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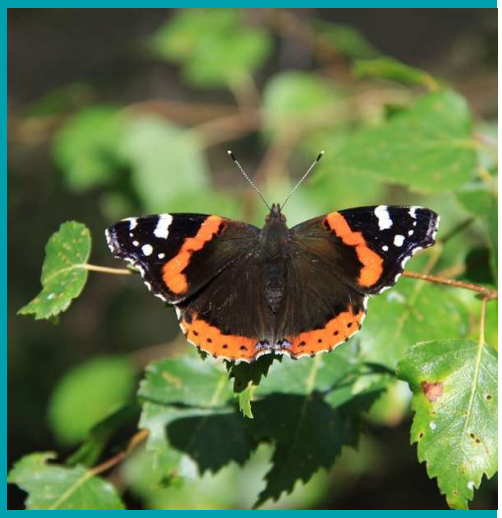
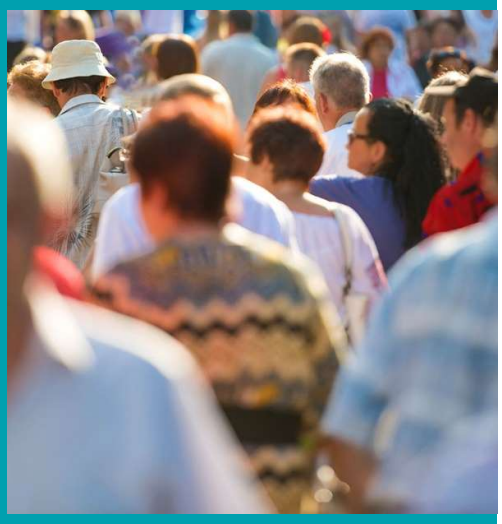
Dŵr Cymru Welsh Water

Water Resources Management Plan 2024 Strategic Environmental Assessment

Environmental Report





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Report for

Richard Amos
Dŵr Cymru Welsh Water
Ty Awen, Spooner Close
Newport
NP10 8FZ

Main contributors

Pete Davis
John Jelbert
Dan Williams
Andrew Williamson

Issued by

andrew.williamson Digitally signed by andrew.williamson
Date: 2022.11.15 13:01:05 Z

Andrew Williamson

Approved by

Pete.Davis Digitally signed by Pete.Davis
Date: 2022.11.15 13:39:03 Z

Pete Davis

Wood Group UK Limited

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FINAL

Non-Technical Summary

Introduction

Dŵr Cymru Welsh Water (DCWW) 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 WRMPs[1]. 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 draft WRMP24. The Environmental Report represents the second formal output of the SEA of the draft WRMP24 following a Scoping Report which was issued to SEA consultation bodies in April 2021.

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

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

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

Water Resource Planning

Consistent with the National Framework[2], 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 Dyfrdwy[3], Severn Trent Water (STW), South Staffordshire Water (SSW) and United Utilities Water (UUW). These five companies, like all water companies in England and Wales, are required[4] 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 Options[5] (SROs) being taken forward by the companies.

WRW published its Emerging Regional Plan[6] in January 2022. This identified that 215 Ml/d of new water would be needed to meet public supply demand by 2031 and that an additional 63 Ml/d would be needed by 2050, for non-public water supply 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.

DCWW's Water Resource Management Plan 2024

Welsh Water's supply demand balances (SDB) have been generated for each of the 23 water resource zones. This identified that three zones would not be resilient under the preferred planning scenario (1 in 200 year level of drought resilience for emergency measures, tested against a medium emission climate change scenario) within the 25-year period to 2050. The zones with an identified shortfall are SEWCUS, the Tywi Gower, and Clwyd Coastal (which had a marginal deficit position during year 1 of AMP8). Mid-South Ceredigion had a forecast deficit under more extreme scenarios. To resolve these issues, Welsh Water's draft WRMP24 proposes:

- A leakage programme to maintain leakage performance over the AMP8 period. The plan presents a challenging target of reducing leakage by a further 10% during AMP8

[2] 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

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

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

[5] The Strategic Water Resource Options (SROs) programme has been initiated by Ofwat to provide at least 1500Ml/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).

[6] 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

as part of Welsh Water's longer-term target to achieve 50% reduction of 2017/18 leakage levels by 2050, thus reducing abstraction from the environment.

- A metering programme that will support both the achievement of Welsh Water's leakage strategy and the long-term reduction in average domestic per capita consumption to 110 l/p/d by 2050.
- Network improvements to increase drought resilience in the SEWCUS and Tywi Gower zones.
- WTW enhancement to increase peak supply capability in the Mid & South Ceredigion zone.

What is Strategic Environmental Assessment (SEA)?

SEA became a statutory requirement following the adoption[7] of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment. In Wales, this was transposed into legislation on 12th July 2004 as Statutory Instrument 2004 No.1656, and 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 draft WRMP24 is to:

- identify the potentially significant environmental effects of the draft WRMP24 in terms of the measures being considered by DCWW for water resource management;
- help identify appropriate measures to avoid, reduce or manage adverse effects and to enhance beneficial effects associated with the implementation of the draft 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 to the draft WRMP24; and
- inform DCWW's selection of measures to be taken forward into the final WRMP24.

SEA comprises five key stages:

- **Stage A**: Scoping;

[7] 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).

- **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 Report[8] (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:

- Review of other relevant policies, plans, programmes and strategies (hereafter referred to as 'plans and programmes').
- Collation and analysis of baseline information.
- Identification of key sustainability issues.
- Development of an assessment framework.
- 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 DCWW's operational area (within the wider WRW region). The Scoping Report set out the proposed framework for assessing the likely significant environmental effects of the draft 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 resource options contained in the draft WRMP24 and any reasonable alternatives (**Stage B**). 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).

These assessments are presented in this Environmental Report (in a form to meet the requirements of Schedule 2 of the SEA Regulations) which has been completed to accompany the draft WRMP24 (**Stage C**).

The draft WRMP24 and accompanying documents including the Environmental Report will then be submitted to the Welsh Government, for a request for publication and once directed to do so, DCWW will publish the documents for consultation (**Stage D**). Following consultation, and within 26 weeks of consultation beginning, DCWW will need to prepare a Statement of Response to the representations received. The revised draft WRMP24 will be sent to the Government, and if changes are likely to be significant, is likely to be subject to further assessment and consultation. Following direction from the Government, the final WRMP24 will be published and implemented accordingly (anticipated August 2023). In conjunction with publishing the final WRMP24, a Post Adoption

[8] 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

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 Environmental Report describes in further detail the requirement for SEA of the draft WRMP24 and the SEA process including its relationship with the preparation of the DCWW's draft WRMP24.

What are the Key Environmental, Social and Economic 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 draft 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 draft WRMP24 are shown in **Table NTS.1**.

Table NTS.1 Key Issues Relevant to the Draft WRMP24

Topic	Summary of Key Issues
Biodiversity Flora and Fauna	Relevance 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. Key Issues Key pressures and risks in respect of biodiversity and nature conservation that are relevant include, inter-alia: • the need to maintain and enhance biodiversity and the resilience of ecosystems, including sites designated for their nature conservation value; • the need to address the climate emergency and nature emergencies together; • 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 protected species; • the need to prevent the spread/introduction of invasive non-native species; • the need to maintain/enhance ecological connectivity; • the need to sustainably manage biodiversity assets, taking into account the effects of climate change; • the need to recognise the key role that green infrastructure plays in supporting (*inter alia*) biodiversity, landscape, wellbeing and climate change resilience; • the need to protect and enhance the green infrastructure network; • the need to continue monitoring biodiversity and ecological indicators; and • the need to work within environmental limits and capacities. • The need to prevent depletion and pollution of groundwater
Soils, Land Use and Geology	Relevance Soils are a non-renewable resource vulnerable to changes in both hydrology and land use.

Topic	Summary of Key Issues
	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. Key Issues • the need to protect, maintain and enhance geomorphological functions and services; • the need to influence how land is managed, promoting sustainable patterns of land use; • the need to conserve and enhance soil quality and function (including carbon sequestration); • the need to protect and avoid damage to Wales' geodiversity and conserve and enhance sites designated for geological interest; and • the need to manage impacts on soil resources, including control of pollution and remediation of contaminated land.
Water - Quantity	Relevance 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. Key Issues • the need to maintain seasonal flows in groundwater and surface water; • the need to restore sustainable and appropriate abstraction levels and water flow/levels in Wales' waters across the full range of regimes from low to high conditions; • the potential effects of climate change and the need to build climate change resilience into the water environment and water management; and • The need to increase resilience to pressures on public water supply
Water - Quality	Relevance 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. Key Issues • the need to maintain and improve water quality; • the potential effects of climate change and the need to build climate change resilience into the water environment and water management; and • the need to prevent the deterioration of Water Framework Directive waterbodies, achieve protected area objectives and achieve water body status objectives.
Water - Flood Risk	Relevance 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

Topic	Summary of Key Issues
	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). Key Issues • the need to ensure that the continued risk of flooding is reduced or where this is not possible, mitigated effectively.
Air Quality	Relevance 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. Key Issues • the need to minimise emissions of pollutant gases and particulates and enhance air quality.
Climatic Factors	Relevance 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. Key Issues • the need to reduce travel and promote sustainable modes of transport; • the need to reduce GHG emissions arising from implementation of the WRMP; • the need to take into account, and where possible adapt to, the potential effects of climate change.
Population	Relevance 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. 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. Key Issues • the need to ensure that water resource requirements of people and visitors can be met at all times, in a sustainable way; • the need to ensure that water resources remain affordable;

Topic	Summary of Key Issues
	• the need to ensure that vulnerable people are not affected by implementation of measures to manage water resources.
Human Health	Relevance 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. Key Issues • the need to ensure that measures to manage water resources do not adversely affect the health and well-being of any member of the community.
Material Assets	Relevance 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. Key Issues • the need to promote water efficiency measures (including metering); • the need to ensure that leakage is managed at a sustainable economic level; • the need to maintain the balance between supply and demand for water; • the need to reduce energy consumption and support low carbon and renewable energy production; • the need to ensure the sustainable and efficient use of resources such as construction materials; and • the need to minimise waste arisings, promote reuse, recovery and recycling and minimise the impact of wastes on the environment and communities.
Cultural Heritage	Relevance 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. Key Issues • the need to conserve and enhance the historic significance of buildings, monuments, features, sites, places, areas and landscapes of archaeological and cultural heritage interest, and their settings; • the need to promote access to Wales' cultural heritage sites within Welsh Water's ownership where possible and safe to do so; and

Topic	Summary of Key Issues
	• the need to avoid damage to important wetland areas with potential for paleoenvironmental deposits.
Landscape	Relevance 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. Key Issues • the need to protect, conserve and enhance landscape character, taking into account the effects of climate change; • the need to ensure the special qualities of designated landscapes are protected; and • the need to minimise any adverse impacts upon landscape that may result from measures in the WRMP.

The key issues listed in **Table NTS.1** above have informed the proposed framework that will be used to assess the effects of the draft WRMP24.

Section 2 of the Environmental Report summarises the review of plans and programmes relevant to the draft 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 Draft WRMP been Assessed?

A draft assessment framework was developed to assess the economic, social and environmental effects of the draft 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 draft WRMP24 is shown in **Table NTS.2**.

Table NTS.2 Assessment Framework for the Draft 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.
Water – Flood Risk	7. To reduce or manage flood risk.
Air	8. To minimise emissions of pollutant gases and particulates and enhance air quality.

Topic	Assessment Objective
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 draft 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 resource management and demand management options) against the 17 SEA assessment objectives detailed in Table NTS2 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 NTS2.
- **Preferred programme assessment**: the cumulative effects of the preferred programme of options will be completed, to ensure that the effects of the draft Plan have been identified, described and evaluated.
- **Reasonable alternative plan assessments**: the cumulative effects of any reasonable alternative plans will be identified, described and evaluated for consideration along with the preferred plan.

The draft 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.

Where quantified information was available for the option from DCWW, the assessment was also informed by reference to threshold values set out in definitions of significance (see **Appendix D** to the Environmental Report).

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

What are the Likely Effects of the Revised Feasible Options?

Overview

In support of the development of the draft WRMP24, the SEA has considered a total of 18 feasible options in the SEWCUZ Resource Zone, 9 in the Tywi Gower Resource Zone, 7 in the Mid-South Ceredigion Resource Zone and 1 in the Clwyd Coastal Resource Zone. In total, 35 feasible options were identified.

Each option was assessed against the SEA objectives to identify the likely environmental effects during both construction/implementation and operation. The findings of the assessments are summarised below. **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.

SEWCUS Resource Zone

Construction

Six of the feasible supply options were assessed as having a significant positive effect on the economy (SEA Objective 11) during construction, associated with the capital spend that they would involve during the construction period. This would have the potential to generate employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers as the options would involve significant investment (capital spend of ≥£25 million). The remaining options were assessed as having a range of minor and moderate positive effects on this objective, reflecting the scale of investment.

No other significant positive effects were identified in the assessment of the feasible supply and demand options for the SEWCUS Resource Zone. 12 of the options were assessed as having a minor or moderate positive effect on soils, geodiversity and land use (SEA Objective 4) as new infrastructure would make best use of existing sites and/or not require new land. However, of these options, a total of eight also recorded a minor or moderate negative effect, as, whilst works would involve the use of existing sites, they would also result in the loss of greenfield land.

A total of 17 of the feasible supply options were assessed as having a negative effect on biodiversity (SEA Objective 1) during the construction phase, with one of these assessed as having a significant negative effect. 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.

A total of 14 of the feasible supply options in the SEWCUS Resource Zone were assessed as having a negative effect on sustainable natural resources (SEA Objective 2), one of these being assessed as having a significant negative effect, associated with all, or part of the option being constructed on greenfield land, resulting in either temporary (e.g. excavation of pipeline routes, where soil/land would be reinstated following completion) or permanent (e.g. where permanent above ground infrastructure would be constructed) loss of habitats (biodiversity net loss), as concluded by the BNG assessment.

Construction works associated with 16 of the feasible supply options would take place within/partially within Flood Zones 2/3 and works may therefore be vulnerable to flooding (depending on the timing) and were therefore assessed as having a negative effect on flood risk (SEA Objective 7). Of this total, two options were considered to be particularly vulnerable to flood

risk given the proportion of the works that would take place in Flood Zone 3 (≥40% of the option site). In these cases, a significant negative effect on SEA Objective 7 was identified.

All but one of the feasible supply and demand options were assessed as having negative effects on air quality (SEA Objective 8) as construction activity would generate emissions to air associated with the use of plant and machinery as well as vehicle movements. One option was assessed as having a significant negative uncertain effect in this regard, as given the scale of capital spend and number of properties where meter installations would take place, there is the potential for significant traffic congestion on the road network across the SEWCUS zone which may have a negative effect on local air quality. Such activity could be concentrated and take place within an AQMA, however, as the exact location of meter installation is uncertain, there remains some uncertainty.

All of the feasible supply and demand options in the SEWCUS Resource Zone 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 six options were assessed as having a significant negative effect on Objective 9, due to the significant scale of embodied carbon (≥7,500tCO2e) associated with construction materials and the scale of the schemes.

All of the feasible supply and demand options in the SEWCUS Resource Zone 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 six of the options were assessed as having a significant negative effect on this objective, as they are anticipated to require significant quantities of construction materials given the scale of works and capital spend. Whilst a negative effect was identified against all options for this objective, a minor positive uncertain effect was also identified against all supply 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).

No further significant negative effects were identified during the construction phase however 15 of the feasible options in the SEWCUS Resource Zone were assessed as having a minor negative effect on climate resilience (SEA Objective 10), 13 were assessed as having a negative effect on tourism and recreation (SEA Objective 12), 16 were assessed as having a negative effect on human health and well-being (SEA Objective 13), 14 were assessed as having a negative effect on cultural heritage (SEA Objective 16), and 12 were assessed as having a negative effect on landscape (SEA Objective 17).

Operation

One option was assessed as having a significant positive effect positive effect on sustainable natural resources (SEA Objective 2) during operation, due to the assumption that that there would be operational biodiversity net gain of scale.

A significant positive effect was assessed against water quantity (SEA Objective 5) for one option during the operational phase, as the option would result in a major reduction in the demand for water, through a combination of metering and leakage reduction.

A significant positive effect was assessed against greenhouse gas emissions (SEA Objective 9) for one option. This is because, whilst the operation of the option would involve carbon emissions

associated with meter reading activities, the option would reduce greenhouse gas emissions associated with reduced electricity used for the pumping and treatment of water and overall, the operation of the option is anticipated to reduce carbon emissions by more than 1,000tCO2e/year across the plan period.

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 eight options were assessed as having a significant positive effect on this objective.

All of the feasible supply and demand 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 DCWW customers, supporting economic/population growth and generating a positive effect on human health. A total of eight options were assessed as having a significant positive effect against Objectives 11 and 13.

All feasible supply and demand options in the SEWCUS Resource Zone 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 DCWW supply area. Eight options were assessed as having a significant positive effect on SEA Objective 14. For the majority of these options, this is because of the significant yield that they would provide; however, for one option, operation would result in a major reduction in demand arising from metering and leakage reduction. As such, in line with the thresholds, this option was also assessed as having a significant positive effect.

No further significant positive effects were identified during the assessment of the operational phase of the feasible SEWCUS Resource Zone options.

A total of seven of the feasible supply options in SEWCUS Resource Zone, were assessed as having a negative effect on INNS (SEA Objective 3), due to the potential for the operation of the options to increase the risk of INNS transfer/spread. Two of these options were assessed as having a significant negative effect, because these options would involve the abstraction and transfer raw water between waterbodies in different WFD surface water catchments, without treatment prior to discharge.

Thirteen of the feasible supply options in the SEWCUS Resource Zone 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 eight of these options were assessed as having a significant negative effect on this objective as they would involve operational carbon emissions of >2000 tonnes CO2e per year.

Eleven of the feasible supply options in the SEWCUS Resource Zone 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 total, four were assessed as having a significant negative effect.

No further significant negative effects associated with the operation of the feasible options were identified during the assessment, however, a range of minor and moderate negative effects were identified.

A total of 16 of the feasible supply options were assessed as having a negative or potentially negative effect on biodiversity (SEA Objective 1) during operation, due to, for example, the effects of additional abstraction on water dependent habitats and species (sometimes including national or international sites).

A total of 11 feasible options were assessed as having a negative effect on water quantity SEA Objective 5) during operation, whilst 12 options were assessed as having a negative effect on water quality (SEA Objective 6), due to the potential for effects on flows/volume and water quality in WFD waterbodies such as streams, rivers, lakes and reservoirs, as assessed by the WFD assessment.

Tywi Gower Resource (TWG) Zone

Construction

A total of nine feasible supply options were assessed for the Tywi Gower Resource Zone.

One of the feasible supply options in the Tywi Gower Resource Zone was assessed as having a significant positive effect against the SEA Objective 11 (Economy) during the construction period. This reflects the scale of capital spend associated with the options in this resource zone; which in all other cases, was below the threshold for significant effect (≥£25m).

No other significant positive effects were assessed against the SEA Objectives for the options in the Tywi Gower Resource Zone, for the construction period.

Eight of the nine feasible options within the Tywi Gower Resource Zone were assessed as having a negative effect on biodiversity (SEA Objective 1). This reflects the potential for construction works associated with the option to result in the loss of/disturbance to habitats and species. One of these options was assessed as having a significant negative effect and another a significant negative uncertain effect.

One option was assessed as having a significant negative effect on flood risk (SEA Objective 7) as the WTW site associated with this option is situated within area of high risk to flooding from surface water/small watercourses (Flood Zone 3). Five of the remaining options in this resource zone were assessed as having a range of minor and moderate negative effects.

Two options were assessed as having a significant negative effect on cultural heritage (SEA Objective 16) during construction, due to potential significant negative effects on heritage assets associated with construction. Of the remaining options, four were assessed as having either a minor or moderate effect.

One option was assessed as having a significant negative uncertain effect against Air Quality (SEA Objective 8), during the construction phase. Construction of the option could result in traffic congestion (this would be on the road network across the TWG zone) which may have a negative effect on local air quality. Construction activity may take place within an AQMA, although this is currently unknown, leading to some uncertainty at this stage. Seven of the remaining eight options were assessed as having either a minor or moderate negative effect on this objective.

A significant negative effect was also assessed for one option against Greenhouse Gas Emissions (SEA Objective 9), for the construction phase. The construction of the option would include embodied carbon from material production of meters in addition to vehicle movements for the distribution and installation of the meters and meter reading activities over the 25 year implementation stage, with the total carbon arising from the implementation phase being >7,500tCO2e. This has been assessed as a significant effect against the determined thresholds. Of

the remaining options, six were assessed as having a minor or moderate negative effect on this objective.

No other significant negative effects were identified during the assessment of the construction phase of the TWG options; however, a range of minor and moderate negative effects were identified.

Operation

One option was assessed as having a significant positive effect on Water Quantity (SEA Objective 5) during the operation phase. The operation of this option would result in a major reduction in the demand for water, through a combination of increased metering and leakage reduction, ensuring the continuity of a resilient water supply. For similar reasons, the same option was assessed as having a significant positive effect against Water Resource Use (SEA Objective 14) as it would involve for one option during the operation phase. Six of the remaining feasible options in the Tywi Gower Resource Zone were assessed as having positive effects on this objective.

No other significant positive effects were assessed against the feasible supply options in the Tywi Gower Resource Zone during the operational period. However, seven of the feasible options were assessed as having a positive effect against climate resilience (SEA Objective 10), the economy (SEA Objective 11), human health and wellbeing (SEA Objective 13) and water resource use (SEA Objective 14) as the water they would provide would help to ensure a continual supply of clean drinking water, supporting economic/population growth, generating a positive effect on human health and increasing adaptability to the effects of climate change.

One option was assessed as having a significant negative uncertain effect against biodiversity (SEA Objective 1) during operation as the HRA highlights that additional abstractions from could affect hydrologically connected waterbodies and any functionally linked habitats, with the HRA concluding overall that the HRA risk is uncertain.

Mid-South Ceredigion (MSC) Resource Zone

Construction

A total of seven feasible supply options were assessed for the Mid-South Ceredigion Resource Zone.

