>The objectives and guide questions that comprise the SEA Framework should, where appropriate, reflect the priorities set out in this Business Plan.</p>
Water Company (various) Drought Plans	
<p>Drought Plans set out the steps that each water company will take through the stages of developing drought, drought, severe drought and recovery from drought to ensure their supply of water resources. Drought Plans must be produced by all water companies to fulfil their requirements under the Water Act 2003. Those Drought Plans relevant to the U UW's WRMP (in addition to the U UW Drought Plan identified above) are:</p> <ul style="list-style-type: none"> • Hafren Dyfrydwy Drought Plan 2020 -2025 • Dwr Cymru Welsh Water Final Drought Plan 2020 • Severn Trent Draft Drought Plan 2019-2024 • Yorkshire Water Drought Plan 2019 	<p>The WRMP will need to consider and be in accordance with the drought plans of neighbouring companies, where relevant.</p> <p>The SEA assessment framework should include a guide question on the effects of the WRMP on water resources and commentary on whether they affect the water resource zones' ability to manage drought. The baseline should, where</p>

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Regional Plans and Programmes	
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<ul style="list-style-type: none"> Northumbrian Water Final Drought Plan 2019 	<p>appropriate, take into account relevant information from neighbouring plans.</p>
Water Company (various) Water Resources Management Plans (published and draft)	
<p>Water Resources Management Plans (WRMPs) have been produced by all water companies to fulfil their requirements under the Water Act 2003. WRMPs set out how companies will manage the balance between supply and demand for water. Where supply demand deficits occur, water companies are required to identify options to address these deficits to ensure security of supply.</p> <p>Those published and draft neighbouring Water Resource Management Plans relevant to the plan are:</p> <ul style="list-style-type: none"> Hafren Dyfrydwy Final Water Resources Management Plan 2019 Dwr Cymru Welsh Water Final Water Resources Management Plan 2019 Severn Trent Final Water Resources Management Plan 2019 Yorkshire Water Revised Draft Water Resources Management Plan 2019 Northumbrian Water Final Water Resources Management Plan 2019 	<p>The WRMP should take account of neighbouring plans where appropriate.</p> <p>The SEA should include an objective/guide question relating to water resources.</p>
Welsh Government (2018) Castles and Town Walls of King Edward in Gwynedd World Heritage Site: World Heritage Site Management Plan 2018 – 28	
<p>In 2004, Cadw published its first comprehensive management plan for the World Heritage Site to help look after the site for the benefit of future generations. Since then, many of the objectives and actions have been achieved, including significant conservation work, installation of new visitor facilities, and new interpretation. Also during this period there have been several wider strategic developments such as updated local and unitary</p>	<p>The WRMP and SEA should consider the impact of any proposed developments on the Castles and Town Walls of King Edward in Gwynedd World Heritage Site.</p>

Regional Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<p>development plans, and new primary legislation in respect of the historic environment and the well-being of future generations in Wales.</p> <p>A new management plan has therefore been prepared to provide a clear strategy and vision for the World Heritage Site, and guide its management for the next ten years. This has been prepared following extensive stakeholder consultation.</p>	
<p>Wrexham County Borough Council British Waterways and the Royal Commission on the Ancient and Historical Monuments of Wales (2012) <i>Pontcysyllte Aqueduct and Canal World Heritage Site – Management Plan</i></p>	
<p>The Management Plan provide the framework by which the Outstanding Universal Value of a World Heritage Site will be maintained, sustained and communicated.</p>	<p>The WRMP and SEA should consider the impact of any proposed developments on the Pontcysyllte Aqueduct and Canal World Heritage Site.</p>
<p>Torfaen County Borough Council (2011) <i>Blaenavon Industrial Landscape World Heritage Site Management Plan</i></p>	
<p>Management of the Blaenavon Industrial Landscape World Heritage Site is co-ordinated by the Blaenavon World Heritage Site Partnership. The Partnership’s long-term vision for the Blaenavon World Heritage Site is as follows:</p> <p>The Blaenavon Industrial Landscape is cared for and presented so that future generations may understand the outstanding universal contribution South Wales made to the Industrial Revolution through exploring, enjoying and learning, thereby contributing to the economic, social, environmental and cultural well-being and prosperity of its communities.</p>	<p>The WRMP and SEA should consider the impact of any proposed developments on the Blaenavon Industrial Landscape World Heritage Site Management Plan and the long-term vision for its management.</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
Area of Outstanding Natural Beauty (AONB) Management Units (various) AONB Management Plans	
<p>The following AONBs are present in the U UW area:</p> <ul style="list-style-type: none"> • Arnside and Silverdale; • Forest of Bowland; • North Pennines; • Solway Coast. <p>The management plans for AONBs contain actions to ensure the protection and enhancement of the landscape.</p>	<p>WRMP options within AONBs should be consistent with the management plan.</p> <p>The SEA assessment framework should consider the effects of options on landscapes, including designated landscapes.</p>
Cheshire and Warrington Enterprise Partnership (2017) Cheshire and Warrington Matters, A Strategic and Economic Plan for Cheshire and Warrington	
<p>This strategy, refreshed in July 2017, is intended to be a high level, strategic road map to achieving growth ambition. It includes the deployment of funding for additional homes and new job opportunities.</p>	<p>The implementation of the WRMP may have an effect upon community cohesion, well being and continued prosperity within a sustainable environment.</p> <p>The SEA should seek to maintain and improve welfare and community infrastructure and maximise positive social impacts.</p>
Cumbria Strategic Partnership (2004) Sustainable Cumbria - A sub-regional strategy for Cumbria	
<p>This Strategy sets out a sustainable approach to securing economic growth, social progress and environmental protection and enhancement in Cumbria over the next 20 years.</p> <p>Objectives:</p> <ul style="list-style-type: none"> • Sustainable Cumbria will be a County that: • Celebrates its diversity, creativity and heritage; • Engages everyone in the mainstream of community life; 	<p>There may be some social, economic and environment effects associated with the implementation of the WRMP that may have effect upon the sustainable development and regeneration of the Cumbria sub-region.</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<ul style="list-style-type: none"> Retains and attracts the skilled and talented; Participates to the full as a competitive sub-region; Strengthens its infrastructure; Makes a positive contribution to the wealth of the North West; and, Marries economic growth with social progress and environmental protection and enhancement. <p>The strategy also includes 9 priority areas, 4 of these are town/area specific topics, the remaining 6 are:</p> <ul style="list-style-type: none"> Sustainable communities and well-being; High quality tourism; Strategic communications through improvements to the road, rail and air transport infrastructure; Creating wealth and a diversified economy; Rural regeneration; and, Addressing housing market failure and lack of affordable housing. 	<p>The SEA should seek to address the potential effects upon the local economy.</p>
Defra (2010) Eel Management Plans (various)	
<p>A total of 15 Eel Management Plans have been prepared covering the UK’s 15 river basin districts. The Plans set out actions aimed at reversing the decline in eel numbers, to ensure that at least 40% of potential adult eels will return to the sea to spawn. Those Plans relevant to the WRMP include the North West, Solway Tweed and Dee.</p>	<p>The WRMP should take account of relevant Eel Management Plan actions, where relevant.</p>
Environment Agency (various) Catchment Flood Management Plans	
<p>Catchment Flood Management Plans (CFMPs) give an overview of the flood risk across each river catchment. They recommend ways of managing those risks now and over the next 50-100 years. CFMPs consider all types of inland flooding, from rivers, ground water, surface water and tidal flooding, but not flooding</p>	<p>The WRMP should take the CFMPs into account.</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<p>directly from the sea, (coastal flooding), which is covered in Shoreline Management Plans. They also take into account the likely impacts of climate change, the effects of how we use and manage the land, and how areas could be developed to meet our present day needs without compromising the ability of future generations to meet their own needs.</p> <p>Those CFMPs present in the U UW area are:</p> <ul style="list-style-type: none"> • Alt Crossens CFMP • Derwent CFMP • Douglas CFMP • Irwell CFMP • Kent and Leven CFMP • Lune CFMP • Mersey Estuary CFMP • Ribble CFMP • South West Lakes CFMP • Upper Mersey CFMP • Weaver Goway CFMP • Wyre CFMP • Eden CRMP • Dee CFMP 	<p>The SEA should include a guide question relating to flood risk.</p>
Environment Agency and Natural Resources Wales (various) Salmon Action Plans	
<p>The aim of the action plans is to ensure the objectives set out in the National Salmon Strategy are met. They set out what needs to be done to support and restore salmon populations.</p> <p>Individual targets are set out in each action plan</p>	<p>The WRMP should consider its effects on salmon populations.</p> <p>The SEA assessment framework should include a</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
	guide question relating to the effects of options on fish.
Environment Agency (2013)(various) <i>Abstraction Licensing Strategies (CAMS process)</i>	
<p>This Licensing Strategies set out how the Environment Agency will manage the water resources of a catchment and contribute to implementing the WFD. It provides information about where water is available for further abstraction and an indication of how reliable a new abstraction licence may be.</p> <p>Strategies within the U UW area include:</p> <ul style="list-style-type: none"> • Derwent and West Cumbria • Eden and Esk • South Cumbria • Lune and Wyre • Ribble, Douglas and Crossens • Lower Mersey and Alt • Northern Manchester • Upper Mersey • Weaver and Dane • Dee 	<p>The WRMP should take the Strategy into account.</p> <p>The SEA should include a guide question relating to sustainable water use.</p>
Environment Agency and Scottish Environment Protection Agency (2021) <i>Draft River Basin Management Plans: 2021 (Various)</i>	
<p>River Basin Management Plans (RBMPs) set out how the water environment will be managed and provides a framework for more detailed decisions to be made. RBMPs set out a more integrated approach to river basin management based on the following principles:</p> <ul style="list-style-type: none"> • Integrate and streamline plans and processes; • Set out a clear, transparent and accessible process of analysis and decision-making; 	<p>The WRMP should reflect the broad targets set out in the RBMPs.</p> <p>The SEA objectives should reflect the need to manage water resources on a catchment basis in a sustainable manner to help</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<ul style="list-style-type: none"> • Focus at the river basin district level; • Work in partnership with other regulators; • Encourage active involvement of a broad cross-section of stakeholders; • Make use of the alternative objectives to deliver sustainable development; • Use Better Regulation principles and consider the cost-effectiveness of the full range of possible measures; • Seek to be even handed across different sectors of society and sectors of industry; • Seek to be even handed and transparent in the management of uncertainty; • Develop methodologies and refine analyses as more information becomes available. <p>RBMPs relevant to the U UW area are the North West, Solway Tweed and Dee.</p>	<p>improve the quality of water resources.</p>
Environment Agency, Defra, Natural Resources Wales and Natural Scotland (2015) (various) River Basin Management Plans	
<p>River Basin Management Plans (RBMPs) set out how the water environment will be managed and provides a framework for more detailed decisions to be made. RBMPs set out a more integrated approach to river basin management based on the following principles:</p> <ul style="list-style-type: none"> • Integrate and streamline plans and processes; • Set out a clear, transparent and accessible process of analysis and decision-making; • Focus at the river basin district level; • Work in partnership with other regulators; • Encourage active involvement of a broad cross-section of stakeholders; 	<p>The WRMP should reflect the broad targets set out in the RBMPs.</p> <p>The SEA objectives should reflect the need to manage water resources on a catchment basis in a sustainable manner to help improve the quality of water resources.</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<ul style="list-style-type: none"> • Make use of the alternative objectives to deliver sustainable development; • Use Better Regulation principles and consider the cost-effectiveness of the full range of possible measures; • Seek to be even handed across different sectors of society and sectors of industry; • Seek to be even handed and transparent in the management of uncertainty; • Develop methodologies and refine analyses as more information becomes available. <p>RBMPs relevant to the U UW area are the North West, Solway Tweed and Dee.</p>	
Environment Agency, Natural Resources Wales and SEPA (2016) Flood Risk Management Plans (various)	
<p>Flood Risk Management Plans (FRMPs) give an overview of the flood risk across each river catchment. They recommend ways of managing those risks now and over the next 50-100 years. FRMPs consider all types of inland flooding, from rivers, groundwater, surface water and tidal flooding. They also take into account the likely impacts of climate change, the effects of how we use and manage the land, and how areas could be developed to meet our present day needs without compromising the ability of future generations to meet their own needs. Policies for managing flood risk and proposed actions for implementation are set out for each of sub-areas within the FRMPs.</p> <p>Those FRMPs present in the U UW area are:</p> <ul style="list-style-type: none"> • North West river basin district flood risk management plan; • Dee river basin district flood risk management plan; and • Solway Tweed river basin district flood risk management plan. 	<p>The WRMP should take FRMPs into account.</p> <p>The SEA should include a guide question relating to flood risk.</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
Greater Manchester Combined Authority (2017), <i>Our People Our Place: Greater Manchester Strategy</i>	
<p>The strategy identifies ten priorities for the future of the Manchester city-region, to make it:</p> <ul style="list-style-type: none"> • A place where all children are given the best start in life and young people grow up inspired to exceed expectations. • A place where people are proud to live, with a decent home, a fulfilling job, and stress-free journeys the norm. But if you need a helping hand you'll get it. • A place of ideas and invention, with a modern and productive economy that draws in investment, visitors and talent. • A place where people live healthy lives and older people are valued. • A place at the forefront of action on climate change with clean air and a flourishing natural environment. • A place where all voices are heard and where, working together, we can shape our future. 	<p>There could be some social, economic and environmental effects associated with the implementation of the WRMP that may have effect with a particular focus upon a number of social, health and infrastructure related issues in the Manchester area.</p> <p>The SEA assessment framework should include objectives and guide questions relating to social and economic well-being, health, climate change and air quality.</p>
Hadrian's Wall Partnership Board (2015), <i>Hadrian's Wall Management Plan 2015-2019</i>	
<p>World Heritage Sites are required to have a Management Plan, as part of their management system, that sets out why the place is special; what will be done to conserve and enhance it over a five-year period, and what will be done to explain its significance to visitors. The Hadrian's Wall Management Plan (2015 – 2019) is the fourth edition of the Management Plan for the Hadrian's Wall World Heritage Site. The others were produced in 1996 - the first such Plan in the UK - in 2002, and in 2008*</p> <p>Objectives include:</p> <ul style="list-style-type: none"> • Informed management of the world heritage site; • Maintaining boundaries of the world heritage site. 	<p>The SEA should ensure that there are no negative direct or indirect impacts, for example during construction, on the world heritage site.</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<ul style="list-style-type: none"> • Protect the outstanding universal value (OUV) of the site using appropriate legislation, planning policy, guidance and management measures. • To maintain effective protection and management of the undesignated remains. • To pre-empt where possible direct and indirect threats to the OUV. • To manage the archaeological remains in the world heritage site. • To achieve a sustainable balance whereby the OUV can be • conserved within current and future land use. 	
Lake District National Park Authority (2006) A Vision for 2030	
<p>This vision will guide the review of the National Park Management Plan and development policies and plans within the Local Development Framework.</p> <p>Vision and objectives:</p> <p>The Lake District National Park will be an inspirational example of sustainable development in action. A place where its prosperous economy, world class visitor experiences and vibrant communities come together to sustain the spectacular landscape, its wildlife and cultural heritage.</p> <p>Local people, visitors, and the many organisations working in the National Park or have a contribution to make to it, must be united in achieving this.</p> <p>The 4 key elements of the National Park plan are:</p> <ul style="list-style-type: none"> • A Prosperous Economy – Businesses will locate in the National Park because they value the quality of opportunity, environment and lifestyle it offers – many will draw on a strong connection to the landscape. Entrepreneurial spirit will be nurtured across all sectors 	<p>The WRMP could help to ensure resources required to achieve the visions for local communities and economic development.</p> <p>The SEA should ensure that there are no negative impacts, for example during construction, on heritage sites.</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<p>and traditional industries maintained to ensure a diverse economy;</p> <ul style="list-style-type: none"> • World Class Visitor Experiences –High quality and unique experiences for visitors within a stunning and globally significant landscape. Experiences that compete with the best in the international market; • Vibrant Communities –People successfully living, working and relaxing within upland, valley and lakeside places where distinctive local character is maintained and celebrate; and • A Spectacular Landscape – A landscape which provides an irreplaceable source of inspiration, whose benefits to people and wildlife are valued and improved. A landscape whose natural and cultural resources are assets to be managed and used wisely for future generations. 	
Lake District National Park Authority (2008) Landscape Character Assessment and Guidelines	
<p>The Assessment seeks to provide a framework for developing a shared understanding of the current character of the Lake District’s landscapes and its future management needs. The specific aims and objectives for the two elements of the Assessment are:</p> <p>Character Assessment</p> <p><i>Aims</i></p> <ul style="list-style-type: none"> • To improve the knowledge and understanding of the Lake District landscape to help conserve and enhance the overall characteristics, qualities and diversity of landscape character, its sense of place and local distinctiveness; • To identify and understand factors influencing landscape change; and • To provide baseline data to facilitate future monitoring. <p><i>Objectives</i></p>	<p>The WRMP should recognise the importance of effective management of water as an issue for natural landscapes. The WRMP may also have an effect on access to the national park and recreational opportunities for local communities and visitors.</p> <p>The SEA should seek to protect the landscapes of the Lake District National Park; including the conservation and enhancement of the historic environment and the enrichment of biological diversity.</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<ul style="list-style-type: none"> • To highlight and describe the character of the physical, cultural, historical, ecological, visual and sensory landscape; • To identify past, present and future forces for change and describe their impacts; and • To assess the sensitivity to and capacity for change, for each defined landscape character unit. <p>Guidelines</p> <p><i>Aims</i></p> <ul style="list-style-type: none"> • To support a holistic approach to managing change and encourage the sustainable planning and management of the Lake District landscape including the conservation and enhancement of the historic environment and the enrichment of biological diversity. <p><i>Objectives</i></p> <ul style="list-style-type: none"> • To provide planning, management and design guidelines, integrated with the Local Development Framework and the National Park Management Plan, for each landscape character type and area of distinctive character; and • To suggest indicators for monitoring landscape change. 	
Lake District National Park Authority (2021) Local Plan	
<p>The Local Plan 2020 to 2035 sets out the strategy for all new development in the Lake District. It provides a practical framework within which decisions on planning applications can be made with a high degree of predictability and efficiency. Local Plans are where some of the big decisions on planning for the future of our communities and use of land are made.</p> <p>The Local Plan provides planning policies which steer development decisions and guide planning applications. This Plan sets out the strategic policies we consider necessary to address the strategic priorities within the Lake District. These do not extend to detailed matters that are more appropriately dealt with through neighbourhood plans. As well as providing</p>	<p>The WRMP should have regard of the Local Plan.</p> <p>The SEA assessment framework should consider the effects of the WRMP on the achievement of the Plans' visions.</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<p>guidance to assess day to day planning applications, it also identifies where and how many new homes should be built, the locations where businesses need more land to expand or to create new jobs and which areas should be protected from development.</p>	
Lake District National Park Authority – Partnership’s Management Plan 2020-2025	
<p>This report summarises the progress made by the Lake District National Park Partnership to deliver Vision for the National Park. The findings of this report will be used to develop the next Partnership Plan.</p>	<p>The WRMP should recognise the importance of effective management of water as an issue for natural landscapes. The WRMP may also have an effect on access to the national park and recreational opportunities for local communities and visitors.</p> <p>The SEA should seek to protect the landscapes and environment of the Lake District National Park.</p>
Local Biodiversity Action Plans (BAPs) (various)	
<p>Each Local Biodiversity Action Plan works on the basis of partnership to identify local priorities and to determine the contribution they can make to the delivery of the national Species and Habitat Action Plan targets. They include targets for increasing and enhancing biodiversity.</p> <p>Species Action Plans set objectives with regard specific species and set out proposed actions and targets along with which agency will be responsible for carrying them out.</p> <p>Habitat Action Plans sets objectives with regard specific UK habitats and sets out proposed actions targets along with which agency will be responsible for carrying them out.</p> <p>Local Biodiversity Actions Plans relevant to the U UW area are:</p> <ul style="list-style-type: none"> • Cumbria; 	<p>WRMP options should take into account BAP objectives.</p> <p>The SEA assessment should consider effects of options on biodiversity and outline enhancement and mitigation opportunities where these are identified.</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<ul style="list-style-type: none"> • Greater Manchester; • Lancashire; • Cheshire; • North Merseyside; • Powys. 	
Local Planning Authority (various) Land Use Plans	
<p>The U UW area covers a large number of Local Planning Authorities. Additionally, Local Development Plans prepared by local authorities in Wales may also be relevant to the WRMP and SEA. The main objectives of the existing and emerging Land Use Plans in these areas are related to the sustainable development of the area.</p>	<p>The SEA should seek to ensure the WRMP options should be consistent with the Land Use Plans of those local authorities that will be affected by the option.</p>
Local Geodiversity Action Plans (LGAPs)	
<p>Local Geodiversity Action Plans (LGAPs) set out actions to conserve and enhance the geodiversity of a particular area. In general they aim to identify, conserve and enhance the best sites that represent the geological history of an area. They also aim to promote geological sites, provide a local geodiversity audit and influence local planning policy.</p> <p>Currently, LGAPs exist or are in development for Cheshire Region, Cumbria, Greater Manchester, Lancashire, West Yorkshire, North Pennines AONB and Clwydian Range.</p>	<p>The WRMP options should take into account the aims of the LGAPs.</p> <p>The SEA assessment should consider effects of options on geodiversity and outline enhancement and mitigation opportunities where these are identified.</p>
Local Planning Authority (various) Local Plans/Local Development Plans	
<p>The U UW assessment area includes a large number of Local Planning Authorities, identified as:</p> <ul style="list-style-type: none"> • Cheshire East • Cheshire West and Chester; • Halton Borough Council; • Warrington Borough Council; • Allerdale Borough Council; 	<p>The WRMP should have regard of the Local Plans and emerging Local Plans.</p> <p>The SEA assessment framework should consider the effects of the WRMP on the achievement of the Plans' visions and the effects of</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<ul style="list-style-type: none"> • Copeland Borough Council; • Barrow In-Furness Borough Council; • Carlisle City Council; • Cumbria County council; • Eden District Council; • South Lakeland District Council; • Bolton Metropolitan Borough Council; • Bury Metropolitan Borough Council; • Manchester City Council; • Oldham Metropolitan Borough Council; • Rochdale Metropolitan Borough Council; • Salford City Council; • Stockport Metropolitan Borough Council; • Tameside Metropolitan Borough Council; • Trafford Metropolitan Borough; • Wigan Metropolitan Borough Council; • Blackburn with Darwen Borough Council; • Blackpool Council; • Burnley Borough Council; • Chorley Borough Council; • Fylde Borough Council; • Hyndburn Borough Council; • Lancashire County Council; • Lancaster City Council; • Pendle Borough Council; • Preston City Council; 	<p>options on sustainable land use.</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<ul style="list-style-type: none"> • Ribble Valley Borough; • Rossendale Borough Council; • South Ribble Borough Council; • West Lancashire Borough Council; • Wyre Borough Council; • Knowsley Metropolitan Borough Council; • Liverpool City Council; • Sefton Council; • St. Helens Metropolitan Borough Council; • Wirral Metropolitan Borough Council; • Bradford District Council; • Calderdale Metropolitan Borough Council; • Craven District Council; • High Peak Borough Council; • Kirklees Metropolitan Borough Council; • Newcastle-under-Lyme Borough Council; • Richmondshire District Council; • Staffordshire Moorlands District Council; • Lake District National Park Authority; 	
Local Wildlife Trust Strategies (various)	
<p>The following local Wildlife Trusts are present in the U UW area:</p> <ul style="list-style-type: none"> • Cumbria Wildlife Trust; • Lancashire Wildlife Trust; • Cheshire Wildlife Trust; and • Derbyshire Wildlife Trust. 	<p>The WRMP should have regard to the protection of local wildlife.</p> <p>The SEA assessment framework should consider the effects of the options on biodiversity.</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<p>The objectives/outcomes of the plans are largely related to the conservation of wildlife and wild places and enjoyment of wildlife by the public, as well as ensuring the effectiveness of the Trust as an organisation.</p>	
National Park Management Plans (various)	
<p>The following National Parks/management plans are present in the U UW area:</p> <ul style="list-style-type: none"> • Lake District National Park Authority – Partnership’s Management Plan 2020-2025 • Peak District National Park Management Plan 2018-2023 • Snowdonia National Park Partnership Plan 2020 • Yorkshire Dales National Park Management Plan 2019-2024 <p>The management plans for National Parks contain actions to ensure the protection and enhancement of the landscape and natural environment of these areas.</p>	<p>WRMP options within the National Parks should be consistent with the respective management plan.</p> <p>The SEA assessment framework should consider the effects of options on landscapes and the natural environment, including designated areas. Proposed extensions to the National Park boundaries should also be recognised where appropriate.</p>
Natural England, Site Improvement Plans (SIPs) for Natura 2000 Sites (various)	
<p>Site Improvement Plans (SIPs) have been developed for each Natura 2000 site in England as part of the Improvement Programme for England’s Natura 2000 Sites (IPENS).</p> <p>The plan provides a high level overview of the issues (both current and predicted) affecting the condition of the Natura 2000 features on the site(s) and outlines the priority measures required to improve the condition of the features. It does not cover issues where remedial actions are already in place or ongoing management activities which are required for maintenance.</p> <p>There are a number of Natura 2000 sites within the U UW operational area.</p>	<p>The WRMP should seek to avoid contributing to any issues affecting the condition of Natura 2000 site features and contribute to their improvement where appropriate.</p> <p>The SEA should include and objective and guide questions related to the protection of biodiversity and designated species and habitats.</p>
Natural England National Character Area (NCA) Profiles (various)	

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<p>There are over 30 NCAs within UUW’s operating boundary. Each of these have individual objective relating to specific landscapes, habitats and species.</p> <p>Generalised objectives for each of these include:</p> <ul style="list-style-type: none"> • Conserve characteristic historic structures • Protect the area's rich and diverse archaeology • Protect the area's high levels of tranquility • Protect, manage and enhance the good rights of way network • Manage and enhance existing habitats • Encourage the maintenance of traditional land management practices • Protect, and encourage sympathetic management • Protect and manage geological features • Plan for climate change mitigation and adaptation 	<p>The WRMP may have an effect on NCAs.</p> <p>The SEA should include objectives that take into account the objectives of the NCAs where relevant (e.g. manage and enhance existing habitats).</p>
Natural England and Environment Agency (various) River Restoration and Water Level Management Plans	
<p>Cumbria River Restoration Strategy</p> <p>The Cumbria River Restoration Strategy was developed to help deliver the joint Natural England/Environment Agency drivers to improve the quality and function of three riverine SSSI/SAC sites; the Eden, Derwent and Kent catchments. River restoration interventions reinstate natural river processes that provide benefits to both people and wildlife.</p>	<p>The WRMP should seek to support the delivery of the aims of the strategy, where appropriate.</p> <p>The SEA should include and objective and guide questions related to the protection of biodiversity, designated species and habitats and restoration of rivers.</p>
Outline Water Cycle Studies	
<p>Water cycle studies identify tensions between growth proposals, particularly housing development, and environmental</p>	<p>The WRMP should take into account any water cycle</p>

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<p>requirements, and identify potential solutions to addressing them. Outline Water Cycle Studies have been prepared for Mid Mersey (Warrington Borough Council, Halton Borough Council and St. Helens Council), Cheshire West and Chester and Central Lancashire and Blackpool Councils have jointly prepared an Outline Water Cycle Study. The strategic objectives for Outline Water Cycle Studies are to:</p> <ul style="list-style-type: none"> • Identify whether environmental resources can cope with further development, with particular reference to Water Framework Directive targets and UKCP09 climate change projections (i.e. can growth be accommodated without breaching water quality and abstraction limits); • Identify any potential impacts of development on the specially designated conservation sites and watercourses in the specified areas and other sites or features of significant nature conservation importance resulting from additional abstraction and wastewater discharge; 	<p>studies completed for identified growth areas (Mid Mersey, Cheshire West and Chester, Central Lancashire and Blackpool).</p> <p>The SEA assessment framework should include an objective relating to the efficient management of water.</p>
Public Rights of Way Improvement Plans (ROWIPs)	
<p>Most local authorities have a rights of way improvement plan. The plan must explain how improvements made by the local authority to the public rights of way network in their area will provide a better experience for these users:</p> <ul style="list-style-type: none"> • walkers • cyclists • horse riders • horse and carriage drivers • people with mobility problems • people using motorised vehicles, e.g. motorbikes <p>Objectives include those associated with each local authority's rights of way improvement plans.</p>	<p>The WRMP may have the potential to affect the objectives of the ROWIPs.</p> <p>The SEA should include objectives that take into account the objectives of the ROWIPs where relevant.</p>
West Lancashire Partnership	

Sub-Regional/Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	Relationships and Influences on the WRMP and the SEA
<p>The West Lancashire partnership involves several organisations working together to improve the health, care and wellbeing of people living in West Lancashire, superseding the One West Lancs Partnership, which was formed in April 2013, and is a partnership of local voluntary, public and business sectors.</p> <p>The partnership is working towards a common vision: ‘A place where we help each other, ourselves and our communities to be the very best we can be.’</p> <p>The key aims of the West Lancashire Partnership are arranged into 4 categories:</p> <ul style="list-style-type: none"> • Health and Wealth • Caring for You • Caring for Yourself • Place 	<p>There may be some economic effects associated with the implementation of the WRMP and the future management of water resources in the north west. The WRMP may also have some effects upon recreational and leisure opportunities. This may have an impact upon some of the strategic ambitions set out in the objectives of the West Lancashire Partnership.</p> <p>The SEA should seek to address the potential effects upon the local economy.</p>

FINAL

Appendix D

Baseline Analysis

8.1 Biodiversity, Flora and Fauna

Baseline Characteristics

Biodiversity is defined as 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 is important in its own right and has value in terms of quality of life and amenity.

The North West of England is rich in areas of biodiversity interest, and it contains some of the most varied upland and lowland terrain in England. The North West Biodiversity Audit⁶⁹ shows that the region contains 31 out of the 37 different 'Broad Biodiversity Action Plan habitat classifications', one of the most diverse in the country. Wildlife indicators show that the region is also a haven for a significant number of species, with 135 rare species that are a UK or regional priority to protect.

The region also includes a number of sites that are designated at a European, national or local level as important for biodiversity, including:

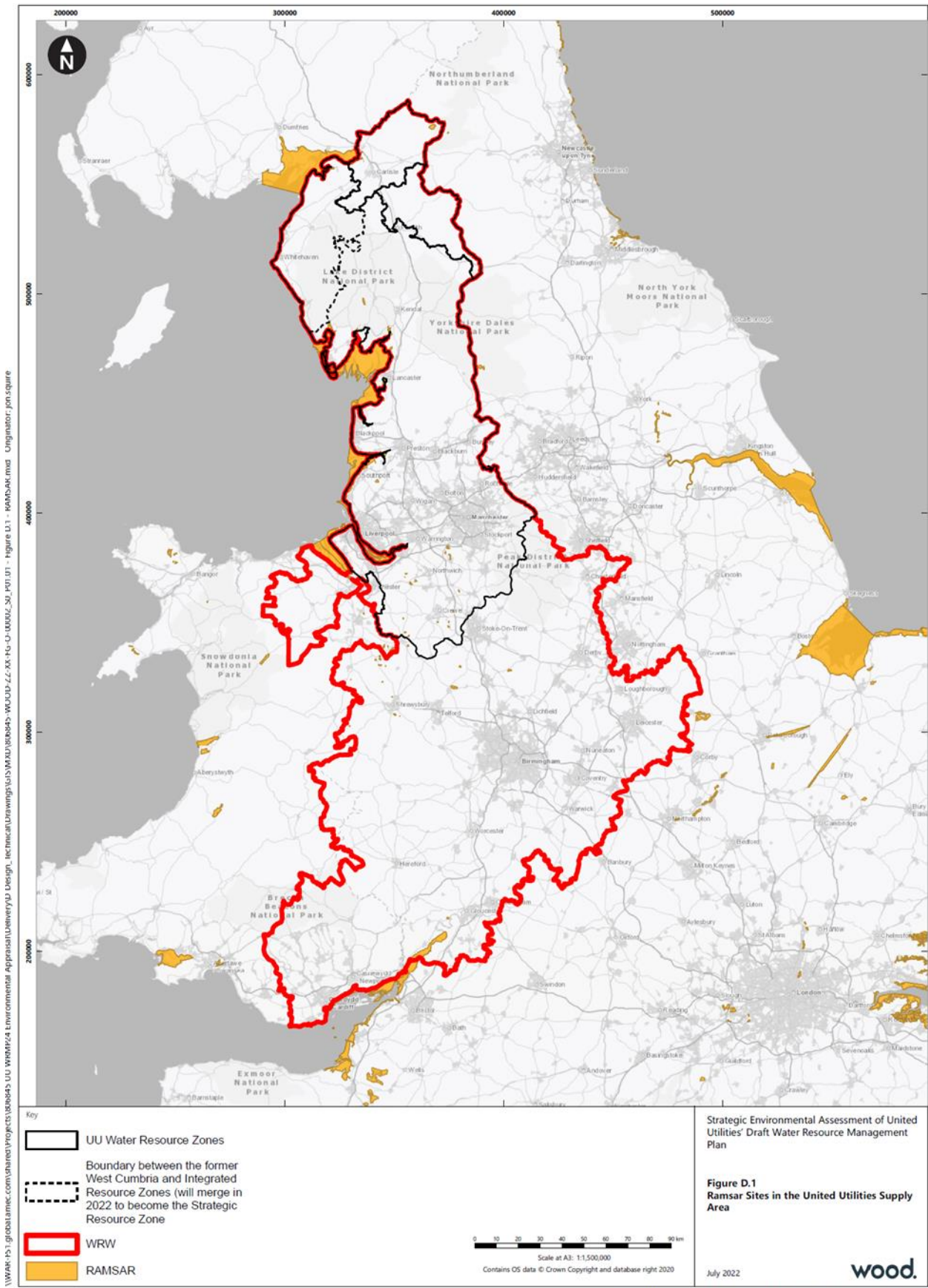
- 18 Ramsar Sites;
- 14 Special Protection Areas (SPA);
- 42 Special Areas of Conservation (SAC);
- 451 Sites of Special Scientific Interest (SSSI);
- 4 Marine Conservation Zones (MCZ);
- 32 National Nature Reserves (NNR);
- 154 Local Nature Reserves (LNR).

The distribution of designated sites across UUW's supply area (including North Wales) is shown in **Figures D.1 to D.5**.

⁶⁹ North West Biodiversity (1999) *Wild About the North West: A Biodiversity Audit of North West England*.

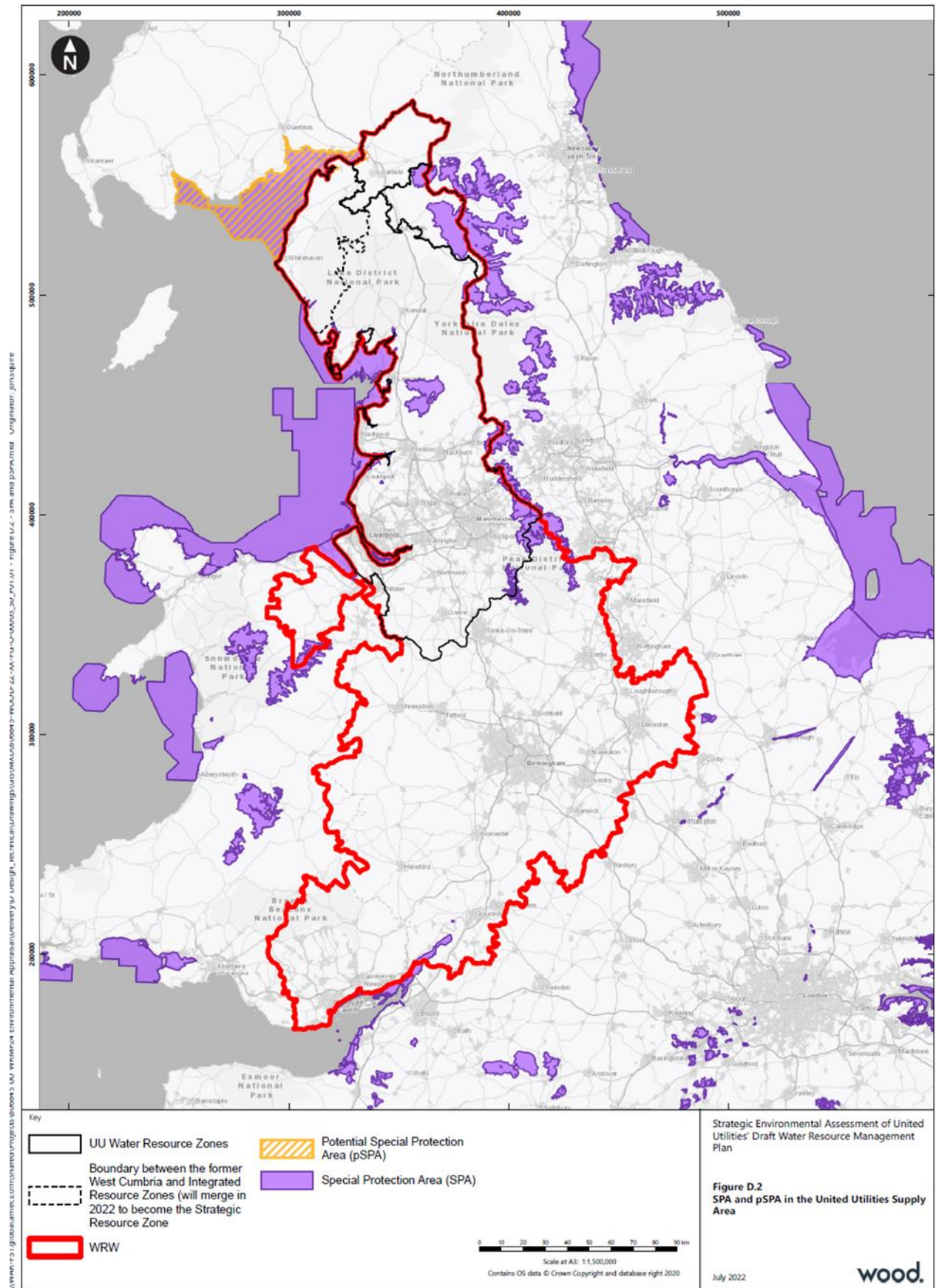
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Figure D.1 Ramsar Sites in the United Utilities Water Supply Area and North Wales



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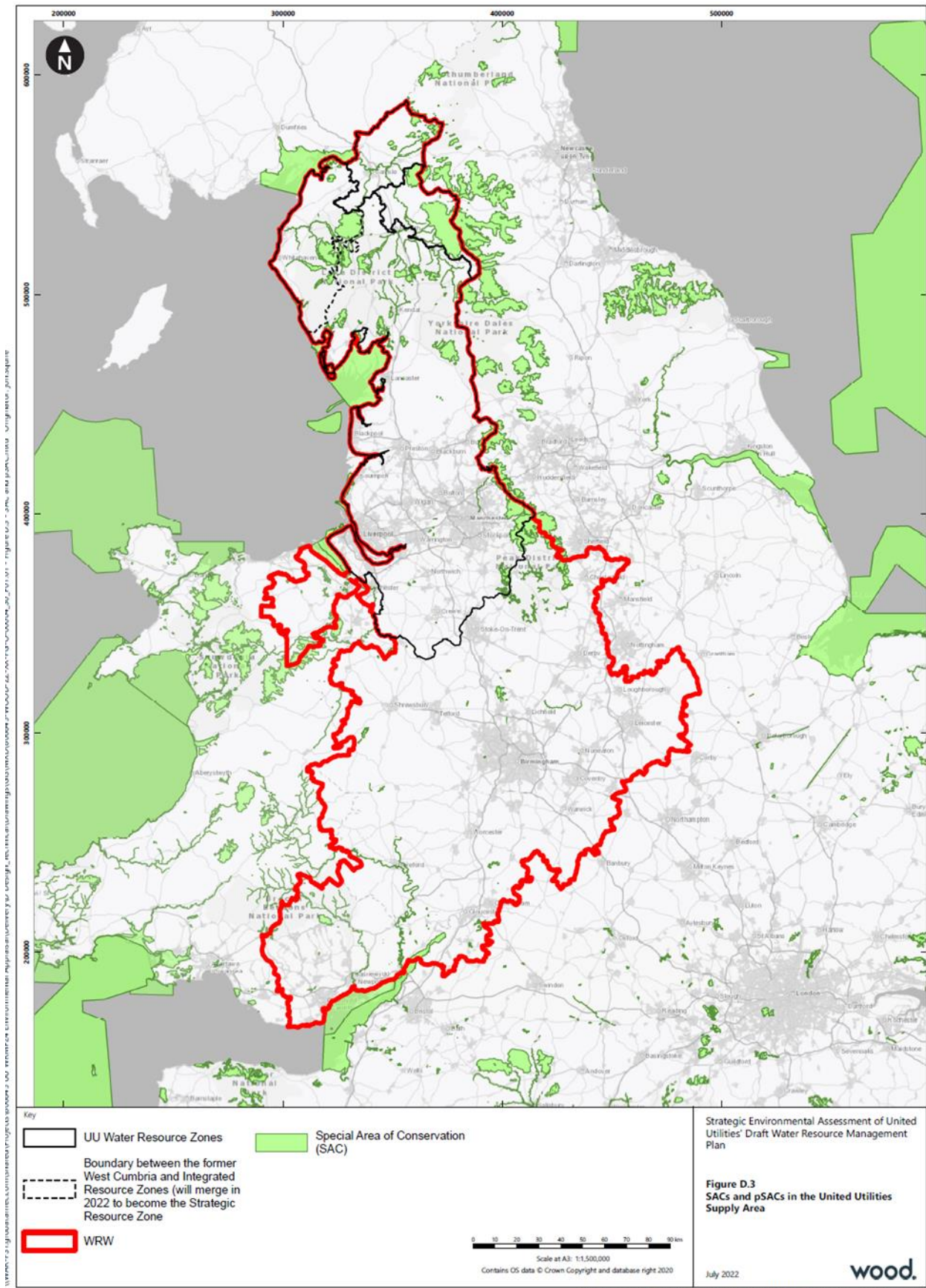
Figure D.2 SPAs and pSPAs in the United Utilities Water Supply Area and North Wales



806845-WOOD-ZZ-XX-FG-O-00003_S0_P01.01 - Figure D.2 - SPA and pSPA

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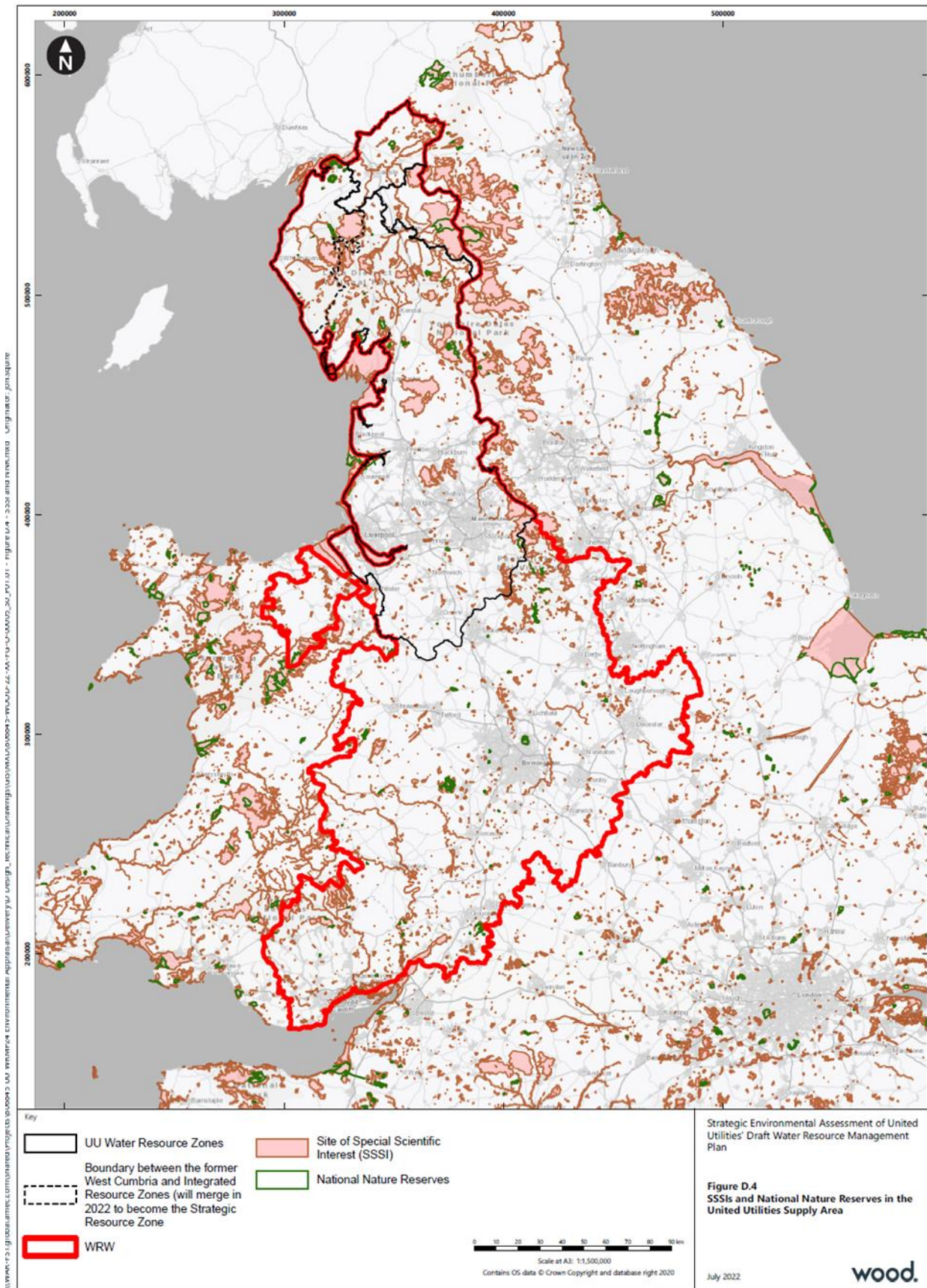
Figure D.3 SACs and pSACs in the United Utilities Water Supply Area and North Wales



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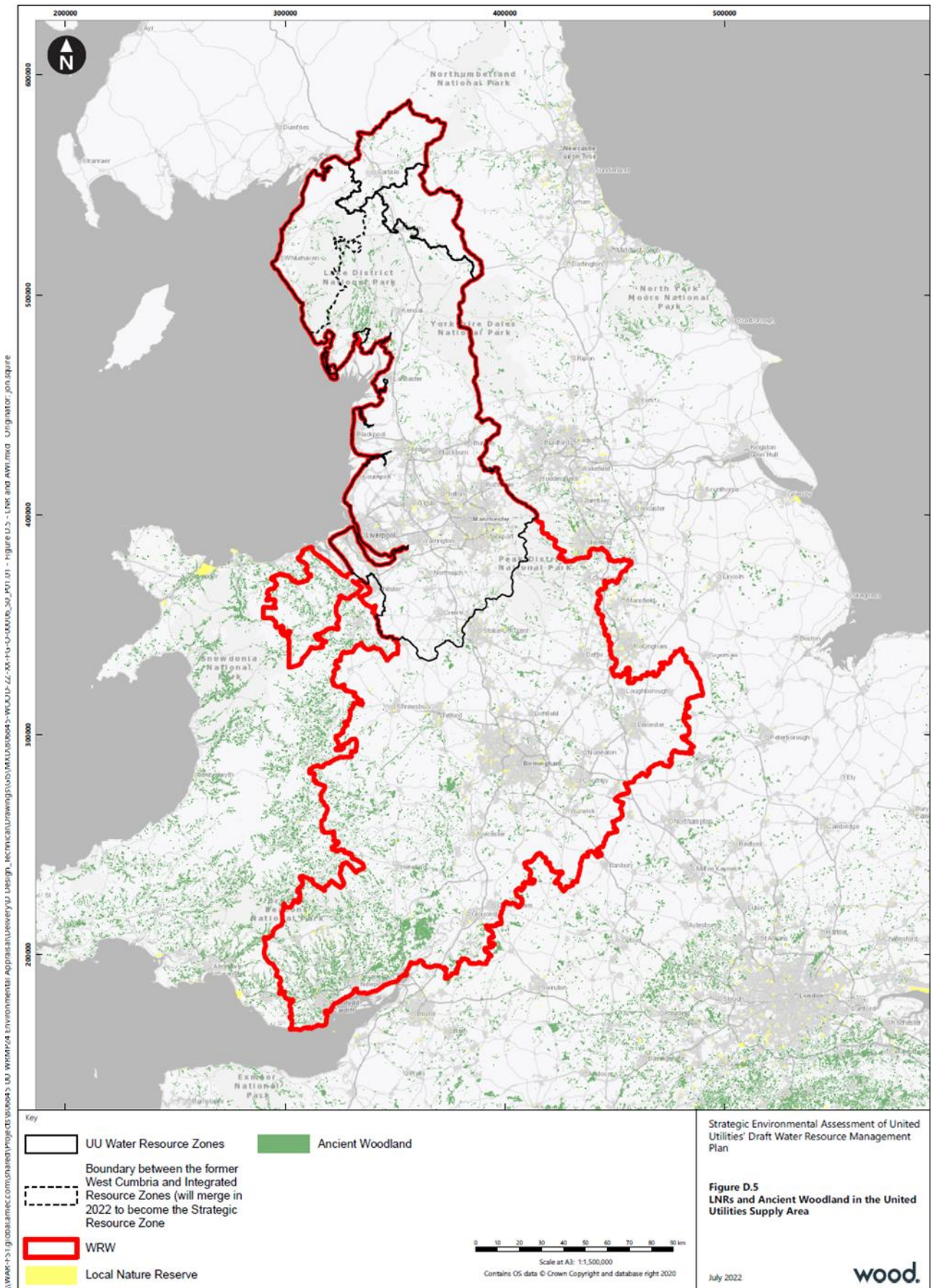
Figure D.4 SSSI and NNRs in the United Utilities Water Supply Area and North Wales



806845-WOOD-ZZ-XX-FG-O-00005_S0_P01.01 - Figure D.4 - SSSI and NNR

FINAL

Figure D.5 LNRs and Ancient Woodland in the United Utilities Water Supply Area and North Wales



FINAL

Information provided by the Natural England database indicates that an area of at least 21,300ha of freshwater, wetland and peatland habitat is designated in the North West, comprising over 400 SSSIs, with much of this area also designated as SPA, SAC and/or Ramsar Site. In Cumbria alone, there are 634km of SAC river systems, including within them approximately 2,500ha of component lakes. A total of 31 lakes and tarns in Cumbria are designated as open water SSSIs. In addition to these SSSIs designated specifically for their freshwater and wetland interest, there are numerous additional SSSIs and international sites with freshwater and wetland habitats present as an important component feature within the wider site.

The condition of habitats in the region has improved over recent years, and this is reflected in a gradual increase in woodland and farmland wild bird populations, one of the UK's key indicators for biodiversity. Improvements in inland and coastal water based habitats have also seen a noteworthy increase in numbers of otters, salmon and trout in some areas. However, the long-term regional population trends for some of these species is still showing a general decline.

The Biodiversity 2020 strategy⁷⁰ contains the UK Governments commitment to improving the condition of more SSSIs to favourable condition. As at July 2022, across the whole of England the number of SSSIs identified as having a condition of 'favourable' or 'unfavourable recovering' was 88.7% (38.15% and 50.55% respectively)⁷¹. As at July 2022, 83.51% of the North West's SSSIs were in 'favourable' or 'unfavourable recovering' condition (41.86% and 41.65% respectively) whilst 10.03% were classified as being in 'unfavourable no change' condition and 6.42% were classified as being in 'unfavourable declining' condition⁷².

To the west of United Utilities' operational area, the West Cheshire and North East Wales area contains some significant areas that are protected nationally or internationally. This includes the Clwydian Range Area of Outstanding Natural Beauty (AONB), a 35km long chain of hills rising between the Vale of Clwyd to the west and the Dee Estuary to the east. The area also has 8 SACs, 4 SPAs and 3 Ramsar Sites including the Dee Estuary, an area deemed of particular importance for its internationally recognised population of wintering waterfowl and waders.

To the north west of United Utilities' operational area (crossing the border between England and Scotland) is the Solway Firth Estuary, which is internationally and nationally designated (Solway Firth SAC/SPA/ Upper Solway Flats & Marshes Ramsar/SSSI – shown in **Figures D.1 to D.4**) due to the importance of its habitats, including sandbanks, estuary, mudflats and sandflats, saltmarshes and salt meadows, which make the estuary of national and international importance for internationally recognised species including wintering wildfowl and wading birds and it is a vital link in a chain of west coast estuaries used by migrating birds⁷³.

The River Dee and Bala Lake SAC, meanwhile, are part of a network of water resources used by United Utilities. The River Dee flows from Llyn Tegid and is important for a range of species and habitats including migratory fish, particularly salmon, and three species of lamprey. The Dee is also

⁷⁰ Defra (2011) *Biodiversity 2020: A strategy for England's wildlife and ecosystem services*.

⁷¹ Natural England (2022) *SSSI Condition Summary*. Available online at: <https://designatedsites.naturalengland.org.uk/ReportConditionSummary.aspx?SiteType=ALL> [Accessed July 2022].

⁷² Natural England (2022) *Condition of SSSI Units in Region: North West*. Available online at: <https://designatedsites.naturalengland.org.uk/SearchRegion.aspx> [Accessed July 2022]

⁷³ JNCC (2005) *Information Sheet on Ramsar Wetlands (RIS)* Available online at: <https://rsis.ramsar.org/RISapp/files/RISrep/GB341RIS.pdf> [Accessed July 2022]

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important for its population of otters, which live and breed in the river and tributaries throughout the catchment, and for bullhead which are widespread throughout the river system. The State of Natural Resources Report (SoNaRR) for Wales published by Natural Resources Wales⁷⁴ highlights that as at 2013, the condition of SAC and SPA species features on sites in Wales remained mostly unfavourable (55%), with the exception of birds and mammals of which 86% and 68% were in favourable condition, respectively.

There has been a dramatic increase in the number of non-native species arriving in Britain over recent decades, as well as in the numbers of invasive species being established⁷⁵. There are approximately 2,000 non-native species establish in Britain, with the majority in the terrestrial environment and smaller numbers in marine and freshwater environments. Non-native species cause significant adverse impacts, including out-competing native species and spreading disease. The UK Government 2015 strategy on invasive non-native species⁷⁶ builds on previous strategies to provide a framework for coordination action to prevent spread and work to eradicate species across the UK.