None of the feasible supply options in the Mid-South Ceredigion Resource Zone were assessed as having any significant positive effects during the construction period. This reflects the scale of capital spend associated with the options in this resource zone; which in all cases was below the threshold for significant effect (≥£25m) against the Economy (SEA Objective 11). Six of the options were assessed as having a minor or moderate positive effect on this objective.

A minor uncertain positive effect was assessed for all options in this resource zone, other than the demand management option, against Waste and Resource Use (SEA Objective 15) during the construction phase. This is due to the potential for waste building materials such as steel and plastic, to be reused or recycled, however the significance of this is unknown, hence the uncertainty.

Minor positive effects were also identified for four of the options within the Mid-South Ceredigion Resource Zone, against Soils, Geodiversity and Land Use (SEA Objective 4) during the construction phase.

No other positive effects were identified during the assessment of the construction phase for the Mid-South Ceredigion options.

A significant negative effect was assessed against Biodiversity (SEA Objective 1) for three options 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.

A significant negative uncertain effect was assessed for one option against Air Quality (SEA Objective 8), for the construction phase. The option is not situated within an AQMA, however, construction would require the transportation of materials/equipment to site and given the significant scale of the option, could have a significant negative effect on air quality. However, as the exact scale and number of vehicle movements required is currently not clear, there is uncertainty.

No other significant negative effects were identified during the assessment of the construction phase of the Mid-South Ceredigion Resource Zone options. However, a range of minor and moderate effects were identified.

Operation

A significant positive effect has been assessed for one option, against Flood Risk (SEA Objective 7) during the operation phase. Although the scheme does not lie within Flood Zones 2 or 3, it is a reservoir raising scheme that could help to further alleviate flooding in the catchment through provision of extra capacity.

A significant positive uncertain effect has been assessed for one option, against Climate Resilience (SEA Objective 10) during the operation phase. The scheme is a reservoir raising scheme that could help alleviate flooding by providing extra capacity for water storage in the catchment. This may increase resilience to the effects of climate change, including more frequent and severe rainfall events and increases in flash flooding. The scheme would also help to ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change. However, it is currently unclear what the daily yield volume associated with this option would be, hence there remains some uncertainty. The remaining options have been assessed as having a range of minor, moderate, neutral and uncertain effects against this objective.

No other significant positive effects were identified during the assessment of the operation phase of the Mid-South Ceredigion Resource Zone options. However, a range of minor, moderate and uncertain effects were identified.

No significant negative effects were identified during the assessment of the operation phase for the Mid-South Ceredigion options. However, a range of minor, moderate and uncertain negative effects were assessed.

Clwyd Coastal (CC) Resource Zone

A total of one feasible option was assessed for the Clwyd Coastal Resource Zone.

No significant positive effects were identified during assessment of the option for the construction phase. However, a moderate positive effect was assessed against the Economy (SEA Objective 11). This is reflective of the scale of the option.

No significant negative effects were identified during assessment of the option for the construction phase. However, a range of moderate, minor and uncertain effects were assessed against Air Quality (SEA Objective 8), Greenhouse Gas Emissions (SEA Objective 9) and Waste and Resource Use (SEA Objective 15).

No significant positive effects were identified during assessment of the option for the operational phase. Minor positive effects were assessed against a range of objectives; Water Quantity (SEA Objective 5), Greenhouse Gas Emissions (SEA Objective 9), Climate Resilience (SEA Objective 10), Economy (SEA Objective 11), Human Health and Wellbeing (SEA Objective 13) and Water Resource Use (SEA Objective 14).

No negative effects were identified during assessment of the option.

What are the Likely Significant Effects of the Draft WRMP?

Following the completion of the option appraisal process, DCWW has identified five supply options and four metering options (across the four identified water resource zones within DCWW's draft WRMP24 operational area) as preferred options. These options have been updated to reflect revised design, engineering feasibility and costing. The preferred options have been assessed to identify the likely environmental effects during both construction/implementation and operation. The findings of the assessments are summarised below.

Section 6 of the Environmental Report presents the detailed results of the preferred options assessment by WRZ, whilst the individual preferred option assessment matrices are presented in **Appendix G** to the Environmental Report.

Table NTS.4 and **NTS.5** list the preferred options and summarises their findings. **Table NTS.3** presents a key to the meaning of the symbols in the assessment summary tables.

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 the Draft WRMP24 Preferred Supply and Metering Options

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
TWG12	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
TWG14	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WEF-MET-8201	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
SEW166	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

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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
SEW168	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	0	0	0
	Operation (positive)	0	0	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WEF-MET-8121	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
MSC08	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	-
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WEF-MET-8202	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
WEF-MET-8012	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

Construction

The supply side and metering options will cumulatively involve significant capital expenditure during the construction phase. This is considered to have a significant positive effect on the local economy (**SEA Objective 11**) 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. Two options (WEF-MET-8201 and WEF-MET-8121) were individually assessed as having a significant positive effect on SEA Objective 11 during construction due to the significant capital expenditure they would involve. 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.

No further significant positive effects from construction have been identified during the assessment of the preferred programme of options. However, minor positive effects were identified for two options and moderate positive effects were identified for one option in respect of soils, geodiversity and land use (**SEA Objective 4**).

Construction of the preferred programme of options will generate emissions to air which could affect local 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 within/in close proximity to AQMAs. The construction associated with metering options (WEF-MET-8201, WEF-MET-8121, WEF MET-8202 and WEF-MET-8012) may take place in an AQMA, however, there is uncertainty as the exact location of meter installation is currently unknown. Overall, it is concluded that there will likely be significant negative air quality effects during the construction phase, although there is uncertainty about this. Two options (WEF-MET-8201 and WEF-MET-8121) were individually assessed as having a significant negative uncertain effect on **SEA Objective 8**, due to the scale of the capital spend and expected vehicle movements they would require to be implemented.

For the majority of options that comprise the draft WRMP24, 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 programme of supply side options will require materials with 2,273 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. The demand management options would incur 32,535.04 tCO2e over the plan period in the construction phase. Overall, a significant negative effect on greenhouse gas emissions (**SEA Objective 9**) has been assessed during the construction period. Two options (WEF-MET-8201 and WEF-MET-8121) were individually assessed as having a significant negative effect on SEA Objective 9 during construction.

Given the cumulative concrete, steel, plastics that will be required to construct the preferred programme of supply options and the range of materials required for metering 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). As such the preferred programme has been assessed as having a significant negative effect on waste and resource use (**SEA Objective 15**).

No further significant negative effects have been identified during the assessment of the construction phase of the Preferred Programme of options. However, 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),

flood risk (SEA Objective 7), climate 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 metering options would result in demand reductions of 23.75 Ml/d in the TWG WRZ, 41.53 Ml/d in the SEWCUS WRZ, 2.03 Ml/d in the CC WRZ and 1.79 Ml/d in MSC WRZ totalling 69.13Ml/d across the DCWW supply area, this has been assessed as cumulatively having a significant positive effect against water quantity (SEA Objective 5). Two options (WEF-MET-8201 and WEF-MET-8121) were individually assessed as having a significant positive effect in this regard. However, abstraction associated with options SEW168 and MSC08 were assessed as having a minor negative effect on **SEA Objective 5** during operation.

One of the metering options (WEF-MET-8121) was assessed as having a significant positive effect on greenhouse gas emissions (**SEA Objective 9**) as it would individually result in significant reduction in carbon linked to reduced demand for water. Cumulatively the metering options will see a reduction in carbon linked to reduced operation energy associated with reduction in treatment and pumping arising from the reduced demand for water. This is equivalent to 2,350.10 tCO2e. per annum with an overall significant positive effect. However, in the operational phase the supply side options would incur significant carbon emissions (3,969 tCO2e per annum) and in particular option SEW166 was individually assessed as having a significant negative effect on SEA Objective 9.

Cumulatively the preferred programme of options would increase the capacity by supply of 62.6 M/d and demand management reduction of 69.13 Ml/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 62.6 Ml/d of clean drinking water from the preferred supply options, in addition to the 69.13 Ml/d reduction in the amount of water used associated with the preferred metering options, would, 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). Individually, options SEW166 and WEF-MET-8121 were each assessed as having a significant positive effect against SEA Objectives 10, 11 and 13.

The preferred programme of options will help to support the resilience of water resources in the DCWW area. The preferred programme of options will cumulatively support increased water supply (approx. 62.6 Ml/d) and metering (approx. 69.13 Ml/d), which assessed as having a significant positive effect on water resource use (**SEA Objective 14**). Individually, options SEW166 and WEF-MET-8121 were both assessed as having a significant positive effect on this objective.

No further significant positive or negative effects have been identified during the assessment 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), 3 (INNS), 6 (water quality), 7 (flood risk), 15 (waste and resource use), 16 (cultural heritage) and 17 (landscape).

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 draft 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 6.7.

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:

- 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 Next Steps in the SEA Process?

This Environmental Report is being issued for consultation to the SEA consultation bodies (Natural Resources Wales, Cadw and the Welsh Government in Wales and the Environment Agency, Historic England and Natural England in England) and provided as part of the evidence base to support the consultation on the draft WRMP24. The consultation will run from **16th November 2022 – 22nd February 2023**.

Details of how to respond to the consultation are provided below.

This Consultation: How to Give Us Your Views

We would welcome views on any aspect of this report. However, responses to the following questions would be particularly welcomed:

1. **Do you think that the Environmental Report has correctly identified the likely significant effects of the draft WRMP24? If not, what other significant effects do you think we have missed, and why?**
2. **Do you agree with the conclusions of the Environmental Report and the recommendations concerning the mitigation and enhancement of significant effects?**
3. **Do you agree with the proposed arrangements for monitoring the significant effects of the implementation of the draft WRMP24? If not, what measures do you propose?**

Please provide your comments by 22nd February 2023. Please send your response via email to Water@gov.wales .

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1. Introduction

1.1 Overview

1.1.1 Dŵr Cymru Welsh Water (DCWW) 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, with DCWW's most recent being published in 2019[9].

1.1.2 WRMPs must comply with international, UK and national legislation pertaining to the environment, as well as associated guidance on the development of WRMPs[10]. 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.

1.1.3 This Environmental Report presents the findings of the SEA of DCWW's draft WRMP24.

1.2 Purpose of the Environmental Report

1.2.1 The purposes of the report are

- to ensure that the likely significant environmental and socio-economic effects of the draft 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 draft WRMP24 wherever possible;
- to provide a framework for monitoring the potential significant effects arising from the implementation of the draft WRMP24;
- to give the statutory consultees, stakeholders and the wider public the opportunity to review and comment upon the environmental effects that the draft WRMP24 may have on them, their communities and their interests, and to encourage and support them to make responses and suggest improvements to the draft WRMP24;
- to inform 's decisions on the draft WRMP24; and

[9] DCWW (2019) *Final Water Resource Management Plan 2019*, August 2019. Available at: · https://www.dwrcymru.com/en/our-services/water/water-resources/final-water-resources-management-plan-2019

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

- to demonstrate that the draft WRMP24 has been developed in a manner consistent with the requirements of the SEA Regulations.

1.3 Water Resource Planning

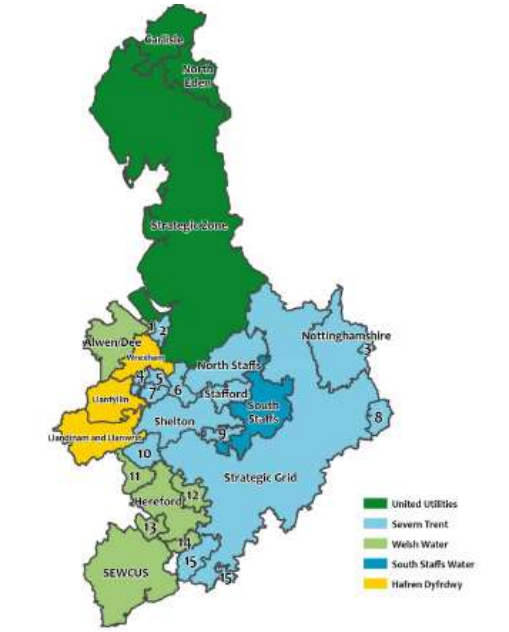
1.3.1 Water resources management planning is being undertaken regionally and by all water companies in England and Wales in order to ensure reliable, resilient water supplies over the long-term planning horizon.

1.3.2 Water resources management planning includes working out and 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.

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

Water Resources West Regional Plan

1.3.4 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 Dyfrdwy[11], Severn Trent Water (STW), South Staffordshire Water (SSW) and United Utilities Water (UUW) (see opposite).



No.	Name	Company
1	Saltney	Hafren Dyfrdwy
2	Chester	Severn Trent
3	Newark	Severn Trent
4	Mardy	Severn Trent
5	Kinsall	Severn Trent
6	Whitchurch and Wem	Severn Trent
7	Ruyton	Severn Trent
8	Rutland	Severn Trent
9	Wolverhampton	Severn Trent
10	Bishops Castle	Severn Trent
11	Pileth	Welsh Water
12	Whitbourne	Welsh Water
13	Vowchurch	Welsh Water
14	Ross on Wye	Welsh Water
15	Forest and Stroud	Severn Trent

1.3.5 These five companies, like all water companies in England and Wales, are required[12] to prepare, maintain and publish a WRMP.

1.3.6 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 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

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

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

methodologies to reflect local, regional and national needs into the development of the plans.

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 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 Options[13] (SROs) being taken forward by the companies.

1.3.9 In March 2020, WRW published its Initial Resource Position[14]. 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 update[15] (published in February 2021) to its resource position, WRW noted that the need maybe greater than previously estimated. WRW published its Emerging Regional Plan[16] 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 Ml/d of new water would be needed to meet public supply demand by 2031 and that an additional 63 Ml/d would be needed by 2050, for non-public water supply sectors.

Strategic Resource Options

1.3.10 Two SROs are within Wales but do not interact with the DCWW supply area namely, the North-West Transfer SRO and the Severn-Thames Transfer SRO.

1.3.11 The NWT SRO solution promotes cost efficient source options selected to facilitate transfer volumes by the release of raw water directly from Lake Vyrnwy into River Vyrnwy or transferred through a new River Vyrnwy bypass pipeline into the River Severn as part of the Severn Thames Transfer (STT) SRO.

1.3.12 Both SROs are subject to ongoing work as part of RAPID's gated process.

1.3.13 The potential for these SROs to interact with the DCWW options is considered as part of the cumulative effects assessment.

[13] The Strategic Water Resource Options (SROs) programme has been initiated by Ofwat to provide at least 1500Ml/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).

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

[15] 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].

[16] 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

Water Resource Management Plans

1.3.14 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.

1.3.15 For each Water Resource Zone[17] (WRZ) in the WRMP area, a supply demand balance is generated for public water supply (PWS). A set of non-PWS water availability assessments will also be generated. Each supply-demand balance will be structured around a consistent "central" set of planning assumptions and will be used to identify WRZs in deficit over the plan period.

1.3.16 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** 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;
- **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.

1.3.17 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

[17] 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)*".

Demand Management Options	Distribution and Leakage Options	Production Efficiency Options	Supply Options
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

1.3.18 Options tend to be generated from the company responsible for the WRMP but can also be joint[18] (where more than one company is working in partnership), provided by third parties or be multi-sector.

1.3.19 All zones with deficits have then been 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 (EBSD) 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 consider the interaction between zones to establish a best value plan for the company (and for the region as whole).

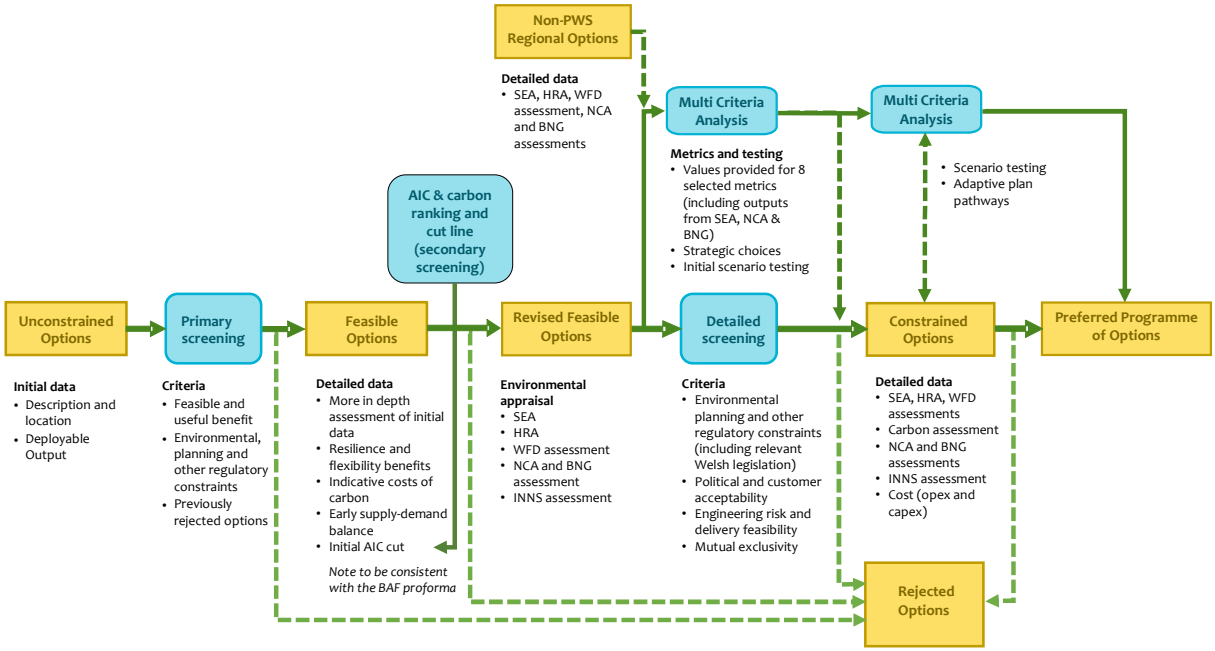
1.3.20 Scenarios have been used to test the preferred and any identified alternative plans. They have been used to explore what would happen if one of these plans was adopted and the

[18] 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.

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).

1.3.21 The process, and key decision points in the development of the WRMP plan and WRW Regional Plan are illustrated in **Figure 1.1**.

Figure 1.1 Environmental assessments into option and plan development



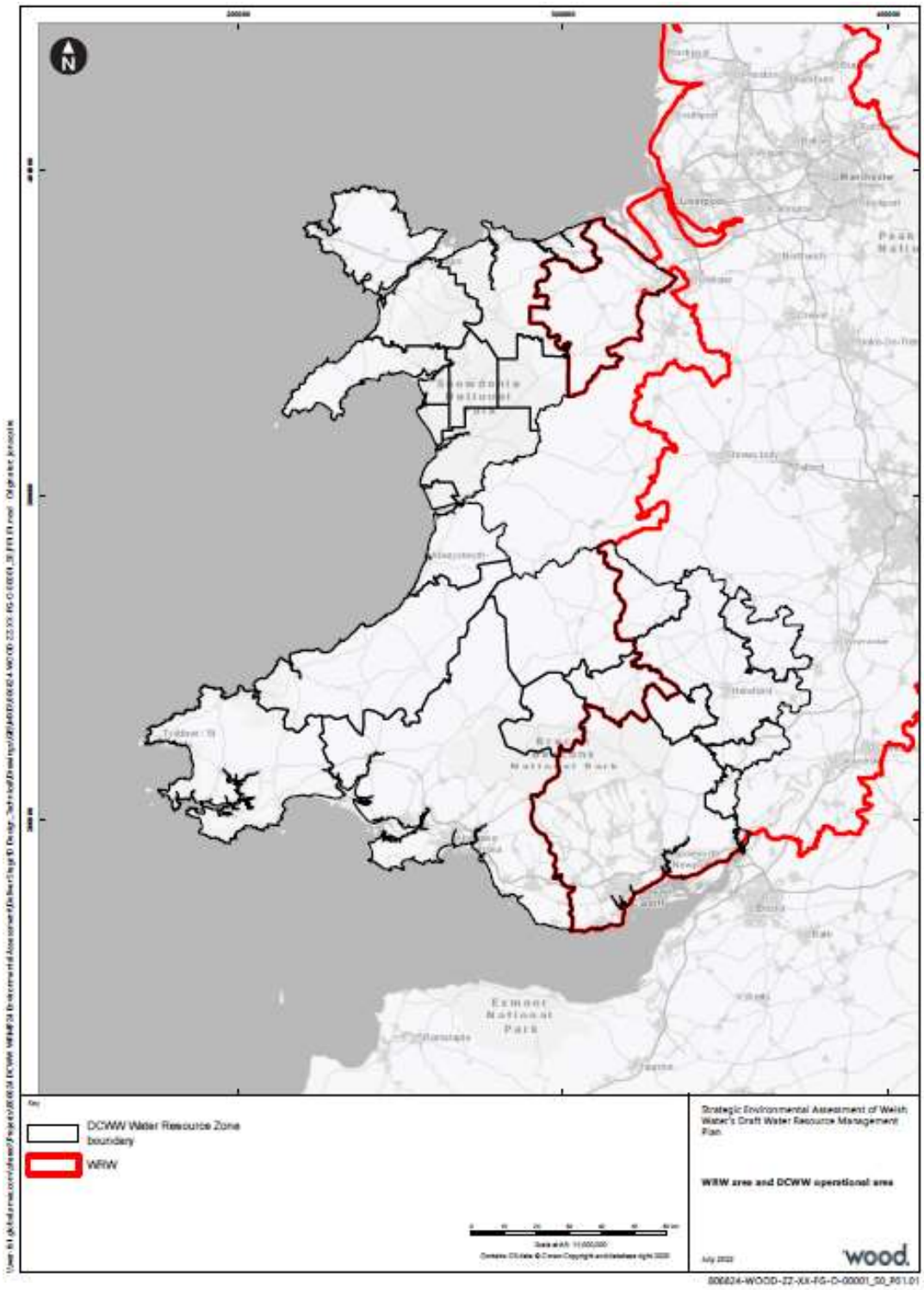
1.3.22 Environmental assessment information (derived from the SEA and other regulatory assessments) has been provided for the following key decision points:

- **MCA**, undertaken in advance of the selection of options. DCWW, as part of WRW developed a best value optimisation tool, ValueStream1, to provide equivalent monetised costs for best value metric scores, enabling option comparison.
- **scenario testing** of the constrained options; and
- selection of the preferred programme **of options**.