United Utilities owns some 57,000 ha of land, much of which is of high value in terms of nature conservation and recreational use. 30% of the land within United Utilities' ownership is designated as SSSIs, and United Utilities is helping to protect these sites as part of its obligation to conserve and enhance these areas. This has included working with partners such as the Royal Society for the Protection of Birds (RSPB), Natural England and the Forestry Commission on a Sustainable Catchment Management Programme (SCaMP) project, which began in 2005. This scheme has helped to:

- protect and improve water quality;
- reduce the rate of increase in raw water colour which will reduce future revenue costs;
- reduce or delay the need for future capital investment for additional water treatment;
- deliver Government targets for SSSIs;
- ensure a sustainable future for the company's agricultural tenants;
- enhance and protect the natural environment;
- permit moorland habitat to become more resilient to long term climate change; and
- allow healthy upland peat moors to absorb significant volumes of carbon from the atmosphere.

SCaMP 3 (the third iteration of the programme) was driven by drinking water safeguard zones i.e., drinking water catchments where water quality in rivers, reservoirs or groundwater has been

⁷⁴ Natural Resources Wales (2020) *The State of Natural Resources Report (SoNaRR)*. Available online at: <https://naturalresources.wales/evidence-and-data/research-and-reports/state-of-natural-resources-report-sonarr-for-wales-2020/?lang=en> [Accessed July 2022].

⁷⁵ Defra (2012) *Non-Native Species in Great Britain: establishment, detection and reporting to inform effective decision making*. Available online at: <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=16281> [Accessed July 2022]

⁷⁶ Defra (2015) *The Great Britain Invasive Non-native Species Strategy*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/455526/gb-non-native-species-strategy-pb14324.pdf [Accessed July 2022]

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deteriorating and was becoming harder to treat, due to human activities on the land. Between 2015 and 2020, United Utilities invested in 29 projects under SCaMP 3. The Catchment Wise initiative has also been put in place to drive similar change around wastewater issues, in order to tackle pollution at source to improve the quality of water in lakes, rivers and the sea.⁷⁷

United Utilities' Catchment Systems Thinking (CaST) approach (an evolution of the SCaMP), has taken these programmes forward and sets out to manage catchments in a holistic, integrated manner to meet the needs of the whole catchment, considering what is best for the environment and communities, by viewing water and wastewater in an integrated way, and the environment as a connected system⁷⁸.

Non-statutory Protected Sites and Other Biodiversity

There are over 100 LNRs across the North West region, in addition to numerous Local Wildlife Sites. Local Wildlife Sites include the following:

- **Cumbria:** over 1,600 County Wildlife Sites, including ancient woodland, species-rich grasslands, wetlands, roadside verges and hedgerows.⁷⁹
- **Lancashire:** over 1,100 Biological Heritage Sites, covering 25,000 ha. This represents 8% of the county's area.
- **Greater Manchester:** more than 500 sites, which are known as Sites of Biological Importance⁸⁰.
- **North Merseyside:** 161 Local Wildlife Sites in the area.⁸¹
- **Cheshire:** around 1,000 Local Wildlife Sites, covering over 15,000 ha and representing 5.75% of the total area of Cheshire.⁸²
- **Derbyshire:** 1,179 Local Wildlife Sites covering almost 10,000 ha (outside of the Peak District National Park).⁸³

⁷⁷ United Utilities (2022) *Catchment Management*. Available online at: <https://corporate.unitedutilities.com/corporate/responsibility/stakeholders/catchment-systems-thinking/catchment-management/> [Accessed July 2022]

⁷⁸ United Utilities (2022) *CaST Catchment Systems Thinking*. Available online at: <https://collab-uu.co.uk/cast/> [Accessed July 2022]

⁷⁹ Cumbria Wildlife Trust, *County Wildlife Sites in Cumbria*. Available online at: <http://www.cumbriawildlifetrust.org.uk/what-we-do/county-wildlife-sites> [Accessed July 2022].

⁸⁰ Greater Manchester Ecology Unit (GMEU), *Sites of Biological Importance (SBI / LWS) in Greater Manchester (Spreadsheet)*. Available online at: <https://data.gov.uk/dataset/81cbf1a0-6304-470c-ade8-60272be0d219/sites-of-biological-importance-sbi-lws-in-greater-manchester> [Accessed July 2022]

⁸¹ Merseyside Biodiversity Group (2008) *North Merseyside Local Wildlife Site Selection Guidelines*. Available online: <http://www.merseysidebiodiversity.org.uk/download/north-merseyside-local-wildlife-site-selection-guidelines/> [Accessed July 2022].

⁸² Cheshire Wildlife Trust, *Local Wildlife Sites (LWS)*. Available online at: <https://www.cheshirewildlifetrust.org.uk/wildlife/our-work-wildlife/our-work-wildlife/local-wildlife-sites> [Accessed July 2022]

⁸³ Derbyshire Wildlife Trust, *Local Wildlife Sites*. Available online at: <https://www.derbyshirewildlifetrust.org.uk/local-wildlife-sites> [Accessed July 2022]

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In Wales, 557 species are identified under Section 7 of the Environment (Wales) Act 2016, which specifies species of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales. This comprises:

- 188 invertebrates;
- 67 lichens;
- 77 vascular plants;
- 51 birds;
- 55 marine species;
- 52 mosses and liverworts;
- 27 fungi;
- 5 stoneworts;
- 17 mammals;
- 10 fish; and
- 8 amphibians and reptiles.⁸⁴

Across the UK, 177 priority species (15%) are classified as internationally threatened whilst 324 priority species (28%) have suffered a marked decline in the UK.⁸⁵

Likely Evolution of the Baseline without the WRMP

Current trends in data have shown that the condition of SSSIs in the region has improved over the recent years. Considerable effort is being made to ensure that the condition of SSSIs improves and condition assessments are undertaken regularly, as such, the condition of SSSIs in the region is likely to continue to improve.

In the Biodiversity Strategy 2020, the Government has outlined an aspiration to maintain at least 95% of SSSIs in favourable or unfavourable recovering condition, therefore a range of measures are included in the management plans to contribute towards either maintaining or improving the conditions of each site. Further to this, there are several legislative instruments, including the Habitats Regulations and the UK's Restoring Sustainable Abstraction programme, which should contribute towards future improvements to the quality of habitats in the region.

Trend data has also shown that otters are showing a gradual increase in numbers in recent years and this trend is expected to continue⁸⁶. However, salmon and eel stocks in the North West and North Wales have shown a decline over recent years, in common with a wider national trend⁸⁷. Eel

⁸⁴ Wales Biodiversity Partnership (2021) *Section 7 lists: Section 7 Priority species*. Available online at: <https://www.biodiversitywales.org.uk/Environment-Wales-Act> [Accessed July 2022]

⁸⁵ JNCC (2010) *Priority Lists Spreadsheet*. Available online at: <http://jncc.defra.gov.uk/page-5717> [Accessed July 2022].

⁸⁶ Environment Agency, North West Environment Summary

⁸⁷ Environment Agency, North West Regional Contribution 2010-2015 Evidence Pack

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Management Plans (EMPs) have been prepared for every River Basin District in England and Wales, which set out actions to halt and reverse the decline in the European eel stock.

Wild bird species indicators have shown an increase in the incidence of farmland and woodland bird species in the region. However, this is in contrast to national trends and as such, possible future trends for the region are difficult to predict or determine.

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. There is, therefore, a need to allow wildlife to adapt to climate change, in line with the Government's ambition for the reversal of the decline in native species and increase in wildlife-rich habitats⁸⁸.

Key Issues Relevant to the WRMP

The key issues relevant to the WRMP and the SEA arising from the analysis of the biodiversity baseline are:

- key pressures and risks in respect of biodiversity and nature conservation that are relevant include, inter-alia:
 - ▶ population growth;
 - ▶ habitat loss and fragmentation by development;
 - ▶ agricultural intensification and changes in agricultural management practices;
 - ▶ water abstraction, drainage or inappropriate river management;
 - ▶ lack of appropriate habitat management;
 - ▶ atmospheric pollution (acid precipitation, nitrogen deposition);
 - ▶ water pollution from both point and wider (diffuse) agricultural sources;
 - ▶ climate change and sea level rise;
 - ▶ recreational pressure and human disturbance; and
 - ▶ invasive and non-native species.
- the need to protect, maintain or enhance biodiversity, ecological functions and biodiversity connectivity within United Utilities' supply and source areas, particularly protected sites designated for nature conservation;
- the need to promote the resilience of ecosystems;
- the need to continue to increase and improve the condition of priority habitats and habitats of priority species, and restore populations of these species and other specially protected species;

⁸⁸ Defra (2019) *Annexes to the Environment Bill*. Available online at: <https://publications.parliament.uk/pa/bills/cbill/58-01/0009/Environment%20Bill%20IA%20ANNEXES.pdf> [Accessed July 2022]

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- the need to avoid, and mitigate against where necessary, activities likely to cause irreversible damage to natural heritage;
- the need to take opportunities to improve connectivity between fragmented habitats to create functioning habitat corridors;
- the need to control the spread of Invasive Non-Native Species (INNS) and eradicate where already present;
- 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.

8.2 Geology, Land Use and Soils

Baseline Characteristics

Geology

There is a great diversity in the composition of geology across the North West region. The majority of the lowland Cheshire plains, Merseyside and western Lancashire are dominated largely by Triassic mudstone and sandstone. The uplands of Cumbria are partly made up of volcanic igneous rock from the Devonian period. Moving eastwards towards the Yorkshire Dales, the geology becomes dominated by distinctive carboniferous limestone, and south into Lancashire millstone grit and coal becomes abundant.

As a broad overview of Welsh geology, the following rock types exist in a progression from North West to South East (predominant rock types): Ordovician; Silurian; Devonian; and Carboniferous Peat (covers 3% to 4% of Wales and is predominantly acid blanket peat) (**Figure D.6**). There are small areas of raised bog scattered in lowland areas.⁸⁹ The Permo-Triassic sandstone forms an important groundwater resource in North Wales, whilst peat, sand and gravel deposits along river valleys support strategic local water supplies.

Within the North West region, there are 203 Geological Conservation Review (GCR) Sites, i.e., sites that are often SSSIs and selected on the basis of their national and international importance.⁹⁰ Information obtained from Natural England indicates that, UK-wide, 86% of SSSIs designated for

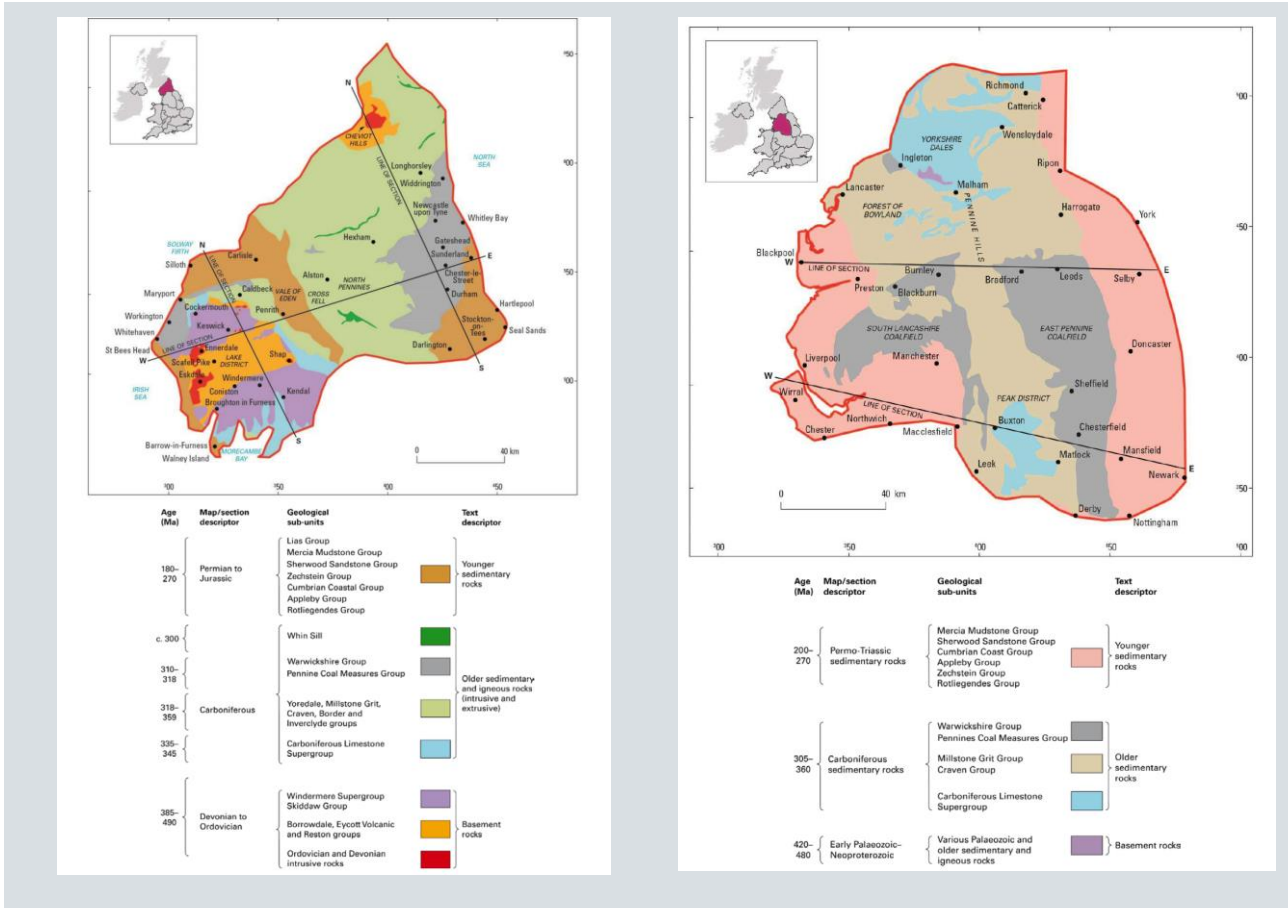
⁸⁹ JNCC (2022) *Habitat Account - Raised Bogs and Mires and Fens* [available at: <http://jncc.defra.gov.uk/protectedsites/sacselection/habitat.asp?FeatureIntCode=H7110> [accessed July 2022].

⁹⁰ JNCC (2019) *Geological Conservation Review (GCR) csv extract of the GCR database (part) 2019* (filtered to Cheshire, East Cumbria, West Cumbria, Lancashire, Sefton, Greater Manchester North) Available online: <https://hub.jncc.gov.uk/assets/b0f53582-f93d-4e70-8ff9-0f16b660e4ad> [Accessed July 2022].

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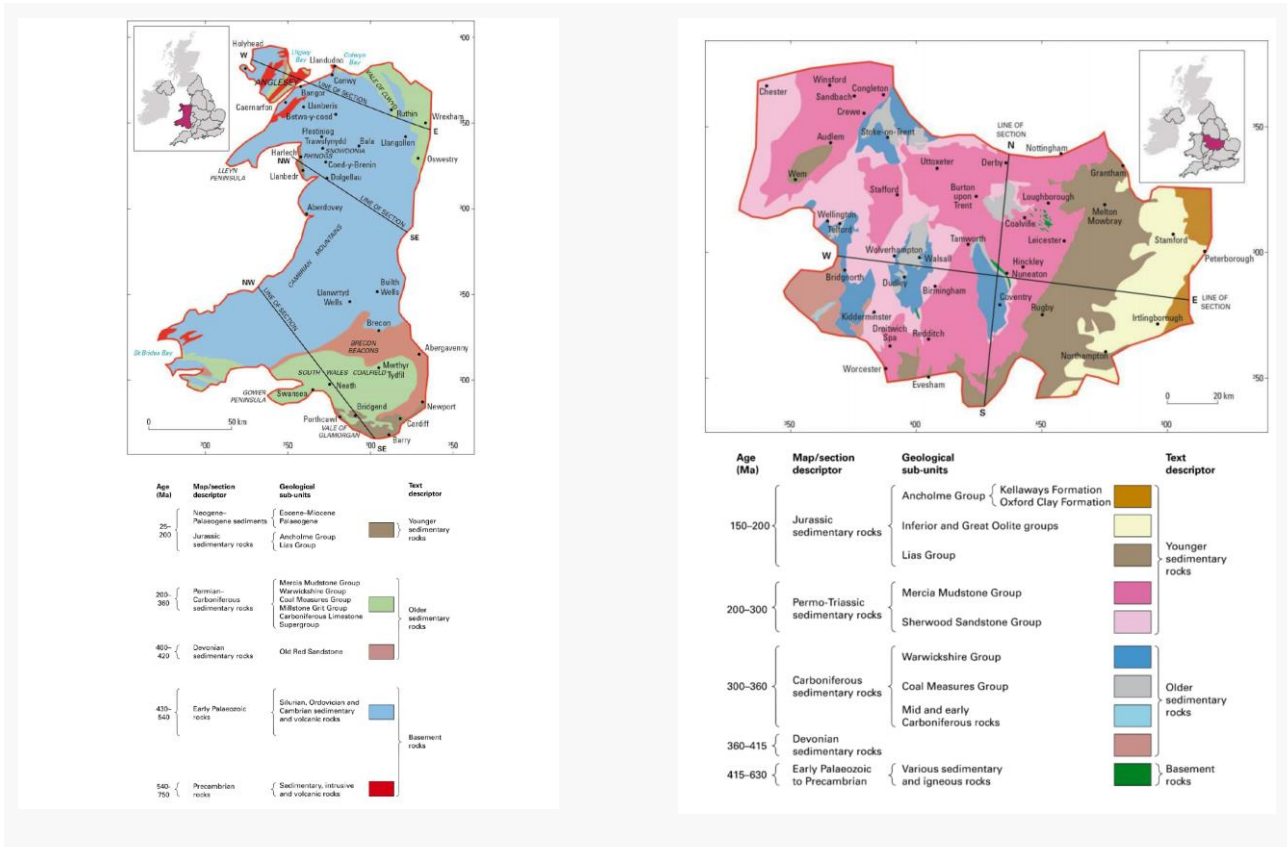
one or more geodiversity features are in favourable or unfavourable recovering condition.⁹¹ Within Wales there are 452 GCR Sites⁹².

Figure D.6 Geological Map for Northern England (top left), Pennines and adjacent areas (top right), Wales (bottom left) and Central England (bottom right)



⁹¹ Natural England (2015) *Natural England Access to Evidence Information Note EIN007: Summary of evidence: Geodiversity* [available at: <http://publications.naturalengland.org.uk/publication/5005683512573952> [Accessed July 2022]]

⁹² JNCC (2019) *Geological Conservation Review (GCR) csv extract of the GCR database (part) 2019* Available online: <https://hub.jncc.gov.uk/assets/b0f53582-f93d-4e70-8ff9-0f16b660e4ad> [Accessed July 2022].



Sources: BGS (2020) Regional Geological Summaries Available from: <https://www.bgs.ac.uk/geology-projects/regional-geological-summaries/> [Accessed July 2022]

Soils

The variety of underlying geology in the North West region is reflected in its soils, the agricultural value of which varies. Rural land covers 80% of the region, with the majority of this managed for agriculture. Intensive arable and livestock farming are supported in lowland areas, while upland areas may be managed for grouse, forestry or farming.

The Agricultural Land Classification System developed by Defra provides a method for assessing the quality of farmland, principally for use in land use planning. The system divides the quality of land into five categories, as well as non-agricultural and urban. The 'best and most versatile land' is generally defined as the agricultural land which falls into Grades 1, 2 and 3a.

Figure D.7 shows agricultural land quality across United Utilities' supply area. The quality of agricultural land in the North West region is relatively poor, with large swathes of land classed as 'Poor' (Grade 4) or 'Very Poor' (Grade 5) reflecting the large proportion of upland area which generally has low agricultural quality due to exposure and poor soil cover. Areas to the north of Liverpool, west of Blackpool and across the southern part of the region include small areas of agricultural land of 'Excellent' (Grade 1) or 'Very Good' (Grade 2) quality. Large areas of 'Good to Moderate' (Grade 3) land are also present in the far north, far south and central parts of the region.

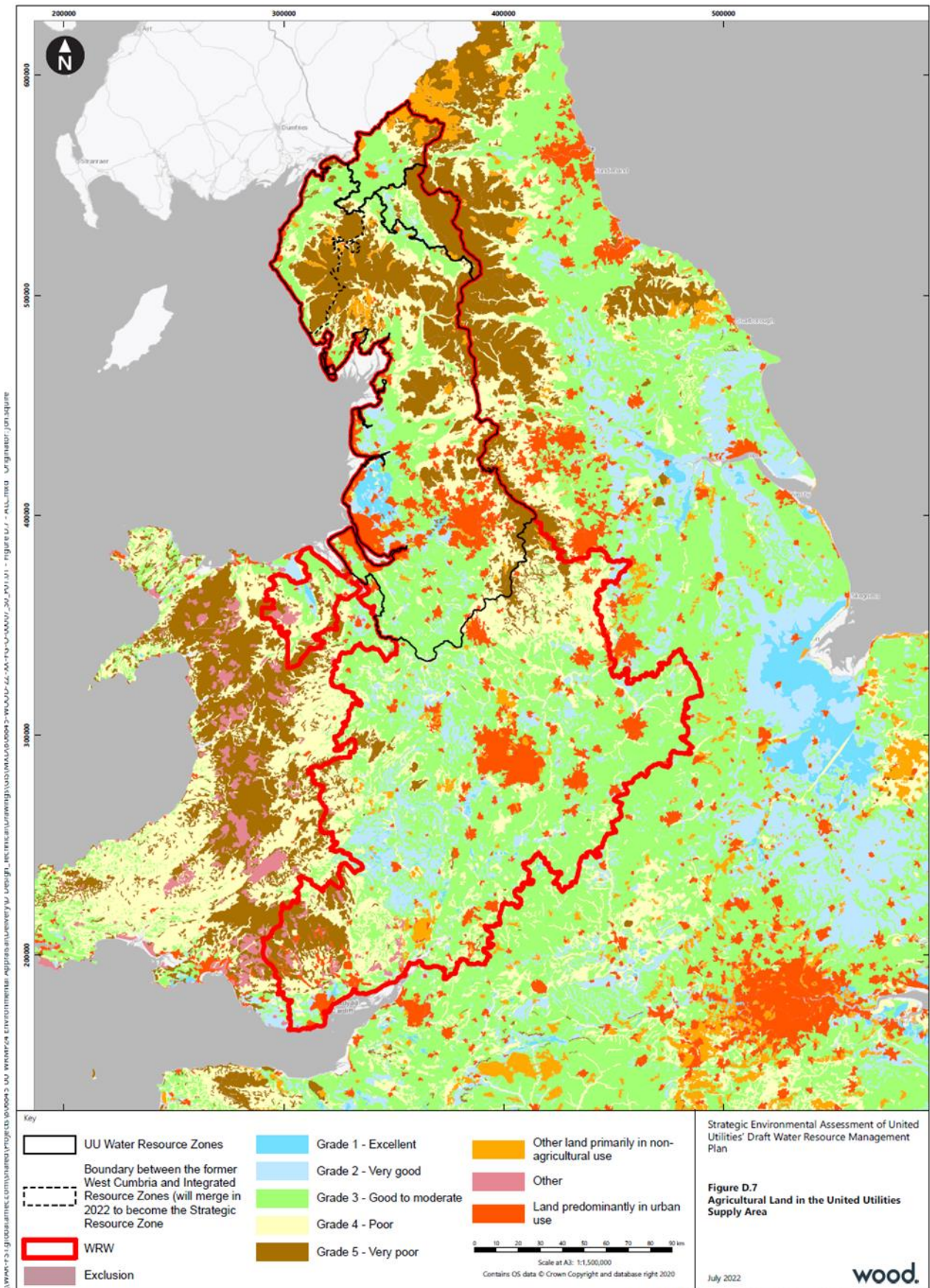
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Areas of urban land are focussed around Manchester and Liverpool. In Wales, 7% of the total land cover is classified as the 'best and most versatile land'.⁹³

⁹³ Welsh Government (2021) *Agricultural Land Classification: Predictive Map*. Available at: <https://gov.wales/agricultural-land-classification-predictive-map> [Accessed July 2022].

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Figure D.7 Agricultural Land Classification in the United Utilities Supply Area and North Wales



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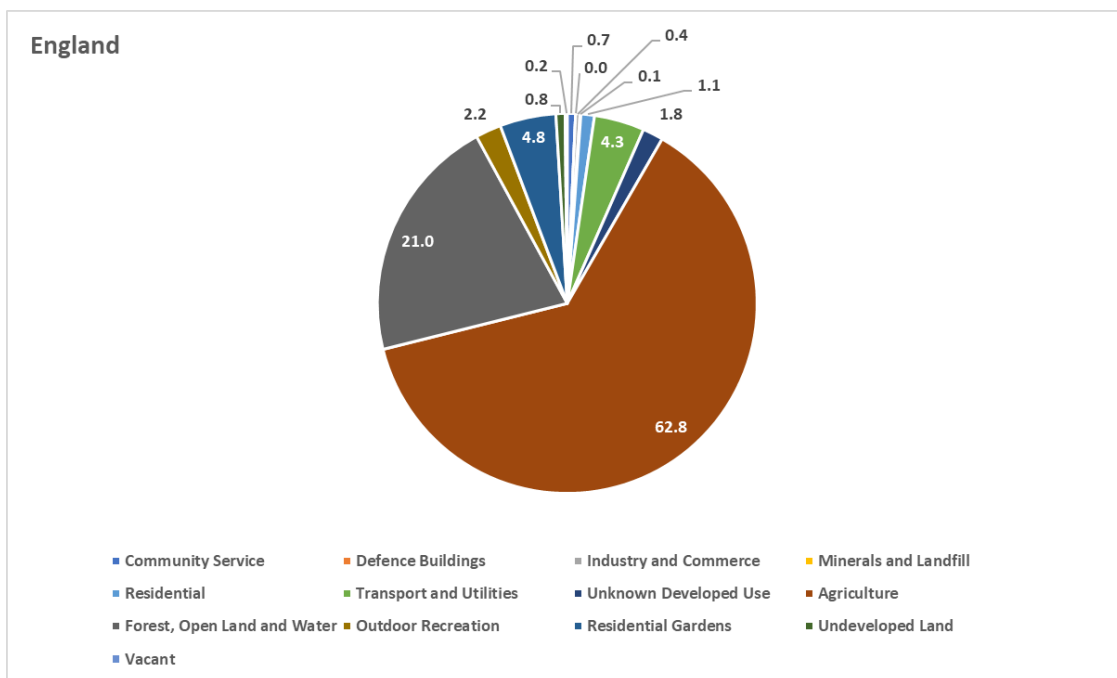
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Peat is of great importance in the North West region and nationally, providing a rich habitat, water quality improvements (through filtration of water), flood management and carbon storage. The UK’s peatlands contain more carbon than all the forests in France and the UK combined. Half of England’s blanket bog lies in the north Pennines in an area that straddles parts of Cumbria, and peat soils cover 40% of the Lake District National Park and World Heritage Site. There is pressure on peatland in England, with over 80% of UK peatland in a damaged state due to peat extraction, drainage for agriculture and forest planting, overgrazing, burning and pollution.⁹⁴ With regard to Wales, SoNaRR highlights that only 30% of the Welsh peat soil area is considered to be in ‘good condition.’⁹⁵

Land Use

Figure D.8 shows land use in England and the North West region as reported in the Land Use Statistics for England (2018). This indicates that for both the North West region and England, agriculture constitutes the majority of the total land area (46.8% and 62.8% respectively). The next largest area of land cover is forest, open land and water (36.0% of land cover in the North West region and 21.0% of land cover in England).