DCWW's draft Water Resource Management Plan

1.3.23 Welsh Water manages its water supplies and demands across 23 water resource zones (WRZs). **Figure 1.2** presents DCWW's WRMP24 operational area within the WRW regional plan area.

Figure 1.2 WRW and DCWW's Operational Area



1.3.24 Welsh Water provides water and sewerage services to some 3 million customers in much of Wales and small parts of Cheshire and Herefordshire in England. It also has over 100,000 business customers, and in total delivers more than 850 million litres of drinking water every day. This can increase by up to 20 per cent during a hot summer. Most of the

water Welsh Water abstracts is supplied from impounding reservoirs although significant volumes are abstracted from lowland river sources such as those on the Rivers Wye and Usk in South East Wales, the River Towy in South West Wales and the River Dee in North Wales. Groundwater accounts for less than 5 per cent of water supplies by Welsh Water but at a local level, may be the whole supply[19].

1.3.25 In previous WRMPs, Welsh Water identified and implemented significant asset investment to manage the implementation of the Water Framework Directive and Habitats Directives through abstraction licence changes. Demand management and leakage reduction by at least 15% during AMP7 was also mandated by regulatory expectation.

1.3.26 Although the environment remains a key aspect of the draft WRMP24, no confirmed abstraction licence changes have been agreed through the National Environment Programmes that would reduce Welsh Water's current supply capability.

1.3.27 Welsh Water's supply demand balances (SDB) have been generated for each of the 23 water resource zones. This identified that three zones would not be resilient under the preferred planning scenario (1 in 200 year level of drought resilience for emergency measures, tested against a medium emission climate change scenario) within the 25-year period to 2050. The zones with an identified shortfall are SEWCUS, the Tywi Gower, Mid-South Ceredigion (which has a forecast deficit under more extreme scenarios), and Clwyd Coastal. To resolve these issues, Welsh Water's draft WRMP24 proposes:

- A leakage programme to maintain leakage performance over the AMP8 period. The plan presents a challenging target of reducing leakage by a further 10% during AMP8 as part of Welsh Water's longer-term target to achieve 50% reduction of 2017/18 leakage levels by 2050, thus reducing abstraction from the environment.
- A metering programme that will support both the achievement of Welsh Water's leakage strategy and the long-term reduction in average domestic per capita consumption to 110 l/p/d by 2050.
- Network improvements to increase drought resilience in the SEWCUS and Tywi Gower Zones.
- WTW enhancement to increase peak supply capability in the Mid & South Ceredigion zone

1.3.28 As part of the WRMP development process, DCWW initially identified feasible supply-side and demand-side options to resolve deficits, improve network resilience and make water available for transfer. These options were subject to a staged filtering process (which included a high-level consideration of the HRA-related risks associated with each option) designed to establish the best-value plan for DCWW taking into account the regional plan requirements.

1.3.29 The draft WRMP24 therefore proposes:

- five supply options

[19] Welsh Water (2019) *Final Water Resources Management Plan 2019. Technical Report. March 2019.* Available online: https://www.dwrcymru.com/en/our-services/water/water-resources/final-water-resources-management-plan-2019 [Accessed March 2021].

- four 'demand' management options

1.3.30 These options are summarised in **Tables 1.2, 1.3, 1.4** and **1.5**. Please note that following completion of the assessment of the preferred options, there have been further amendments and refinement of the yield values by DCWW, taking into account additional modelling and which are reflected in the final dWRMP24.

Table 1.2 Preferred Options for the Tywi Gower WRZ included in the draft WRMP24

Option ID	Option name	Yield (Ml/d)	Description
TWG12	Crai Distribution Option - Upsize Christopher Road WPS	4.1	In order to reduce demand on Crai resources, GCG SRv (2.4 Ml/d average demand) and Bros SRv(1.7Ml/d average demand) will be rezoned to the Felindre WTW by upsizing Christopher Road PS to reverse flows in the 17" main from Crai and putting two booster PS's to pump to GCG SRv and Bros SRv.
TWG14	Ystradfellte - Reverse flow through Tonna control valve	2.5	In order to reduce the stress on the resource from Cefn Drysgoed, flows through the Tonna Flow control valve will be reversed so that 2.5Ml/d from the Felindre system can meet some of the demand on the Cefn Drysgoed network. Elements: New Park Field Pumping Station (PS) to pump to the Cefn Drysgoed network (2.5Ml/d - from the model).
WEF-MET-8201	WEF-MET-8201	23.75	This option would involve the significant increase in metering of customer properties in the zone, and the fixing of identified leakage as it is detected on customer supply pipes.

Table 1.3 Preferred Options for the SEWCUS WRZ included in the draft WRMP24

Option ID	Option name	Yield (Ml/d)	Description
SEW166	Memorial and Cefn Mably upgrade	47	This option would involve providing 47 Ml/d peak flows to the Pontsticill Low Level network in order to release the flows from the Pontsticill WTW to enable other WRMP options and the trading option. In order to be able to supply the combined 47 Ml/d, Cilfynydd WPS (21Ml/d) will be reinstated to support the Memorial WPS (26 Ml/d). The Pumps at Memorial WPS will be replaced with Low suction, high lift pumps to be able to pump to Ty Gwyn SRv. Cefn Mably WPS will be reinstated to provide additional pressure to the supply side of Memorial WPS and Tongwynlais SRv. Installation of a pressure and flow control valve arrangement at the inlet to Tongwynlais SRv to ensure that the service reservoir does not overtop.
SEW168	Removal of Llwynon Min flow	7	Scheme to enable DCWW to stop supplying 7 Ml/d minimum sweetening flow year round into the Llwynon gravity main in order to avoid WQ issues. The scheme comprises installation of new pressure reducing valves (PRVs), meters, burst protection valves and flow control valves.
WEF-MET-8121	WEF-MET-8121	43.31	This option would involve the significant increase in metering of customer properties in the zone, and the fixing of identified leakage as it is detected on customer supply pipes.

Table 1.4 Preferred Options for the Clwyd Coastal WRZ included in the draft WRMP24

Option ID	Option name	Yield (Ml/d)	Description
WEF-MET-8012	WEF-MET-8012	2.03	This option would involve the significant increase in metering of customer properties in the zone, and the fixing of identified leakage as it is detected on customer supply pipes.

Table 1.5 Preferred Options for the Mid-South Ceredigion WRZ included in the draft WRMP24

Option ID	Option name	Yield (Ml/d)	Description
MSC08	Upsize Llechryd WTW	2	Llechryd WTW currently has a maximum capacity of 19 Ml/d. The maximum abstraction rate is 800 m3/h. It is expected that the abstraction licence could be increased to 880 m3/h freeing up an extra 2 Ml/d.
WEF-MET-8202	WEF-MET-8202	1.79	This option would involve the significant increase in metering of customer properties in the zone, and the fixing of identified leakage as it is detected on customer supply pipes.

1.3.31 Further work is being completed by Welsh Water on its leakage options, which will be reflected in any update to this SEA.

1.4 Strategic Environmental Assessment

Overview

1.4.1 SEA became a statutory requirement following the adoption[20] of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment. In Wales, this was transposed into legislation on 12th July 2004 as Statutory Instrument 2004 No.1656 - The Environmental Assessment of Plans and Programmes (Wales) Regulations 2004. These apply to plans and programmes whose effects are wholly within Wales; however, if plans or programmes could affect more than one country in the UK, then The Environmental Assessment of Plans and Programmes Regulations 2004 (Statutory Instrument 2004 No.1633) would apply.

1.4.2 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.

[20] 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 Environmental Report 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).

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)[21] 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 Government[22], regulator[23] and industry[24] 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 guidance[25] on WRMPs, meanwhile, identifies environmental legislation relevant to the WRMP. As it is possible that the draft WRMPs could affect England and Wales, the UK SEA Regulations, as opposed to the Welsh SEA Regulations,[26] will apply.

[21] 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

[22] 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*

[23] EA, OfWAT and NRW *(2022) Water Resource Planning Guidance [online]. Available at: https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline*

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

[25] 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

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

Applying SEA to Water Resource Management Plans

1.4.8 DCWW's dWRMP24s will be 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 the draft WRMP24 will be to:

- identify the potentially significant environmental effects of the draft 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 draft plan wherever possible;
- give the statutory SEA bodies, stakeholders and the wider public the ability to see and comment upon the effects that the draft plan may have on them, and encourage them to make responses and suggest improvements to the draft plans; and
- inform the selection of water resource management options to be taken forward into the final versions of the WRMP24.

1.4.9 In summary, the SEA will identify, describe and assess the likely significant effects arising from the following aspects of the 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 the plans.

1.4.10 Where relevant, any assessment work that has already been completed e.g., as part of the RAPID[27] gated submission process for the SROs, this will be used 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;
- **Stage B**: Develop and Refine Alternatives and Assess Effects;
- **Stage C**: Prepare Environmental Report;

[27] 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]

- **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 Report[28] (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 comprises five tasks that are listed below:

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

1.4.13 Information collected and analysed (as part of tasks i and ii) covers England and Wales reflecting the DCWW operational area (with the WRW region). The Scoping Report set out the proposed framework for assessing the likely significant environmental effects of the draft 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**.

1.4.14 Following consultation, and amendment as appropriate, the assessment framework has been used for assessing the likely significant effects (including cumulative effects) of the water resource options contained in the draft WRMP24 and any reasonable alternatives (**Stage B**). 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).

1.4.15 These assessments are presented in this Environmental Report (in a form to meet the requirements of Schedule 2 of the SEA Regulations) which has been completed to accompany the draft WRMP24 (**Stage C**).

1.4.16 The draft WRMP24 and accompanying documents including the Environmental Report will then be submitted to the Welsh Government, for a request for publication and once directed to do so, DCWW will publish the documents for consultation (**Stage D**). Following consultation, and within 26 weeks of consultation beginning, DCWW will need to prepare a Statement of Response to the representations received. The revised draft WRMP24 will be sent to the Government, and if changes are likely to be significant, is likely to be subject to further assessment and consultation. Following direction from the Government, the final WRMP24 will be published and implemented accordingly (anticipated August 2023). In conjunction with publishing the final WRMP24, a Post Adoption Statement will also be issued (to meet the requirements of SEA regulation 16

[28] 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

(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 The SEA requires monitoring of any resulting environmental effects of the WRMP24 (**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 site[29] or a European offshore marine site[30] (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 HRA[31]. An HRA determines whether there will be any '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)[32] and, if so, whether there will be any 'adverse effects on site integrity'[33].

1.5.4 Water resource plans (whether WRMPs or Regional Plans) are not explicitly included within this legislation, although the regulator guidance[34] 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.

[29] 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.

[30] '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.

[31] 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.

[32] Also referred to as the 'test of significance'.

[33] Also referred to as the 'integrity test'.

[34] EA, OfWAT and NRW (2022) *Water Resources Planning Guideline*

1.5.5 Whilst the HRAs has been undertaken and reported separately from the SEAs, its findings will be used as appropriate to inform the findings of this SEA, notably against the biodiversity, fauna and flora topic.

1.5.6 The HRA of DCWW's draft WRMP24 also contributes towards the HRA of the accompanying WRW draft Regional Plan. In this way it contributes to the evidence for how the water companies have coordinated their water resources planning activities and considered the needs of multiple sectors (aligned with WRW Regional Plan).

1.6 Water Framework Directive Assessment

1.6.1 The Water Framework Directive[35] (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 RBMPs (known as the 'Cycle 2 plans') were published in February 2016 and are expected to be updated in September 2022.

1.6.3 DCWW (for the draft 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, DCWW must be able to confirm that it would not preclude the delivery of measures to facilitate the improvements needed to attain good status.

1.6.4 A separate WFD assessment has been undertaken to provide the evidence base to respond to these requirements. 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 bought about by changes in land use, when designed and delivered well, BNG can secure benefits for nature, people and places, and for the economy[36].

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.

[35] 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.

[36] 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/

1.7.3 The WRPG[37] 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[3839], 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 Natural Capital Assessment (NCA) has been undertaken of DCWW dWRMP24 to address these requirements. 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.

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 its contribution to achieving the seven well-being goals, 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 The 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 requirements[40] is considered to be within this definition.

1.8.3 The Water Resources Planning Guideline (WRPG)[41] 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*".

1.8.4 The requirements of the WFGA WRMPs could be met through either a standalone assessment, or integrated with other assessments, such as SEA, as was the practice in the assessment of WRMP19s. A similar high-level assessment has been completed and included as part of this SEA.

The Environment (Wales) Act 2016

1.8.5 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

[37] Ofwat, NRW & EA (2022) *Water Resources Planning Guideline* – Updated 22 July 2022
[38] EA (2021) *WRPG 2024 supplementary guidance – Environment and society in decision-making*. Published 24/03/2021
[39] NRW (2021) *WRPG 2024 supplementary guidance – Environment and Society in decision-making* (Wales). Published 07/04/2021
[40] Water Industry Act 1991, as amended by the Water Act 2003 and the Water Act 2014

[41] EA, OfWAT and NRW (2022) *Water Resources Planning Guideline, 5th bullet point after heading 'Wales' in paragraph 4.1.1.*

and, in so doing, meet 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."

1.8.6 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

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

1.8.7 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".

1.8.8 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

1.9.1 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 the draft WRMP and 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 the draft plan and SEA with the detailed social, economic and environmental characteristics presented in **Appendix D**;
- **Section 4: Approach to the Assessment** - Outlines the revised approach to the SEA of the draft WRMP 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 draft WRMP's revised feasible options (detailed assessment matrices for revised feasible options presented in **Appendix F**);
- **Section 6: Assessment of the Draft WRMP** - Presents the findings of the assessment of the preferred options and preferred programme of options that comprise the draft WRMP 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.
- The report also contains the following appendices:
- **Appendix A: Quality Assurance Checklist.**
- **Appendix B: Schedule of Scoping Consultation Reponses.**
- **Appendix C: Review of Plans and Programmes.**
- **Appendix D: Baseline Analysis.**
- **Appendix E: Definitions of Significance.**
- **Appendix E: Revised Feasible Options Assessment**
- **Appendix G: Preferred Options Assessment.**

1.10 How to Comment on the Environment Report

1.10.1 This Environmental Report is being issued for consultation to the SEA consultation bodies (Natural Resources Wales, Cadw and the Welsh Government in Wales and the Environment Agency, Historic England and Natural England in England) and provided as part of the evidence base to support the consultation on the draft WRMP24. The consultation will run from **16th November 2022 – 22nd February 2023**.

1.10.2 Details of how to respond to the consultation are provided below.

This Consultation: How to Give Us Your Views

We would welcome views on any aspect of this report. However, responses to the following questions would be particularly welcomed:

1. **Do you think that the Environmental Report has correctly identified the likely significant effects of the draft WRMP24? If not, what other significant effects do you think we have missed, and why?**
2. **Do you agree with the conclusions of the Environmental Report and the recommendations concerning the mitigation and enhancement of significant effects?**
3. **Do you agree with the proposed arrangements for monitoring the significant effects of the implementation of the draft WRMP24? If not, what measures do you propose?**

Please provide your comments by 22nd February 2023. Please send your response via email to Water@gov.wales .

2. Review of Plans and Programmes

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

2.1.3 Relevant regional and local plans, policies and programmes were identified from the wide range that has been produced. The emphasis is on "relevant": plans and programmes that have no likely interaction with the WRMP (i.e., they are unlikely to influence the WRMP, or be influenced by it), have been excluded from the review. Important and relevant regional and local plans, policies and programmes and strategic level plans that fall within the area under consideration identified in Section 1 above have been considered.

2.2 Overview

2.2.1 The findings of the review of local and regional policy, plans and programmes are set out in **Table A2.1** and in **Appendix C. Appendix C** contains the table that sets out the purpose and objectives of the policies, plans and programmes, their potential relationship with Welsh Water's WRMP, and the potential implications of the plan objectives for the objectives of the SEA.

Table 2.1 Summary of the Regional and Local Policy, Plans and Programmes Relevant to the SEA of the WRMP

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** **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 (1999) Directive on the Landfill of Waste 99/31/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 Resource- Efficient Europe- Flagship Initiative Under the Europe 2020 Strategy, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions (COM 2011/21)
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
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 (2020) Energy white paper: Powering our net zero future
BEIS (2021) Heat and buildings strategy
BEIS (2021) Net Zero Strategy: Build Back Greener

Cadw, CCW and ICOMOS (UK) (International Council on Monuments and Sites) (2001) Register of Landscapes of Historic Importance
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
Countryside Council for Wales (CCW) (2003) Priority Habitats of 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
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) Conserving Biodiversity in a Changing Climate: Guidance on Building Capacity to Adapt
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 and Welsh Government (2014), River Basin Planning Guidance
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 and Natural Resources Wales (2021) Water resources planning guideline
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
Future Generations Commissioner for Wales (2020) The Future Generations Report 2020
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
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
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 (2015) Water Framework Directive (Standards and Classification) Directions (England and Wales) 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
Ministry for Housing Communities and Local Government (MHCLG, formerly Department for Communities and Local Government (2014) National Planning Policy for Waste
MHCLG (2019) National Planning Policy Framework 2019
National Assembly for Wales (2015) Well-being and Future Generations (Wales) Act 2015
National Assembly for Wales (2016) Historic Environment (Wales) Act 2016
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 (2016) The State of Natural Resources Report (SoNaRR)
Natural Resources Wales (2020) Salmon and sea trout plan of action for Wales
Ofwat (2008) Water Supply and Demand Policy
Ofwat (2016) Water 2020
Ofwat (2017) Resilience in the Round
Public Health Wales (2017) Creating a Healthier, Happier and Fairer Wales
UKCIP (2018) UK Climate Projections UKCP18
UKTAG: Phase 3 Review of Environmental Standards
Valuing Our Environment Partnership (2010) Valuing the Welsh Historic Environment
Wales Biodiversity Partnership (2015) Nature Recovery Action Plan Wales – the Biodiversity Strategy for Wales
Waterwise (2017) Water Efficiency Strategy for the UK
Water UK (2016) Water Resources Long-term Planning Framework (2015 – 2065)
Welsh Government (1998) Technical Advice Note 14: Coastal Planning
Welsh Government (2004) Technical Advice Note 15: Development and Flood Risk
Welsh Government (2008) One Wales One Planet: The Sustainable Development Scheme for Wales
Welsh Government (2009) Technical Advice Note 5: Nature Conservation and Planning
Welsh Government (2010) National Transport Plan
Welsh Government (2012) Energy Wales: A Low Carbon Transition
Welsh Government (2012) Historic Environment Strategy for Wales
Welsh Government (2014, updated 2019) Energy Wales: A Low Carbon Transition Delivery Plan
Welsh Government (2014) Welsh Rural Development Plan Programme document 2014-2020
Welsh Government (2015) Nature Recovery Plan for Wales
Welsh Government (2015) Water Strategy for Wales
Welsh Government (2016) Energy Efficiency in Wales: A Strategy for the next 10 years 2016-2026
Welsh Government (2016) Guiding Principles for Developing Water Resources Management Plans (WRMP's) for 2020
Welsh Government (2016) Taking Wales Forward 2016-2021
Welsh Government (2016) Technical Advice Note 12: Design
Welsh Government (2017) Future Landscapes: Delivering for Wales
Welsh Government (2017) Natural Resources Policy
Welsh Government (2017) Prosperity for All: National Strategy (2017) and Annual Report 2018
Welsh Government (2017) Prosperity for All: Economic Action Plan
Welsh Government (2017) Technical Advice Note 24: The Historic Environment
Welsh Government (2018) Priorities for the Historic Environment of Wales
Welsh Government (2018) Woodlands for Wales: The Welsh Government's Strategy for Woodlands and Trees
Welsh Government (2019) Prosperity for All: A Low Carbon Wales
Welsh Government (2019) Welsh National Marine Plan
Welsh Government (2020) Agriculture (Wales) White Paper (2020)
Welsh Government (2020) Historic Environment and Climate Change in Wales

Welsh Government (2020) National Strategy for Flood and Coastal Erosion Risk Management in Wales **Welsh Government (2020) The Nature Recovery Action Plan for Wales 2020 – 21** **Welsh Government (2020) Strategic Equality Plan 2020-2024** **Welsh Government (2020) Welcome to Wales: Priorities for the visitor economy 2020 – 2025** **Welsh Government (2021) Future Wales: The National Plan 2040** **Welsh Government (2021) Our Economic Resilience & Reconstruction Mission** **Welsh Government (2021) Planning Policy Wales (Edition 11)**
Regional
Water Company (various) Drought Plans **Water Company (various) Water Resources Management Plans** **Dŵr Cymru Welsh Water (2018) Welsh Water 2050** **Dŵr Cymru Welsh Water (2019) Final Water Resources Management Plan 2019** **Dŵr Cymru Welsh Water (2020) Making time for nature 2020: Welsh Water's revised plan for maintaining and enhancing biodiversity** **Dŵr Cymru Welsh Water (Undated) Our Plan PR19 Business Plan 2020-2025** **Natural England (Various) Site Improvement Plans** **Natural Resources Wales (2015) (Various) River Basin Management Plans** **Natural Resources Wales (Various) Area Statements** **Regional Transport Plans (Various)** **Torfaen County Borough Council (2011) Blaenavon Industrial Landscape World Heritage Site Management Plan** **Welsh Government (2018) Castles and Town Walls of King Edward in Gwynedd World Heritage Site: World Heritage Site Management Plan 2018 – 28**
Sub-Regional/Local
AONB Management Units (various) AONB Management Plans **Defra (Various) Eel Management Plans** **Environment Agency/Natural Resources Wales (various) Catchment Flood Management Plans** **Environment Agency/Natural Resources Wales (various) River Basin Management Plans** **Environment Agency, Natural Resources Wales and Natural Scotland (2016) River Basin District Flood Risk Management Plans** **Environment Agency (undated) Wye Waterway Plan 2017 -2022** **Environment Agency and Natural Resources Wales (various) Salmon Action Plans** **Local Biodiversity Action Plans (LBAPs), including Species and Habitats Action Plans (various)** **Local Geodiversity action Plans (LGAPs) (Various)** **Local Planning Authority (various) Land Use Plans** **National Park Management Plans (various)** **Natural Resources Wales (Various) Catchment Abstraction Management (Licencing) Strategies (CAMS)** **Public Services Boards (PSBs) (Various) PSB Assessments and Local Well-being Plans** **Shoreline Management Plans (various)** **World Heritage Site Management Plans (Various)**

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 draft WRMP. 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;
- 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 draft plan 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 WRMP 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 WRMP

Key Objectives and Policy Messages	Key Sources	Relevant to the SEA of the WRMP?
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; Biodiversity 2020; EU Biodiversity Strategy for 2030; Marine Strategy Framework Directive; 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; Planning Policy Wales Edition 11; The State of Natural Resources Report (SoNaRR); Salmon and sea trout plan of action for Wales; Natural Resources Policy (NRP); Nature Recovery Action Plan NRAP; 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); Site Improvement Plans (various).	Yes
Soils, Land Use and Geology		
Protection and enhancement of soil quality, promoting sustainable patterns of land use and protecting designated geological features	Safeguarding our Soils – A Strategy for England; Thematic Strategy for Soil Protection; National Planning Policy Framework; Planning Policy Wales Edition 11; Soil: A Precious Resource; Local Planning Authority Local Plans (various); AONB Management Plans; National Park Management Plans (various).	Yes
Water (including flood risk)		
Protection and enhancement of all water supplies and resources	Bathing Waters Directives; Conservation of Habitats & Species Regulations; Water Supply (Water Quality) Regulations; Drinking Water Directive; Habitats Directive; Nitrates Directive; Urban Waste Water Directive; Water Framework Directive; Environmental Quality Standards Directive; Blueprint to Safeguard Europe's Water Resources; Wildlife & Countryside Act; Restoring Sustainable Abstraction Programme; Climate Change	Yes

Key Objectives and Policy Messages	Key Sources	Relevant to the SEA of the WRMP?
	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 (2015 – 2065); Planning Policy Wales Edition 11; 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).	
Promoting the sustainable and efficient use of water	Water Framework Directive; Blueprint to Safeguard Europe's Water Resources; The Water Environment (WFD) (England and Wales) Regulations; Water for People and the Environment; Managing Water Abstraction; Restoring Sustainable Abstraction Programme; The Environment Agency's Approach to Groundwater Protection; Meeting our future water needs: a national framework for water resources; Water Act; Water Supply and Demand Policy; A Green Future: Our 25 Year Plan to Improve the Environment; National Planning Policy Framework; Planning Policy Wales Edition 11; Water Strategy for Wales; 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
Minimising flood risk and improving flood control infrastructure	Floods Directive; Water Framework Directive; Flood and Water Management Act; Shoreline Management Plan Guidance; National Strategy for Flood and Coastal Erosion Risk Management in Wales; National Flood and Coastal Erosion Risk Management Strategy for England; Welsh National Marine Plan; Flood and Water Management Act; National Planning Policy Framework; Planning Policy Wales Edition 11 Shoreline Management Plans (various); Catchment Flood Management Plans (various); River Basin Management Plans (various); Catchment Flood Management Plans (various); Local Planning Authority Local Plans (various).	Yes
Air		
Ensuring air quality is maintained or enhanced and that emissions of air pollutants are kept to a minimum	Ambient Air Quality and Cleaner Air for Europe Direct; Industrial Emissions Directive; Air Pollution: Action in a Changing Climate; Air Quality Strategy for England, Scotland, Wales and Northern Ireland; Air Quality Plan for Nitrogen Dioxide (NO2) in UK; National Planning Policy Framework; Planning Policy Wales Edition 11; Local Planning Authority Local Plans (various).	Yes
Climatic Factors		
Minimising emissions of greenhouse gases that cause climate change	Kyoto Protocol; Paris Agreement; Climate Change Act; Renewable Energy Roadmap; UK Sustainable Development Strategy; UK Renewable Energy Strategy; National Planning Policy Framework; HM Government – Energy White Paper: Powering our Net Zero Future; UK Clean Growth Strategy: Leading the way to a low carbon future ; Energy Wales: A Low Carbon Transition; Climate Change Committee - The path to Net Zero and progress on reducing emissions in Wales; UK Climate Change Risk Assessment; Local Planning Authority Local Plans (various).	Yes
Minimising the effects of climate change on natural resources, inhabitants and the economy	EU Strategy on Adaptation to Climate Change; UK Sustainable Development Strategy; National Strategy for Flood and Coastal Erosion Risk Management in Wales; National Flood and Coastal Erosion Risk Management Strategy for England; National Planning Policy Framework; The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting; Planning Policy Wales Edition 11; Water Resources Management Plans (various); River Basin Management Plans (various); Shoreline Management Plans (various); Catchment Flood Management	Yes

Key Objectives and Policy Messages	Key Sources	Relevant to the SEA of the WRMP?
	Plans (various); UK Climate Change Risk Assessment; Local Planning Authority Local Plans (various).	
Population and Human Health		
Addressing deprivation and reducing inequality	World Summit on Sustainable Development; Europe 2020; Sustainable Development Strategy; National Planning Policy Framework; Future Wales: The National Plan 2040; Planning Policy Wales Edition 11; The Future Generations Report 2020; Strategic Equality Plan 2020-2024; Local Planning Authority Local Plans (various).	Yes
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; Planning Policy Wales Edition 11; Creating a Healthier, Happier and Fairer Wales; Local Planning Authority Local Plans (various).	Yes
Providing high quality services, community facilities and social infrastructure that is accessible to all	National Planning Policy Framework; The National Plan 2040; Planning Policy Wales Edition 11; The Future Generations Report 2020; Local Planning Authority Local Plans (various).	No
Achieving sustainable economic growth and promoting key sectors in the local economy	World Summit on Sustainable Development; Europe 2020; UK Marine Policy Statement; Sustainable Development Strategy; National Planning Policy Framework; Planning Policy Wales Edition 11; Prosperity for All: Economic Action Plan; Prosperity for All: National Strategy; Local Planning Authority Local Plans (various).	Yes
Improving and expanding the tourism economy	National Planning Policy Framework; Planning Policy Wales Edition 11; Prosperity for All: Economic Action Plan; Prosperity for All: National Strategy; Future Wales: The National Plan 2040; Welcome to Wales: Priorities for the visitor economy 2020 – 2025 Local Planning Authority Local Plans (various); AONB Management Plans (various); National Park Management Plans (various). Local Planning Authority Local Plans (various).	Yes
Maximising job opportunities for all and enhancing the quality of employment opportunities	National Planning Policy Framework; Planning Policy Wales Edition 11; Prosperity for All: National Strategy; Our Economic Resilience & Reconstruction Mission; Local Planning Authority Local Plans (various).	Yes
Minimising noise pollution	Environment Noise Directive; National Planning Policy Framework; Local Planning Authority Local Plans (various).	Yes
Promoting sustainable transport	Sustainable Development Strategy; A Roadmap for Moving to a Competitive Low Carbon Economy in 2050; National Planning Policy Framework; Planning Policy Wales Edition 11; The National Plan 2040; Local Planning Authority Local Plans (various).	No
Material Assets and Resource Use		
Minimising waste production, promoting re-use and recycling	Landfill of Waste Directive; Waste Management Plan for England; National Planning Policy Framework; Planning Policy Wales Edition 11; National Planning Policy for Waste; Local Planning Authority Local Plans (various).	Yes
Promoting the most effective and efficient use of natural resources	World Summit on Sustainable Development; Eighth Environmental Action Programme; Energy 2020; Europe 2020; UK Sustainable Development Strategy; National Planning Policy Framework; Planning Policy Wales Edition 11; National Planning Policy for Waste; Local Planning Authority Local Plans (various).	Yes
Promoting the use of sustainable/renewable energy	Eighth Environmental Action Programme; National Policy Statements for Energy Infrastructure; UK Renewable Energy Roadmap; Future Electricity Networks; Energy white paper: Powering our net zero future; Net Zero Strategy: Build Back Greener; Energy 2020; A Roadmap for Moving to a Competitive Low Carbon Economy in 2050;; Sustainable Development	Yes

Key Objectives and Policy Messages	Key Sources	Relevant to the SEA of the WRMP?
	Strategy;; Climate Change Act; UK Renewable Energy Strategy; UK Renewable Energy Roadmap; UK Sustainable Development Strategy; Resources and Waste Strategy for England; Renewable and Low Carbon Energy; National Planning Policy Framework; Planning Policy Wales Edition 11; Local Planning Authority Local Plans (various).	
Promoting the use of sustainable design and construction and encouraging energy efficiency	Energy 2020; Energy Efficiency Directive; A Roadmap for Moving to a Competitive Low Carbon Economy in 2050; Renewable Energy Directive; UK Sustainable Development Strategy; Energy Wales; National Planning Policy Framework; Planning Policy Wales Edition 11; Local Planning Authority Local Plans (various).	Yes
Cultural Heritage		
Protecting and enhancing cultural heritage and archaeological sites	World Heritage Convention; The Historic Environment – A Force for the Future; Scheduled Monuments & Nationally Important but Non-Scheduled Monuments; Ancient Monuments and Archaeological Areas Act; Planning (Listed Buildings and Conservation Areas) Act; National Planning Policy Framework; Valuing the Welsh Historic Environment; Future Wales: The National Plan 2040; Planning Policy Wales Edition 11; Technical Advice Note 24 The historic Environment; the Setting of Heritage Assets; Historic England Advice Note 8; Priorities for the Historic Environment of Wales; Priorities for the Historic Environment of Wales; Historic Environment and Climate Change in Wales; Local Planning Authority Local Plans (various).	Yes
Landscape		
Protecting and enhancing the quality and distinctiveness of natural landscapes and environmental resources	European Landscape Convention; National Planning Policy Framework; Future Wales: The National Plan 2040; Planning Policy Wales Edition 11; Future Landscapes: Delivering for Wales; AONB Management Plans (various); Local Planning Authority Local Plans (various); National Park Management Plans (various).	Yes

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 draft 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;
- 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 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	Relevance 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. Key Issues Key pressures and risks in respect of biodiversity and nature conservation that are relevant include, inter-alia: • the need to maintain and enhance biodiversity and the resilience of ecosystems, including sites designated for their nature conservation value; • the need to address the climate emergency and nature emergencies together; • 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 protected species; • the need to prevent the spread/introduction of invasive non-native species; • the need to maintain/enhance ecological connectivity; • the need to sustainably manage biodiversity assets, taking into account the effects of climate change; • the need to recognise the key role that green infrastructure plays in supporting (*inter alia*) biodiversity, landscape, wellbeing and climate change resilience; • the need to protect and enhance the green infrastructure network; • the need to continue monitoring biodiversity and ecological indicators; and • the need to work within environmental limits and capacities. • The need to prevent depletion and pollution of groundwater	Objective 1: Biodiversity Objective 4: Soils, Land Use and Geology Objective 5: Water Quality Objective 6: Water Quantity Objective 7: Flood Risk Objective 10: Climatic Factors

Soils, Land Use and Geology	Relevance 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. Key Issues • the need to protect, maintain and enhance geomorphological functions and services; • the need to influence how land is managed, promoting sustainable patterns of land use; • the need to conserve and enhance soil quality and function (including carbon sequestration); • the need to protect and avoid damage to Wales' geodiversity and conserve and enhance sites designated for geological interest; and • the need to manage impacts on soil resources, including control of pollution and remediation of contaminated land.	Objective 1: Biodiversity Objective 4: Soil, Land Use and Geology Objective 5: Water Quality Objective 6: Water Quantity
Water - Quantity	Relevance 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. Key Issues • the need to maintain seasonal flows in groundwater and surface water; • the need to restore sustainable and appropriate abstraction levels and water flow/levels in Wales' waters across the full range of regimes from low to high conditions; • the potential effects of climate change and the need to build climate change resilience into the water environment and water management; and • The need to increase resilience to pressures on public water supply.	Objective 1: Biodiversity Objective 4: Soils, Land Use and Geology Objective 5: Water Quality Objective 6: Water Quantity Objective 11: Economy Objective 13: Human Health
Water - Quality	Relevance 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.	Objective 1: Biodiversity Objective 4: Soils, Land Use and Geology Objective 5: Water Quality Objective 6: Water Quantity Objective 11: Economy Objective 13: Human Health

	The historic pollution of groundwater and nitrate concentrations present an issue for water resources infrastructure and ensuring drinking water standards are met. Key Issues • the need to maintain and improve water quality; • the potential effects of climate change and the need to build climate change resilience into the water environment and water management; and • the need to prevent the deterioration of Water Framework Directive waterbodies, achieve protected area objectives and achieve water body status objectives.	
Water - Flood Risk	Relevance 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). Key Issues • the need to ensure that the continued risk of flooding is reduced or where this is not possible, mitigated effectively.	Objective 5: Water Quality Objective 6: Water Quantity Objective 7: Flood Risk Objective 10: Climatic Factors Objective 11: Economy Objective 13: Human Health
Air Quality	Relevance 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. Key Issues • the need to minimise emissions of pollutant gases and particulates and enhance air quality.	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	Relevance 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. Key Issues • the need to reduce travel and promote sustainable modes of transport; • the need to reduce GHG emissions arising from implementation of the WRMP; • the need to take into account, and where possible adapt to, the potential 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	Relevance 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. 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. Key Issues • the need to ensure that water resource requirements of people and visitors can be met at all times, in a sustainable way; • the need to ensure that water resources remain affordable; • the need to ensure that vulnerable people are not affected by implementation of measures to manage water resources.	Objective 11. Economy Objective 12. Tourism and Recreation Objective 13. Human Health Objective 14. Water Resources Objective 15. Waste and Resource Use
Human Health	Relevance 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. Key Issues • the need to ensure that measures to manage water resources do not adversely affect the health and well-being of any member of the community.	Objective 11. Economy Objective 12. Tourism and Recreation Objective 13. Human Health
Material Assets	Relevance 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.	Objective 1: Biodiversity Objective 4: Soils, Land Use and Geology Objective 5: Water Quality Objective 6: Water Quantity

	Key Issues • the need to promote water efficiency measures (including metering); • the need to ensure that leakage is managed at a sustainable economic level; • the need to maintain the balance between supply and demand for water; • the need to reduce energy consumption and support low carbon and renewable energy production; • the need to ensure the sustainable and efficient use of resources such as construction materials; and • the need to minimise waste arisings, promote reuse, recovery and recycling and minimise the impact of wastes on the environment and communities.	Objective 9: Greenhouse Gases Objective 10: Climatic Factors Objective 11. Economy Objective 14. Water Resources Objective 15. Waste and Resource Use
Cultural Heritage	Relevance 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. Key Issues • the need to conserve and enhance the historic significance of buildings, monuments, features, sites, places, areas and landscapes of archaeological and cultural heritage interest, and their settings; • the need to promote access to Wales' cultural heritage sites within Welsh Water's ownership where possible and safe to do so; and • the need to avoid damage to important wetland areas with potential for paleoenvironmental deposits.	Objective 4: Soils, Land Use and Geology Objective 11. Economy Objective 12. Tourism and Recreation Objective 13. Human Health Objective 16: Cultural Heritage Objective 17: Landscape
Landscape	Relevance 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. Key Issues • the need to protect, conserve and enhance landscape character, taking into account the effects of climate change; • the need to ensure the special qualities of designated landscapes are protected; and • the need to minimise any adverse impacts upon landscape that may result from measures in the WRMP.	Objective 1: Biodiversity Objective 4: Soils, Land Use and Geology Objective 11. Economy Objective 12. Tourism and Recreation Objective 13. Human Health Objective 16: Cultural Heritage Objective 17: Landscape and Townscape

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 Scoping Report's publication, the baseline or predicted future trends may have varied from those described above.

3.3.2 The data gathered to complete this baseline pre-dates the Covid-19 pandemic and its environmental, social and economic effects. Data that relates to these changes is only becoming available periodically and it may well be a number of years before the effects of the crisis can be determined, along with whether changes to the topics covered in the baseline have been short-term or sustained. This is an additional uncertainty within the assessment, and where relevant, some qualitative commentary may be provided.

4. Approach to the Assessment

4.1 Introduction

4.1.1 This section describes the approach to the assessment of the draft 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 will be used to assess the options contained in the draft 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 draft 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 draft 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.

Geographic Scope

4.2.4 The geographic extent of the SEA reflects the operational area covered by the draft 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 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 draft 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 guidance[42].

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 draft 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 draft 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 draft 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 DCWW's WRMP24 area.

4.3.2 The SEA objectives and guide questions used in the assessment of the draft WRMP24 reflect the topics contained in Schedule 2 (6) of the SEA regulations and have been informed by:

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

- the previous SEA assessment frameworks used to complete the SEA of DCWW, SSW, STW and UUW'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 UUW's);
- 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 DCWW. It has been revised to reflect the scoping consultations responses and has been used to completion of the assessment of DCWW's draft 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.	• 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.	• 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? • 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).	• 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?

Topic	Assessment Objective	Guide Questions
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.	• 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.	• 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.	• 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.	• 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.	• 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.	• 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? • Will the option affect carbon sequestration?
	10. To adapt and improve resilience to the threats of climate change.	• 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.	• 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?

Topic	Assessment Objective	Guide Questions
		• 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.	• 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.	• 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.	• 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.	• 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)?
Cultural Heritage	16. To conserve and enhance the historic environment including the significance of heritage assets and their settings and archaeological important sites.	• 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.	• 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?

Topic	Assessment Objective	Guide Questions
		• 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 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 resource management and demand management options) 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 WRMPs).
- **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**: the cumulative effects of the preferred programme of options will be completed, to ensure that the effects of the draft Plan have been identified, described and evaluated.
- **Reasonable alternative plan assessments**: the cumulative effects of any reasonable alternative plans will be identified, described and evaluated for consideration along with the preferred plan.

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

Revised Feasible Options

4.4.3 Both the construction and operational effects of each revised feasible option 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 will include 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 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 will take into account, where appropriate, the previous assessment findings and any regulators and stakeholder feedback already received.

4.4.6 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**.

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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....
Objective 3: Minor/Moderate/Major positive uncertain effect - due to....
Objective 4: Minor/Moderate/Major negative uncertain effect - due to....
Objective 4: Minor/Moderate/Major positive uncertain effect - due to....
Objective 5: Minor/Moderate/Major negative uncertain effect - due to....
Objective 5: Minor/Moderate/Major positive uncertain effect - due to....
Objective 6: Minor/Moderate/Major negative uncertain effect - due to....
Objective 6: Minor/Moderate/Major positive uncertain effect - due to....
Objective 7: Minor/Moderate/Major negative uncertain effect - due to....
Objective 7: Minor/Moderate/Major positive uncertain effect - due to....
Objective 8: Minor/Moderate/Major negative uncertain effect - due to....
Objective 8: Minor/Moderate/Major positive uncertain effect - due to....
Objective 9: Minor/Moderate/Major negative uncertain effect - due to....
Objective 9: Minor/Moderate/Major positive uncertain effect - due to....
Objective 10: Minor/Moderate/Major negative uncertain effect - due to....
Objective 10: Minor/Moderate/Major positive uncertain effect - due to....
Objective 11: Minor/Moderate/Major negative uncertain effect - due to....
Objective 11: Minor/Moderate/Major positive uncertain effect - due to....
Objective 12: Minor/Moderate/Major negative uncertain effect - due to....
Objective 12: Minor/Moderate/Major positive uncertain effect - due to....
Objective 13: Minor/Moderate/Major negative uncertain effect - due to....
Objective 13: Minor/Moderate/Major positive uncertain effect - due to....
Objective 14: Minor/Moderate/Major negative uncertain effect - due to....
Objective 14: Minor/Moderate/Major positive uncertain effect - due to....
Objective 15: Minor/Moderate/Major negative uncertain effect - due to....
Objective 15: Minor/Moderate/Major positive uncertain effect - due to....
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....

Operation

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....
Objective 3: Minor/Moderate/Major positive uncertain effect - due to....
Objective 4: Minor/Moderate/Major negative uncertain effect - due to....
Objective 4: Minor/Moderate/Major positive uncertain effect - due to....
Objective 5: Minor/Moderate/Major negative uncertain effect - due to....
Objective 5: Minor/Moderate/Major positive uncertain effect - due to....
Objective 6: Minor/Moderate/Major negative uncertain effect - due to....
Objective 6: Minor/Moderate/Major positive uncertain effect - due to....
Objective 7: Minor/Moderate/Major negative uncertain effect - due to....
Objective 7: Minor/Moderate/Major positive uncertain effect - due to....
Objective 8: Minor/Moderate/Major negative uncertain effect - due to....
Objective 8: Minor/Moderate/Major positive uncertain effect - due to....
Objective 9: Minor/Moderate/Major negative uncertain effect - due to....
Objective 9: Minor/Moderate/Major positive uncertain effect - due to....
Objective 10: Minor/Moderate/Major negative uncertain effect - due to....
Objective 10: Minor/Moderate/Major positive uncertain effect - due to....
Objective 11: Minor/Moderate/Major negative uncertain effect - due to....
Objective 11: Minor/Moderate/Major positive uncertain effect - due to....
Objective 12: Minor/Moderate/Major negative uncertain effect - due to....
Objective 12: Minor/Moderate/Major positive uncertain effect - due to....
Objective 13: Minor/Moderate/Major negative uncertain effect - due to....
Objective 13: Minor/Moderate/Major positive uncertain effect - due to....
Objective 14: Minor/Moderate/Major negative uncertain effect - due to....
Objective 14: Minor/Moderate/Major positive uncertain effect - due to....
Objective 15: Minor/Moderate/Major negative uncertain effect - due to....
Objective 15: Minor/Moderate/Major positive uncertain effect - due to....
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	-

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

4.4.7 The individual preferred options that comprise the preferred plan for DCWW's draft 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 will take account 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).

Preferred Programme Assessment

4.4.8 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 draft WRMP24 have been identified, described and evaluated.

Reasonable Alternative Plan Assessment

4.4.9 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 guidance[43] 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*

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

adverse effects of the proposed plan or programme". Echoing this, Government guidance[44] 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.

4.4.10 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).

4.4.11 Reasonable alternatives that operate at the plan level have also been considered. However, as further work is required and has been identified for AMP8, DCWW has not identified any reasonable alternatives to the preferred plan that are in a form that could be assessed.