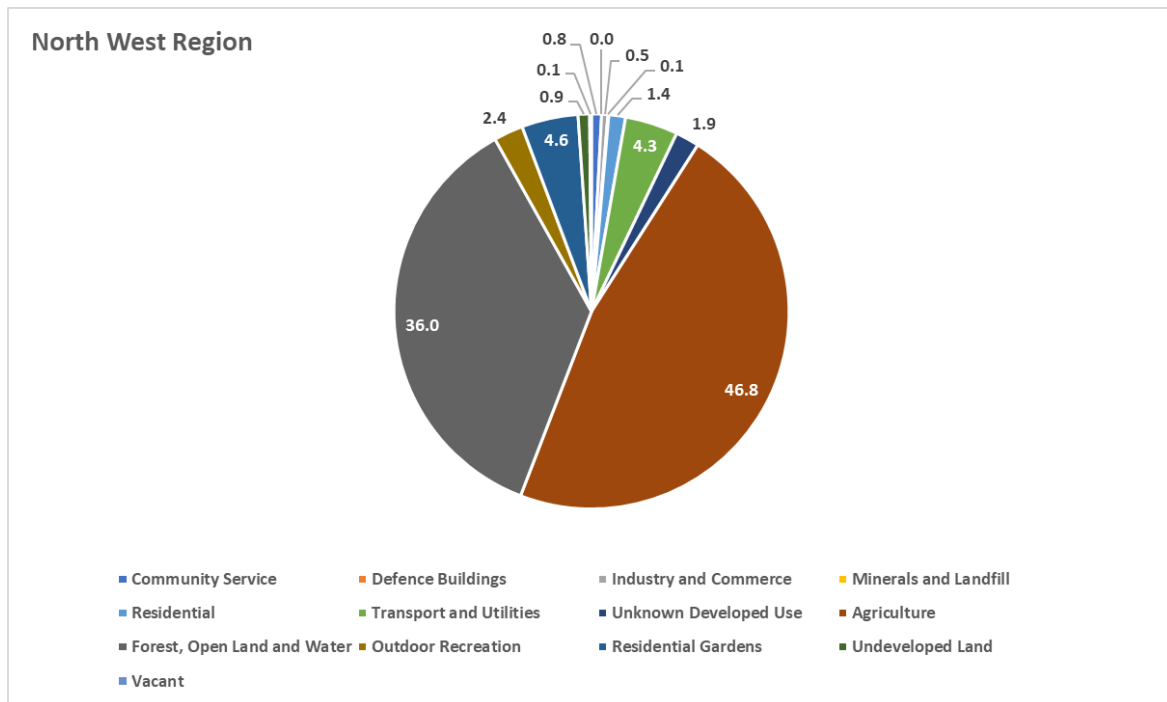
Figure D.8 Land Use in England and the North West Region



⁹⁴ IUCN National Committee United Kingdom Peatland Programme (2021) *What’s So Special about Peatlands?* Available online at: https://www.iucn-uk-peatlandprogramme.org/sites/default/files/2019-06/Peatland_Leaflet_ONLINE_V2.pdf [Accessed July 2022].

⁹⁵ Natural Resources Wales (2016) *The State of Natural Resources Report (SoNaRR): Assessment of the Sustainable Management of Natural Resources. Technical Report. Chapter 3. Summary of extent, condition and trends of natural resources and ecosystems in Wales.* Available online at: <https://naturalresources.wales/media/681127/chapter-3-state-and-trends-final-for-publication.pdf> [Accessed July 2022]

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Source: Ministry of Housing, Communities and Local Government (2020). *Statistical data set - Live tables on land use England 2018*. Available online: <https://www.gov.uk/government/statistical-data-sets/live-tables-on-land-use> [Accessed August 2021]

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. Local Authorities are required to compile a register of PDL. In 2021, the North West had a total of 3,548 ha of PDL that was unused or may be available for redevelopment, which was the third highest of all the English regions (see **Table D.1**).

Table D.1 Total Area of Land on Brownfield Land Registers in 2021

Region	All PDL (ha)
North West	3,548
South East	4,339
Yorkshire & the Humber	2,609
East of England	4,264
East Midlands	2,017
South West	1,966
West Midlands	3,479

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North East	1,174
London	2,800
England	26,256

Source: Campaign to Protect Rural England (2021) *Recycling our land: state of brownfield 2021*. Available via: https://www.cpre.org.uk/wp-content/uploads/2021/11/Nov-2021_CPPE_Recycling-our-land_brownfields-report.pdf

Adopted and emerging local plans of the local planning authorities that comprise the region seek to utilise brownfield sites in addition to greenfield land where appropriate to meet housing and economic development needs.

Likely Evolution of the Baseline without the WRMP

New development (for example, to accommodate population growth) could place pressure on geological assets in the region.

Key threats to soils include draining soils, intensive agriculture, changes in land management, climate change, burning and extraction of peat, construction, and pollution. Loss of nitrate from agricultural soils, meanwhile, can lead to failure of drinking water standards and contribute to eutrophication in estuaries and the sea. Eutrophication can also be caused by excess phosphate entering water bodies, usually via soil erosion.

The vision of Defra's Soils Strategy for England⁹⁶ is for all England's soils to be managed sustainably and degradation threats tackled successfully by 2030. This will improve the quality of England's soils and safeguard their ability to provide essential services for future generations. 'Water for Life'⁹⁷, the Government's white paper for water and the environment, outlines the Government's work towards improving water efficiency within agricultural practices in order to reduce water consumption.

There are a number of Environmentally Sensitive Areas (ESAs) in the region including the Lake District and parts of the North Peak, the South West Peak and the Pennine Dales. The ESA Scheme is designed to protect and enhance the environment by offering payments to landowners and occupiers in these areas to adopt environmentally beneficial agricultural practices. The scheme has now been superseded by the Environmental Stewardship Scheme. Continued development of this scheme is expected to see an improvement in land use in the future.

In this context, it is expected that there will be increased opportunities to protect soils and improve water quality as agricultural practices and farm management are influenced by sustainable land management schemes such as UUW's CaST projects.

The National Policy Planning Framework (NPPF) aims to encourage the effective use of land by reusing land that has been previously developed (brownfield), provided that it is not of high environmental value.

⁹⁶ Defra (2009) *Safeguarding our Soils: A Strategy for England*.

⁹⁷ Defra (2011) *Water for Life*.

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Key Issues Relevant to the WRMP

The key issues relevant to the WMRP and the SEA arising from the analysis of the geology and soils baseline are:

- the need to protect and avoid damage to geodiversity and conserve and enhance sites designated for geological interest (including geological SSSIs);
- the need to manage impacts on soil resources, including control of pollution and remediation of contaminated land, and minimise the loss of the best and most versatile agricultural land;
- the need to conserve and enhance soil quality and function (including peatlands and carbon sequestration);
- the need to sustainably manage and/or improve the quality of agricultural land in the region;
- the need to influence how land is managed, promoting sustainable patterns of land use including the use of previously developed land and minimising the requirements for best and most versatile land;
- 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).

8.3 Water

Baseline Characteristics

The North West's exposure to westerly maritime air masses and extensive areas of high ground make the region one of the wettest in the UK. However, the large geographical differences across the region result in considerable variation in annual rainfall, for example higher parts of the Lake District receive 3,200mm of rain each year, while parts of the Eden Valley in Cumbria receive less than 800mm annually.⁹⁸ Rainfall patterns combined with sources of demand drive the nature of the water resource system operated by U UW.

The high proportion of upland landscape in the region means many of the rivers and streams in the North West are short and steep and often flow over impermeable rock and thin soils, which results in large variations in flow especially during periods of heavy rain.

U UW supplies water to [REDACTED] in Cumbria, Lancashire, Greater Manchester, Merseyside, most of Cheshire and a small part of Derbyshire. More than 90% of the water supplied by U UW comes from rivers and reservoirs, with the remainder from groundwater. In contrast, an average of 60% of water is supplied from rivers and reservoirs across the rest of England.⁹⁹

⁹⁸ Met Office (2016) *North West England & Isle of Man: Climate*. Available online at: <http://www.metoffice.gov.uk/climate/uk/regional-climates/nw> [Accessed August 2021].

⁹⁹ United Utilities (2019) *Final Water Resources Management Plan 2019*

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UUW's region is currently split into four water resource zones (WRZs): Carlisle Resource Zone, North Eden Resource Zone, Strategic Resource zone and the Barepot Resource Zone. The Barepot Resource Zone is geographically within the Strategic Resource Zone; however, it is delineated as a separate zone as it comprises a non-potable supply to industrial customers at Barepot in West Cumbria.

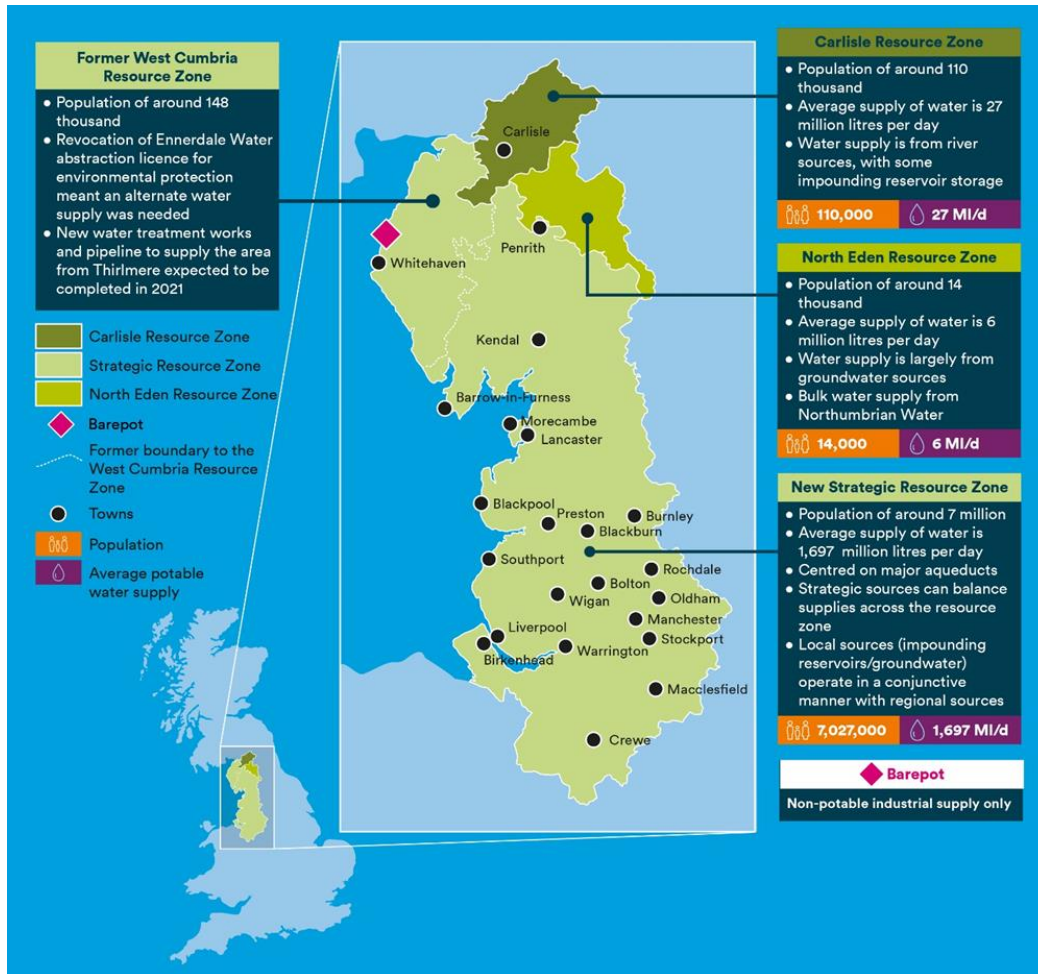
In the WRMP15 (covering the period 2015-2040), UUW identified a future supply shortfall in the former West Cumbria WRZ and the Thirlmere Transfer scheme was selected to meet this shortfall by using some of the spare water available in the neighbouring former Integrated Resource Zone. UUW is in the process of building a new water treatment works and a pipeline from Thirlmere Reservoir into West Cumbria. The scheme is expected to be completed by 2022 and as such, the WRMP19 (covering the period 2020-2045) reflected the merging of the former West Cumbria and Integrated Resource Zones into the Strategic Resource Zone from 2022 onwards (see **Figure D.9**).

UUW owns and operates over 100 water supply reservoirs, various river and stream intakes, as well as lake abstractions and numerous groundwater sources, and supplies around 1,730 million litres per day (MI/d) of drinking water in a typical year (although this would be higher in a dry year). The Strategic Resource Zone supplies around 1,697MI/d of drinking water, and has water sources in Wales, Cumbria and other parts of North West England. The remaining WRZs are served from sources in other parts of the region.¹⁰⁰

¹⁰⁰ Ibid

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Figure D.9 United Utilities Water Resource Zones (from 2022 onwards)



Source: United Utilities Final Water Resources Management Plan 2019

Water Availability

Water abstraction may impact hydrologically sensitive nationally and internationally designated sites and/or influence wider biodiversity. Water abstraction may also impact landscape and visual amenity of landscapes, including those designated as AONBs or as part of National Parks. Lake Vyrnwy, the River Dee, and other freshwater-dependent habitats in North East Wales are of importance for biodiversity and it is noted that many of these habitats are internationally or nationally designated sites for nature conservation.

The Environment Agency and Natural Resources Wales have produced a series of Catchment Abstraction Management Strategies (CAMS) for the North West and other areas from which water is sourced to supply the United Utilities area (e.g., those sources in Wales). These CAMS set out how water resources will be managed in each catchment and provide information on how existing abstraction licences are managed and the availability of water for further abstraction. Within each CAMS, river flows and groundwater levels are monitored at Assessment Points (significant points on rivers) and assessed alongside the amount of water which has been abstracted on average over the previous six years and the situation if all abstraction licences were used to full capacity. This

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data is used to determine the water availability for each water body. Water availability falls into the following categories:

- **Water available for licensing:** There is more water than required to meet the needs of the environment. New licences can be considered depending on local and downstream impacts.
- **Restricted water available for licensing:** If all licensed water is abstracted there will not be enough water left for the needs of the environment. No new consumptive licences would be granted and restrictions may be in place. Trading from an existing licence holder can occur.
- **Water not available for licensing:** Water body flows are below the indicative flow requirement to help support Good Ecological Status (as required by the Water Framework Directive). No further consumptive licences will be granted. Trading from an existing licence holder can occur.

The water availability assessments for the CAMS are summarised in **Table D.2** below.

Table D.2 Summary of CAMS Water Availability Assessments

Catchment Abstraction Management Strategy	Water Available	Restricted Water Available	Water Not Available	Total Number of Assessment Points
Derwent and West Cumbria	4	1	10	15
Eden and Esk	12	5	2	19
Lower Mersey and Alt	10	4	6	20
Lune & Wyre	4	11	8	23
Northern Manchester	0	11	2	13
Ribble, Douglas and Crossens	19	9	8	36
South Cumbria	11	14	1	26
Upper Mersey	1	12	4	17
Weaver and Dane	5	7	1	13
Severn Corridor	0	13	0	13
Tyne	6	1	0	7

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Catchment Abstraction Management Strategy	Water Available	Restricted Water Available	Water Not Available	Total Number of Assessment Points
Dee	0	0	8	8
Total	72	88	50	210

Source: Environment Agency (2013, 2019 and 2020) and Natural Resources Wales (2015) *Abstraction Licensing Strategies*.

Wastewater Treatment

Wastewater from [redacted] homes and [redacted] businesses across the North West is treated by United Utilities every day. The wastewater is carried down drains, into the underground sewer network which comprises 77,000km of sewers, and transported to one of 567 wastewater treatment works, where, once it is treated, is returned to rivers and to the sea¹⁰¹.

Wastewater treatment works discharge consent standards are set to maintain good water quality. In 2020, United Utilities’ wastewater treatment works achieved 99.7% compliance with their environmental permit conditions, slightly higher than both 2018 and 2019 compliance (98.7% and 98.5% respectively) and also slightly above the 2020 average across all water companies in England and Wales (99.3%). The Environment Agency and Natural Resources Wales give water companies a star rating for their overall performance in protecting the environment (including during return of treated water to rivers and the sea). United Utilities achieved the top four star Environmental Performance Assessment (EPA) rating in 2020 having also done so in 2015, 2016 and 2017; however, only three stars were achieved in 2018 and 2019 (although across all water companies in England and Wales, the average was also three stars for 2019). In 2020 United Utilities also completed 100% of its environmental improvement measures, which is above the average (98%) for all water companies in England and Wales¹⁰².

Storm Overflows

Combined sewers handle both rainwater run-off from gutters, drains, roads etc. as well as sewage. Storm overflows act as pressure relief valves during heavy rainfall events, when more surface water enters the sewerage system than it is designed to cope with. During these events, storm overflows allow rainwater, mixed with sewage, to rise inside the sewer and eventually enter a separate pipe which flows into a river or the sea, in order to prevent the flooding of streets, homes and businesses.

UUW operates a larger proportion of combined sewers than the average for water companies in England and Wales, with 54% of United Utilities’ public sewers being combined foul (sewage) and surface water sewers compared to a water company average of 33%. UUW also operates 40% more sewer overflows than the industry average. However, annual water runoff in the North West is 28%

¹⁰¹ United Utilities (2021) *Our Water Cycle*. Available online at: <https://www.unitedutilities.com/corporate/about-us/what-we-do/water-cycle/> [Accessed July 2022].

¹⁰² Discover Water (2022) *Environmental Performance Assessment*. Available online at: <http://www.discoverwater.co.uk/environmental-performance> [Accessed July 2022]

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higher than the average for England and Wales which means more water runs into United Utilities' sewers¹⁰³.

Since 2000, United Utilities has invested £1.2bn to improve overflow discharges to reduce spill frequency, volume and impact upon the natural environment. This investment has improved the operation of over 1,200 intermittent overflows¹⁰⁴.

Water Quality

There are 1,266 surface water bodies covered by three River Basin Management Plans (RBMPs) that lie within the North West region (North West, Solway Tweed and Dee). Additionally, Lake Vyrnwy is a source to the United Utilities supply area which lies within the Severn RBMP district. All the water bodies in the region have been classified for their ecological status and have objectives set for 2021, 2027 and beyond.

Table D.3 shows the percentage of water bodies in each River Basin District that are achieving good ecological status/potential or better, their target status by 2021 (based on data contained within the RBMPs prepared under the WFD) and a summary of the key water management issues that need to be dealt with in each district. The EA has produced draft RBMPs covering the North West, Solway Tweed, Dee and Severn for Cycle 3 (2021- 2027). Data for Cycle 3 supplements the data for Cycle 1 and Cycle 2 and is also presented in **Table D.3**.

Assessments in 2015 showed that around a third of surface water bodies across all districts had good ecological status/potential, with the Solway Tweed River Basin District having the greatest percentage of bodies at good or better status/potential (42%). Conversely, the Severn had the lowest proportion of bodies at good or better status/potential (20%). The percentage of bodies with this status is expected to increase to 2021. Out of the areas with groundwater bodies, the Dee had the greatest percentage at good or better status (100%). The Severn district, meanwhile, had the lowest proportion of groundwater bodies at good status (79%).

Table D.3 Percentage of Water Bodies Achieving Good Ecological Status or Potential, 2015/2021

River Basin District	Surface Water (% of water bodies at good or better ecological status / potential)			Groundwater (% of water bodies at good or better quantitative status)			Significant Pressures
	2015	2021	Draft RBMP	2015	2021	Draft RBMP	
			Cycle 3 data			Cycle 3 data	
North West	22	25	22	89	94	72	<ul style="list-style-type: none"> Physical modification; Phosphate; Pollution from waste water;

¹⁰³ United Utilities (2022) *Combined Sewer Overflows* Available online at: <https://www.unitedutilities.com/corporate/responsibility/environment/Reducing-pollution/combined-sewer-overflows/> [Accessed July 2022]

¹⁰⁴ Ibid

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River Basin District	Surface Water (% of water bodies at good or better ecological status / potential)			Groundwater (% of water bodies at good or better quantitative status)			Significant Pressures
	2015	2021	Draft RBMP	2015	2021	Draft RBMP	
			Cycle 3 data			Cycle 3 data	
							<ul style="list-style-type: none"> • Pollution from rural areas; • Ammonia; • Pollution from towns, cities and transport; • Chemicals; and • Dissolved oxygen.
Solway Tweed	42	57 (surface and ground water)	46	80	57 (surface and ground water)	80	<ul style="list-style-type: none"> • Point source discharges; • Diffuse source pollution; • Water abstraction and flow regulation; • Modifications to physical condition; • Barriers to fish migration; and • Invasive non-native species.
Severn	20	27	9	79	81	73	<ul style="list-style-type: none"> • Phosphate; • Pollution from rural areas; • Pollution from waste water; • Physical modification; • Chemicals; • Pollution from towns, cities and transport; • Abstraction and flow; and • Changes to the natural flow and level of water.
Dee	29	71 (surface and groundwater)	10	100	71 (surface and groundwater)	100	<ul style="list-style-type: none"> • Physical modifications; • Pollution from waste water; • Pollution from rural areas; • Pollution from abandoned mines; • Pollution from towns, cities and transport; and • Changes to the natural flow and level of water.

Source: Environment Agency, Natural Resources Wales and Natural Scotland (2015) *River Basin Management Plans (North West, Solway Tweed, Severn, Dee)*. Draft RBMP data via: <https://environment.data.gov.uk/catchment-planning>

Bathing water in the region is generally of a high quality, with all 29 bathing waters in the North West region achieving a pass status. The 2021 results for bathing waters in England, Wales, and the North West are presented in **Table D.4** below.

Table D.4 Mandatory Compliance Results for Bathing Waters in England, Wales and the North West in 2021

	North West	England	Wales

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	Pass	Fail	Compliance	Pass	Fail	Compliance	Pass	Fail	Compliance
Bathing Waters	29	0	100%	413	4	99.0%	105	0	100%

Source: Defra (2022)¹⁰⁵, Natural Resources Wales (2021)¹⁰⁶

Nitrate Zones

Nitrate Vulnerable Zones (NVZs) are areas of land that drain into surface or groundwater where nitrate levels are already high (greater than 50mg/l) or may have high levels of nitrate in the future. **Table D.5** identifies the number of NVZs designated for high nitrate in surface water for each of the River Basin Districts in the UUW operational area. Draft data for Cycle 3 of the RBMPs is also included. The Severn district has the highest number of NVZs designated for surface water nitrate levels, covering over half of the district. In contrast, the Solway Tweed NVZs cover only 1% of the district (2% in the draft RBMP data). In each district, there are also a smaller number of additional NVZs designated for groundwater nitrate levels or eutrophication.

Table D.5 Nitrate Vulnerable Zones Designated for High Nitrate in Surface Water

River Basin District	Number of NVZs (high nitrate in surface water)	Number of NVZs (high nitrate in surface water) – Draft RBMP	% of RBD covered by NVZ	% of RBD covered by NVZ – Draft RBMP
North West	23	22	26	22
Solway Tweed	7	6	1	2
Severn	66	66	51	49
Dee	7	6	18	43

Source: Environment Agency, Natural Resources Wales and Natural Scotland (2015) *River Basin Management Plans (North West, Solway Tweed, Severn, Dee)*.

The lower parts of the River Dee were designated as a Water Protection Zone (WPZ) in 1999. This is the only designated WPZ in the UK and was designated to protect public water supply sources from point source pollution on the river. This designation means that consent is required before substances including fuels, medicines and liquid foods can be used within the zone.

¹⁰⁵ Defra (2022) *Bathing Water Quality Statistics*. Available online at: <https://www.gov.uk/government/statistics/bathing-water-quality-statistics> [Accessed July 2022]

¹⁰⁶ Natural Resources Wales (2020) *Wales bathing water quality report 2021*. Available online at: <https://naturalresources.wales/evidence-and-data/research-and-reports/water-reports/wales-bathing-water-quality-report-2021/?lang=en> [Accessed July 2022]

FINAL**Flood Risk**

Parts of the area supplied by United Utilities are prone to flooding. Much of the coastal area is at risk of tidal flooding, particularly low-lying land adjacent to the major estuaries in the region including the Solway Firth, the rivers entering Morecambe Bay, the Ribble, the Mersey and the Dee.

The 2016 Flood Risk Management Plans identify the number of people at high risk of flooding (more than a 1 in 30 chance of being flooded in any year (3.3%)) for each River Basin District. In the North West district, approximately 31,000 people are at high risk of flooding from rivers and the sea, and a further 32,600 people are at high risk living in the Severn district. Lower numbers of people are at high risk in the Dee and Solway Tweed river basin districts, with 3,000 people and 1,800 people respectively.¹⁰⁷

Figure D.10 shows the location of areas most at risk from flooding in the United Utilities supply area. Flood Zone 3 represents areas with a high probability of flooding, which could be flooded either from rivers or the sea if there were no flood defences. These areas could be affected by flooding from the sea that has a 0.5% (1 in 200) or greater chance of occurring each year, or flooding from rivers that has a 1% (1 in 100) or greater chance of occurring each year. Flood Zone 2 shows the additional extent of an extreme flood from rivers or the sea, with up to a 0.1% (1 in 1,000) chance of occurring each year.

Sewer flooding can result from blockages within sewers and from the capacity of sewers being exceeded due to intense or prolonged rainfall. United Utilities' 2019/20 target for sewer flooding was exceeded at 79.8 index points against a target of <68.1. This was also higher than performance against the sewer flooding index in 2018/19 (61.7) and 2017/18 (70.0)¹⁰⁸. The target was not met, partly due to the target becoming more stringent in 2019/20, but also likely due to the unusually high rainfall across the year and significant storm events in the winter of 2019/20.