Assessment of Secondary, Cumulative and Synergistic Effects

4.4.12 The SEA Regulations require that the cumulative effects of the draft 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 draft WRMP24 in-combination with other plans and programmes. This includes:

- effects of the draft WRMP24 with other (same) water company plans – an assessment of the effects of the draft WRMP24 with DCWW's Drought Plan and Drainage and Wastewater Management Plan (DWMPs);
- effects of the draft WRMP24 with adjacent water company plans and projects (SROs);
- effects of the draft WRMP24 as part of the WRW draft Regional Plan;
- effects of the dWRMP24 with other plans e.g., Local Plans, National Policy Statements (NPSs);
- effects of the dWRMP24 with other Nationally Significant Infrastructure Projects (NSIPs).

4.4.13 When considering the above, the assessment has been qualitative.

4.4.14 There are areas where the draft WRMP24 preparation has considered some of the other plans and programmes. For example, DCWW's Drought Plan measures have been included in the draft WRMP24 and the Local Plan growth and population projections have already been included within the demand projections.

4.4.15 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.

4.4.16 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 DCWW WRMP24 area. At this stage only the NPS for Nuclear Power (EN-6) is considered relevant

[44] 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]

(and those sites that would have a bearing being Wylfa). 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 https://infrastructure.planninginspectorate.gov.uk/ (focusing on those NSIPs where DCO consent has been granted by the SoS).

4.4.17 When considering the effects of SROs, we have drawn on relevant assessment information provided for the RAPID gated submission process.

Definitions and Thresholds of Significance

4.4.18 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.

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

4.4.20 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 UUW'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;
- 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's WRMP19 options for different option types (e.g., supply-side options such as reservoirs, transfers, boreholes, enhanced treatment);
- scoping consultation feedback;
- practical revisions made when applying the thresholds to the revised feasible option assessment.

4.4.21 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 DCWW'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 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.	Will it protect, 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 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, and enhance where appropriate, coastal and marine habitats and species? Will it maintain and enhance the green infrastructure network and the biodiversity it supports?	+++	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. 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

Proposed SEA Objectives	Proposed Guide Questions	Score		Description
				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

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

4.5.1 Following completion of the assessment of likely significant effects, and if effects have been identified on Wales, a high-level analysis of the impact that the draft WRMP24 will have on the achievement of the seven well-being goals for Wales and the objective for SMNR, will be undertaken.

4.6 Difficulties Encountered in Undertaking the Assessment

4.6.1 The SEA Regulation 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 draft WRMP 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 DCWW'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 draft WRMP 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 DCWW's 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 WRMP. 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.
- Whilst leakage scenarios have been identified within the draft WRMP24, detailed option information of an equivalence to that for either the metering options or the supply options has not been available for assessment. The assessment will be undertaken as part of the revisions of the draft WRMP24 post consultation.
- Whilst the assessment of the cumulative effects of the implementation of the draft 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.

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 SEWCUS Resource Zone (**Section 5.2**), the Tywi Gower Resource Zone (**Section 5.3**), and the Mid-South Ceredigion 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.

5.2 SEWCUS Resource Zone

5.2.1 A total of 18 feasible supply options and one feasible metering option were assessed for the SEWCUS 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**.

Table 5.1 Feasible Supply and Metering Options: SEWCUS Resource Zone

Option ID	Option Name	Yield (Ml/d)	Description
SEW005a	Great Spring to Court Farm	30	Up to 30Ml/d of additional water will be abstracted from the Great Spring and the existing Network Rail pumps will pump it to a new pumping station at DCWW's Sudbrook WTW. This will deliver 30Ml/d of raw water to a new collection chamber at Court Farm, via 22km of new 700mm dia raw water main, running south of the M4.
SEW005c	Great Spring to Llandegfedd	30	Up to 30Ml/d of additional water will be abstracted from the Great Spring and the existing Network Rail pumps will pump it to a new pumping station at DCWW's Sudbrook WTW. This will deliver up to 30Ml/d of raw water to Court Farm reservoir, via 22km of new 700mm dia raw water main, running

Option ID	Option Name	Yield (Ml/d)	Description
			south of the M4. From Court Farm reservoir, 30Ml/d will be transferred up to Llandegfedd reservoir, along a new 700 dia raw water main. It will be treated at Sluvad with the option to send raw water to Court Farm. Any additional water at Court farm will reduce the requirement for other sources to supply Court Farm.
SEW007	Talybont Raising	630Ml reservoir capacity increase	This scheme would raise Talybont Reservoir by 0.5m to increase storage capacity. The depth-volume curve indicates that capacity would be increased by about 630 Ml. Capacity gained from raising would be abstracted for treatment at Talybont WTW. The scheme assumes that any upgrades necessary at the WTW, or in the network, are dealt with elsewhere.
SEW009	Utilisation of Grwyne as Usk compensating reservoir	10	Grwyne Reservoir previously supplied water to the Abertillery area. The reservoir has been mothballed since 2004. This option would release 10 Ml/d of water into the Usk on a put & take arrangement for subsequent abstraction at Prioress Mill. Raw water would be transferred, around sensitive fishing grounds, to the confluence with the Grwyne Fechan using part of the existing 16" outlet main and a 4.6 km extension. The existing 16" main is currently used as a distribution main and would be replaced with a smaller new supply pipe.
SEW022	Ponthir and Wentwood	37	30 MLD final effluent from Ponthir WwTW to be treated to drinking water quality in a new reverse osmosis plant at Court Farm. This will be built on DCWW owned land in the field to the west of the WTW. The treatment process will include DAF and sand filtration as pre-treatment for reverse osmosis to produce 30 Ml/d of treated water. It will be combined with 7Ml/d water from the newly reinstated Wentwood Reservoir.
SEW022a	Ponthir WwTW	30	Up to 30 MLD final effluent from Ponthir WwTW to be treated to drinking water quality in a new reverse osmosis plant at Court Farm. This will be built on DCWW owned land in the field to the west of the WTW. The treatment process will include DAF and sand filtration as pre-treatment for reverse osmosis to produce 24 Ml/d of treated water.
SEW036a	Utilisation of Pany-yr-Eos	13.7	An additional 13.7Ml/d is supplied to Court Farm WTW from Pant-yr-Eos reservoir, gravitating through a new pipe connected to the existing LG Main which transfers to Court Farm. The main will become dual purpose, retaining its function as an emergency washwater discharge. This option does not include for any increased treatment costs at Court Farm (assumed to have capacity).
SEW036b	Utilisation of the Ynys y Fro	9	9 Ml/d is supplied to Court Farm WTW from Ynys-y-Fro through a pumped main from Ynys-y-Fro connecting to the existing LG Main which transfers to Court Farm. The main will become dual purpose, retaining its function as an emergency washwater discharge. This option does not include for any increased treatment costs at Court Farm (assumed to have capacity).
SEW036c	Ynys-y-Fro and Pant-yr-Eos to Court Farm via LG main (bi-directional raw water main)	22.7	Up to 22.7 Ml/d is supplied to Court Farm WTW from Ynys-y-Fro and Pant-yr-Eos reservoirs. 13.7 Ml/d gravitating from Pant-yr-Eos and 9Ml/d pumped from Ynys-y-Fro, by connecting to the existing LG Main which transfers to Court Farm. The LG main will become dual purpose, retaining its function as an emergency washwater discharge. This option does not include for any increased treatment costs at Court Farm (assumed to have capacity).

Option ID	Option Name	Yield (Ml/d)	Description
SEW044	Schwyll Boreholes	25	Recommission the Schwyll groundwater spring system and transfer flow north to connect up to the new Tywi CUS to SEWCUS transfer main within the operational land of Cefn Hirgoed SRv. The option includes full treatment costs to allow transfer at all times. The option entails taking 25 Ml/d intermittently from Schwyll. Existing source pumps (total capacity 30 Ml/d) will require replacement.
SEW052	Afon Lwyd	10	Revocation of six upstream licences which provides water at low flow. Proposed abstraction of up to 10Ml/d from the Afon Lwyd by means of a new intake structure, and pumping the raw water to Court Farm through 400m of 450mm HDPE pipe connecting to the LG Main
SEW053	New Abstraction from the Afon Lwyd to Llandegfedd through Court Farm	10	Abstraction of 10Ml/d from the Afon Lwyd by means of a new intake structure, and pumping the raw water to Court Farm reservoir through 400m of 450mm HDPE pipe connecting to the LG Main. The flows are then taken to Llandegfedd through a new PS at Court Farm and pumped through the existing 42" CO main
SEW063	Nantybwch Wastewater	2.5	Currently Nantybwch produces approximately 2 - 2.5 MLD per day in washwater that is sent to sewer. Recovering this washwater would reduce the amount of raw water the needs to be extracted for treatment. Proposed works is a washwater recovery plant and sludge thickening and return pumps back to the head of the works.
SEW064	Wentwood to Court Farm	7	Wentwood reservoir will be brought back into service to provide a DO of up to 7Ml/d. A new pumping station will be built at Wentwood to pump the raw water 10.9km to Llantrisant pumping station where it will be delivered to Court Farm via the existing raw water main. An additional stage of coagulation dosing and DAF will be required before the raw water enters the reservoir, to deal with any potential algae in the Wentwood raw water. The works will be sized for 7 MLD as this is the limit of the abstraction licence. A average yield of 4.3 Ml/d is expected from the source. An additional coagulation and DAF stage will be required, before the water reaches the raw water reservoir in order to deal with the anticipated algae in the Wentwood water. Catchment management measures will be implemented in the Wentwood catchment in order to reduce the risk of algal blooms.
SEW067	Effluent recirculation for washwater use (reduce potable demand) at Cardiff East and Cog Moors		Currently washwater at both sites is sourced from the potable network. The washwater is used for washing down screens, diluting polymer for sludge processing, clean sludge thickeners. Proposal is to source washwater from final effluent using new washwater booster sets to connect to existing washwater manifold. A total average saving of 0.8 Ml/d (800 m3/d) is expected.
SEW166	Memorial PS	47	This option would involve providing 47 Ml/d peak flows to the Pontsticill Low Level network in order to release the flows from the Pontsticill WTW to enable other WRMP options and the trading option. In order to be able to supply the combined 47 Ml/d, Cilfynydd WPS (21Ml/d) will be reinstated to support the Memorial WPS (26 Ml/d). The Pumps at Memorial WPS will be replaced with Low suction, high lift pumps to be able to pump to Ty Gwyn SRv. Cefn Mably WPS will be reinstated to provide additional pressure to the supply side of Memorial WPS and Tongwynlais SRv. Installation of a pressure and flow control valve arrangement at the inlet to Tongwynlais SRv to ensure that the service reservoir does not overtop.

Option ID	Option Name	Yield (Ml/d)	Description
SEW167	Trading Option - New Transfer from the Wye to Severn Trent	105	This option would involve abstracting 105Ml/d water from the River Wye at the existing Monmouth Intake then pumped using the existing pumpstation (upgraded to provide the necessary head) through a new pressure main and gravity main which discharge into the River Severn at a location close to Deerhurst. Provisional route initially follows the A40 and A417 and crosses the River Wye in 2 locations
SEW168	Llwynon Gravity Main Upgrades	7	Scheme to enable DCWW to stop supplying 7 Ml/d minimum sweetening flow year round into the Llwynon gravity main in order to avoid WQ issues. The scheme comprises installation of new pressure reducing valves (PRVs), meters, burst protection valves and flow control valves.
WEF-MET-8121	WEF-MET-8121	41.53	This option would involve the installation of meters in 1,338,715 households and 80,769 meters in non-households across the SEWCUS zone between 2025-2050.

Table 5.2 Feasible Supply and Metering Options Assessment Summary: SEWCUS 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
SEW005a	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
SEW005c	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
SEW007	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
SEW009	Construction (negative)	--/?	---	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
	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
SEW022	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
	Operation (positive)	0	++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
SEW022a	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	0
SEW036a	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	-

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 (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
SEW036b	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	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
SEW036c	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
SEW044	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
	Operation (positive)	0	++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
SEW052	Construction (negative)	-	-	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
	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
SEW053	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	-
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
SEW063	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
SEW064	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

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 (positive)	0	++	0	0	0	0	0	0	0	++	++	+/?	++	++	0	0	0
SEW067	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	0
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	0	0	0	+	0	0	0
SEW166	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
SEW167	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
SEW168	Construction (negative)	-	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
	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	0
WEF-MET-8121	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

Construction Effects

5.2.2 All of the feasible supply and demand options in the SEWCUS Resource Zone were assessed as having a positive effect on the economy (SEA Objective 11) during construction associated with the capital spend that they would involve during the construction period which would have the potential to generate employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers. A total of six of the feasible supply options (SEW005a, SEW005c, SEW022, SEW022a, SEW044 and SEW167) in addition to the feasible metering option (WEF-MET-8121) were assessed as having a significant positive effect in this regard, as they would involve significant investment (capital spend of ≥£25 million). Two of the remaining feasible supply options (SEW009 and SEW064) were assessed as having a moderate positive effect on this objective (capital spend of between £5 million and <£25 million), whilst the remaining 10 options (SEW007, SEW036a, SEW036b, SEW036c, SEW052, SEW053, SEW063, SEW067, SEW166 and SEW168) were assessed as having a minor positive effect (capital spend of between £1 million and <£5 million). However, HGV movements and construction works associated with 16 of the feasible supply options are considered to have the potential to cause traffic disruption, generating a minor or moderate negative effect (14 options and two options respectively) on SEA Objective 11 and leading to an overall mixed score against the objective.

5.2.3 No other significant positive effects were identified in the assessment of the feasible supply and demand options for the SEWCUS Resource Zone. A total of 12 options were assessed as having a minor or moderate positive (10 options and two options respectively) 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 seven 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 A total of 17 of the feasible supply options 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, one option (SEW167) was assessed as having a significant negative effect. This reflects the fact that the option would involve pipeline works which would cross 3 SAC's (The Wye Valley Woodlands/Coetiroedd Dyffryn Gwy (Wales), the River Wye/Afon Gwy (Wales) and the River Wye/Afon Gwy (England)), 5 SSSI's (Fiddler's Elbow, River Wye (Lower Wye)/Afon Gwy (Gwy Isaf), Aston Ingham Meadows, River Wye and Ashleworth Ham) and would involve works within close proximity (within 1km) or adjacent to a number of other sites including SACs, SSSIs an LNR and Ancient Woodland. Given that the option involves significant works crossing a number of sites and in close proximity to others, there is potential for loss/damage to habitats and disturbance (e.g. noise, vibration, dust), a significant negative effect was identified. Of the remaining options, 10 were assessed as having a minor negative effect, five were assessed as having a moderate negative effect and one was assessed as having a moderate negative uncertain effect on SEA Objective 1.

5.2.5 A total of 14 of the feasible supply options in the SEWCUS Resource Zone were assessed as having a negative effect on sustainable natural resources (SEA Objective 2) associated with all, or part of the option being constructed on greenfield land, resulting in either temporary (e.g. excavation of pipeline routes, where soil/land would be reinstated following completion) or permanent (e.g. where permanent above ground infrastructure would be constructed) loss of habitats (biodiversity net loss), as concluded by the BNG assessment. One option (SEW009) was assessed as having a significant negative effect in this regard, as the BNG assessment concluded a that there would be significant temporary and more minor permanent loss of habitats associated with the construction of the pipeline. Of the remaining options, 10 were assessed as having a moderate negative effect and three were assessed as having a minor negative effect on SEA Objective 2.

5.2.6 Construction works associated with 16 of the feasible supply options would take place within/partially within Flood Zones 2/3 and works may therefore be vulnerable to flooding (depending on the timing of works) and were therefore assessed as having a negative effect on flood risk (SEA Objective 7). Of this total, two options (SEW007 and SEW053) were considered to be particularly vulnerable to flood risk given the proportion of the option works that would take place in Flood Zone 3 (≥40% of the option site). In these cases, a significant negative effect on SEA Objective 7 was identified. Of the remaining options, 11 were assessed as having a minor negative effect, two were assessed as having a moderate negative effect, and one was assessed as having a moderate negative uncertain effect on SEA Objective 7.

5.2.7 Construction activity would generate emissions to air associated with the use of plant and machinery as well as vehicle movements. The majority (18 out of 19) of the feasible supply and demand were therefore assessed as having negative effects on air quality (SEA Objective 8). Option WEF-MET-8121 was assessed as having a significant negative uncertain effect in this regard, as given the scale of capital spend and number of properties where meter installs would take place, there is the potential for significant traffic congestion on the road network across the SEWCUS zone which may have a negative effect on local air quality. Construction activity may take place within an AQMA, however, as the exact location of meter installs is uncertain, there remains some uncertainty. Of the remaining options, eight were assessed as having a minor negative effect, five were assessed as having a minor negative uncertain effect, three were assessed as having a moderate negative effect and one was assessed as having a moderate negative uncertain effect on SEA Objective 8.

5.2.8 All of the feasible supply and demand options in the SEWCUS Resource Zone 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 six options (SEW005a, SEW005c, SEW022, SEW044, SEW167 and WEF-MET-8121) were assessed as having a significant negative effect on Objective 9, due to the significant scale of embodied carbon (≥7,500tCO2e) associated with construction materials and the scale of the schemes, whilst six options were assessed as having a moderate negative effect and seven were assessed as having a minor negative effect.

5.2.9 All of the feasible supply and demand options in the SEWCUS Resource Zone 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 six of the options (SEW005a, SEW005c, SEW022, SEW044, SEW063 and SEW167) were assessed as having a significant negative effect on SEA Objective 15, as they are anticipated to require significant quantities of construction materials given the scale of works and capital spend. Of the remaining options, five were assessed as having a moderate negative effect, whilst the remaining eight were assessed as having a minor negative effect on SEA Objective 15. Whilst a negative effect was identified against all options for this objective, a minor positive uncertain effect was also identified against all supply 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).

5.2.10 No further significant negative effects were identified during the construction phase, although minor and or moderate effects were identified as follows.

5.2.11 A total of 15 of the feasible supply options were assessed as having a minor 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).

5.2.12 A total of 13 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 eight options were assessed as having a minor negative effect, one option was assessed as having a minor negative uncertain effect and four options were assessed as having a moderate negative effect against Objective 12.

5.2.13 The majority of feasible supply options in the SEWCUS Resource Zone options (16 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 two options were assessed as having a moderate negative effect, whilst 14 were assessed as having a minor negative effect in this regard.

5.2.14 A total of 14 of the feasible supply options were assessed as having a negative effect on cultural heritage (SEA Objective 16) during construction due to the potential for construction works to effect the setting of designated heritage features, such as listed buildings and Scheduled Ancient Monuments. In total 11 options were assessed as having a minor negative effect in this regard, whilst three options were assessed as having a moderate negative effect.

5.2.15 A total of 12 of the feasible supply options were assessed as having a negative effect on landscape (SEA Objective 17) associated with the potential for the construction of water resources infrastructure including pipeline works has the potential to temporarily affect landscape character and/or visual amenity (in some cases, including minor effects on

designated landscapes). In total 10 options were assessed as having a minor negative effect and two options were assessed as having a moderate negative effect in this regard.

5.2.16 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), whilst all options except for one (SEW009) were assessed as having a neutral effect on water quality (SEA Objective 6). All options were also assessed as having a neutral effect on 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

5.2.17 Option SEW009 was assessed as having a significant positive effect positive effect on sustainable natural resources (SEA Objective 2) during operation, due to the assumption that that there would be operational biodiversity net gain which would be greater than the net loss in construction (described above). Of the remaining options, a total of 13 were assessed as having either a minor positive effect (three options) or moderate positive effect (10 options) on SEA Objective 2, consistent with this assumption.

5.2.18 A significant positive effect was assessed against water quantity (SEA Objective 5) for option WEF-MET-8121 during the operational phase as the operation of the option would result in major reductions in the demand for water (41.53Ml/d), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering, resulting in a significant positive effect on water quantity. One other option (SEW005c) was assessed as having a minor positive uncertain effect against SEA Objective 5.

5.2.19 A significant positive effect was assessed against greenhouse gas emissions (SEA Objective 9) for option WEF-MET-8121. This is because, whilst the operation of the option would involve carbon emissions associated with meter reading activities; the option would reduce greenhouse gas emissions associated with reduced electricity production for the production/treatment of water and water use in the home (e.g. heating, etc.) and overall, the operation of the option is anticipated to reduce carbon emissions by more than 1000tCO2e/year (reduction of 1413.2tCO2e/year compared to business as usual) across the plan period.

5.2.20 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 eight feasible options (SEW005a, SEW005b, SEW022, SEW022a, SEW044, SEW166, SEW167 and WEF-MET-8121) 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. Of the remaining options, two were assessed as

having a minor positive effect and nine were assessed as having a moderate positive effect on SEA Objective 10.

5.2.21 A total of 18 of the feasible supply and demand 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 DCWW customers, supporting economic/population growth and generating a positive effect on human health. A total of eight options (SEW005a, SEW005b, SEW022, SEW022a, SEW044, SEW166, SEW167 and WEF-MET-8121) were assessed as having a significant positive effect against Objectives 11 and 13, as the yield benefit associated with these options would be ≥25Ml/d, which, consistent with the definitions of significance, is above the threshold for significant effect against these objectives. A further eight options were assessed as having a moderate positive effect against both objectives (yield of between 5Ml/d and <25Ml/d), whilst two options were assessed as having a minor positive effect against both objectives (yield of between 1Ml/d and <5Ml/d).

5.2.22 All feasible supply and demand options in the SEWCUS Resource Zone 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 DCWW supply area.

5.2.23 A total of eight options (SEW005a, SEW005b, SEW022, SEW022a, SEW044, SEW166, SEW167 and WEF-MET-8121) were assessed as having a significant positive effect on SEA Objective 14. For the majority of these options, this is because of the significant yield that they would provide, however, for option WEF-MET-8121, the operation of the option would result in a major reduction in demand from the supply network (41.53Ml/d), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering, therefore significantly increasing water efficiency and resilience. As such, in line with the thresholds (water efficiency option with a design capacity of >10Ml/d), this options were assessed as having a significant positive effect. Of the remaining options, three were assessed as having a minor positive effect and eight were assessed as having a moderate positive effect on SEA Objective 14.

5.2.24 No further significant positive operational effects were identified during the assessment of the operational phase of the feasible SEWCUS Resource Zone options. However, for option SEW007 a minor positive uncertain effect was assessed against SEA Objective 1 (biodiversity), whilst a moderate positive effect was assessed against SEA Objective 7 (flood risk). This is because the option would see an increase in the capacity of the Talybont Reservoir, which would have a positive effect on flood risk by providing additional capacity in the catchment and additionally, as the reservoir is part of a designated LNR an increase in the size of the reservoir may have positive effects on biodiversity, however, there is uncertainty.

5.2.25 A total of seven of the feasible supply options in SEWCUS Resource Zone, were assessed as having a negative effect on INNS (SEA Objective 3), due to the potential for the operation of the options to increase the risk of INNS transfer/spread. Two of these options (SEW053 and SEW167) were assessed as having a significant negative effect, because these options would involve the abstraction and transfer raw water between waterbodies in different WFD surface water catchments, without treatment prior to discharge. Option

SEW053, would involve the transfer of raw water from the Afon Lwyd into Court Farm Reservoir (in the same WFD surface water catchment) and then from Court Farm Reservoir water would be transferred to Llandegfedd Reservoir (in a different WFD surface water catchment) whilst option SEW167, would involve a significant transfer of raw water from the River Wye to the River Severn, without treatment. Of the remaining options, three were assessed as having a minor negative effect and two were assessed as having a moderate negative effect on SEA Objective 3.

5.2.26 A total of 13 of the feasible supply options in the SEWCUS Resource Zone 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 eight of these options (SEW005a, SEW005c, SEW022, SEW022a, SEW044, SEW063, SEW166 and SEW167) 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. Of the remaining options, one was assessed as having a moderate negative effect, whilst the remaining four were assessed as having a minor negative effect on this SEA Objective 9.

5.2.27 Eleven of the feasible supply options in the SEWCUS Resource Zone 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 total, four were assessed as having a significant negative effect as they are anticipated to require significant ongoing operational energy, chemical use and/or vehicle movements. Of the remaining options, three were assessed as having a moderate negative effect and four were assessed as having a minor negative effect on SEA Objective 15 during operation.

5.2.28 No further significant negative effects associated with the operation of the feasible options were identified during the assessment, however, a range of minor and moderate negative effects were identified.

5.2.29 A total of 16 of the feasible supply options were assessed as having a negative or potentially negative effect on biodiversity (SEA Objective 1) during operation, due to, for example, the effects of additional abstraction on water dependent habitats and species (sometimes including national or international sites). Of this number, a total of two were assessed as having a minor negative effect, six were assessed as having a minor negative uncertain effect and eight were assessed as having a moderate negative uncertain effect.

5.2.30 One option (SEW007, was assessed as having a minor negative effect on soils, geodiversity and land use (SEA Objective 4) associated with operational land loss resulting from inundation due to an increased reservoir volume.

5.2.31 A total of 11 feasible options were assessed as having a negative effect on water quantity SEA Objective 5) during operation, whilst 12 options were assessed as having a negative effect on water quality (SEA Objective 6), due to the potential for effects on flows/volume and water quality in WFD waterbodies such as streams, rivers, lakes and reservoirs, as assessed by the WFD assessment. A total of seven options were assessed as having a moderate negative effect against both objectives, one option was assessed as having a moderate negative uncertain effect against both objectives, and two options were assessed as having a minor negative effect against both objectives. Option SEW005c was

assessed as having a moderate negative effect on SEA Objective 6 only (with a minor positive effect on SEA Objective 5 as noted above), whilst option SEW036b was assessed as having a moderate negative effect against SEA Objective 5 and minor negative effect on SEA Objective 6.

5.2.32 A total of eight options were assessed as having a negative effect on flood risk (SEA Objective 7) during operation (six options were assessed as having a minor negative effect and two 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. Reflecting this, a total of six of the same options were assessed as having a negative effect on climate resilience (SEA Objective 10) (one moderate negative effect and five minor negative effect).

5.2.33 A total of two options were assessed as having a minor negative effect, whilst an additional two were assessed as having a minor negative uncertain effect on tourism and recreation (SEA Objective 12) during operation as abstraction associated with the options has the potential to impact upon water dependent recreational activities such as angling.

5.2.34 One option (SEW005c) was assessed as having a minor negative effect on cultural heritage (SEA Objective 16) due to potential impacts on the settings of proximate heritage assets associated with new above ground infrastructure.

5.2.35 Similarly, a total of five 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.

5.2.36 None of the feasible supply or demand options in the SEWCUS Resource Zone were assessed as having any effect on air quality during operation

5.3 Tywi Gower Resource Zone

5.3.1 A total of eight feasible supply options and one metering option were assessed for the Tywi Gower Resource Zone; 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 Supply and Metering Options: Tywi Gower Resource Zone

Option ID	Option Name	Yield	Description
TWG03	Bryn Gwyn Supernatant Recovery	2.3Ml/d	Bryn Gwyn WTW produces approximately 2-2.5Ml/d of supernatant. This supernatant is collected with site drainage (including chemical delivery run-off) before being discharged into the river. Separating and recovering this supernatant from surface run-off would reduce the amount of raw water needing to be abstracted for treatment.
TWG09	Upsize Llangyfelach WPS	4Ml/d	To reduce demand on the Bryn Gwyn system, the Llangyfelach water pumping station pumping water to Cockett service reservoir will be upsized

Option ID	Option Name	Yield	Description
			to supply an additional 4Ml/d on top of the existing 14.59Ml/d (at 75.4m lift and 165kW).
TWG11	Bryn Gwyn Distribution Options - Felindre WTW Supply to Llanon	4Ml/d	In order to reduce stress on the Bryn Gwyn WTW resource, 4Ml/d will be supplied to the Llannon SRv demand area from Felindre through the Hendy connection to the Llannon network. The flow in the network will reverse back to the demand area and Llannon SRv through the existing DN 250mm/10 inch DI distribution main. A new pumping station (Bryngwili) will be connected to the existing distribution to pump 4Ml/d.
TWG12	Crai Distribution Option - Upsize Christopher Road WPS	4.1Ml/d	In order to reduce demand on Crai resources, GCG SRv (2.4 Ml/d average demand) and Bros SRv(1.7Ml/d average demand) will be rezoned to the Felindre WTW by upsizing Christopher Road PS to reverse flows in the 17" main from Crai and putting two booster PS's to pump to GCG SRv and Bros SRv.
TWG13	Crai Distribution - Rezoning and Valve Isolation	0Ml/d	The option is aimed at providing a permanent solution to the water quality issues, experienced in the DMA. An investigation following a 2018 major water quality incident found that the poor water quality was primarily due to the deteriorated cement lining in the trunk mains. The deterioration is not localised but sporadic. This option resolves the water quality issues by removing the deteriorated lining and relining the whole trunk main.
TWG14	Ystradfellte - Reverse flow through Tonna control valve	2.5Ml/d	In order to reduce the stress on the resource from Cefn Drysgoed, flows through the Tonna Flow control valve will be reversed so that 2.5Ml/d from the Felindre system can meet some of the demand on the Cefn Drysgoed network. Elements: New Park Field Pumping Station (PS) to pump to the Cefn Drysgoed network (2.5Ml/d from the model).
TWG15	Llyn y Fan Fach Regulation	10.4Ml/d	The scheme will support the Usk main by supplying up to 10.4Ml/d from Llyn y Fan Fach reservoir directly to Bryn Gwyn water treatment works through a new gravity raw water pipeline. A new hydro turbine will provide power at the works.
TWG26	Bryn Gwyn Distribution Options - Carn Powell SRV to Llannon SRV	0.9Ml/d	To support the Bryn Gwyn network an additional 0.9Ml/d will be pumped from Carn Powell service reservoir to Llannon service reservoir via a new pumping station at Carn Powell (11Ml/d with 50m lift).
WEF-MET-8201	WEF-MET-8201	23.75	This option would involve the installation of meters in 749,595 households and 53,350 meters in non-households across the TWG zone between 2025-2050.

Table 5.4 Feasible Supply and Metering Options Assessment Summary: Tywi Gower 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
TWG03	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
TWG09	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
	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
TWG11	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	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
TWG12	Construction (negative)	--	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
	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	0
TWG13	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	0	0	0	0
	Operation (positive)	0	++	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWG14	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
	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
TWG15	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	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 (positive)	0	++	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
TWG26	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WEF-MET-8201	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

Construction Effects

5.3.2 One of the feasible supply options in the Tywi Gower Resource Zone was assessed as having a significant positive effect against the SEA Objective 11 (Economy) during the construction period. This reflects the scale of capital spend associated with the options in this resource zone; which in all cases, other than WEF-MET-8201, was below the threshold for significant effect (≥£25m. A total of three options (TWG12, TWG 13 and TWG15), were assessed as having a moderate positive effect on SEA Objective 11 (capital spend between £5m to <£25m), whilst four options (TWG09, TWG11, TWG14 and TWG26) were assessed has having a minor positive effect (capital spend of between £1m and <£5m).

5.3.3 No other significant positive effects were assessed against the SEA Objectives for the options in the Tywi Gower Resource Zone, during the construction period.

5.3.4 All of the feasible Tywi Gower Resource Zone, with the exception of WEF-MET-8201, were assessed as having a negative effect on biodiversity (SEA Objective 1). 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. Option TWG13 was assessed as having a significant negative effect in this regard, as the scheme would involve pipeline works which would cross the Nant Llech SSSI in addition to a number of areas of Ancient Woodland and there would be a number of other sites within 10km of the works. Option TWG15 was assessed as having a significant negative uncertain effect against SEA Objective 1 as the scheme would involve pipeline works which would cross the Black Mountain SSSI, in addition to a number of areas of Ancient Woodland and additionally, because the HRA assessment concludes that effects on the Afon Tywi SAC and Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC cannot be screened out due to their hydrological connection to the works via the Afon Sawdde upstream, and that further investigation would be required to understand the use of the Afon Sawdde by mobile qualifying species of the Afon Tywi SAC to understand potential sensitivities when the pipeline is constructed at the pipeline crossings and the potential for disturbance and habitat degradation. As such the HRA concludes that the HRA risk is uncertain. Of the remaining options, one option (TWG12) was assessed as having a moderate negative effect, whilst the remaining five options were assessed as having a minor negative effect on SEA Objective 1 during construction.

5.3.5 One option (TWG09) was assessed as having a significant negative effect on flood risk (SEA Objective 7) as the WTW site associated with this option is situated within area of high risk to flooding from surface water/small watercourses (Flood Zone 3). Of the remaining options, three (TWG03, TWG13 and TWG15) were assessed as having a moderate negative effect on SEA Objective 7), as they would involve works at sites partially (<40%) within Flood Zone 3, whilst two options (TWG11 and TWG12) were assessed as having a minor negative uncertain effect on this objective, as they appear to involve works on sites which lie within small areas of land between areas at risk of flooding, however, it is not clear whether any of the works would be situated within these areas at risk, given the limited space in between them.

5.3.6 Two options (TWG13 and TWG15) were assessed as having a significant negative effect on cultural heritage (SEA Objective 16) during construction, due to potential significant negative effects on heritage assets associated with construction. Option TWG13 would

involve pipeline works directly crossing Craig-y-Nos Registered Park and Garden and directly adjacent to three Scheduled Monuments (Crimea Colliery & Canal Quay, Remains of Lock and Dry Dock at Pantyffynnon and Tramroad at Ystradgynlais) as well as Listed Buildings, whilst option TWG15 would involve works within 0.1km of two Scheduled Monuments (Twyn yr Esgair Settlement at approximately 0.05km and Standing Stones and Round Cairns South of Tyle-Pengan at approximately 0.09km) and additionally, one Listed Building (Valve House on former filter beds on Afon Sawdde) would be situated approximately 0.01km from the works. Of the remaining options, one option (TWG14) was assessed as having a moderate negative effect, whilst three options (TWG03, TWG09 and TWG11) were assessed as having a minor negative effect)

5.3.7 One option, WEF-MET-8201, was assessed as having a significant negative uncertain effect against Air Quality (SEA Objective 8), during the construction phase. The construction of the option could result in traffic congestion during the construction period (on the road network across the TWG zone) which, may have a negative effect on local air quality. Meter installations may take place within an AQMA, although this is currently unknown, leading to an uncertain effect being identified. Of the remaining options, four (TWG09, TWG11, TWG14 and TWG26) were assessed as having a minor negative effect whilst three (TWG12, TWG13 and TWG15) were assessed as having a moderate negative effect on SEA Objective 8.

5.3.8 A significant negative effect was also assessed against option WEF-MET-8201, in regard to Greenhouse Gas Emissions (SEA Objective 9), during the construction phase. The construction of the option would include embodied carbon from material production of meters (749,595 household meters and 53,350 non-household meters total), in addition to vehicle movements for the distribution and installation of the meters and over the 25 year implementation stage, with the total carbon arising from the implementation phase being >7500tCO2e. Of the remaining options, four (TWG11, TWG12, TWG14 and TWG26) were assessed as having a minor negative effect and two (TWG13 and TWG15) were assessed as having a moderate negative effect on SEA Objective 9.

5.3.9 No other significant effects were identified during the assessment of the construction phase of the TWG options, however, a range of minor and moderate negative effects were identified.

Operational Effects

5.3.10 Option WEF-MET-8201 was assessed as having a significant positive effect on Water Quantity (SEA Objective 5) and Water Resource Use (SEA Objective 14) during the operational phase, as the option would result in major reductions in the demand for water (23.75Ml/d WAFU benefit), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering.

5.3.11 A significant positive was also assessed against Water Resource Use (SEA Objective 14) for option WEF-MET-8201 during the operational phase. The option would involve a major reduction in demand from the supply network (23.75Ml/d), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering, thus resulting in a major improvement in water efficiency and resilience, which in line with the thresholds of significance would result in a significant

positive effect (water efficiency options resulting in >10Ml/d). Six of the remaining feasible options in the Tywi Gower Resource Zone were assessed as having positive effects on this objective. Of this number, one option (TWG15) was assessed as having a moderate positive effect as the yield associated with the option (10.4Ml/d) would be within the threshold for a moderate positive effect (5Ml/d to <25Ml/d), whilst the remaining five options were all assessed as having a minor positive effect, as they would result in a yield within the threshold for minor effect (1Ml/d to <5Ml/d)

5.3.12 No other significant positive effects were assessed against the feasible options in the Tywi Gower Resource Zone during the operational period. However, seven of the feasible options were assessed as having a positive effect against climate resilience (SEA Objective 10), the economy (SEA Objective 11) and human health and wellbeing (SEA Objective 13) as the water they would provide would help to ensure a continual supply of clean drinking water, supporting economic/population growth, generating a positive effect on human health and increasing adaptability to the effects of climate change. Of this number, two options (TWG15 and WEF-MET-8201) were assessed as having a moderate positive effect against all three of the objectives as the yields associated with the options (10.4Ml/d and 23.75Ml/d respectively) would be within the threshold for a moderate positive effect (5Ml/d to <25Ml/d), whilst the remaining five options were all assessed as having a minor positive effect against all three objectives, as they would result in a yield within the threshold for minor effect (1Ml/d to <5Ml/d).

5.3.13 Two options (TWG13 and TWG15) were assessed as having a moderate positive effect on sustainable natural resources (SEA Objective 2) due to the assumption that that there would be operational biodiversity net gain which would be greater than the net loss in construction; however, without quantification, its magnitude was uncertain, and hence in consequence, an equivalent positive score to the negative score in construction was provided.

5.3.14 One option (WEF-MET-8201) was assessed as having a moderate positive effect on Greenhouse Gas Emissions (SEA Objective 9) during the operational phase. Although the operation of the option would involve carbon emissions associated with meter reading activities, the option would reduce greenhouse gas emissions associated with reduced electricity production for the production/treatment of water and water use in the home (e.g. heating, etc.) and overall, the operation of the option is anticipated to reduce carbon emissions by between 100 and <1000tCO2e/year across the plan period.

5.3.15 No other positive effects were identified during the assessment of the operational phase of the feasible Tywi Gower Resource Zone options.

5.3.16 Option TWG15 was assessed as having a significant negative uncertain effect against biodiversity (SEA Objective 1) during operation as the HRA highlights that additional abstractions from the Llyn y Fan Fach reservoir could affect the hydrologically connected Afon Tywi SAC and any functionally linked habitat within the Afon Sawdde and potentially the Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC which is hydrologically connected downstream, and therefore the same mobile qualifying features could be affected through their use of the upper Afon Tywi catchment, with the HRA concluding overall that the HRA risk is therefore uncertain.

5.3.17 Option TWG09 was assessed as having a significant negative effect on flood risk (SEA Objective 7) during operation as the WTW site is located in an area of high risk to flooding from surface water/small watercourses (Flood Zone 3) and hence could be at risk of flooding during operation. Of the remaining options, two options were assessed as having a moderate negative effect on SEA Objective 7 whilst one other was assessed as having a minor negative uncertain effect.

5.3.18 No other significant negative effects were identified during the assessment of the feasible Tywi Gower Resource Zone options during the operational phase, however a range of minor and moderate negative effects were identified.

5.3.19 One option (TWG12) was assessed as having a minor negative effect against INNS (SEA Objective 3) due to the potential for the operation of the options to increase the risk of INNS transfer/spread.

5.3.20 One option (TWG15) was assessed as having a minor negative uncertain effect against air quality (SEA Objective 8) due to uncertainty over the number of vehicle movements that would be required during operation and potential for effects on air quality.

5.3.21 Two options were assessed as having a moderate negative effect, two options were assessed as having a minor negative effect and one option was assessed as having a minor negative uncertain effect against 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.

5.3.22 Seven options were assessed as having a minor negative uncertain effect against waste and resource use (SEA Objective 15) as they would require ongoing energy and/or chemical use for the pumping and/or treatment of water.

One option (TWG14) was assessed as having a minor negative uncertain effect against cultural heritage (SEA Objective 14) due to the potential for new above ground infrastructure to have adverse impacts on the setting of heritage assets.

5.4 Mid-South Ceredigion Resource Zone

5.4.1 A total of six feasible supply options and one metering option were assessed for the Mid-South Ceredigion Resource Zone; 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 Supply and Metering Options: Mid-South Ceredigion Resource Zone

Option ID	Option Name	Yield (Ml/d)	Description
MSC01	Claerwen Transfer	7	The objective of the scheme is to reduce demand on the Teifi Pools reservoirs by about 70%. This will be achieved by means of abstraction of up to 7 Ml/d of raw water from Claerwen Reservoir, to be pumped to Strata Florida WTW through 12km of 450mm DI pipework. The existing process at Strata Florida is considered adequate for Claerwen raw water. No additional modifications necessary.

Option ID	Option Name	Yield (Ml/d)	Description
MSC02	New zonal connection to North Ceredigion	2.3	The objective of the scheme is to support a WRZ that is expected to be in deficit with water from a zone in surplus, through a new connection between Cefnllan SRv and Penuwch SRv.
MSC06a	Llyn Egnant Dam Raising - 0.5m	TBC - increase in reservoir capacity of 90Ml	This scheme would raise Llyn Egnant Dam by 0.5m to increase storage capacity. This option would provide approximately 90 Ml of additional storage, but would require significant adianta work to the dam
MSC06b	Llyn Egnant Dam Raising - 1m	TBC - increase in reservoir capacity of 180Ml	This scheme would raise Llyn Egnant Dam by 1m to increase storage capacity. The crest height is raised by 0.9m to maintain the previous freeboard level. This option would provide approximately 180 Ml of additional storage, but would require significant additional work to the dam.
MSC07	Llechryd WTW Distribution Options - Upgrades to automate Deri Goch WPS	0	As part of the Llechryd WTW Distribution Options - upgrades are required to automate Deri Goch WPS. This will maximise supply from Llechryd WTW, and hold back flow from Strata Florida WTW to preserve minimum storage in the Llyn Teifi and Llyn Egnant reservoirs.
MSC08	Upsize Llechryd WTW	2	Llechryd WTW currently has a maximum capacity of 19 Ml/d. The maximum abstraction rate is 800 m3/h. It is expected that the abstraction licence could be increased to 880 m3/h freeing up an extra 2 Ml/d.
WEF-MET-8202	WEF-MET-8202	1.79	This option would involve the installation of meters in 55,923 households and 12,290 meters in non-households across the MSC zone between 2025-2050.

Table 5.6 Feasible Supply and Metering Options Assessment Summary: Mid-South Ceredigion 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
MSC01	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
	Operation (positive)	0	+	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
MSC02	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	0
	Operation (positive)	0	++	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
MSC06a	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
MSC06b	Construction (negative)	---	--	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
	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
MSC07	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
MSC08	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	-
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WEF-MET-8202	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

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 (positive)	**0**	**0**	**0**	**0**	**+**	**0**	**0**	**0**	**+**	**+**	**+**	**0**	**+**	**+**	**0**	**0**	**0**

Construction Effects

5.4.2 None of the feasible supply or metering options in the Mid-South Ceredigion Resource Zone were assessed as having any significant positive effects during the construction period. This reflects the scale of capital spend associated with the options in this resource zone; which in all cases was below the threshold for significant effect (≥£25m) against the SEA Objective 11 (Economy). A total of three options (MSC01, MSC02 and WEF-MET-8202), were assessed as having a moderate positive effect on SEA Objective 11 (capital spend between £5m to <£25m), whilst another three options (MSC06a, MSC06b, and MSC08) were assessed has having a minor positive effect (capital spend of between £1m and <£5m), and MSC07 was assessed as having a neutral effect on this objective. One option (MSC02), was also assessed as having a moderate negative effect on SEA Objective 11, due to the potential for construction works to result in increased congestion and disruption/driver delay on the road network due to associated vehicle movements and intersection of pipeline works with the local road network.

5.4.3 A minor uncertain positive effect was assessed for the majority of the feasible options in the Mid-South Ceredigion Resource Zone, with the exception of MSC07 and WEF-MET-8202, against Waste and Resource Use (SEA Objective 15) during the construction phase. This is due to the potential for waste building materials such as steel and plastic, to be reused or recycled, however the significance of this effect is unknown, hence there remains uncertainty. For options MSC07 and WEF-MET-8202, the impact is expected to be negligible due to the small scale of the options and required construction/implementation works and materials. However, reflecting the potential for positive effects associated with the re-use or recycling of construction waste, all options with the exception of MSC07 were assessed as having a negative effect on SEA Objective 15, reflecting the requirement for construction materials and potential for waste generation (two options were assessed as having moderate negative effects and four options were assessed as having minor negative effects in this regard). Minor positive effects were also identified against four of the feasible options within the Mid-South Ceredigion Resource Zone (MSC02, MSC06a, MSC06b and MSC08), with respect to Soils, Geodiversity and Land Use (SEA Objective 4) during the construction phase. These options would be predominantly built within the footprint of existing DCWW infrastructure and not result in additional land take, therefore having a positive effect on this objective.