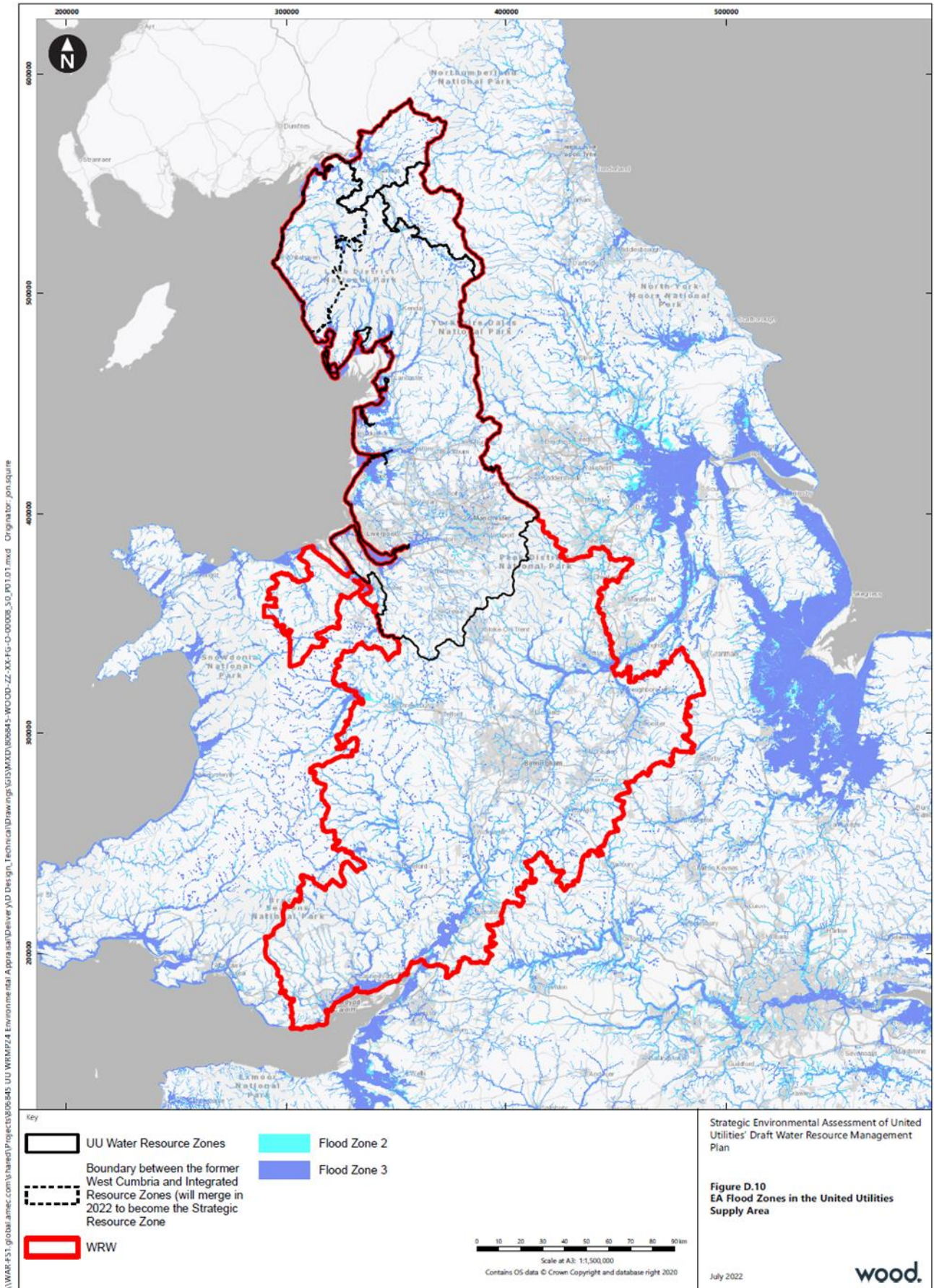
Additionally, United Utilities' infrastructure may be at risk of flooding and flood events could lead to disruption to water supply and pollution incidents. This occurred during the December 2015 storms, when the Keswick treatment works and several other large wastewater treatment works were heavily flooded resulting in severe impacts on operations.

¹⁰⁷ Environment Agency, Natural Resources Wales, SEPA (2016) *Flood Risk Management Plans (North West, Solway Tweed, Severn, Dee)* [available at: <https://www.gov.uk/government/collections/flood-risk-management-plans-frmps-2015-to-2021>].

¹⁰⁸ United Utilities Water Limited (2020) *United Utilities 2019/20 Annual Performance Report* Available online at: <https://www.unitedutilities.com/corporate/about-us/performance/annual-performance-reports-2015-20/> [Accessed September 2021]

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Figure D.10 Areas at Risk of Flooding in the United Utilities Water Operational Area



FINAL**Likely Evolution of the Baseline without the WRMP**

Under the WFD, rivers in England, Wales and Scotland were required to have achieved 'good ecological status' by 2015. Where this was not possible and subject to criteria set out in the Directive, the aim is to achieve good status by 2021 or 2027. Draft RBMP data shows that only 9 – 46 of water bodies in the relevant River Basin Districts have met this target; suggesting that the quality of water in rivers and seas in the North West region has reduced in recent years. With current targets and measures in place, this trend is expected to continue.

Pressure to meet demand for public water supply in the area will increase as the population grows, despite efforts to manage demand through water efficiency and leakage reduction. Water is restricted for licensing in much of the North West. The West Cumbria Thirlmere Transfer Project is being brought forward in response to the need to cease abstraction from Ennerdale Water. In the interim, United Utilities has committed to revoking some licences in West Cumbria as compensation for the continued abstraction at Ennerdale until 2022. Further sustainability reductions may be required over the period of the WRMP, although this is to be confirmed by the Environment Agency.

Priority water quality issues in the region include various pollution sources (including waste water, rural areas, diffuse and point source discharges), physical modifications and phosphate, which may put further pressure on water quality as well as habitats and species. With specific regard to Wales, SoNaRR highlights a need to work within whole catchments to manage nutrients, and maintain, enhance and restore floodplains and hydrological systems.

Climate change presents increased risk with respect to coastal flooding in the long term, while climate change combined with an increase in housing numbers or urban area presents an increased risk to fluvial and sewer flooding. The UK Climate Programme 2009 (UKCP09) projections for the North West for the medium emissions scenario central estimate (50% probability) that:

- Winter mean precipitation will increase by 16% by the 2080s. It is very unlikely to increase by less than 3% and is very unlikely to increase by more than 34%.
- Summer mean precipitation will reduce by 22% by the 2080s. It is very unlikely that summer mean precipitation will reduce by more than 43% and it is very unlikely that it will increase by more than 0%.

UKCP18¹⁰⁹ has updated the UKCP09 projections. It has found that climate change trends projected over UK land for the 21st century are broadly consistent with earlier projections (UKCP09) showing an increased chance of milder, wetter winters and hotter, drier summers along with an increase in the frequency and intensity of extremes.

SoNaRR highlights that climate change may affect groundwater recharge in Wales and that by 2025, it is likely that groundwater recharge will decrease, resulting in decreased dry weather river flows and a general lowering of groundwater levels. This may have impacts on base-flow to rivers and wetlands in dry periods and affect small domestic and agricultural water supplies.

¹⁰⁹ UKCP18 website. *UK Climate projections (2019) Headline findings*. Available online: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp-headline-findings-v2.pdf> [Accessed September 2021].

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Following regional flooding in 2015, the Environment Agency committed to investing in flood defence programmes covering the North West of England, including spending of £46 million towards a flood defence scheme along the River Irwell to better protect nearly 1,000 homes¹¹⁰. The Government has further recognised the importance of investing in flood risk and coastal management by committing £2.6 billion investment from 2015 to 2051 to fund 1,500 flood defences, with the aim to improve protection to 300,000 homes.

Key Issues Relevant to the WRMP

The key issues relevant to the WRMP and the SEA, arising from the analysis of the water baseline are:

- the need to further improve the quality of the region's river, estuarine and coastal waters taking into account WFD/RBMP objectives;
- the need to maintain and improve the quantity and quality of groundwater resources taking into account WFD/RBMP objectives;
- the need to improve the resilience, flexibility and sustainability of water resources in the UUV region, particularly in light of potential climate change impacts on surface water and groundwater;
- the need to address increased pressures on the public water supply;
- 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;
- the need to reduce flood risk;
- the need to ensure the continued risk of flooding is managed and mitigated effectively.

8.4 Air Quality

Baseline Characteristics

The emission of pollutants to air can pose a hazard to human health (e.g., respiratory illnesses and lung conditions) and can also have a negative impact on the environment (e.g., changes to ecosystems and damage to vegetation when present within the atmosphere in excess of certain concentrations). Such thresholds are set as objectives and include pollutants such as nitrogen dioxide (NO₂), sulphur dioxide (SO₂) volatile organic compounds (VOCs) and fine particles (known as 'particulates'). Air Quality Management Areas (AQMAs) are declared in specific locations where atmospheric concentrations of one or more pollutants are either close to or exceeding statutory

¹¹⁰ Gov.uk (2018) '£40m extra funding to boost regeneration and better protect thousands of homes against flooding' Available online at: <https://www.gov.uk/government/news/40m-extra-funding-to-better-protect-thousands-of-homes-against-flooding> [Accessed July 2022]

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objectives set out within the *Air Quality Strategy for England, Scotland, Wales and Northern Ireland*.¹¹¹

A total of 36 local authorities across the North West have declared AQMAs for exceedance of NO₂ (within each local authority there may be several AQMAs). One local authority has declared an AQMA for particulate matter. In Wales, there are currently 11 local authorities with AQMAs declared for NO₂, predominantly across south Wales, and there is a further particulate matter AQMA in Neath Port Talbot¹¹².

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

- Atmospheric concentrations of SO₂ decreased across the UK due to reductions in the use of coal, gas and oil and reductions in the sulphur content of fuels over the last 30 years.
- While overall emissions of NO_x have decreased over the last 25 years, the monitored atmospheric concentrations of urban traffic sites did not show such a consistent decrease, potentially due to the quantity and type of traffic on the adjacent road. Annual mean limit values and objectives are frequently exceeded at roadside sites in the UK although the extent of these exceedances was substantially reduced in 2020 in comparison with previous years due to the effects on Covid-19 pandemic on transport.
- Atmospheric concentrations of particulate matter (PM₁₀ and PM_{2.5}) have steadily decreased since the early 1990s but have remained relatively constant since 2009.
- Carbon monoxide (CO) concentrations have reduced as a result of reductions in emissions from road transport, iron and steel production and the domestic sector over the last 25 years and have been within limit values for many years.¹¹³

Likely Evolution of the Baseline without the WRMP

With increasingly strong air quality legislation and de-industrialisation, coupled with technological improvements such as lower emission vehicles, levels of the majority of air pollutants are expected to continue to decline.

Pollutants associated with road transport such as nitrogen oxides and ozone will be harder to reduce particularly in hotspot areas of traffic congestion.

¹¹¹ Defra (2007) *Air Quality Strategy for England, Scotland, Wales and Northern Ireland* Available online: <https://www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-2> [Accessed July 2022]

¹¹² Welsh Government (2022) *Air Quality Management Areas*. Available online: <https://airquality.gov.wales/laqm/air-quality-management-areas> [Accessed July 2022]

¹¹³ Defra (2021) *Air Pollution in the UK 2020* Available online at: <https://uk-air.defra.gov.uk/library/annualreport/> https://uk-air.defra.gov.uk/library/annualreport/assets/documents/annualreport/air_pollution_uk_2019_Compliance_Assessment_Summary_Issue1.pdf [Accessed July 2022].

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Key Issues Relevant to the WRMP

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

- the need to minimise emissions of pollutant gases and particulates and enhance air quality arising from the implementation of UUW's WRMP;
- the need to reduce the need to travel and promote sustainable modes of transport.

8.5 Climatic Factors

Baseline Characteristics

The effects of climate change are potentially some of the most significant environmental problems facing this area. These effects could include increased variability in precipitation and drought patterns, increased sea levels and a higher risk of flooding.

Greenhouse gases (GHG) including carbon dioxide (CO₂) emitted from human actions are a major contributor to climate change. North West England emitted 11% of the UK's GHG emissions in 2019. The amount of CO₂ emitted in the North West of England between 2014 and 2019 is shown in **Table D.6** and highlights that emissions have reduced since 2014 by nearly 13.6% to 38.5 million tonnes (Mt) CO₂ in 2019, principally because of declines in emissions from the industry and commercial and domestic sectors. Overall, since 2005 emissions in the North West have dropped by 36% (which is comparable to the UK average of 35.8%).¹¹⁴ All local authorities in the North West region saw a decline in GHG emissions.

¹¹⁴ Department for Business, Energy and Industrial Strategy (2021) *2005 to 2019 UK local and regional CO₂ emissions – data tables* Available online at: <https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2019> [Accessed July 2022]

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Table D.6 End User Estimates of Carbon Emissions (kt CO₂), North West England 2014-2019

End User	2014	2015	2016	2017	2018	2019
Industry	10,716.7	10,175.8	9,552.6	9,240.0	8,919.5	8,755.8
Commercial	5,329.9	4,601.5	3,941.9	4,057.5	3,789.6	3,482.2
Public Sector	1,944.4	1,992.5	1,787.6	1,525.8	1,563.0	1,529.2
Domestic	12,449.2	11,943.7	11,428.5	10,807.1	10,789.7	10,527.4
Transport	13,814.9	14,105.5	14,298.4	14,079.5	13,964.6	13,917.3
LULUCF	336.1	332.1	340.7	318.1	326.5	329.8
Total	44,591.2	43,151.1	41,349.6	40,028.0	39,352.8	38,541.6
Per capita Emissions (t)	6.3	6.0	5.7	5.5	5.4	5.3

Source: Department for Business, Energy and Industrial Strategy (2021)¹¹⁵

Wales also experienced a decline in emissions across the same period, with the amount of CO₂ emitted reducing by around 16.5% between 2014 and 2019. CO₂ emissions in 2019 were 23.8 MtCO₂ for Wales. In Wales, industrial emissions were the highest sector with 11MtCO₂ although this sector has shown marked reductions over the same period.¹¹⁶

On a per capita basis, the North West emitted 5.3 tonnes (t) CO₂ per person in 2019. Across the UK as a whole, this averaged at 5.2 tCO₂ with figures ranging from 3.2 tCO₂ per person in London to 7.6 tCO₂ per person in Wales, the highest in the UK. This reflects the significant industrial base in Wales which resulted in a high contribution from industrial and commercial emissions.

Increasing the amount of renewable energy generation is one response to the need to reduce CO₂ emissions, and the North West region has shown a steady year-on-year increase in renewable electricity generation from 2003 to 2020, with slight drops in 2010 and 2016 (compared to the previous year). The renewable electricity capacity in the region continued to rise in 2020. The most recent data from the Department for Business, Energy & Industrial Strategy (BEIS) shows that in 2020, the North West generated 11,606.3 GWh electricity from renewable sources, an increase of 514% compared to 2010 (primarily due to increases in wind capacity)¹¹⁷. In 2020, the North West

¹¹⁵ Ibid

¹¹⁶ Ibid

¹¹⁷ BEIS (2021) *Regional Statistics 2003-2020: Generation*. Available online: <https://www.gov.uk/government/statistics/regional-renewable-statistics> [Accessed July 2022].

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had a total renewable energy installed capacity of 3,515.2MWe, equivalent to 7.4% of the UK total (47,815.5MWe), while Wales had 7.5% (3,589.6 MWe) of the UK's capacity.¹¹⁸

In 2021/22 United Utilities' GHG emissions were 136 ktCO₂e (compared to 139 ktCO₂e), a reduction of over 70% since 2010. In 2020 United Utilities met its target of reducing its carbon footprint by 50% from a 2005/06 baseline. A major contributor to this has been the purchase of certified renewable electricity, with over 95 per cent of the electricity used having zero emissions. The company's renewable energy production in 2021/22 was 210 GWh, which represented 26% of total electricity consumption. This was predominantly from energy recovery, wind and solar photovoltaics.¹¹⁹

Actions associated with infrastructure work such as building water treatment works, renewing pipes and infrastructure can also require large quantities of materials which contain embodied carbon as a result of transport and manufacturing processes.

Likely Evolution of the Baseline without the WRMP

UKCP18 provides the following predictions on changes in climate in the UK (based on a high emissions scenario). By 2070:

- winter temperature: a change in temperature of between 0.7 and 4.2°C;
- summer temperature: a change in temperature of between 0.9 and 5.4°C;
- winter precipitation: an increase of up to 35 per cent; and
- summer precipitation: 47 per cent drier to 2 per cent wetter.

Sea levels are also forecast to rise, although the highest increases are expected in the south rather than the north of the UK¹²⁰.

The changes in average temperatures and rainfall as a result of climate change are likely to cause hotter, drier summers which will potentially result in:

- Increased maximum summer temperatures that are likely to lead to increased thermal discomfort in buildings;
- Increased health problems in the summer, including heat related deaths and those linked to high air pollution (elevated summer temperatures cause health problems both directly and indirectly, via elevated levels of air pollutants);
- Increased summer water shortages as summer rainfall decreases;
- Growth in summer tourism; and

¹¹⁸ BEIS (2020) *Regional Statistics 2003-2020: Installed Capacity*. Available online: <https://www.gov.uk/government/statistics/regional-renewable-statistics> [Accessed July 2022].

¹¹⁹ United Utilities (2022) 2022 Annual Report. Available online: <https://unitedutilities.annualreport2022.com/> [Accessed July 2022]

¹²⁰ UKCP18 website. *UK Climate projections (2019) Headline findings*. Available online: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp-headline-findings-v2.pdf> [Accessed July 2022]

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- Changes to the natural environment including impacts on habitats and species associated with changing temperatures and water availability (in both summer and winter).

Milder winters are expected to result in:

- A reduction in the number and severity of annual frosts and snowfall, caused by the likely increased temperatures during the winter months which could lead to longer growing seasons for suitable crops and grasslands;
- Less cold weather transport disruption;
- Reduced demand for winter heating;
- Less cold weather related illnesses;
- Increased river and urban flooding, due to the increased incidence and severity of extreme rainfall events;
- Increased pressure on sewer systems with associated water quality impacts; and
- Increased localised flooding as a result of pressures on the sewerage/drainage network due to exceeded capacity.

Under the third UK Climate Change Risk Assessment evidence report, there are significant reductions projected in the availability of public water supplies by the 2050s and the 2080s under both a medium and high climate change scenario¹²¹. Climate change is also identified as one of the potential key drivers associated with a significant and growing risk of severe drought.

The 2015 United Nations Climate Change Conference (UNCCC) (COP21) negotiated the Paris Agreement, a global agreement to (*inter alia*) hold the increase in the global average temperature to well below 2 °C above pre-industrial levels and to increase the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development. The 2021 UNCCC Glasgow Climate Pact (COP26)¹²² set out agreement to work to reduce the gap between existing emission reduction plans and what is required to reduce emissions, so that the rise in the global average temperature can be limited to 1.5 degrees. Nations are also called upon to phase down unabated coal power and inefficient subsidies for fossil fuels.

The UK and the Welsh Government are committed to net zero emissions in 2050 and are required to set carbon budgets to set out a trajectory for emissions reductions to 2050. For the UK, the sixth carbon budget has been set at a 78% reduction in emissions between 1990 and 2030. For Wales, the carbon budgets have been set for 37% lower than the baseline over 2021-25 and an average of 58% lower than the baseline for 2026-30.

There the potential for some conflict between increasing the level of pumping, pre-treatment and treatment of water required to meet demand and stricter environmental quality standards, the

¹²¹ UK Climate Change Risk Assessment 2022. Available online:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1047003/climate-change-risk-assessment-2022.pdf [Accessed July 2022]

¹²²UNCCC (2021) Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on its third session, held in Glasgow from 31 October to 13 November 2021. Available online:

https://unfccc.int/sites/default/files/resource/cma2021_10_add1_adv.pdf [Accessed July 2022]

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associated increase in energy used and the resultant carbon emissions (depending on the energy source) that result from the improved treatment processes. It is anticipated that this will be resolved through the move to low carbon and renewable energy sources and United Utilities' commitments to net zero¹²³.

Key Issues Relevant to the WRMP

The key sustainability issues relevant to the WRMP and the SEA arising from the analysis of the climatic factors baseline are:

- the need to reduce greenhouse gas emissions arising from implementation of UUW's WRMP;
- the need to take into account, and where possible adapt to, the potential effects of climate change through, sustainable water resource management, water use efficiencies, specific aspects of natural ecosystems (e.g. connectivity), as well as accommodating potential opportunities afforded by climate change;
- the need to increase environmental resilience to the effects of climate change.

8.6 Population and Human Health

Baseline Characteristics

Demographics

As at the 2021 Census, the population of the North West was 7,417,300, an increase of 5% from 2011.

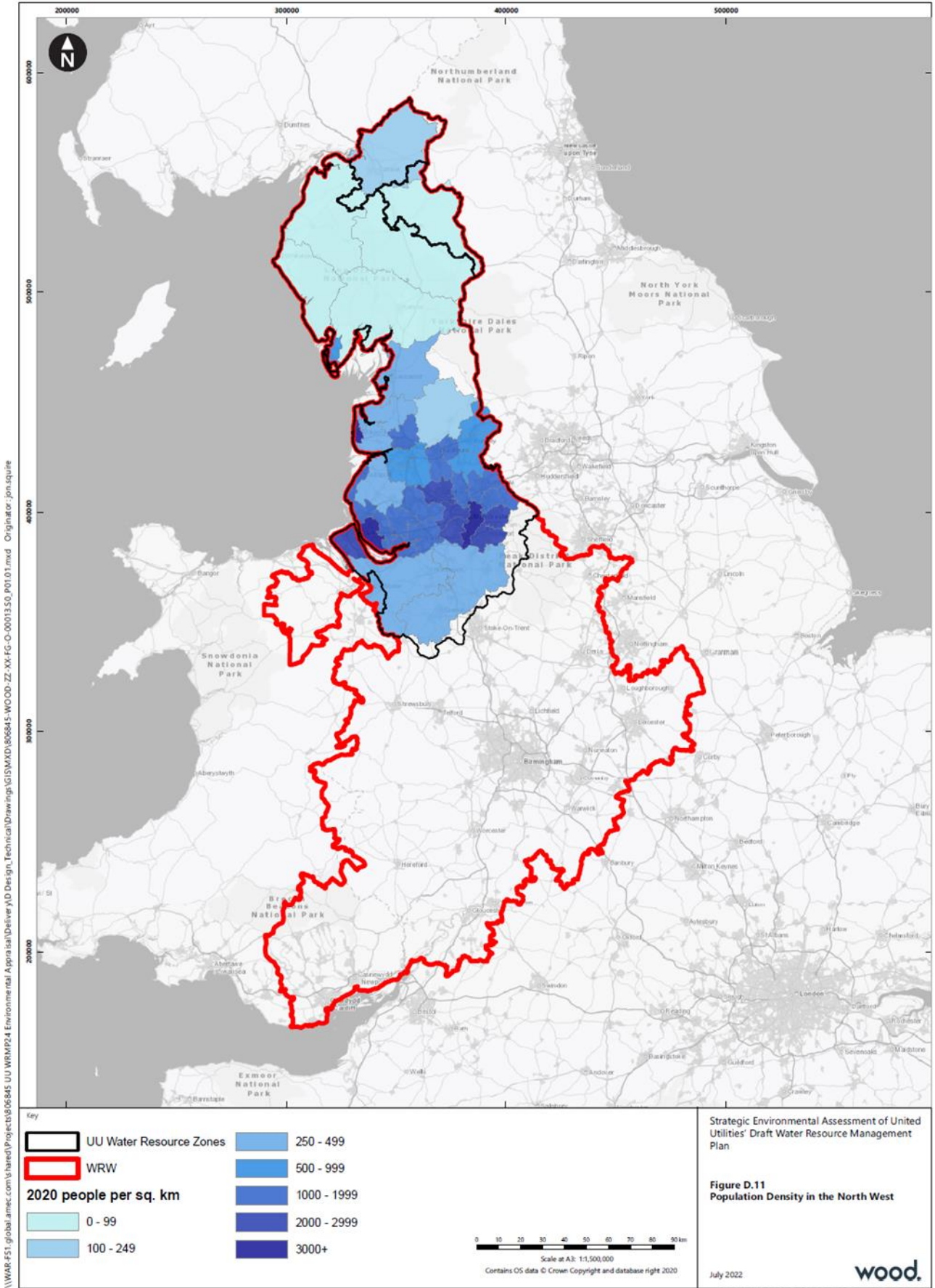
The majority of the region's residents live in urban areas, with 2011 Census data suggesting that this equates to 89% of total residents. Population densities vary greatly across the region. The estimated North West average population density was 522 people per square kilometre (sq km) in 2020; the most densely populated area was Manchester with 4,805 people per sq km, followed by Liverpool with 4,475 people per sq km¹²⁴. In contrast, the district of Eden in Cumbria had the lowest population density in England with 25 people per sq km. **Figure D.11** illustrates the population density across the region.

¹²³ <https://www.unitedutilities.com/corporate/responsibility/stakeholders/catchment-systems-thinking/beyond-water-series/our-journey-to-net-zero/>

¹²⁴ ONS (2021) Population midyear estimates 2020. Available via: <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland> [Accessed July 2022]

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Figure D.11 Population Density in the North West



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The population of Wales stood at 3,107,500 in the 2021 Census which represents a 1.4% population increase from the 2011 Census data. Wales had an estimated population density of 153 people per sq km in 2020.¹²⁵ 67% of the population lived in urban areas.

Economy

The North West region has a large and diverse economy and areas within the region are facing different challenges. The North West's share of total UK gross value added (GVA) has remained relatively stable over the period 2010 - 2020 (remaining between 9.8% - 9.5%) with a 9.6% share of total UK GVA in 2020. In absolute terms, the region's GVA grew by 32.3% over this period which is similar to the national average of 34.2%.¹²⁶

The economic performance of sub-regional areas does vary significantly. The growth of areas such as Liverpool and Manchester has been strong, and the general economic performance of other areas such as Cheshire and Lancashire has also been positive. However, there does continue to be a degree of variation in economic performance within these sub-regions. Cumbria remains the poorest performing sub-region, particularly in areas such as Carlisle and Barrow-in-Furness which have been affected by the loss of some of the manufacturing base and agriculture.

The proportion of economically active people during the period March 2022 to May 2022 (seasonally adjusted) was 77.6% in the North West region, 76.6% in Wales with both being lower than for the UK as a whole (78.9%). Economically active in this context is defined as those persons of working age who are employed or looking to be employed. In the same period, the unemployment rates for the North West was 4.4% which is higher than both Wales (3.8%) and the UK average (3.8%).¹²⁷ It should be noted that unemployment rates have been recently affected by the global COVID-19 pandemic and whilst they had shown long term decline since 2012, there were increases between July 2020 and January 2021, however, they have again begun to reduce throughout 2021 and 2022.

The average gross weekly earnings for full-time employees in the North West in 2021 was £578/week (compared to £610/week for the UK), whilst the Wales average was £570/week.¹²⁸

The largest proportion of jobs in the North West and Wales are within the wholesale and retail trade and human health and social work sectors, similar to UK trends. As at March 2022, a total of 22,000 jobs in the North West (0.6%) are within the water supply, sewerage and waste

¹²⁵ Ibid.

¹²⁶ ONS (2022) Regional gross value added (balanced) per head and income components. Available from <https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalregionalgrossvalueaddedbalancedperheadandincomecomponents> [Accessed July 2022]

¹²⁷ ONS (2022) Labour market profile by region. Available from <https://www.nomisweb.co.uk/reports/lmp/gor/2013265922/report.aspx> [Accessed July 2022]

¹²⁸ Nomis (2022) Earnings by Place of Residence. Available from <https://www.nomisweb.co.uk/reports/lmp/gor/2013265922/report.aspx> [Accessed July 2022]

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management sector, similar to the proportion of jobs in this sector in Wales (1.1%) and for the UK as a whole (0.7%).¹²⁹

United Utilities currently employs over 5,000 people and plays a major role in the North West’s economy. In addition, 10,000 people are engaged through the United Utilities supply chain, meaning that the company generates (either directly or indirectly) one in every 150 jobs in the region¹³⁰. United Utilities also invested £2.82 million in the local community in 2021/2022. This figure was higher than the previous year as a result of increased activity with partners and returning of customer facing events as the country emerges from the impacts of the COVID-19 pandemic.¹³¹

Education and Skills

The levels of qualifications in the North West region are reasonably representative of the UK (see **Table D.7**). In the period January to December 2021, a slightly higher than average percentage of people had qualifications equivalent to GCSE Grades A-C or above, although the proportion of people with degree level qualifications was slightly below the national average, and those with no qualifications was above.