5.4.4 No other positive effects were identified during the assessment of the construction phase of the feasible Mid-South Ceredigion Resource Zone options.

5.4.5 A significant negative effect was assessed against Biodiversity (SEA Objective 1) for three feasible options (MSC01, MSC06a and MSC06b) during the construction phase. This reflects 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. The majority of the pipeline route associated with option MSC01 lies within the Elenydd – Mallaen SPA, and additionally crosses the Elenydd SAC and SSSI and one area of Ancient Woodland. A number of designated sites are also situated within 1km of the option. The construction of the option would likely result in loss to/damage to the habitats of the designated sites listed above and has therefore been assessed as having a significant negative effect. Llyn Egnant Reservoir, which would be raised as part of options

MSC06a and MSC06b is surrounded on all sides by the Elenydd – Mallaen SPA. The reservoir itself lies within the Afon Teifi SAC and is also adjacent to the Elenydd SAC. The raising of the reservoir level as proposed under both options, would result in the permanent loss of habitats of the Elenydd - Mallaen SPA and Elenydd SAC (which could include blanket bog, grassland and heathland) which would become inundated as a result of increased water levels in the reservoir and as such, both MSC06a and MSC06b have been assessed as having a significant negative effect on SEA Objective 1. The remaining options were assessed as having a range of minor and moderate effects on SEA Objective 1, with the exception of WEF-MET-8202, which was assessed as having a neutral effect.

5.4.6 A significant negative uncertain effect was assessed for option MSC02 against Air Quality (SEA Objective 8), during the construction phase, as whilst the option is not situated within an AQMA, construction would require the transportation of materials/equipment to site and given the significant scale of the option, could have a significant negative effect on air quality. However, as the exact scale and number of vehicle movements required is currently not clear, there is uncertainty. Three other feasible options in the Mid-South Ceredigion Zone were assessed as having minor, potentially minor or potentially moderate negative effects on SEA Objective 8 (MSC01, MSC08 and WEF-MET-8202)

5.4.7 No other significant negative effects were identified during the assessment of the construction phase of the Mid-South Ceredigion Resource Zone options. However, a range of minor and moderate effects were identified.

5.4.8 Four feasible supply options were assessed as having negative effects (one minor, three moderate) on sustainable natural resources (SEA Objective 2), associated with all, or part of the options being constructed on greenfield land, resulting in either temporary (e.g. excavation of pipeline routes, where soil/land would be reinstated following completion) or permanent (e.g. where permanent above ground infrastructure would be constructed) loss of habitats (biodiversity net loss), as concluded by the BNG assessment.

5.4.9 Two of the feasible supply options were assessed as having a moderate negative effect on flood risk as they would involve works within Flood Zones 2 and/or 3 which would potentially be at risk of flooding during construction. Reflecting this both options were also assessed as having a minor negative effect on climate resilience (SEA Objective 10) as it would be at risk to the effects of climate change (flooding).

All feasible options in the Mid-South Ceredigion Resource Zone with the exception of MSC07 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. In total two options were assessed as having a moderate negative effect and four were assessed as having a minor negative effect.

5.4.10 A total of four feasible supply options were assessed as having a minor 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/or sports/recreational facilities, with the potential to affect users of such spaces/facilities.

5.4.11 One option was assessed as having a minor negative effect and one option was assessed as having a moderate 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.

5.4.12 A total of two of the feasible supply options were assessed as having a negative effect (one minor, one moderate) on cultural heritage (SEA Objective 16) during construction due to the potential for construction works to affect the setting of designated heritage features/assets.

5.4.13 A total of five of the feasible supply options were assessed as having a minor negative effect on landscape (SEA Objective 17) associated with the potential for the construction of water resources infrastructure including pipeline works to temporarily affect landscape character and/or visual amenity.

5.4.14 All feasible 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), water quality (SEA Objective 6) and water resource use (SEA Objective 14) during the construction phase, as 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

5.4.15 A significant positive effect has been assessed for option MSC06b, against Flood Risk (SEA Objective 7) during the operational phase. Although the scheme does not lie within Flood Zones 2 or 3, it is a reservoir raising scheme that could help to further alleviate flooding through provision of extra storage capacity in the catchment. A moderate positive effect has also been assessed against SEA Objective 7 for option MSC06a.

5.4.16 A significant positive uncertain effect has also been assessed against option MSC06b, in respect of Climate Resilience (SEA Objective 10) during the operational phase. As noted above, the scheme is a reservoir raising scheme that could help alleviate flooding through provision of extra storage capacity in the catchment. The alleviation of flooding may increase resilience to the effects of climate change, including more frequent and severe rainfall events and increases in flash flooding. In this regard, option MSC06a was assessed as having a moderate positive uncertain effect. The schemes would also help to ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change. However, it is currently unclear what the daily yield volume associated with these options would be, hence there remains some uncertainty. Of the remaining options, three were assessed as having minor positive effect and one was assessed as having a moderate positive effect against SEA Objective 10, associated with the increased yield that they would provide.

5.4.17 No other significant positive effects were identified during the assessment of the operation phase of the Mid-South Ceredigion Resource Zone options. However, a range of minor, moderate and uncertain effects were identified.

5.4.18 A moderate positive effect was identified against two options and a minor positive effect was identified against two options with respect to sustainable natural resources (SEA Objective 2) due to the assumption that that there would be operational biodiversity net gain which would be greater than the net loss in construction; however, without quantification, its magnitude was uncertain, and hence in consequence, an equivalent positive score to the negative score in construction was provided.

5.4.19 A minor positive effect was identified with respect to water quantity (SEA Objective 5) for option WEF-MET-8121 during the operational phase as the operation of the option would result in a reduction in the demand for water, through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering.

5.4.20 Three options were assessed as having a minor positive effect, one option was assessed as having a minor positive uncertain effect, one option was assessed as having a moderate positive effect and one option was assessed as having a moderate positive uncertain effect against SEA Objectives 11 (Economy), 13 (Human Health and Wellbeing) and 14 (Water Resource Use) as the capacity they would provide would help to ensure a continual supply of clean drinking water and increase resilience of supply to DCWW customers, supporting economic/population growth.

5.4.21 No significant negative effects were identified during the assessment of the operation phase for the Mid-South Ceredigion options. However, a range of minor, moderate and uncertain negative effects were identified.

5.4.22 A total of four of the feasible supply options were assessed as having a potentially negative effect on biodiversity (SEA Objective 1) during operation, due to, for example, the effects of additional abstraction on water dependent habitats and species. Of this number, three were assessed as having a minor negative uncertain effect and one assessed as having a moderate negative uncertain effect.

5.4.23 One option was assessed as having a moderate negative effect on INNS (SEA Objective 3), due to the potential for the operation of the options to increase the risk of INNS transfer/spread.

5.4.24 Two options were assessed as having a minor negative effect on soils, geodiversity and land use (SEA Objective 4) associated with operational land loss resulting from inundation due to an increased reservoir volume.

5.4.25 A total of three feasible supply options were assessed as having a moderate negative effect, whilst one feasible supply was assessed as having a minor negative effect on water quantity SEA Objective 5) and water quality (SEA Objective 6) during operation, due to the potential for effects on flows/volume and water quality in WFD waterbodies such as streams, rivers, lakes and reservoirs, as assessed by the WFD assessment.

5.4.26 A total of three of the feasible supply options were assessed as having a negative effect (one moderate negative effect, two minor 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. Two of these options were also assessed as having a negative effect (one minor negative uncertain effect and one moderate negative uncertain effect) on waste and resource use (SEA

Objective 15) as they would require ongoing energy and/or chemical use for the pumping and/or treatment of water.

5.4.27 Three feasible supply 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.

5.4.28 None of the feasible supply or metering options in the Mid-South Ceredigion Resource Zone were assessed as having any effect on air quality (SEA Objective 8), tourism and recreation (SEA Objective 12) or cultural heritage (SEA Objective 16) during operation

5.5 Clwyd Coastal Resource Zone

5.5.1 One feasible option was assessed for the Clwyd Coastal Resource Zone; this is outlined in **Table 5.7**. A summary of the assessment of this option 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 Supply and Metering Options: Clwyd Coastal Resource Zone

Option ID	Option Name	Yield	Description
WEF-MET-8012	WEF-MET-8012	2.03	This option would involve the installation of meters in 82,130 households and 6,943 meters in non-households across the CC zone between 2025-2050.

Table 5.8 Feasible Supply and Metering Options Assessment Summary: Clwyd Coastal 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
WEF-MET-8012	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

Construction Effects

5.5.2 No significant positive effects were identified during assessment of Option WEF-MET-8012 for the construction phase. However, a moderate positive effect was assessed against the Economy (SEA Objective 11). This is reflective of the scale of the option. Construction of this option would result in a significant capital spend of between £5m and £25m, with capital spend being spread across 25 years (2025 - 2050). This could result in a positive effect on the local economy associated with potential employment opportunities, supply chain benefits and spend by workers and contractors in the local economy.

5.5.3 No significant negative effects were identified during assessment of Option WEF-MET-8012 for the construction phase. However, negative effects were identified against Air Quality (SEA Objective 8) (moderate negative uncertain effect), Greenhouse Gas Emissions (SEA Objective 9) (moderate negative effect) and Waste and Resource Use (SEA Objective 15) (minor negative effect), reflecting the potential for the distribution/installation of meters to result in vehicle movements with effects on local air quality; embodied carbon in meters/devices alongside carbon emissions from the distribution of meters; and material requirements and waste associated with the production and installation of meters.

Operation Effects

5.5.4 No significant positive effects were identified during assessment of Option WEF-MET-8012 for the operational phase. Minor positive effects were assessed against a range of objectives, including Water Quantity (SEA Objective 5), Greenhouse Gas Emissions (SEA Objective 9), Climate Resilience (SEA Objective 10), Economy (SEA Objective 11), Human Health and Wellbeing (SEA Objective 13) and Water Resource Use (SEA Objective 14). This reflects the anticipated reduction in raw water abstraction associated with reduced demand from metering/reduced leakage associated with metering, reduced carbon emissions associated with a reduction in treated water production and use of water in the home, and increase in the resilience of supply associated with a reduction in water use and increase in efficiency, which would result in associated economic and social wellbeing benefits.

5.5.5 No negative effects were identified during assessment of Option WEF-MET-8012 for the operational phase.

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

5.6.1 The SEA findings for the revised feasible options have been used as inputs into the following key decision points:

- **MCA**, undertaken in advance of the selection of options;
- **scenario testing** of the constrained options; and
- **selection of the preferred programme of options**.

MCA (ValueStream1)

5.6.2 With respect to the MCA and ValueStream 1 (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
- Mult-abstractor benefits (SEA Objectives 5, 6 and 14).

5.6.3 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 DCWW'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.

5.6.4 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, this 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.

Scenario Testing

5.6.5 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 across the WRW region were providing benefits below 0.01Ml/d but still assessed positively). 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

5.6.6 Options were subject to refinement, following further modelling in response to various scenarios (this included changes to scheme elements such as yields).

5.6.7 For those options taken forward for the inclusion in the draft WRMP24s, further work was undertaken in discussion with DCWW's engineering teams, highlighting further opportunities for scheme refinement, taking into account potential mitigation measures identified at the revised feasible option stage.

5.6.8 The options, refined to reflect the changes above have then been taken forward and subject to further assessment (individually and cumulatively) to ensure that the effects of DCWW's draft WRMP24 has been identified, described and evaluated.

6. Assessment of the Draft WRMP

6.1 Introduction

6.1.1 This section describes the findings of the assessment of the draft WRMP24. In particular, it presents:

- **Section 6.2: Draft WRMP24 Preferred Option Assessment** to identify, describe and evaluate the effects of the preferred options (five supply options and four metering 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 DCWW.
- **Section 6.5: 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 6.6: Contribution of the Draft WRMP to Wales' Well-being Goals and the Objective for SMNR.**
- **Section 6.7: Mitigation and Enhancement.**
- **Section 6.8: Conclusions.**

Draft WRMP24 Preferred Option Assessment

Overview of Selected Options

6.1.2 Following the detailed screening and selection of best value options (Section 5.6), a total of nine options have been identified by DCWW as preferred options. These options are summarised in **Table 6.1, Table 6.2, Table 6.3** and **Table 6.4**. Please note that following completion of the assessment, there has been minor amendments and refinement of the yield values by DCWW.

Table 6.1 Preferred Options for the Tywi Gower Resource Zone included in the draft WRMP24

Option ID	Option name	Yield (Ml/d)	Description
TWG12	Crai Distribution Option - Upsize Christopher Road WPS	4.1	In order to reduce demand on Crai resources, GCG SRv (2.4 Ml/d average demand) and Bros SRv (1.7Ml/d average demand) will be rezoned to the Felindre WTW by upsizing Christopher Road PS to reverse flows in the 17" main from Crai and putting two booster PS's to pump to GCG SRv and Bros SRv.

Option ID	Option name	Yield (Ml/d)	Description
TWG14	Ystradfellte - Reverse flow through Tonna control valve	2.5	In order to reduce the stress on the resource from Cefn Drysgoed, flows through the Tonna Flow control valve will be reversed so that 2.5Ml/d from the Felindre system can meet some of the demand on the Cefn Drysgoed network. Elements: New Park Field Pumping Station (PS) to pump to the Cefn Drysgoed network (2.5Ml/d - from the model).
WEF-MET-8201	WEF-MET-8201	23.75	This option would involve the significant increase in metering of customer properties in the zone, and the fixing of identified leakage as it is detected on customer supply pipes.

Table 6.2 Preferred Options for the SEWCUS Resource Zone included in the draft WRMP24

Option ID	Option name	Yield (Ml/d)	Description
SEW166	Memorial and Cefn Mably upgrade	47	This option would involve providing 47 Ml/d peak flows to the Pontsticill Low Level network in order to release the flows from the Pontsticill WTW to enable other WRMP options and the trading option. In order to be able to supply the combined 47 Ml/d, Cilfynydd WPS (21Ml/d) will be reinstated to support the Memorial WPS (26 Ml/d). The Pumps at Memorial WPS will be replaced with low suction, high lift pumps to be able to pump to Ty Gwyn SRv. Cefn Mably WPS will be reinstated to provide additional pressure to the supply side of Memorial WPS and Tongwynlais SRv. Installation of a pressure and flow control valve arrangement at the inlet to Tongwynlais SRv to ensure that the service reservoir does not overtop.
SEW168	Removal of Llwynon Min flow	7	Scheme to enable DCWW to stop supplying 7 Ml/d minimum sweetening flow year round into the Llwynon gravity main in order to avoid WQ issues. The scheme comprises installation of new pressure reducing valves (PRVs), meters, burst protection valves and flow control valves.
WEF-MET-8121	WEF-MET-8121	43.31	This option would involve the significant increase in metering of customer properties in the zone, and the fixing of identified leakage as it is detected on customer supply pipes.

Table 6.3 Preferred Options for the Clwyd Coastal Resource Zone included in the draft WRMP24

Option ID	Option name	Yield (Ml/d)	Description
WEF-MET-8012	WEF-MET-8012	2.03	This option would involve the significant increase in metering of customer properties in the zone, and the fixing of identified leakage as it is detected on customer supply pipes.

Table 6.4 Preferred Options for the Mid-South Ceredigion Resource Zone included in the draft WRMP24

Option ID	Option name	Yield (Ml/d)	Description
MSC08	Upsize Llechryd WTW	2	Llechryd WTW currently has a maximum capacity of 19 Ml/d. The maximum abstraction rate is 800 m3/h. It is expected that the abstraction licence could be increased to 880 m3/h freeing up an extra 2 Ml/d.
WEF-MET-8202	WEF-MET-8202	1.79	This option would involve the significant increase in metering of customer properties in the zone, and the fixing of identified leakage as it is detected on customer supply pipes.

Summary of Effects

6.1.3 **Table 6.5, Table 6.6, Table 6.7** and **Table 6.8** present the summary of the construction and operational effects of the preferred options in the Tywi Gower, SEWCUS, Mid-South Ceredigion and Clwyd Coastal Resource Zones respectively. The likely significant effects are then detailed by option in the remainder of the subsection.

Tywi Gower Resource Zone

Table 6.5 Summary of Preferred Option Assessments for Tywi Gower 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
TWG12	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
TWG14	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WEF-MET-8201	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

TWG12 Crai Distribution Option - Upsize Christopher Road WPS

Construction

6.1.4 No significant positive or negative effects were identified during assessment of Option TWG12 for the construction phase.

Operation

6.1.5 No significant positive or negative effects were identified during assessment of Option TWG12 for the operational phase.

TWG14 Ystradfellte - Reverse flow through Tonna control valve

Construction

6.1.6 No significant positive or negative effects were identified during assessment of Option TWG14 for the construction phase.

Operation

6.1.7 No significant positive or negative effects were identified during assessment of Option TWG14 for the operational phase.

WEF-MET-8201 - WEF-MET-8201

Construction

6.1.8 A significant positive effect has been assessed against the economy (SEA Objective 11) for this option, during the construction phase. This option would result in a significant capital spend of over £25 million, with capital spend being spread across 25 years (2025 - 2050). This could result in a positive effect on the local economy associated with potential employment opportunities, supply chain benefits and spend by workers and contractors in the local economy.

6.1.9 No further significant positive effects were identified during assessment of Option WEF-MET-8201 for the construction phase.

6.1.10 A significant negative uncertain effect has been assessed against air quality (SEA Objective 8) for this option, during the construction phase. This is due to the possibility for construction of the option (given the scale of capital spend and number of properties where meter installations would take place) to result in significant traffic congestion on the road network across the Tywi Gower Resource Zone which, may have a negative effect on local air quality. Construction activity may take place within an AQMA, however, as the exact location of meter installs is uncertain, there remains some uncertainty.

6.1.11 A significant negative uncertain effect has also been assessed against greenhouse gas emissions (SEA Objective 9) for this option, during the construction phase. Implementation of the option would include embodied carbon from material production

of meters, in addition to vehicle movements for the distribution and installation of the meters over the 25 year implementation stage. The total carbon arising from the implementation phase being over 7,500tCO2e (10,999.6tCO2e above business as usual construction emissions over the plan period), resulting in a significant negative effect against this objective

6.1.12 No further significant negative effects were identified during assessment of Option WEF-MET-8201 for the construction phase.

Operation

6.1.13 A significant positive effect has been assessed against water quantity (SEA Objective 5) for this option, during the operational phase. The operation of the option would result in major reductions in the demand for water (23.75Ml/d), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering, resulting in a significant positive effect on water quantity.

6.1.14 A significant positive effect has also been assessed against water resource use (SEA Objective 14) for the operational phase of this option. The operation of this option would involve a major reduction in demand from the supply network (23.75Ml/d), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering. The option would result in a major improvement in water efficiency and resilience.

6.1.15 No further significant positive effects were identified during assessment of Option WEF-MET-8201 for the operational phase.

6.1.16 No significant negative effects were identified during assessment of Option WEF-MET-8201 for the operational phase.

SEWCUS Resource Zone

Table 6.6 Summary of Preferred Option Assessments for SEWCUS 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
SEW166	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0
SEW168	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	0	0	0
	Operation (positive)	0	0	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0
WEF-MET-8121	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

SEW166 - Memorial and Cefn Mably upgrade

Construction

6.1.17 No significant positive or negative effects were identified during assessment of Option SEW168 for the construction phase.

Operation

6.1.18 The significant yield (47Ml/d, which would enable the use of other WRMP options in addition to facilitate water trading) provided by option SEW166, was assessed as having a significant positive effect on climate resilience (SEA Objective 10) during operation, as it 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.

6.1.19 A significant positive effect has been assessed against the economy (SEA Objective 11) for this option, during operation, associated with the additional capacity of 47Ml/d which it would provide, which would help ensure a continual supply of clean drinking water and increase resilience of supply to DCWW customers, supporting economic growth which could result in a positive effect on the local economy and social wellbeing.

6.1.20 A significant positive effect has been assessed against human health and wellbeing (SEA Objective 13) during the operational phase of this option, as the increase in capacity of 47Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health, as well as supporting economic/population growth, which could result in a positive effect on the local economy and social wellbeing.

6.1.21 A significant positive effect has also been assessed against water resource use (SEA Objective 14) during the operational phase of this option, due to the significant yield of water that this option would provide, which would enable the use of other options and water trading (if required), which would increase the resilience of water supply in both the DCWW supply area and in other regions (if water trading occurs).

6.1.22 No further significant positive effects were identified during the assessment of the operational phase of option SEW166

6.1.23 Option SEW166 would require operational energy for the pumping of water, and as such the option was assessed as having a significant negative effect on greenhouse gas emissions (SEA Objective 9), as its operational energy demand would result in significant annual carbon emissions of 2,908tCO2e (above the threshold for significant effect >2000tCO2e/year).

6.1.24 No further significant negative effects were identified during the assessment of the operational phase of Option SEW166.

SEW168 - Removal of Llwynon Min flow

Construction

6.1.25 No significant positive or negative effects were identified during assessment of Option SEW168 for the construction phase.

Operation

6.1.26 No significant positive or negative effects were identified during assessment of Option SEW168 for the operational phase.

WEF-MET-8121 - WEF-MET-8121

Construction

6.1.27 A significant positive effect has been assessed against the economy (SEA Objective 11) for this option, during the construction phase. This option would result in a significant capital spend of over £25 million, with capital spend being spread across 25 years (2025 - 2050). This could result in a positive effect on the local economy associated with potential employment opportunities, supply chain benefits and spend by workers and contractors in the local economy.

6.1.28 No further significant positive effects were identified during assessment of Option WEF-MET-8121 for the construction phase.

6.1.29 A significant negative uncertain effect has been assessed against air quality (SEA Objective 8) for this option, during the construction phase. This is due to the possibility for construction of the option (given the scale of capital spend and number of properties where meter installs would take place) to result in significant traffic congestion on the road network across the SEWCUS zone which may have a negative effect on local air quality. Construction activity may take place within an AQMA, however, as the exact location of meter installs is uncertain, there remains some uncertainty.