Table D.7 Level of Qualifications

Qualifications	North West	UK
(economically active population of working age)		
Degree or equivalent and above (NVQ 4 equivalent and above)	38.5%	43.5%
Higher education below degree level (NVQ3 equivalent)	18.0%	16.6%
Trade Apprenticeships	3.3%	2.8%
GCSE A level or equivalent (NVQ2 equivalent)	17.5%	15.3%
GCSE grades A-C or equivalent (NVQ1 equivalent)	10.0%	9.4%
Other qualifications	5.2%	5.8%
No qualifications	7.5%	6.7%

¹²⁹ Nomis (2022) Workforce Jobs by Industry Section. Available from <https://www.nomisweb.co.uk/reports/lmp/gor/2013265922/report.aspx> [Accessed July 2022]

¹³⁰ United Utilities (2022) Employees. Available from <https://www.unitedutilities.com/corporate/responsibility/employees/#:~:text=In%20addition%2C%2010%2C000%20people%20are,is%20worth%20getting%20hurt%20for.> [Accessed July 2022]

¹³¹ United Utilities (2021) Community Investment. Available from <https://www.unitedutilities.com/corporate/responsibility/communities/community-investment/> [Accessed July 2022]

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Source: Nomis (2022) Qualifications. Available from <https://www.nomisweb.co.uk/reports/lmp/gor/2013265922/report.aspx> [Accessed July 2022]

Housing

In 2020, there were an estimated 3.36 million dwellings in the North West, which represents around 13.5% of England's housing stock. An estimated 65.2% of the housing stock in the North West was owner (or shared ownership) occupied (very similar to the overall English proportion, 63.8%), 14.8% was rented from a housing association, 2.4% was rented from a local authority, and 17.6% was privately rented.¹³²

Transport

The North West is easily accessible from the north and the south via the M6 and the West Coast mainline railway between London and Edinburgh; from east to west, the M62 connects Liverpool to Leeds. There are two major international airports in the region; Manchester Airport and Liverpool John Lennon Airport. The North West also has a major seaport, Liverpool.

The North West accounted for 11.4% of Great Britain's motor vehicle miles in 2019 with 40.5 billion million miles driven in the region. This figure was reduced in 2020, (32.3 billion miles) due to the impacts of COVID-19 on travel. Prior to 2020 vehicle miles driven had seen a steady increase since 2010; prior to this, there had been a notable drop in annual motor vehicle miles, likely to be associated with the effects of COVID-19 on travel.¹³³ In 2020 the average resident of the North West made around 752 (all transport mode) trips within England each year, slightly above the average for England (739 trips).¹³⁴ In 2020, the average distance travelled per person per year in the North West by all modes of transport was 4,233 miles, slightly lower than the England average of 4,334 miles. In the North West, over 3,536 miles (83.7%) were undertaken as a car/van driver or passenger, higher than the England average of 81.3%.¹³⁵ Both the average number of trips and distance travelled by persons in the North West and in England in 2020 was substantially reduced due to the effects of the COVID-19 pandemic on travel.

Human Health

The health of people residing in the North West region is relatively poor compared to other regions in England and the national average for a range of physical and mental health indicators. In 2018-20 infant mortality stands at 4.3 per 1,000 compared to 3.9 for England. Preventable sight loss stands at 33.8 per 100,000 compared to 29.2 per 100,000 for England in 2020/21. Overweight (including obesity) levels in Year 6 children stand at 37.4% compared to 35.2% for England whilst

¹³² Ministry of Housing, Communities and Local Government (2021) Dwelling Stock. Available from <https://www.gov.uk/government/statistical-data-sets/live-tables-on-dwelling-stock-including-vacants> [Accessed July 2022]

¹³³ Department for Transport (2021) Motor vehicle traffic (vehicle miles) by local authority in Great Britain, annual from 1993. Available from <https://www.gov.uk/government/statistical-data-sets/road-traffic-statistics-tra> [Accessed July 2022]

¹³⁴ Department for Transport (2022) Average number of trips (trip rates) by main mode, region and Rural-Urban Classification: England. Available from <https://www.gov.uk/government/statistical-data-sets/nts99-travel-by-region-and-area-type-of-residence> [Accessed July 2022]

¹³⁵ Department for Transport (2022) Average distance travelled by mode, region and Rural-Urban Classification: England. Available from <https://www.gov.uk/government/statistical-data-sets/nts99-travel-by-region-and-area-type-of-residence> [Accessed July 2022]

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adults classed as overweight or obese stands at 65.9% compared to 63.5% for England in 2020/21. Within Wales 61% of adults are classified as overweight or obese.¹³⁶

With regards to suicide rates these are slightly higher in the North West (10.7 per 100,000) compared to England (10.4 per 100,000) in 2018-20. Additionally, deaths related to drugs misuse stand at 7.1 per 100,000 for the North West compared to 5.0 per 100,000 for England.¹³⁷ Wales has reported suicide rates of 10.0 deaths per 100,000 which is very similar to the North West and England average.

Life expectancy is used as a broad measure of the health of an area and where a person is born can influence how long they will live. In the North West, the average life expectancy at birth for 2020 was 77.0 years for men and 81.0 years for women, compared to 78.7 and 82.7 years respectively for all of England. These figures are recognised to have declined in 2020 due to the COVID-19 pandemic and increased level of excess deaths. The region has one of the lowest life expectancies across all the English regions and one of the highest proportions of life spent with a persistent illness or disability. Compared with England as a whole, men and women in the North West can expect to live 1.7 years less on average based on the 2020 figure.¹³⁸ Within Wales life expectancy for the 2018-20 period was 78 years for males and 82 for females.¹³⁹

Deprivation

The English Index of Deprivation measures relative levels of deprivation in small areas of England called Lower Layer Super Output Areas (LSOA). The Indices of Deprivation is based on seven different domains of deprivation:

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

The 2019 indices show that there are some significant pockets of deprivation in all of the counties and districts in the region, with particularly large concentrations in and around the urban conurbations of Knowsley, Liverpool, Manchester and Blackpool.

¹³⁶ Welsh Government (2021) Healthy Weight: Healthy Wales priority plan 2020 to 2021. Available via <https://gov.wales/healthy-weight-healthy-wales-priority-plan-2020-2021> [Accessed July 2022]

¹³⁷ Public Health England (2022) Fingertips Public Health Data - Public Health Outcomes. Available via: Framework <https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data> [Accessed July 2022]

¹³⁸ Public Health England (2021) Health Profile for England 2021 [available at: https://fingertips.phe.org.uk/static-reports/health-profile-for-england/hpfe_report.html#mortality-and-life-expectancy [Accessed July 2022]

¹³⁹ Public Health Wales (2022) Inequalities in life expectancy on the increase in Wales. Available via: <https://phw.nhs.wales/news/inequalities-in-life-expectancy-on-the-increase-in-wales/> [Accessed July 2022]

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Levels of deprivation, particularly income deprivation, affect the ability of customers to pay for water and may also impact on total water usage. United Utilities invests in programmes that support communities and those struggling to pay bills, and has various schemes to give financial support and reduce debts.¹⁴⁰ In 2021/2022, United Utilities invested £2.82 million directly in local communities and helped those struggling to pay their bills, with a further £15 million being made available to help customers reduce their water bill to an affordable amount through the extension of United Utilities' social tariff.¹⁴¹

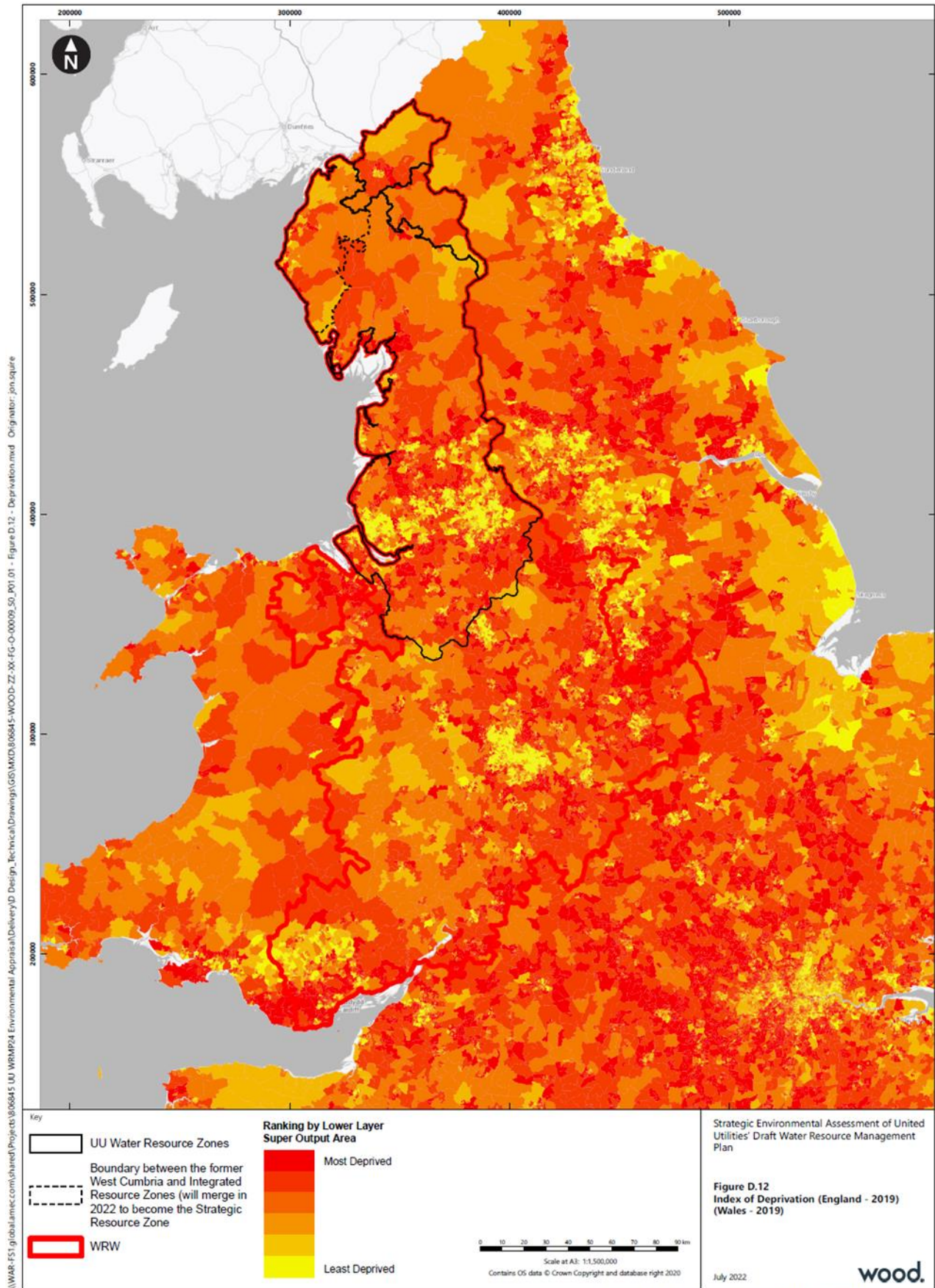
Figure D.12 presents the index of deprivation for the LSOA for the United Utilities area.

¹⁴⁰ United Utilities (2021) *Value for Money*. Available from <https://www.unitedutilities.com/corporate/responsibility/customers/value-for-money/> [Accessed July 2022]

¹⁴¹ United Utilities (2022) Community Investment. Available from <https://www.unitedutilities.com/corporate/responsibility/communities/community-investment/> [Accessed July 2022]

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Figure D.12 Index of Deprivation for United Utilities Water Operational Area and North Wales



806845-WOOD-ZZ-XX-FG-O-00009_S0_P01.01 - Figure D.12 - Deprivation

FINAL**Recreation and Tourism**

The North West offers a variety of opportunities for recreation and tourism, from the cultural offerings of the major cities to recreation in the region's National Parks and AONBs. Tourism also generates value for the region's economy. In 2019, 14.1 million UK domestic overnight trips were made to the North West, amounting to spending of just over £2.9 billion¹⁴².

UUW contributes to the recreational and tourism assets of the region through its ownership and management of land and water bodies, and through the impact of its activities on the wider natural environment. The company owns over 56,000ha of land, the majority of which is accessible to the public for recreational use. Specifically, there are opportunities for angling, water sports activities, walking and cycling trails as well as educational centres on nature reserves, reservoirs, and other land owned by the company. The Environment Agency has prepared a strategy¹⁴³ for water-based recreation in the North West. This report identifies priorities and initiatives which will help to address gaps in information or activity provision in the North West.

UUW's water management has an impact on river and bathing water quality and thus can bear a direct influence on the tourist industry in the North West. 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.

Likely Evolution of the Baseline without the WRMP

The population of the North West region are likely to continue to change, particularly with an increasing ageing population. The 2018-based sub-national population projections provide an indication of future population levels if current trends continue. The projections indicate that over the period 2018 to 2028, the population of the North West is expected to rise by 289,138 to reach 7,581,231 people. This equates to a 4.0% population increase across the 10-year period. Longer term, the population of the North West is expected to rise further to 7,912,587 by 2043¹⁴⁴.

If recently observed trends continue, the number of households in the region is expected to increase by 5.7% between 2018 and 2028 to 3,297,000 households which is lower than the national average increase (7.1%)¹⁴⁵.

¹⁴² Kantar (2020) The GB Tourist 2019 Annual Report. Available from <https://www.visitbritain.org/great-britain-tourism-survey-latest-monthly-overnight-data> [Accessed July 2022]

¹⁴³ Environment Agency (2010) Blue Horizons 2010-2015.

¹⁴⁴ Office for National Statistics (2020) Population projections for regions: Table 1 Available online at: <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/regionsinenglandtable1> [Accessed July 2022]

¹⁴⁵ Office for National Statistics (2020) Household projections for England: 2018-based. Available from <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/householdprojectionsforengland/2018based> [Accessed July 2022]

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The population of Wales is projected to increase by 2.7% to 3.22 million by 2028, and by 3.7% to 3.26 million by 2043¹⁴⁶. The total number of households in Wales is projected to be around 1.42 million by 2028 (an increase of 4.4% compared to 2018) and to 1.49 million by 2043¹⁴⁷.

An increase in population and households is likely to place additional pressures on water resources and drainage and wastewater infrastructure.

Future economic activity and growth is more uncertain given the ongoing impacts of the COVID-19 pandemic, although it is anticipated that growth will return in the longer term. In this context, whilst unemployment in the North West has fallen since 2012, it has recently increased, similar to national trends and those experienced in Wales and Scotland.

There is likely to be an increase in tourist numbers in the region and popularity of water sports and other water based recreational activities which may place seasonal pressure on water resources and drainage and wastewater infrastructure.

Department for Transport (DfT) forecasts¹⁴⁸ indicate that vehicle miles travelled in the North West could increase by circa 40% by 2050 (compared to a 2015 baseline). This increase is likely to lead to impacts including increased congestion, driver delay and accidents. However, associated emissions to air are expected to decline, reflecting the progressive change from diesel and petrol engine vehicles to electric vehicles.

Key Issues Relevant to the WRMP

The key issues relevant to the WRMP and the SEA arising from the analysis of the population and human health baseline are:

- the need to ensure that UUW's WRMP has a positive economic impact;
- the need to ensure that the water requirements of people, visitors and other users such as energy and agriculture can be met at all times, in a sustainable way, including in the seasonal peaks associated with tourism;
- the need to ensure that water supplies remain affordable, in particular for deprived or vulnerable communities;
- the need to accommodate an increase in population, households, dwellings and development associated with other uses that might impact on demand for water whilst ensuring the continued provision of essential services including water supply;

¹⁴⁶ Welsh Government (2019) National population projections: 2018-based. Available from <https://gov.wales/national-population-projections-2018-based#:~:text=The%20population%20of%20Wales%20is,536%2C300%20between%202018%20and%202028>. [Accessed July 2022]

¹⁴⁷ Welsh Government (2020) Subnational household projections (local authority): 2018 to 2043. Available from <https://gov.wales/subnational-household-projections-2018-based#:~:text=the%20total%20number%20of%20households,local%20authorities%2C%20other%20than%20Ceredigion&text=the%20number%20of%20households%20in%20Ceredigion%20is%20projected%20to%20decrease%20by%201.6%25>.

¹⁴⁸ DfT (2018) Road Traffic Forecasts 2018. Available from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/873929/road-traffic-forecasts-2018-document.pdf [Accessed July 2022]

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- health inequalities exist in many communities - this is due to a number of factors (and the interplay between them) including housing quality, economic wellbeing, employment, lifestyle, heredity factors, cultural and environmental factors;
- sustained exposure to elevated air pollution levels (including exposure to elevated concentrations of particulate matter, oxides of nitrogen and sulphur) contributes to respiratory illness;
- the need to ensure continuing safe, reliable and resilient provision of water services to maintain health and wellbeing of the population;
- the need to ensure that UUW's WRMP measures do not adversely affect the health and well-being of any member of the community;
- the need to ensure that UUW's WRMP minimise impacts on the ability of people to access facilities for sport, recreation and leisure purposes;
- the need to ensure that 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.

8.7 Material Assets and Resource Use

Baseline Characteristics

Water Demand

UUW currently [REDACTED] distributes approximately 1,730 million litres of water every day to meet customer demand in the North West.¹⁴⁹ In 2020/21, the UUW regional average household per capita consumption was 151 litres/person/day which was a significant increase (5%) from the previous year.¹⁵⁰

Consumption in the UUW area is slightly higher than the average for England and Wales of 145 l/hd/d but has largely reflected the average in the last three years.¹⁵¹ Within the WRMP 2019 UUW project household consumption to fall to 110 litres/person/day by 2039/40, this target is required by Ofwat, to be achieved by all water companies by 2050¹⁵².

The key demand statistics for UUW are set out for each WRZ in **Table D.8**. Resource demand is heavily weighted to the Integrated Resource Zone, which is unsurprising given that it is by far the largest area of the four WRZs in the UUW supply area and contains the North West's main urban

¹⁴⁹ United Utilities (2019) *United Utilities Final Water Resources Management Plan 2019*. Available online: https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/wrmp-2019---2045/final-water-resources-management-plan-2019.pdf [Accessed July 2022]

¹⁵⁰ United Utilities (2021) *Annual Water Resources Review April 2020 – March 2021*. Available online: [Annual Review of Water Resources Management Plan 2020-21 \(unitedutilities.com\)](https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/wrmp-2019---2045/final-water-resources-management-plan-2019.pdf) [Accessed July 2022]

¹⁵¹ Discover Water (2021) *The Amount We Use*. Available online: <https://discoverwater.co.uk/amount-we-use> [Accessed July 2022]

¹⁵² Defra (2022) Government's Strategic Priorities for Ofwat. Available online: [February 2022: The government's strategic priorities for Ofwat - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/strategic-priorities-for-ofwat) [accessed July 2022]

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centres. From 2022, the Integrated Resource Zone will be merged with the West Cumbria Resource Zone to form the strategic Resource Zone¹⁵³.

Table D.8 Key WRZ Data for United Utilities Water 2020/21

	Carlisle Resource Zone	Integrated Resource Zone	North Eden Resource Zone	West Cumbria Resource Zone	Regional Total
Water available for use (own water sources) (MI/d)	35	1,886	9	56	1,986
Total Population (000's)	110	7,022	14	148	7,294
Number of metered households (000's)	20	1,337	3	20	1,370
Water consumption by households (MI/d)	17	997	2	23	1,039
Leakage (MI/d)	6	398	3	17	424
Average per capita use (l/hd/d)	159	151	184	161	151

Source: Annual Water Resources Review April 2020–March 2021¹⁵⁴

Leakage

Leakage levels are affected by a number of factors including the length, age and condition of the water mains network as well as weather conditions. Between 2019/20 and 2020/21, overall leakage in the U UW operational area reduced by 15.1MI/d to 424 MI/d. This was below the target of 443.5 MI/d, for the 15th consecutive year. However, leakage varies between the WRZs reflecting the length of the network, age and condition of pipes, and the volume of water supplied through the network (see **Table D.9**). Despite this, there was a decrease in leakage in all WRZs except for the Carlisle Resource Zone compared to the previous year.¹⁵⁵

Table D.9 United Utilities Water Leakage Rates by WRZ

	Carlisle Resource Zone	Integrated Resource Zone	North Eden Resource Zone	West Cumbria Resource Zone	Regional Total
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¹⁵³ United Utilities (2021) Annual Water Resources Review (April 2020 – March 2021) Available online: [Annual Review of Water Resources Management Plan 2020-21 \(unitedutilities.com\)](https://www.uu.co.uk/annual-review-of-water-resources-management-plan-2020-21) [Accessed July 2022]

¹⁵⁴ Ibid.

¹⁵⁵ Ibid.

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Total leakage 2019/20 (MI/d)	5.5	419.3	3.8	17.4	446.1
Total leakage 2020/21 (MI/d)	6	398.3	3.2	17.1	424.7

Source: Annual Water Resources Review April 2020–March 2021¹⁵⁶

Water Efficiency

In 2019/20, United Utilities saved an estimated 4.06 MI/d through water efficiency measures, exceeding Ofwat’s target of 2.95 MI/d. **Table D.10** below summarises UUW’s water efficiency programme in 2019/20.

Table D.10 Summary of United Utilities Water’s Water Efficiency Programme 2019/20

Water Efficiency Activity	Number	Estimated Water Saving (MI/d)
Cistern devices distributed to customers	26,682	0.22
Water butts distributed to customers	3,566	0.01
Water Efficiency Education Programme, pupils visited	9,913	1.20
Crystal packs / water sticks distributed to customers	12,179	0.01
Retrofit devices distributed to customers	51,976	1.27
Base Service Water Efficiency Programme – Total		2.71
Free meter options	25,817	0.87
West Cumbria Sustainable Level of Water Efficiency Programme	25,682	0.40
West Cumbria education programme	1,926	0.08
TOTAL SAVING		4.06

Source: Annual Water Resources Review April 2019–March 2020¹⁵⁷

¹⁵⁶ Ibid.

¹⁵⁷ United Utilities (2020) *Annual Water Resources Review April 2019 – March 2020*. Available online: <https://www.unitedutilities.com/globalassets/documents/pdf/annual-review-of-water-resources-management-plan-2019-20.pdf> [Accessed July 2022].

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Water metering can help improve water efficiency within the home as households pay for the water that they use and as a result typically use less. Since 2001, UUW’s customers have been entitled to trial water meters free of charge. In 2020/21, 16,314 households opted for a free meter although the number of requests per year varies due to a range of factors, this year it was further impacted by COVID-19 restrictions. The number of free meter installations is generally expected to continue to decline in future within the forecasts; as the metering increases, the number of unmetered customers who still stand to benefit most from a free meter reduces.¹⁵⁸

Energy Use

Table D.11 provides a breakdown of total energy use in 2019 for the region for industry and commercial uses, domestic and road transport. It shows that for the North West, energy use by sector is broadly in line with the UK average, while for Wales, the proportion of energy use in the industrial and commercial sector is notably higher than the rest of the UK.

Table D.11 Breakdown of Energy Consumption in North West England and Comparison with UK, 2019

Sector	North West Proportion of Total Regional Energy Use (%)	Wales Proportion of Total Regional Energy Use (%)	UK Proportional Energy Use (%)
Domestic	32.6	27.6	32.8
Transport	30.1	25.2	30.5
Industrial, Commercial and other	37.3	47.2	36.7

Source: BEIS¹⁵⁹

Energy consumption by source in the North West is fairly representative of national trends, with most energy coming from petroleum (36.6%) and natural gas (37.9%)¹⁶⁰. North West generated 11,606.3 GWh electricity from renewable sources, an increase of 514% compared to 2010. In 2020, in Wales, 8,790.7GWh of electricity was generated from renewable sources, whilst in Scotland 32,031.2GWh was generated from renewable sources.¹⁶¹

Total energy consumption in Wales over the period 2005 to 2019 reduced from 109,883.7 GWh to 92,803.9 GWh, a decrease of 15.5%. Petroleum (primarily associated with road transport) and

¹⁵⁸ United Utilities (2021) Annual Water Resources Review (April 2020 – March 2021) Available online: [Annual Review of Water Resources Management Plan 2020-21 \(unitedutilities.com\)](https://www.uu.co.uk/annual-review-of-water-resources-management-plan-2020-21) [Accessed July 2022].

¹⁵⁹ BEIS (2021) *Total final energy consumption at regional and local authority level: 2005 to 2019*. Available online: <https://www.gov.uk/government/statistics/total-final-energy-consumption-at-regional-and-local-authority-level-2005-to-2019> [Accessed September 2021]

¹⁶⁰ Ibid.

¹⁶¹ BEIS (2021) *Regional Statistics 2003-2020: Generation*. Available online: <https://www.gov.uk/government/statistics/regional-renewable-statistics> [Accessed October 2021]

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natural gas are the most dominant energy sources in Wales, although manufactured fuels also make a notable contribution to the energy mix in Wales.¹⁶²

In 2021/21, U UW’s electricity consumption approximately 807 GWh. Over the same period 2021/21 U UW generated the equivalent of 210 GWh of renewable electricity, an increase of 4.7 GWh on 2020/21. U UW plans to significantly increase renewables generation over the next few years.¹⁶³

Material use and waste generation

In 2020/21, around 3.6 million tonnes of waste were collected by local authorities in the North West. As highlighted in **Table D.12**, annual household waste collected by local authorities in the region has reduced overall between 2015/16 and 2019/20 tonnes before increasing again in 2020/21. Non-household waste arisings have reduced and recycling has increased.

Table D.12 Local Authority Collected Waste Generation (in thousand tonnes) in the North West from 2015/16 to 2020/21

Household waste from:	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Regular household collection	1,296	1,310	1,301	1,287	1,296	1,472
Other household sources	169	164	165	158	165	168
Civic amenity sites	263	293	297	289	292	234
Household recycling	1,476	1,498	1,425	1,436	1,471	1,515
Total household	3,204	3,265	3,188	3,170	3,224	3,389
Non household sources (excl. recycling)	179	183	155	128	125	115
Non household recycling	140	123	132	150	154	110
Total LA collected waste	3,523	3,571	3,475	3,448	3,504	3,614

Source: DEFRA¹⁶⁴

Recycling rates across the region have remained level in the last six years (44-46%) but have risen significantly from 31% in 2006/07, and are higher than the national average of 41.5% in 2020/21. Whilst the volume of local authority collected waste sent to landfill in the North West has fallen

¹⁶² Ibid

¹⁶³ United Utilities Group PLC (2022) Annual Report and Financial Statements for the year ended 31 March. 2022. Available online: <file:///C:/Users/daniel.williams2/Downloads/United%20Utilities%20Annual%20Report%202022.pdf> [Accessed July 2022].

¹⁶⁴ Defra (2020) ENV18 - Local authority collected waste: annual results tables. Available online: <https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables> [Accessed July 2022]

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from 66% to 9.2% over the same period (see **Table D.13**), it is slightly higher than the national average (7.8 %).

Table D.13 Management of Local Authority Collected Waste in the North West from 2015/16 to 2019/20

Method	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Landfill	846	865	673	441	326	335
(percentage)	24.1%	24.3%	19.4%	12.6%	9.2%	9.2%
Incineration with EfW	860	859	1,033	1,283	1,427	1,522
(percentage)	24.5%	24.1%	29.7%	36.8%	40.2%	41.9%
Incineration without EfW	34	104	117	55	55	66
(percentage)	1.0%	2.9%	3.4%	1.6%	1.5%	1.8%
Recycled-composted	1,617	1,622	1,557	1,586	1,626	1,625
(percentage)	46.0%	45.6%	44.8%	45.5%	45.8%	44.7%
Other	159.90	110	99	124	119	87
(percentage)	4.5%	3.1%	2.8%	3.5%	3.4%	2.4%
Total	3,517	3,560	3,477	3,488	3,553	3,635

Source: DEFRA¹⁶⁵

In 2021/22 United Utilities operations produced 661,933 tonnes of waste. United Utilities diverted 97.8% of waste produced for beneficial reuse (the target for 2025 is 98%). Some 379,704 tonnes comprised of wastewater sludge which was all diverted to beneficial use.¹⁶⁶

Likely Evolution of the Baseline without the WRMP

UUW has more than halved leakage over the last 25 years and the company met its performance commitment for leakage for 1010/21 which was to maintain leakage below the target of 443.5 MI/d.

¹⁶⁵ Ibid.

¹⁶⁶ United Utilities (2022) Resource Efficiency. Available online at: <https://www.unitedutilities.com/corporate/responsibility/environment/resource-efficiency/> [Accessed July 2022]

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Across the supply area as a whole, U UW forecast that water demand will generally reduce, despite the forecast growth in population and number of houses to be supplied with water. This is primarily due to the expected effects of:

- reduced demand from businesses and industry (due to becoming less water intensive);
- households becoming more water efficient;
- water efficiency promotion;
- pipe leak detection and repair; and
- provision of water meters to customers free of charge.

Notwithstanding the above, U UW's current 2019 WRMP identifies that there would be a supply-demand deficit in the West Cumbria Resource Zone over the lifetime of the plan due to the need to cease abstraction from Ennerdale Water. The Thirlmere Transfer scheme was selected to meet this shortfall by using some of the spare water available in the neighbouring water resource zone (the former Integrated Resource Zone). The WRMP also sets out that U UW will continue to:

- operate the most economically sustainable level of leakage;
- encourage customers to take up a Free Meter Option; and
- be leaders in the area of water efficiency.

Water Resources West predict that by 2050, water demand in the region will have increased by approximately 507MI/d. 166MI/d for public water supply, 41MI/d for non-public and around 300MI/d for uncertainties surrounding climate change, population growth and environmental considerations¹⁶⁷. WRW published its Emerging Regional Plan¹⁶⁸ in January 2022. This updated the forecast, taking into account a commitment to achieve a 50% reduction in leakage from the public water supply network by 2050 and a per capita consumption reduction to 110 litres/person/day. The updated WRW forecast identified that 215 MI/d of new water would be needed to meet public supply demand by 2031 and that an additional 63 MI/d would be needed by 2050, for non-public water supply sectors. Options such as those described in Section 1.3 of this Environmental Report and contained in U UW's WRMP24, amongst others, will be required to meet the coming shortfall in supply vs. demand.

Installed renewable energy capacity is expected to continue to increase across North West England. In this wider context, U UW plans to significantly increase its renewable generation, and be a net zero carbon company by 2030¹⁶⁹.

Future waste arisings in North West England, England and Wales are likely to remain relatively stable, as they have done for recent years. There may be a future decoupling between economic

¹⁶⁷ Water Resources West (2020) Tomorrow's Water. Today's Challenge. Available online: [Water Resources West](#) [accessed July 2022]

¹⁶⁸ WRW (2022) Emerging Regional Plan, January 2022. Available from: <https://static1.squarespace.com/static/5e67889204d86850e1fdcece/t/61e5a4e237970d62de92fa10/1642439906757/WRW+Emerging+Regional+Plan+Executive+Summary.pdf>

¹⁶⁹ United Utilities (2020) United Utilities plans for Net Zero Carbon by 2030 Available online at: <https://www.unitedutilities.com/corporate/newsroom/latest-news/united-utilities-plans-for-net-zero-carbon-by-2030/> [Accessed June 2022]

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growth and waste growth due to regulatory and economic measures and cultural factors, and the likely further decline in the industrial/manufacturing sector in this region. UUW met its target to divert 95% of waste to beneficial use by 2020.

Key Issues Relevant to the WRMP

The key sustainability issues relevant to the WRMP and the SEA, arising from the analysis of the material assets and resource use baseline are:

- the need to minimise current and future demand for water resources through water efficiency measures (including metering);
- the need to continue to actively control leakage to optimise the water available;
- the need to reduce energy consumption;
- the need to ensure the sustainable and efficient use of resources such as construction materials;
- the need to minimise waste arisings, promote reuse, recovery and recycling and minimise the impact of wastes on the environment and communities.

8.8 Cultural Heritage

Baseline Characteristics

The cultural and historic heritage of the region is largely dominated by its contribution towards the UK's industrial history, largely due to its wealth of natural resources and good connections via sea and inland waters to other areas of the UK and other countries. Appreciation of the North West's industrial heritage is marked through the conservation of buildings dating from the Industrial Revolution in the cities of Manchester, Salford and Liverpool.

Conversely, the majority of the region's ancient historical and archaeological heritage occurs in the more rural areas, which contain important sites including St Bees Heritage Coastline and those designated as part of the Frontiers of the Roman Empire UNESCO World Heritage Site (Hadrian's Wall). The heritage and cultural value of the region's diverse range of landscapes are also deemed of importance, with three National Parks or parts of National Parks being located within the region.

Figure D.13 highlights the key cultural heritage designations within and around the United Utilities area. This includes:

- 3 World Heritage Sites;
- 1,325 scheduled monuments;
- 436 Grade I listed buildings;
- 1,506 Grade II* listed buildings;
- 24,139 Grade II listed buildings;
- 137 registered parks and gardens;

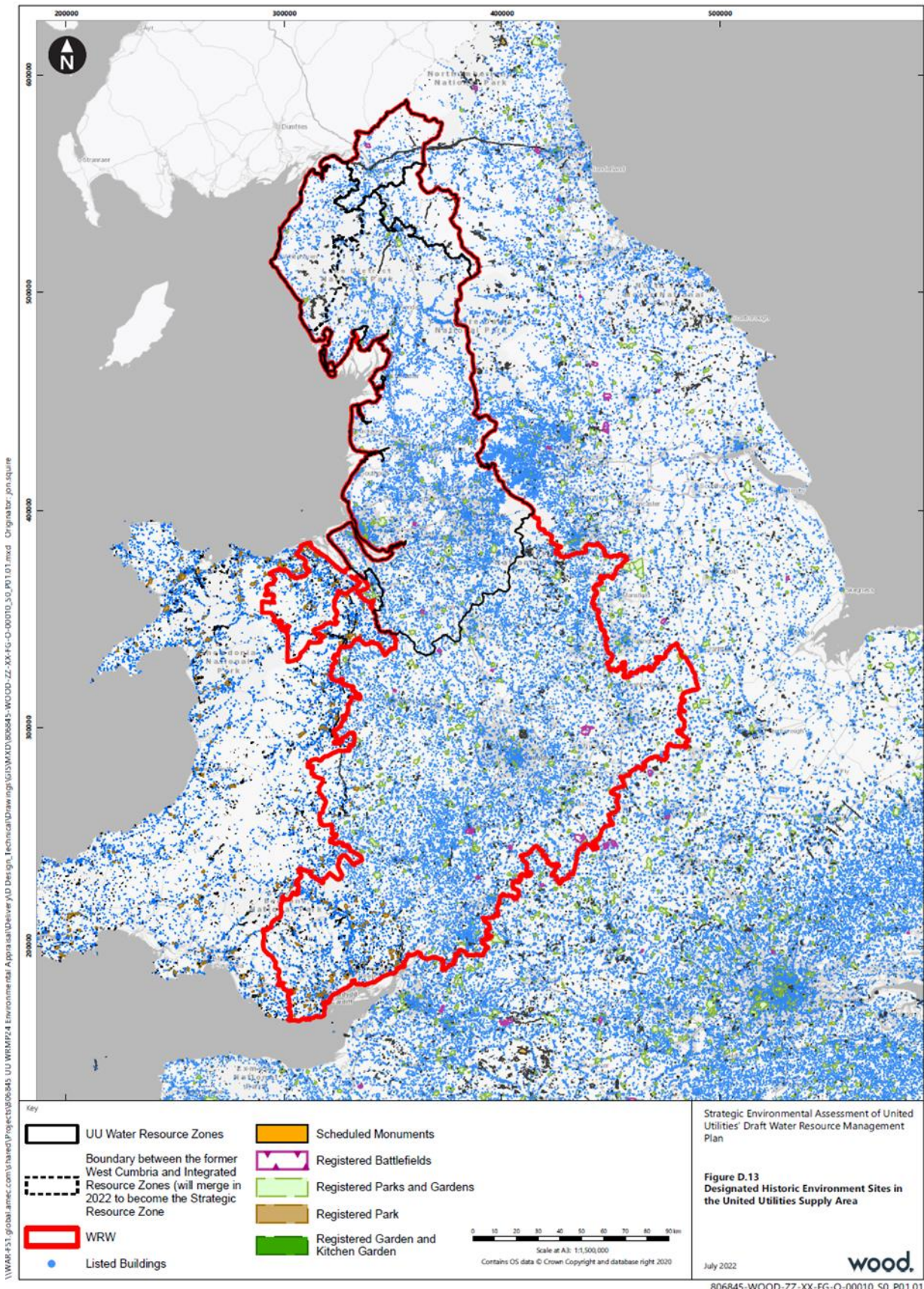
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- 4 registered battlefields; and
- 876 conservation areas.

The cultural heritage of the North West is recognised internationally through the designation of three UNESCO World Heritage Sites; Hadrian's Wall, The Lake District National Park, and, as of 2019, the Jodrell Bank Observatory. The North East Wales area is also particularly noted for its Iron Age hill forts, particularly along the Clwydian Range. Additionally, Pontcysyllte Aqueduct and Canal is located in North East Wales.

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Figure D.13 Designated Historic Environment Sites in the United Utilities Water Operational Area and North Wales



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The 2022 Heritage at Risk Register¹⁷⁰ highlights that:

- 131 Grade I and Grade II* listed buildings (excluding places of worship) are at risk in the region;
- 121 of region's scheduled monuments are at risk;
- 8 of the region's 136 registered parks and gardens are at risk;
- none of the regions' registered battlefields are at risk; and
- of the 867 conservation areas in the North West, 69 are at risk.

The North West region and North East Wales contain a large number of undesignated cultural heritage assets, many of which may be of considerable significance (some of national quality, although not formally designated). Historic Environment Records (HERs) held by local authorities and Welsh Archaeological Trusts include both designated and undesignated assets.

The region's paleoenvironmental deposits also serve as important baseline features. These contain important records of past human activities as well as climate change. Most of this evidence is organic and only survives in favourable conditions. If water levels are reduced, these delicate materials are highly susceptible to decay and destruction. Such baseline information is site specific and no general trends or regional spatial variability is available.

Likely Evolution of the Baseline without the WRMP

There are no significant trends relating to archaeology or cultural heritage, therefore, predicting future changes is extremely difficult. The EU Rural Development Programme, which comes to an end in 2023, has identified that many of the region's cultural heritage sites are endangered and there are particular concerns regarding buildings on upland sites.

Development pressures, social pressures, natural and environmental threats including climate change (including increased flooding), pressures from resource exploitation and infrastructure continue to threaten the condition of cultural heritage sites and monuments. In this context, the protection, preservation and settings of cultural heritage assets needs to be considered when locating any new development including drainage and wastewater management infrastructure.

Key Issues Relevant to the WRMP

The key issues relevant to the WRMP and the SEA, arising from the analysis of the cultural heritage baseline are:

- the need to conserve and enhance the historic significance of buildings, monuments, features, sites, places, areas of archaeological and cultural heritage interest, and their settings;
- the need to conserve and enhance the World Heritage Sites within the WRMP area;

¹⁷⁰ Historic England (2022) Heritage at Risk Register 2022 – North West Available online at: [Heritage at Risk 2021 Registers | Historic England](#) [Accessed July 2022].

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- the need to promote access to heritage sites within UUW;s ownership where possible and safe to do so; and
- the need to avoid damage to important wetland areas with potential for paleoenvironmental deposits.

8.9 Landscape

Baseline Characteristics

The landscape of the North West of England is some of the most diverse in the country, containing 29 National Character Areas as defined by Natural England¹⁷¹. Although the region is generally low lying, it also contains some of the most striking upland landscapes in England, particularly within the Lake District National Park and UNESCO World Heritage Site.

The National Landscape Character Area map of Wales¹⁷² recognises 48 sub-regional Landscape Character Areas across Wales. Each Area has a distinctive sense of place that enables it to be recognised as a single area (for example, a range of hills or a major urban area). Local detail is recorded in LANDMAP, an all-Wales landscape resource where landscape characteristics, qualities and influences on the landscape are recorded and evaluated. It includes nationally consistent, quality assured spatial datasets covering geological landscape, landscape habitats, visual and sensory, historic landscape and cultural landscape, evaluating their importance from a national to local scale.

Figure D.14 shows the national character areas in the United Utilities operational area and landscape character areas in Wales.

The coastal landscape in the North West contains remnants of the region's industrial history, in particular the Liverpool and Merseyside docklands, as well as having protected areas of Heritage Coastline around St Bee's Head. A Heritage Coast is a section of coast exceeding one mile in length that is of exceptionally fine scenic quality, substantially undeveloped and containing features of special significance and interest. They are agreed between Natural England and the local authority. The national distribution of heritage coasts is far from even and within United Utilities operating area there is just 1% of the UK's Heritage Coastline, located around St. Bee's Head.

Cadw and other stakeholders produced the Register of Landscapes of Historic Interest in Wales¹⁷³ as a means of identifying, and to provide information on, the most important and best-surviving historic landscapes in Wales. The Register has been issued in two parts, covering 36 'outstanding' and 22 'special' historic landscape areas. All landscape areas identified on the Register are of

¹⁷¹ Natural England (2014) National Character Area Profiles. Available from <https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles> [Accessed September 2021]

¹⁷² Natural Resources Wales. Wales environmental information portal. Available at <https://naturalresources.wales/evidence-and-data/maps/nlca/?lang=en> [Accessed July 2022]

¹⁷³ Cadw, Welsh Government and Countryside Council for Wales (2007) Historic Landscapes, 2007. Available online at: https://cadw.gov.wales/sites/default/files/2019-05/Caring_for_Historic_Landscapes_EN_CY.pdf [Accessed July 2022]

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national importance in the Welsh context¹⁷⁴. North East Wales includes Vale of Clwyd and Holywell Common and Halkyn Mountain landscapes of outstanding interest.

The Lake District National Park and World Heritage Site in Cumbria covers an area of 2,362 km². The National Park boundary was extended by 3% towards the east in August 2016, up to the M6 and the newly extended Yorkshire Dales National Park. Two other National Parks also fall partly within the North West region; the Yorkshire Dales and the Peak District. In total, 18% of the North West is designated as National Parks.

The North West has three AONBs which lie wholly or mainly in the region (Solway Coast, Arnside and Silverdale and Forest of Bowland). The North Pennines AONB also straddles Cumbria's eastern border. Snowdonia National Park and the Clwydian Range and Dee Valley AONB are the significant designated landscape sites within the region of Lake Vyrnwy and the River Dee. In total, 25 per cent of Wales is designated as either a National Park or an AONB.

Figure D.15 shows those landscape designations in the United Utilities area and North Wales.

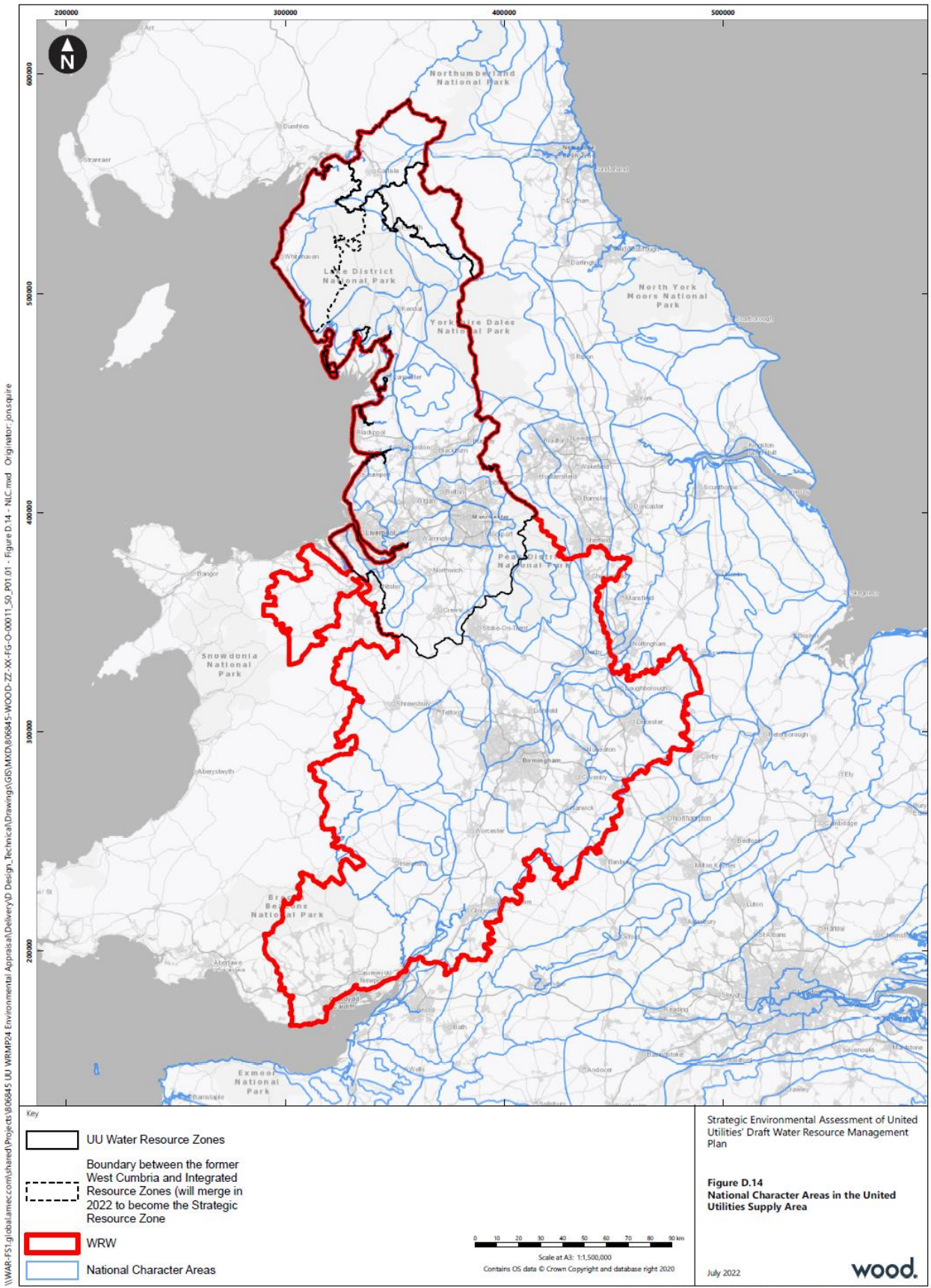
Nationally, land area designated as Green Belt, in which major developments will generally not be permitted except in very special circumstances in accordance with the NPPF, has been gradually decreasing. Across the North West region, the area of land designated as Green Belt was 255,900ha (18.1% of total land area) in 2020/21. Green belt in the North West reduced by 2,725ha between 2013/14 and 2020/21¹⁷⁵.

174 Cadw (et al) (2007) Guide to Good Practice on using the Register of Landscapes of Historic Interest in Wales in the Planning and Development Process

175 Ministry of Housing Communities and Local Government (2020) Local authority green belt statistics for England: 2020 to 2021. Available from [Local authority green belt statistics for England: 2020 to 2021 - GOV.UK \(www.gov.uk\)](https://www.gov.uk) [Accessed July 2022]

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Figure D.14 National Character Areas in the United Utilities Supply Area and Wales



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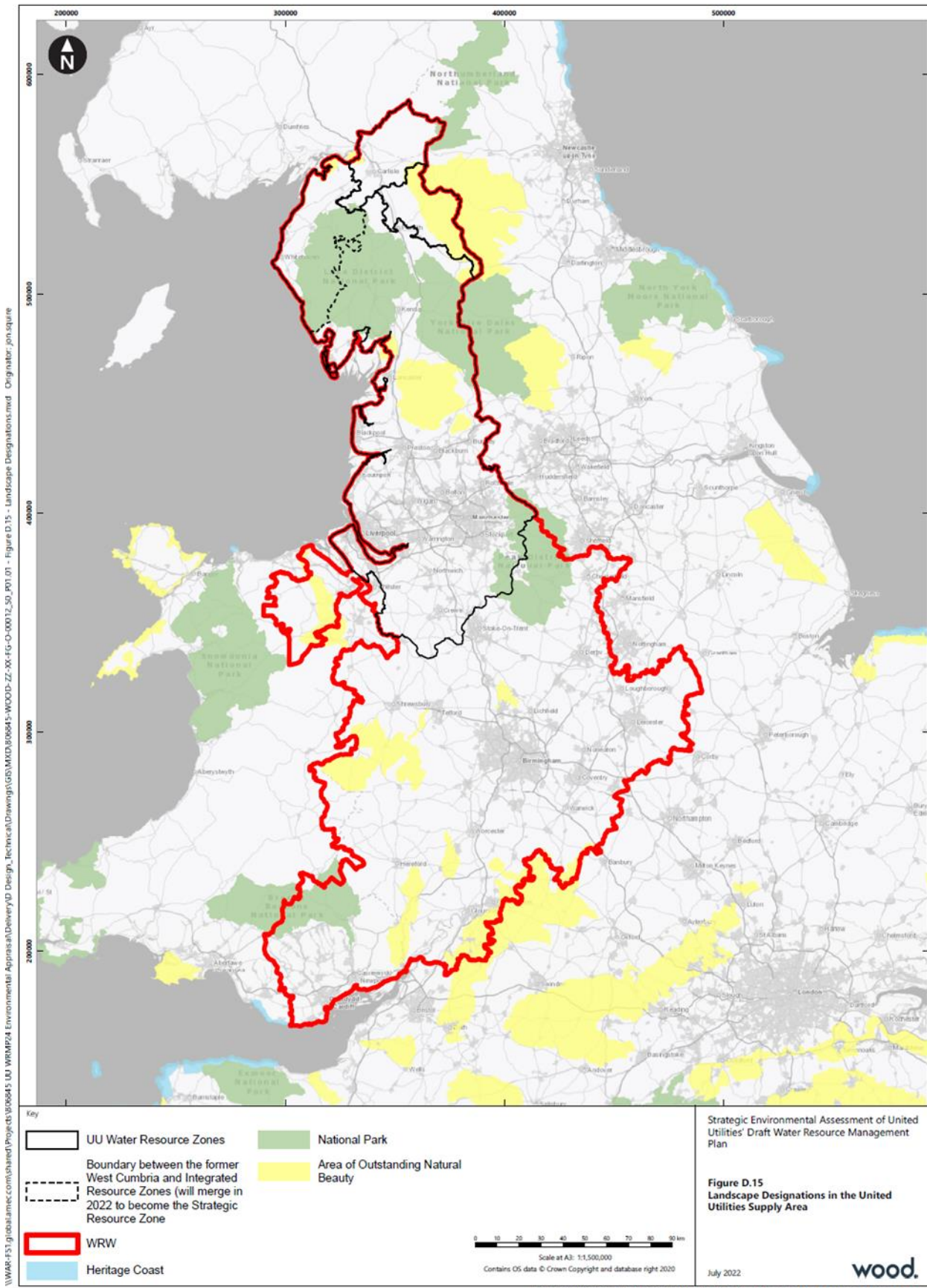


- | | |
|---|---|
| <ul style="list-style-type: none"> 1 Anglesey Coast 2 Central Anglesey 3 Arfon 4 Llyn 5 Tremadoc Bay 6 Eryri 7 Conwy Valley 8 Colwyn and Northern Coastline 9 Y Rhos 10 Denbigh Moors 11 Vale of Clwyd 12 Clwydian Range 13 Deeside and Wrexham 14 Maelor 15 Vale of Llangollen and Dee Valley 16 Y Berwyn 17 Montgomeryshire Hills and Vales 18 Shropshire Hills (part) 19 Severn Valley 20 Radnorshire Hills 21 Cambrian Mountains 22 Aberdyfi Coast 23 Rheidol and Ystwyth Hills and Valleys 24 Ceredigion Coast | <ul style="list-style-type: none"> 25 Ceredigion 26 Upper Wye Valley 27 The Spas and Wells of Central Wales 28 Eppynt Plateau and Valleys 29 Wye and Usk Vales 30 Brecon Beacons and Black Mountains 31 Central Monmouthshire 32 Wye Valley and Wentwood 33 Gwendraeth Vales 34 Gwent Levels 35 Cardiff and Newport 36 Vale of Glamorgan 37 South Wales Valleys 38 Swansea Bay 39 Gower 40 Teifi Valley 41 Tywi Valley 42 Pembroke and Carmarthen Foothills 43 West and North Pembrokeshire Coast 44 Taf and Cleddau Vales 45 Taf, Tywi and Gwendraeth Estuaries 46 Preseli Hills 47 South Pembrokeshire Coast 48 Milford Haven |
|---|---|

Source: Natural Resources Wales. National Landscape Character Areas (NLCA)

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Figure D.15 Landscape Designations in the United Utilities Water Operational Area and North Wales



806845-WOOD-ZZ-XX-FG-O-00012_S0_P01.01 - Figure D.15 - Landscape Designations

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Likely Evolution of the Baseline without the WRMP

It is envisaged that landscape and designated sites will be maintained and enhanced for the enjoyment of the public. However, landscape character and visual amenity is likely to be affected by development pressure, particularly associated with population growth. In this context, Green Belts in the region are at risk of continuing to reduce in size which may affect local landscapes.

Defra has set a number of future targets in order to see significant expansion and restoration of a number of priority woodland habitats. These include Upland Oak, Upland Mixed Ash, Wet Woods and Beech. Furthermore, the Government has committed to increasing nationwide woodland cover by 2% before 2060¹⁷⁶.

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 in the visual amenity of the North West.

Key Issues Relevant to the WRMP

The key issues relevant to the WRMP and the SEA, arising from the analysis of the landscape baseline are:

- the need to ensure the special qualities of designated landscapes including National Park and AONBs are protected;
- the need to minimise any adverse impacts upon landscape and seascape that may result from UUW's WRMP24, having regard to NCA profiles and the potential for effects on designated landscapes and their settings;
- the need to conserve and enhance landscape and seascape character and distinctiveness, taking into account the effects of climate change and recommendations for managing change in the profile of relevant NCAs.

¹⁷⁶ Forestry in England: Seeing the wood for the trees (2017) Accessed at: www.parliament.uk.



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Appendix E

Definitions of Significance

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SEA Objectives	Guide Questions	Score		Description
1. To protect, restore and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species, enhance ecosystem resilience and habitat connectivity and deliver a net biodiversity gain.	<ul style="list-style-type: none"> Will it protect, restore and enhance where possible, the most important sites for nature conservation (e.g., internationally or nationally designated conservation sites such as SACs, SPAs, Ramsar and SSSIs)? Will it protect, restore and enhance non-designated sites and local biodiversity? Will it provide opportunities for new terrestrial and aquatic habitat creation or restoration and/or link existing habitats as part of the development process? Will it provide opportunities to deliver biodiversity net gain? Will it lead to a change in the ecological quality of habitats? Will it protect, restore and enhance where appropriate, coastal and marine habitats and species? Will it maintain and enhance the green infrastructure network and the biodiversity it supports? Will it alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems? 	+++	Major/Significant Positive	The option would result in a major enhancement on the quality of designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat quality and availability. The option would result in a major increase in the population of, or habitats for, a priority species. Effects could be caused by beneficial changes in water flows/water quality, or large amounts of creation or enhancement of habitat, promoting a major increase in ecosystem structure and function.
		++	Moderate Positive	The option would result in a moderate enhancement on the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat creation and enhancement measures. The option would result in a moderate increase in the population of, or habitats for, a priority species. Effects could be caused by beneficial changes in water flows/water quality, or moderate amounts of creation or enhancement of habitat, promoting a moderate increase in ecosystem structure and function.
		+	Minor Positive	The option would result in a minor enhancement of the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat creation and enhancement measures. The option would result in a minor increase in the population of, or habitats for, a priority species. Effects could be caused by beneficial changes in water flows/water quality, or small amounts of creation or enhancement of habitat, promoting a minor increase in ecosystem structure and function.
		0	Neutral	The option would not result in any effects on designated or non-designated sites including habitats and/or species).
		-	Minor Negative	The option would result in a minor negative effect on the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation.

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SEA Objectives	Guide Questions	Score		Description
				The option would result in a minor decrease in the population of, or habitats for, a priority species. Effects could be caused by detrimental changes in flows/water quality, or small losses or degradation of habitat leading to a minor loss of ecosystem structure and function.
		--	Moderate Negative	The option would result in a moderate negative effect on the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation. The option would result in a moderate decrease in the population of, or habitats for, a priority species. Effects could be caused by detrimental changes in flows/water quality, or moderate loss or degradation of habitat leading to a moderate loss of ecosystem structure and function.
		---	Major/Significant Negative	The option would result in a major negative effect on the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation. The option would result in a major decrease in the population of, or habitats for, a priority species. Effects could be caused by detrimental changes in flows/water quality, or large losses or degradation of habitat leading to a major loss of ecosystem structure and function.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
2. To protect and enhance sustainable natural resources and the ecosystem services they provide.	<ul style="list-style-type: none"> Will it protect or enhance natural capital and ecosystem services? Will it maintain and enhance ecosystem resilience? Will it contribute to the sustainable management of natural habitats and ecosystems, i.e., within their limits and 	+++	Major/Significant Positive	<p>The option would lead to a major increase in natural capital/ecosystem resilience and enhancement (as measured by the NCA).</p> <p>The option would lead to a biodiversity net gain of greater than 10% (as measured by the BNG assessment).</p> <p>The option would protect and enhance all the ecosystem services identified in the NCA (biodiversity and habitat, climate regulation, natural hazard regulation, water purification, water regulation, recreation and tourism, health and well-being and agricultural).</p>

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SEA Objectives	Guide Questions	Score		Description
	<ul style="list-style-type: none"> capacities taking into account climate change adaptability? Will it provide opportunities for climate adaptation and protect the climate resilience of vulnerable and priority sites? 	++	Moderate Positive	<p>The option would lead to a moderate increase in natural capital/ecosystem resilience and enhancement (as measured by the NCA).</p> <p>The option would lead to a biodiversity net gain of 10% (as measured by the BNG assessment).</p> <p>The option would protect and enhance at least three categories of ecosystem services identified in the NCA (with neutral effects on the remaining services).</p>
		+	Minor Positive	<p>The option would lead to a minor increase in natural capital/ecosystem resilience and enhancement (as measured by the NCA).</p> <p>The option would lead to a biodiversity net gain of less than 10% (as measured by the BNG assessment).</p> <p>The option would protect and enhance at least one category of ecosystem services identified in the NCA (with neutral effects on the remaining services).</p>
		0	Neutral	<p>The option would have no effect on natural capital, biodiversity net gain or ecosystem services.</p>
		-	Minor Negative	<p>The option would lead to a minor decrease in natural capital/ecosystem resilience (as measured by the NCA).</p> <p>The option would lead to a biodiversity net loss of less than 10% (as measured by the BNG assessment).</p> <p>The option would adversely affect at least one category of ecosystem services identified in the NCA (with neutral effects on the remaining services).</p>
		--	Moderate Negative	<p>The option would lead to a moderate decrease in natural capital/ecosystem resilience (as measured by the NCA).</p> <p>The option would lead to a biodiversity net loss of 10% (as measured by the BNG assessment).</p> <p>The option would adversely affect at least three categories of ecosystem services identified in the NCA (with neutral effects on the remaining services).</p>

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SEA Objectives	Guide Questions	Score		Description
		---	Major/Significant Negative	<p>The option would lead to a major decrease in natural capital/ecosystem resilience (as measured by the NCA).</p> <p>The option would lead to a biodiversity net loss of greater than 10% (as measured by the BNG assessment).</p> <p>The option would adversely affect all categories of ecosystem services identified in the NCA.</p>
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
3. To avoid and minimise the risk of spread of, and, where required, manage invasive and non-native species (INNS).	<ul style="list-style-type: none"> Will it prevent or minimise the risk of spread/introduction of invasive and non-native species? Will it contribute to the eradication of invasive and non-native species, where they are already present and it is technically and economically feasible to do so? 	+++	Major/Significant Positive	The option would result in a major reduction or management of INNS.
		++	Moderate Positive	The option would result in a moderate reduction or management of INNS.
		+	Minor Positive	The option would result in a minor reduction or management of INNS.
		0	Neutral	The option would not result in any effects on INNS.
		-	Minor Negative	The option would result in a minor increase or spread of INNS.
		--	Moderate Negative	The options would result in a moderate increase or spread of INNS.
		---	Major/Significant Negative	The option would result in a major increase or spread of INNS.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.

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SEA Objectives	Guide Questions	Score		Description
4. To protect and enhance soil quantity, quality and functionality and geodiversity and ensure the appropriate and efficient use of land.	<ul style="list-style-type: none"> Will additional land be required for the development or implementation of the option or will the option require below ground works leading to land sterilisation? Will it avoid damage to, protect and enhance where possible protected sites designated for their geological interest (GCR sites, SSSI and RIGS) and features of wider geodiversity interest? Will it minimise the loss of best and most versatile agricultural land? Will it minimise land contamination? Will it ensure efficient use of land (e.g., make use of previously developed land)? Will it contribute towards a catchment-wide approach to land management? Will it avoid adverse effects on other land uses (such as forestry)? 	+++	Major/Significant Positive	The option would result in a major enhancement on the quality of soils as a result of remediation, implementation of catchment approaches, or other measures.
		++	Moderate Positive	The option would result in a moderate enhancement on the quality of soils as a result of remediation, implementation of catchment approaches, or other measures.
		+	Minor Positive	The option would be located on a brownfield site and has no effect on soils or existing land use. The option results in the remediation of contaminated land.
		0	Neutral	The option would not result in any effects on soils or land use.
		-	Minor Negative	The option would not be located on a brownfield site and/or results in a minor loss of best and most versatile agricultural land or is in conflict with existing land use.
				The option would result in land contamination. The option would result in a minor negative effect on a site designated for their geological interest.
		--	Moderate Negative	The option would result in a moderate loss of best and most versatile agricultural land or is in substantial conflict with existing land use.
				The option would result in land contamination. The option would result in a moderate negative effect on a site designated for their geological interest. The option would be partially overlying mineral resources leading to partial mineral sterilisation.
---	Major/Significant Negative	The option would result in a major loss of best and most versatile agricultural land or is in substantial conflict with existing land use. The option would result in land contamination. The option would result in a major negative effect on a site designated for their geological interest. The option would be directly overlying mineral resources leading to mineral sterilisation.		

FINAL

SEA Objectives	Guide Questions	Score		Description
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
5. To protect and enhance surface and ground water levels and flows.	<ul style="list-style-type: none"> Will it minimise the demand for water resources? Will it result in changes to river flows, channel morphologies, wetted width or river levels? Will it result in changes to groundwater levels? Will it support the achievement of relevant environmental objectives set out in River Basin Management Plans? Will it alter the flow regime of surface waters? 	+++	Major/Significant Positive	The option would result in major reduction in the demand for water.
		++	Moderate Positive	The option achieves savings through demand management and does not require abstraction to achieve yield. The option would result in moderate reduction in demand for water.
		+	Minor Positive	The option achieves savings through demand management and does not require abstraction to achieve yield. The option would result in minor reduction in the demand for water.
		0	Neutral	The option would have no discernible effect on river flows or on groundwater levels.
		-	Minor Negative	The option would result in minor short-term decreases in river flows, wetted width, depth, and velocity over small distances. The option would result in minor decreases in groundwater levels. The option would result in minor increases in demand for water.
		--	Moderate Negative	The option would result in medium-term, moderate decreases in river flows, wetted width, depth, and velocity over moderate distances. The option would result in moderate decreases in groundwater levels. The option would result in moderate increases in demand for water.
		---	Major/Significant Negative	The option would result in major decreases in river flows over the long-term affecting significant stretches of river. The option would result in major decreases in groundwater levels. The option would result in major increases in demand for water.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.

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SEA Objectives	Guide Questions	Score		Description
6. To protect and enhance the quality of surface and groundwater resources.	<ul style="list-style-type: none"> Will it prevent pollution and protect and improve surface, groundwater, estuarine and coastal water quality? Will it prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)? Will it support the achievement of WFD protected area objectives? Will it ensure a new activity or new physical modification does not prevent the future achievement of good status for a water body? Will it support the achievement of relevant environmental objectives set out in River Basin Management Plans? Will the option prevent nutrient loading in water bodies? 	+++	Major/Significant Positive	The option would result in addressing failure of WFD Good Ecological Status / Good Ecological Potential.
		++	Moderate Positive	The option would contribute to addressing failure of WFD Good Ecological Status / Good Ecological Potential.
		+	Minor Positive	The option would contribute to a minor improvement in surface/coastal water quality or in groundwater quality.
		0	Neutral	The option would have no discernible effect on river flows or surface/coastal water quality or on groundwater quality. The option would not lead to a change in WFD classification.
		-	Minor Negative	The option would have a minor effect on river and/or coastal water quality and lead to short term or intermittent effects on receptors (e.g., designated habitats, protected species or recreational users of rivers and the coastline) that could not be avoided but could be mitigated. The option would result in minor decreases in groundwater quality.
		--	Moderate Negative	The option would have a moderate effect on river and/or coastal water quality and lead to long term or continuous effects on receptors (e.g., designated habitats, protected species or recreational users of rivers and the coastline) that could not reasonably be mitigated. The option would result in the likely deterioration of WFD classification. The option would result in moderate decreases in groundwater quality.
		---	Major/Significant Negative	The option would have a major effect on river and/or coastal water quality and lead to long term or continuous effects on receptors (e.g., designated habitats, protected species or recreational users of rivers and the coastline) that could not reasonably be mitigated. The option results in the deterioration of WFD classification. The option would result in major decreases in groundwater quality.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
	<ul style="list-style-type: none"> Will the option be at risk of flooding now or in the future? 	+++	Major/Significant Positive	The option would result in a major improvement to flood risk.

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SEA Objectives	Guide Questions	Score		Description
7. To reduce or manage flood risk.	<ul style="list-style-type: none"> Will it have the potential to cause or exacerbate flooding in the catchment area including the risks to people and property, now or in the future? Will it have the potential to help alleviate or mitigate flooding in the catchment area including to people and property now or in the future? E.g. will it avoid reducing flood plain storage, or provide opportunities to improve flood risk management? Will it promote the use of sustainable drainage systems? Will it promote opportunities for collaborative working with other risk management authorities? 	++	Moderate Positive	The option would result in a moderate improvement to flood risk.
		+	Minor Positive	The option would involve the construction of above-ground water supply infrastructure which would help alleviate flooding in the catchment.
		0	Neutral	The option would involve the construction of above-ground water supply infrastructure, but is located outside floodplain areas. It is anticipated that the option would neither cause nor exacerbate flooding in the catchment.
		-	Minor Negative	The option would involve the construction of above-ground water supply infrastructure which would be wholly or partially located within Flood Zone 2.
		--	Moderate Negative	The option would involve the construction of above-ground water supply infrastructure which would be partially (but < 40% by area) located within Flood Zone 3 and/or site is at medium risk of surface water flooding.
		---	Major/Significant Negative	The option would involve the construction of above-ground water supply infrastructure which would be wholly or partially (≥40% of the site) within flood zone 3a or 3b and/or site is at high risk of surface water flooding.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
8. To minimise emissions of pollutant gases and particulates and enhance air quality.	<ul style="list-style-type: none"> Will it maintain or enhance ambient air quality, keeping pollution below Local Air Quality Management thresholds (e.g., in Air Quality Management Areas or sensitive habitats)? 	+++	Major/Significant Positive	The option would result in a major enhancement of the air quality within one or more AQMAs.
		++	Moderate Positive	The option would result in a moderate enhancement of the air quality within one or more AQMAs.
		+	Minor Positive	The option would result in an enhancement of the air quality.

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SEA Objectives	Guide Questions	Score		Description
		0	Neutral	The option would not result in any effects on Air Quality and AQMAs. Vehicle movements of < 1,000 per annum, assuming that this is equivalent to < 5 per day.
		-	Minor Negative	The option would result in a decrease of the air quality. Vehicle movements of 1000 to < 7,750, per annum assuming that this is an equivalent to 5 to <35 per day (so an average max of 5 per hour)
		--	Moderate Negative	The option would result in a decrease of the air quality within one or more AQMAs. Vehicle movements of 7,750 to <15,500 per annum assuming that this is an equivalent to 35 to <70 per day (so an average max of 10 per hour)
		---	Major/Significant Negative	The option would result in a major decrease in the air quality within one or more AQMAs. Vehicle movements > 15,500 per annum, assuming that this is an equivalent of ≥ 70 per day.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
9. To reduce greenhouse gas emissions.	<ul style="list-style-type: none"> Will it reduce or minimise greenhouse gas emissions? Will it have a low level of embodied carbon? Will it provide new infrastructure that is energy efficient and/or minimises the use of energy? Will it provide new infrastructure that could contribute or make use of renewable energy sources? Will the option affect carbon sequestration? 	+++	Major/Significant Positive	The option would reduce operational carbon emissions by more than 1,000 tonnes CO2e/year e.g., it would provide new infrastructure/assets that maximise the use of renewable energy sources. The option would result in a major increase in carbon sequestration.
		++	Moderate Positive	The option will reduce operational carbon emissions by between 100 and <1,000 tonnes CO2e/year. The option will result in a moderate increase in carbon sequestration
		+	Minor Positive	The option will reduce operational carbon emissions by less than 100 tonnes CO2e/year
		0	Neutral	The option would have no discernible effect on greenhouse gas emissions.

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SEA Objectives	Guide Questions	Score		Description
		-	Minor Negative	The construction of the option would use of materials with a minor amount of embodied carbon (100 to <1,000 tonnes CO2e). The option would result in a minor or temporary increase in operational carbon emissions (100 to <500 tonnes CO2e).
		--	Moderate Negative	The construction of the option would use of materials with a moderate amount of embodied carbon (1,000 to 7,500 tonnes CO2e). The option would result in a moderate increase in operational carbon emissions (500-2,000 tonnes CO2e). The option will result in a moderate release of previously sequestered carbon.
		---	Major/Significant Negative	The construction of the option would use of materials with a major amount of embodied carbon (>7,500 tonnes CO2e). The option would result in major or long term increases in operational carbon emissions (>2,000 tonnes CO2e). The option would result in a major release of previously sequestered carbon.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
10. To adapt and improve resilience to the threats of climate change.	<ul style="list-style-type: none"> Will it improve resilience and/or adaptability to the likely effects of climate change, e.g., by increasing resilience of water supplies or catchments? Will it increase environmental resilience to the effects of climate change including to impacts on flood risk and water quality? Will coastal erosion have consequences on the operation of this option now or in the future, 	+++	Major/Significant Positive	The option would have a major positive effect on increasing the resilience/decreasing the vulnerability to climate change effects.
		++	Moderate Positive	The option would have a moderate positive effect on increasing the resilience/decreasing the vulnerability to climate change effects.
		+	Minor Positive	The option would have a minor positive effect on increasing the resilience/decreasing the vulnerability to climate change effects.
		0	Neutral	The option would have no effect on resilience/decrease vulnerability to climate change effects

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SEA Objectives	Guide Questions	Score		Description
	taking account of expected climate change sea level rise?	-	Minor Negative	The option would not increase resilience/decrease vulnerability to climate change effects.
		--	Moderate Negative	The option would have a moderate negative effect on resilience/decreasing vulnerability to climate change effects.
		---	Major/Significant Negative	The option would have a major negative effect on resilience/significantly decrease vulnerability to climate change effects.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
11. To promote a sustainable economy and maintain and enhance the economic and social well-being of local communities.	<ul style="list-style-type: none"> Will it ensure that sufficient water resources infrastructure is in place to support predicted population increases? Will it ensure sufficient infrastructure is in place to sustain a seasonal influx of tourists? Will it help to meet the employment needs of local people? Will it ensure that an affordable supply of water is maintained, and vulnerable customers protected? Will it contribute to sustaining and growing the local and regional economy? Will it avoid disruption through effects on the transport network? Will it avoid negative effects on built assets/ existing infrastructure including transport? 	+++	Major/Significant Positive	The option would provide an additional design capacity of ≥25Ml/d. The option would result in a significant increase in construction jobs (capital spend of ≥£25m).
		++	Moderate Positive	The option would provide an additional design capacity of 5Ml/d to <25Ml/d. The option would result in a moderate increase in construction jobs (capital spend £5m to <£25m).
		+	Minor Positive	The option would provide an additional design capacity of 1Ml/d to <5Ml/d. The option would result in a minor increase in construction jobs (capital spend £1m to <£5m).
		0	Neutral	The option would have no effect on local employment opportunities, the regional or local economy, or on recreational facilities. The option would provide an additional design capacity of <1Ml/d.
		-	Minor Negative	It is not expected that any options will have a negative effect on employment opportunities, the economy or design capacity. The option would result in a minor disruption on built assets and infrastructure, including transport.

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SEA Objectives	Guide Questions	Score		Description
		--	Moderate Negative	It is not expected that any options will have a negative effect on employment opportunities, the economy or design capacity. The option would result in a moderate disruption on built assets and infrastructure, including transport.
		---	Major/Significant Negative	It is not expected that any options will have a negative effect on employment opportunities, the economy or design capacity. The option would result in a major disruption on built assets and infrastructure, including transport.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
12. To maintain and enhance tourism and recreation.	<ul style="list-style-type: none"> Will it protect and enhance public access to, and enjoyment of, green and blue infrastructure, open space/recreational facilities and the natural and historic environment, and in doing so help promote healthy lifestyles including mental well-being? 	+++	Major/Significant Positive	The option would provide new, and/or significantly enhances existing, recreational facilities, publicly accessible greenspace and/or tourism within the operational area.
		++	Moderate Positive	The option would have a moderate positive effect on existing, recreational facilities, publicly accessible greenspace and/or tourism within the operational area
		+	Minor Positive	The option would have a minor positive effect on existing, recreational facilities, publicly accessible greenspace and/or tourism within the operational area
		0	Neutral	The option would not result in any effects on existing recreational facilities and/or tourism.
		-	Minor Negative	The option would reduce the availability and quality of existing recreational facilities and/or tourism within the operational area.
		--	Moderate Negative	The option would result in the permanent removal of existing recreational facilities, publicly accessible greenspace and/or tourism within the operational area.
		---	Major/Significant Negative	The option would result in the removal of existing recreational facilities, publicly accessible greenspace and/or tourism within the operational area.

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SEA Objectives	Guide Questions	Score		Description
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
13. To protect and enhance human health and well-being.	<ul style="list-style-type: none"> Will it ensure the continuity of a safe and secure drinking water supply? Will it help to protect or improve drinking water quality? Will it maintain surface water and bathing water quality within statutory standards? Will it help to promote healthy communities and avoid risks to health and wellbeing (for example, due to noise resulting from construction traffic or disruption to safe and reliable water/sewerage services)? Will it raise awareness of the importance and value of the water environment for health and well-being? Will it be located in an area considered to be significantly more health deprived than others in the region? Will it improve opportunities for social interaction and community cohesion? 	+++	Major/Significant Positive	The option would lead to a major increase in design capacity (≥ 25 MI/d) of drinking water, would have a sustained positive effect on the health of local communities and would ensure that surface water and bathing water quality is maintained within statutory limits.
		++	Moderate Positive	The option would lead to a moderate increase in design capacity (5MI/d to <25MI/d) of drinking water, would have a positive effect on the health of local communities and would ensure that surface water and bathing water quality is maintained within statutory limits.
		+	Minor Positive	The option would lead to a minor increase in design capacity (1MI/d to <5MI/d) of drinking water, would have a temporary positive effect on the health of local communities and would ensure that surface water and bathing water quality is maintained within statutory limits.
		0	Neutral	The option would not result in any effects on human health and existing recreational facilities and/or tourism.
		-	Minor Negative	The option would result in the deterioration of surface water or bathing water quality and would have a temporary effect on human health (e.g., noise or air quality).
		--	Moderate Negative	The option would have a moderate long-term negative effect on human health (e.g., noise or air quality).
		---	Major/Significant Negative	The option would have a significant long-term effect on human health (e.g., noise or air quality).
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
14. To promote and enhance the sustainable and efficient use of	<ul style="list-style-type: none"> Will it lead to reduced leakage from the supply network? Will it improve efficiency in water consumption? 	+++	Major/Significant Positive	<p>The option would involve a major reduction in leakage from the supply network or is a water efficiency option with a design capacity of >10 MI/d.</p> <p>The option would result in a major improvement in water efficiency and resilience.</p>

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SEA Objectives	Guide Questions	Score		Description
resilient water resources.	<ul style="list-style-type: none"> Will it ensure sustainable abstractions, taking account of water resource availability? Will it enable efficient water resource management to help maintain a supply-demand balance? Will it increase the resilience of water resources, now and into the future? Will it contribute towards improving the awareness of water sustainability? 	++	Moderate Positive	The option would involve a moderate reduction in leakage reduction from the supply network or is a water efficiency option with a design capacity of 5 to 10MI/d. The option would result in a moderate improvement in water efficiency and resilience.
		+	Minor Positive	The option would involve reducing leakage from the supply network or is a water efficiency option with a design capacity of <5 MI/d. The option would result in a minor improvement in water efficiency and resilience.
		0	Neutral	The option will have no effect on sustainable and efficient use of resilient water resources.
		-	Minor Negative	The option would result in minor decreases in water efficiency and reduces resilience.
		--	Moderate Negative	The option would result in moderate decreases in water efficiency and reduces resilience.
		---	Major/Significant Negative	The option would result in major decreases in water efficiency and reduces resilience.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
15. To minimise waste, promote resource efficiency and move towards a circular economy.	<ul style="list-style-type: none"> Will it make use of existing infrastructure? Will it promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill? Will it help to encourage sustainable design or use of 	+++	Major/Significant Positive	The option would make extensive reuse of existing built assets and infrastructure. The option will re-use or recycle substantial quantities of waste materials and any new infrastructure will incorporate substantial sustainable design measures and materials.
		++	Moderate Positive	The option would make reuse of existing built assets and infrastructure. The option would re-use or recycle moderate quantities of waste materials and any new infrastructure would incorporate some sustainable design measures and materials.

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SEA Objectives	Guide Questions	Score		Description
	sustainable materials (e.g., supplied from local resources)?	+	Minor Positive	The option would re-use or recycle limited quantities of waste materials and any new infrastructure would incorporate limited sustainable design measures and materials.
		0	Neutral	The option would largely rely on existing infrastructure and only require small quantities of additional materials to realise design capacity. Quantities of concrete required are estimated as < 100 tonnes.
		-	Minor Negative	The option would require new infrastructure. The quantities of concrete required are estimated as between 100 to <1,000 tonnes. The option would have limited opportunities for the re-use or recycling of waste materials. There would be limited opportunities for sustainable design or the use of sustainable materials.
		--	Moderate Negative	The option would require new infrastructure. The quantities of concrete required are estimated as between 1,000 to <15,000 tonnes. The option would have limited opportunities for the re-use or recycling of waste materials.
		---	Major/Significant Negative	The option would require significant new infrastructure that cannot be provided through the re-use or recycling of waste materials. There are no opportunities for sustainable design or the use of sustainable materials. The quantities of concrete required are estimated as ≥ 15,000 tonnes.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
16. To conserve and enhance the historic environment including the significance of heritage assets and their settings and	<ul style="list-style-type: none"> Will it avoid damage to, conserve or enhance the historic environment, including heritage assets and their settings such as historic buildings, conservation areas, features, places and spaces, that enhance local distinctiveness? Will it avoid or minimise damage to archaeologically important sites? 	+++	Major/Significant Positive	The option will result in enhancements to designated heritage assets and/or their setting, fully realising the significance and value of the asset, such as: Securing repairs or improvements to heritage assets, especially those identified in the Historic England Buildings/Monuments at Risk Register; Improving interpretation and public access to important heritage assets.
		++	Moderate Positive	The option will result in enhancements to designated heritage assets and/or their setting. Improving interpretation and public access to important heritage assets.
		+	Minor Positive	The option will result in enhancements to non-designated heritage assets and/or their setting.

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SEA Objectives	Guide Questions	Score		Description
archaeological important sites.	<ul style="list-style-type: none"> Will the hydrological setting of water-dependent assets be altered, such as important wetland areas with potential for paleo-environmental deposits? Will it avoid damage to important wetland areas with potential for paleoenvironmental deposits? Will it improve access, value, understanding or enjoyment of heritage assets and culturally/historically important assets in the region? Will it protect or enhance (where relevant) Welsh language and culture? 	0	Neutral	The option will have no effect on cultural heritage assets or archaeology.
		-	Minor Negative	The option will result in the loss of significance of undesignated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected. There will be limited damage to known, undesignated archaeology important sites with a consequent loss of significance only partly mitigated by archaeological investigation
		--	Moderate Negative	The option will result in the loss of significance of undesignated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected. The option will diminish significance of designated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected.
		---	Major/Significant Negative	<p>The option would diminish the significance of designated heritage assets and/or their setting such as:</p> <ul style="list-style-type: none"> Demolition or further deterioration in the condition of designated heritage assets especially those identified in the Historic England Buildings/Monuments at Risk Register; Loss of public access to important heritage assets and lack of appropriate interpretation. <p>There would be major damage to known, designated archaeological sites/remains or geologically important sites with a consequent loss of significance only partly mitigated by archaeological investigation.</p>
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
17. To conserve, protect and enhance landscape and townscape character and visual amenity.	<ul style="list-style-type: none"> Will it avoid adverse effects to, and enhance where possible, protected/designated landscapes and the settings of designated landscapes (including woodlands) such as National Parks or AONBs? Will it help to protect and improve non-designated areas of natural beauty and distinctiveness (e.g., woodlands) and avoid the loss of 	+++	Major/Significant Positive	The option results in new, above ground infrastructure that significantly enhances the local landscape, townscape or seascape.
		++	Moderate Positive	The option results in new, above ground infrastructure that has a moderate positive effect on the local landscape, townscape or seascape
		+	Minor Positive	The option results in new, above ground infrastructure that has a minor positive effect on the local landscape, townscape or seascape.

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SEA Objectives	Guide Questions	Score		Description
	landscape features and local distinctiveness? • Will it protect and enhance landscape character, townscape, seascape and green infrastructure? • Will it minimise adverse visual impacts?	0	Neutral	The option would not result in any effects on the local landscape, townscape or seascape
		-	Minor Negative	The option results in new, above ground infrastructure that has a minor negative effect on the local landscape, townscape or seascape.
		--	Moderate Negative	The option would have a moderate negative effect on a designated landscape or feature (i.e. significant visually intrusive infrastructure) whose effects could not be reasonably mitigated. The option results in new, above ground infrastructure that has a moderate negative effect on the local landscape, townscape or seascape.
		---	Major/Significant Negative	The option would have a negative effect on a designated landscape or feature (i.e. significant visually intrusive infrastructure) whose effects could not be reasonably mitigated. The option results in new, above ground infrastructure that has a major negative effect on the local landscape, townscape or seascape.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain

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Appendix F

Revised Feasible Options Assessment Matrices

REDACTED

REVISED DRAFT

Appendix G

Preferred Options Assessment Matrices

REDACTED