6.1.30 A significant negative uncertain effect has also been assessed against greenhouse gas emissions (SEA Objective 9) for this option, during the construction phase. Implementation of the option would include embodied carbon from material production of meters, in addition to vehicle movements for the distribution and installation of the meters over the 25 year implementation stage. The total carbon arising from the implementation phase being over 7,500tCO2e (19,466.94tCO2e above business as usual construction emissions over the plan period), resulting in a significant negative effect against this objective

6.1.31 No further significant negative effects were identified during assessment of Option WEF-MET-8121 for the construction phase.

Operation

6.1.32 A significant positive effect has been assessed against water quantity (SEA Objective 5) for this option, during the operational phase. The operation of the option would result in major reductions in the demand for water (41.53Ml/d), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering, resulting in a significant positive effect on water quantity.

6.1.33 A significant positive effect has been assessed against greenhouse gas emissions (SEA Objective 9) for this option. The operation of the option would involve carbon emissions associated with meter reading activities; however, the option would reduce greenhouse gas emissions associated with reduced electricity production for the production/treatment of water and water use in the home (e.g. heating, etc.) and overall, the operation of the

option is anticipated to reduce carbon emissions by more than 1,000tCO2e/year (reduction of 1,413.2tCO2e/year compared to business as usual) across the plan period.

6.1.34 The significant reduction in demand for water achieved by this option (41.53Ml/d), was assessed as having a significant positive effect on climate resilience (SEA Objective 10) during operation, as it 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.

6.1.35 A significant positive effect has been assessed against the economy (SEA Objective 11) for this option, during operation. The option would provide an additional capacity of 41.53Ml/d, which would help ensure a continual supply of clean drinking water and increase resilience of supply to DCWW customers, supporting economic growth which could result in a positive effect on the local economy and social wellbeing.

6.1.36 A significant positive effect has been assessed against human health and wellbeing (SEA Objective 13) for the operational phase of this option, as the increase in capacity of 41.53Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social wellbeing.

6.1.37 A significant positive effect has also been assessed against water resource use (SEA Objective 14) for the operational phase of this option. The operation of this option would involve a major reduction in demand from the supply network (41.53Ml/d), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering. The option would result in a major improvement in water efficiency and resilience.

6.1.38 No further significant positive effects were identified during assessment of Option WEF-MET-8121 for the operational phase.

6.1.39 No significant negative effects were identified during assessment of Option WEF-MET-8121 for the operational phase.

Mid-South Ceredigion Resource Zone

Table 6.7 Summary of Preferred Option Assessments for Mid-South Ceredigion 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
MSC08	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	-
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0
WEF-MET-8202	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

MSC08 - Upsize Llechryd WTW

Construction

6.1.40 No significant positive or negative effects were identified during assessment of Option MSC08 for the construction phase.

Operation

6.1.41 No significant positive or negative effects were identified during assessment of Option MSC08 for the operational phase.

WEF-MET-8202 - WEF-MET-8202

Construction

6.1.42 No significant positive or negative effects were identified during assessment of Option WEF-MET-8202 for the construction phase.

Operation

6.1.43 No significant positive or negative effects were identified during assessment of Option WEF-MET-8202 for the operational phase.

Clwyd Coastal Resource Zone

Table 6.8 Summary of Preferred Option Assessments for Clwyd Coastal 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
WEF-MET-8012	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

WEF-MET-8012 - WEF-MET-8012

Construction

6.1.44 No significant positive or negative effects were identified during assessment of Option WEF-MET-8012 for the construction phase.

Operation

6.1.45 No significant positive or negative effects were identified during assessment of Option WEF-MET-8012 for the operational phase.

6.2 Preferred Programme Assessment

6.2.1 **Table 6.9** presents the cumulative assessment of the strategic effects of the draft WRMP24 preferred programme of options. Note where effects have been quantified, they are in aggregate, across the lifetime of the plan.

Table 6.9 Preferred Programme Assessment

SEA Objective	Cumulative score	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.	--/?	The construction phase will lead to some effects due to loss of/disturbance of habitats and species although given the distance between the options no additional cumulative effects (over and above the effects recorded above in Section 6.2) are assessed. No likely significant effects were assessed for any of the options that comprise the preferred programme of options. The majority of options were assessed as having minor negative or neutral effects on biodiversity. Moderate negative effects were assessed for construction of TWG12, due its location within ancient woodland. For MSC08 moderate uncertain effects were assessed for the operational phase arising from the additional 2Ml/d abstraction from the Afon Teifi, a site designated (SAC) for a range of freshwater fish species e.g. river lamprey, brook lamprey and bull head as well as Atlantic Salmon. Whilst the ALS indicates water is available, it is unclear that this could be abstracted without additional effects on these designated features without further modelling. HRA screening found that only option SEW166 has the potential to affect any European sites (those associated with the Severn Estuary, in the absence of mitigation). The HRA concluded that as the option is a network resilience solution that will not require 'new water' it will not have any operational effects and HRA risk is negligible. However, overall, a cumulative moderate negative effect with uncertainty is assessed.
2. To protect and enhance sustainable natural resources and the ecosystem services they provide.	+	The BNG assessment identifies that there would be a temporary and permanent loss of habitat during the construction of the preferred programme of supply side options although the majority of options have no or extremely small loss of habitat that would result in neutral effects. The BNG assessment concludes that only one option within the programme, TWG014, has been identified to have any negative impact, and that would be very minor in extent. The BNG assessment states that while the very limited impact associated with the Preferred Programme does not drive a large-scale strategic response, opportunities to provide local benefit, in line with SMNR and the Welsh Wellbeing Goals, should

SEA Objective	Cumulative score	Commentary
		still be considered, particularly since option TWG014 is immediately adjacent to a residential area.
3. To avoid and, where required, manage invasive and non-native species (INNS).	**-/?**	Overall, minor negative effects are assessed for preferred programme. The presence and extent of negative effect is uncertain given that the INNS risk assessment identifies no risk for nearly all of the preferred programme of options. Option TWG12 will transport water between catchments but the water will be transferred in a closed system and will be treated further reducing the risk of any new INNS pathways.
4. To protect and enhance soil quantity, quality and functionality and geodiversity and ensure the appropriate and efficient use of land.	**++/-**	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. Some of the preferred programme options would take place on PDL land or existing operational land which may support achievement of the objective whilst only one option (TWG12) would take place on agricultural land (although not the best and most versatile). Therefore, a likely mixed moderate positive and minor negative score is assessed for the preferred programme of options.
5. To protect and enhance surface and ground water levels and flows.	**+++/-**	The supply side options would result in 6.6 Ml/d in the TWG WRZ, 54 Ml/d in the SWCUS WRZ, 2 Ml/d in the MSC WRZ totalling 62.6Ml/d across the DCWW supply area. The demand management options would result in reductions of 23.75 Ml/d in the TWG WRZ, 41.53 Ml/d in the SEWCUS WRZ, 2.03 Ml/d in the CC WRZ and 1.79 Ml/d in MSC WRZ totalling 69.13Ml/d across the DCWW supply area. This is a cumulatively significant positive effect. The majority of the supply side options would result in no effects on flows or levels. However, two options (SEW168, MSC08) were assessed as having minor negative effects due to the potential to affect water quality and WFD status. Although in both cases WFD assessment considers both options are WFD compliant. Overall, a mix of significant positive and minor negative effect is assessed.
6. To protect and enhance the quality of surface and groundwater resources.	**-**	The majority of preferred options would have no effect on water quality. The WFD assessment found that two options (SEW168, MSC08) may reduce river flows, which could have an impact on water quality potentially causing a deterioration in WFD status. However, in both cases the WFD concluded that they would be compliant. Overall, minor negative effects are assessed. The preferred demand management options would have no effects on water quality.
7. To reduce or manage flood risk.	**-/?**	Most of the options would have a neutral effect on flood risk as they are located within areas at risk of flooding. Only option TWG12 was identified as being potentially within a location in Flood Zone 2 or 3 (but further information would be required as to whether the option would involve works in these areas). However, the risk is localised, and the option is not expected to exacerbate flood risk issues elsewhere. The collective implementation of the preferred programme is not expected to increase the level of flood risk over and above that associated with the construction and operation of TWG12. A cumulative minor negative effect has been assessed although this is uncertain depending on the exact site.
8. To minimise emissions of pollutant gases and particulates and enhance air quality.	**---/?**	Construction of the preferred programme of options will generate emissions to air which could affect local 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 within/in close proximity to AQMAs.

SEA Objective	Cumulative score	Commentary
		The construction associated with demand management WEF-MET-8201, WEF-MET-8121 WEF-MET-8202 may take place in an AQMA. Overall, it is concluded that there will likely be significant negative air quality effects during the construction phase, although there is uncertainty about this. In the operational phase these effects linked to vehicle movements are expected to be neutral.
9. To reduce greenhouse gas emissions.	+++/---	In total, the construction of the preferred programme of supply side options will require materials with 2,273 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 would incur 3,969 tCO2e per annum. The demand management options would incur 32,535.04 tCO2e over the plan period in the construction phase. The demand management options will see a reduction in carbon linked to reduced demand for water. This is equivalent to 2,350.10 tCO2e. per annum. Overall, a mix of significant negative and positive effects are assessed.
10. To adapt and improve resilience to the threats of climate change.	+++/-/?	Cumulatively the preferred programme of options would increase the capacity by supply of 62.6 M/d and demand management reduction of 69.13 Ml/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. However, as noted for SEA Objective 7 one option is potentially located in Flood Zone 3 which may reduce resilience to climate change. Overall, the cumulative effect is considered to be a mix of significant positive and minor negative effects, although there is uncertainty related to the presence and extent of the negative effect.
11. To promote a sustainable economy and maintain and enhance the economic and social well-being of local communities.	+++/-	The supply side and demand site 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. In the operational phase the Preferred Programme of options would support the delivery of 62.6 Ml/d of clean drinking water whilst the demand management would reduce the amount of water used. This will, in-turn, support population and economic growth which would also support achievement of a cumulative significant positive effect. 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.
12. To maintain and enhance tourism and recreation.	-	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, given the distance between option, the preferred programme has been assessed as having minor negative effects due to the likely impacts of construction. However, these effects are temporary.
13. To protect and enhance human health and well-being.	+++/--	The construction of water resources infrastructure can adversely affect traffic, noise, vibration, air quality and emission. 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 given the distance between options. In the operational phase the effects on health primarily relate to the provision of

SEA Objective	Cumulative score	Commentary
		62.6 Ml/d of clean drinking water across the DCWW area. Therefore, cumulatively a mix of significant positive and moderate negative effects are assessed. The negative effects will largely be temporary.
14. To promote and enhance the sustainable and efficient use of resilient water resources.	+++	The preferred programme of options will help to support the resilience of water resources in the DCWW area. The preferred programme will cumulatively support metering (approx. 69.13Ml/d) and support the provision of 62.6Ml/d of deployable output. This is considered to be significant.
15. To minimise waste, promote resource efficiency and move towards a circular economy.	---	Given the cumulative concrete, steel, plastics that will be required to construct the preferred programme of supply options and the range of materials required for metering 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. Cumulative significant negative effects have therefore been assessed for this objective.
16. To conserve and enhance the historic environment including the significance of heritage assets and their settings and archaeological important sites.	--	No significant effects are anticipated for the preferred programme of options given the distance between 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, listed buildings and registered parks and gardens 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. The preferred programme of options is considered to cumulatively have moderate negative effects given the proximity of works for TWG14 to a range of heritage assets. 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.
17. To conserve, protect and enhance landscape and townscape character and visual amenity.	--	The construction and operation of the preferred programme of options would likely have negative effects on landscape/townscape. One of options (SEW168) would be situated in the Brecon Beacons National Park and during construction temporary effects on this landscape are likely. 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. Where above ground infrastructure forms part of the operational phase there are also likely to be negative effects sustained. Overall, given the location of SEW168, moderate negative effects are assessed.

6.3 Reasonable Alternative Plan Assessment

6.3.1 The long-term impact of DCWW's leakage and demand management measures is forecast to generate an increased water resource surplus which over time provides greater drought resilience and enhanced benefit. DCWW has an objective to move to a 1 in 500 drought resilience position by 2040 to align with the position being taken in England and ensuring that customers receive at least an equal, if not better, level of service. DCWW has identified a number of risks to the achievement of this objective and has used scenario testing to examine the implications. As a result, further investigations are proposed during AMP8 to better understand this risk and to support regulator engagement. This will then be reflected in WRMP29 where a number of plan alternatives will be outlined (and assessed). In consequence, until the additional work has been completed, for the draft WRMP24, DCWW has not identified any reasonable alternatives to the preferred plan that are in a form that could be assessed.

6.3.2 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).

6.4 Secondary, Cumulative and Synergistic Effects Assessment

6.4.1 The SEA Regulations require that the cumulative effects of the draft WRMP24 are assessed. In addition to the assessments of the preferred programme of option (at the WRZ level) and plan level assessments (and alternatives) described above, this has included the cumulative effects of the draft WRMP24 in-combination with other plans and programmes. This includes:

- effects of the draft WRMP24 with other (same) water company plans – an assessment of the effects of the draft WRMP24 with DCWW's Drought Plan and Drainage and Wastewater Management Plan (DWMPs);
- effects of the draft WRMP24 with adjacent water company plans and projects (SROs);
- effects of the draft WRMP24 as part of the WRW draft Regional Plan;
- effects of the dWRMP24 with other plans e.g., Local Plans, National Policy Statements (NPSs);
- effects of the dWRMP24 with other Nationally Significant Infrastructure Projects (NSIPs).

Other DCWW Plans

Drought Plan

6.4.2 DCWW published the final Drought Plan in February 2021 following direction from Welsh Government to do so. The Drought Plan recognises that despite the relatively high rainfall in parts of Wales, drought can present a significant risk that needs to plan for adequately. The Drought Plan sets out how DCWW will deal with drought conditions within both the urban and rural areas, and how it will monitor the effect of any actions that are taken on the natural environment. The Drought Plan sets out the response to drought in terms of:

- The way in which DCWW monitor indicators so that they know when a drought is happening;
- Defining the trigger levels at which DCWW will take action and;
- Identifying the specific actions that DCWW will take as trigger levels are met.

6.4.3 The Drought Plan outlines trigger levels to ensure that that drought actions are proportionate to the level of drought risk. These are:

Stage 1 - Normal operation;

Stage 2 - Developing drought;

Stage 3 - Drought;

Stage 4 - Severe drought; and

Stage 5 – Emergency Measures.

6.4.4 **Table 6.10** summarises the supply side and demand side actions to be taken at the drought trigger levels (action zones).

Table 6.10 Actions to be taken at drought trigger levels

Drought Action Zone	Supply Side Actions	Demand Side Actions
Normal	Weekly monitoring of rainfall, reservoir and river levels. Optimise sources to minimise the costs of operations whilst remaining within licence, operation and quality constraints	Daily and weekly monitoring of demand levels including leakage and review of supply/demand situation.
Developing Drought	Targeted leakage management. Convene 'Gold incident' command centre. Implementation of dry weather operations to optimise water supply. Liaison in line with Management and Communication Plan	Continuous monitoring of demand levels including leakage and review of supply /demand situation. Implement demand side options: • Media Campaigns with Water Efficiency Device Offering • Enhanced Leakage Management
Drought	Continue to optimise current dry weather operational activities to preserve resource. Review feasibility of bringing mothballed sources back in supply. If applicable: Preparation of supply side application for Drought Permit/Drought Order from Natural Resources Wales/ Environment Agency and or Welsh Government/Defra. Commence baseline environmental monitoring	Continuation of preceding actions. Effectiveness of demand side measures estimated. Preplanning for the implementation of Temporary Use Bans. If applicable: Implement demand side options: • Temporary Use Bans (saving of up to 5% of demand anticipated).
Severe Drought	Continuation of preceding actions. Bring mothballed sources back in supply where feasible. If applicable: Implement supply side options	Continuation of preceding actions. Implement demand side options: • Temporary Use Bans (saving of up to 5% of demand anticipated). Preplanning for the implementation of Non-Essential Use Bans. Preplanning for the implementation of Emergency Drought Order. If applicable: Implement demand side options: • Non-Essential Use Bans (saving of up to 10% of demand anticipated). • Emergency Drought Order (saving of up to 17.5% of demand anticipated)

Drought Action Zone	Supply Side Actions	Demand Side Actions
Emergency Measures	Customers Other water users	Emergency measure activities will be fully coordinated with external party activities through the Drought Liaison Group and Local Resilience Forum's as needed. Radio / TV advertising / billboard notices – these can be tailored to relevant areas or be applicable to the entire operating area. Website – as above Social media activity – including social media site advertising Welsh Water spokesperson film clips – will be broadcast on company website and through social media channels Letters to customers – where a water resource issue is relevant to a confined area in our operating area, letters will be issued advising of this and asking customers to help conserve water by using it wisely. Press Releases – as above and with appropriate messaging (see next column) Media interviews with senior managers – as above Paid for adverts – as above and with appropriate messaging (See next column) Presence at organised events e.g. Royal Welsh Agricultural Show, National Eisteddfod Water efficiency roadshows at shopping centres etc. Billing call centre messages / recorded messages
	Stakeholders	Regular face to face briefings set up across impacted geographical areas – to follow same format as above Direct Mailing – as above social media activity

6.4.5 It is not anticipated that there would be any additional adverse cumulative effects from implementation of the draft WRMP24 in-combination with the Drought Plan. The draft WRMP24 includes drought measures and complements and is consistent with the Drought Plan. The draft WRMP24 seeks to increase the level of drought resilience with an objective to move to a 1 in 500 drought resilience position by 2040 (to ensure alignment with the position being taken in England). The WRMP24 would support effective drought management through reduced leakage, progressive metering with a shift to smart meters, and network improvements as part of the preferred programme of draft WRMP24. The demand management options will also result in reduced required abstraction at source.

Drainage and Wastewater Management Plan (DWMP)

6.4.6 The DWMP will set out how DCWW will extend, improve and maintain a robust and resilient drainage and wastewater system considering the pressures of climate change, population growth and growing customer expectations. The plan will take a long-term view, setting out responses to drainage and wastewater management challenges over a

planning period of at least 25 years. The DWMP is currently in preparation with a draft DWMP published in July 2022.

6.4.7 The DWMP sets out three planning objectives:

- **Water quantity** - Reducing the risk of flooding to communities
- **Water quality** - Improving water quality for the environment
- **Resilience and maintenance** - Making sure DCWW can adapt to changes in the future, whilst also maintaining important services and protecting the environment

6.4.8 The DWMP operates at the following spatial levels:

- **Level 1 - Company Operational Level** - An operational area which consolidates the more localised mapping in levels 2 and 3 in a published strategic report for the whole operational area.
- **Level 2 - Strategic Planning Unit (SPU) -** A subdivision of the company operational area. Originally set at the River Basin Management District catchment (RBMD) level and revised to take into account drainage from sewers.
- **Level 3 - Tactical Planning Unit (TPU)** - A consolidation of WwTW and its catchments joined together by its river drainage system. At this level a detailed assessment of risks and opportunities is undertaken. This sets out a long-term plan of interventions needed to meet the needs of the catchment, the communities that live there and the DWCC strategic plans.

6.4.9 DCWW has identified a range of options to inform the strategic direction of the TPU and SPU across the following key themes:

- Combined and Foul Sewer Systems;
- Customer Side Management;
- Indirect Measures influencing policy;
- Wastewater Treatment; and
- Surface Water Management.

6.4.10 No additional negative cumulative effects are expected from the implementation of the WRMP24 in combination with the DWMP above those already identified for the draft programme of WRMP24 options in **Section 6.3**. The draft WRMP24 includes a range of measures (such as demand management and network resilience investment) which complement those set out in the draft 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).

6.4.11 The draft DWMP options should at minimum do no harm to the water environment or communities in which they are located, and preferably make a (significant) contribution to enhancing the quality of each locality, by reducing the adverse effects arising from

flooding and poor water quality. No additional, in-combination effects are therefore expected with regards to water quality.

Adjacent water company plans and projects (SROs)

6.4.12 The NWT SRO comprises two principal components:

- new sources to offset water transferred out of region from Lake Vyrnwy as part of the STT SRO; and
- 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 50Ml/d).

6.4.13 Taking into account the location and nature of options identified in DCWW's draft WRMP24 for the WRZ's forecast to be in deficit, no cumulative effects, either during construction or operation have been identified with the NWT SRO (based on the published Gate 1 information of the proposed scheme).

6.4.14 The Severn to Thames Transfer (STT) SRO involves the transfer of raw water to the South East region, utilising excess flows in the River Severn. Additional water sources will supplement flows in the River Severn, including: releases from Vyrnwy Reservoir into the River Severn via the River Vyrnwy and a pipeline; diversion of treated water from Oswestry WTW (allowing a reduction in current abstractions on the River Severn); a reduction in licensed abstraction at Mythe; and the transfer of treated wastewater from Minworth and Netheridge WwTWs.

6.4.15 The SRO Gate 1 submission SEA[45] identified a range of significant positive and negative effects from those engineering elements of the STT SRO within Wales (however, outside DCWW's operational area). Taking into account the location and nature of options identified in DCWW's draft WRMP24 for the WRZ's forecast to be in deficit, no cumulative effects, either during construction or operation have been identified with the STT SRO (based on published Gate 1 information for the proposed scheme).

Water Resources West draft Regional Plan

6.4.16 Water Resources West (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 Resources[46]. WRW includes all or part of the operational areas of Dŵr Cymru Welsh Water (DCWW), Hafren Dyfrdwy[47], Severn Trent Water (STW), South Staffordshire Water (SSW) and UUW. The Regional Plan focuses on demand management and supply options to address water supply deficits.

[45] 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

[46] EA (2020) *Meeting our future water needs: a national framework for water resources*

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

6.4.17 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 supply needs of non-public water supply (non-PWS) abstractors as well as public water supplies. The Regional Plan will contain all the proposals for the component draft WRMP24s that relate to the area covered by the regional Plan. In consequence, there is likely to be overlap between likely measures that will be forthcoming within the Regional Plan and those included within the draft WRMP24 and therefore there are likely to be cumulative effects where the plans work together to support effective management of water resources. As identified in Section 6.3 there are a range of likely significant effects for the draft preferred programme of WRMP24 options alone.

6.4.18 The WRW Regional Plan may (dependent on locational aspects) lead to additional significant effects in relation to (for example) cultural heritage and landscape, where in combination with regional measures, the plans together would lead to development within (or close proximity to) designated landscapes or construction works take place within or in the settings of designated heritage assets.

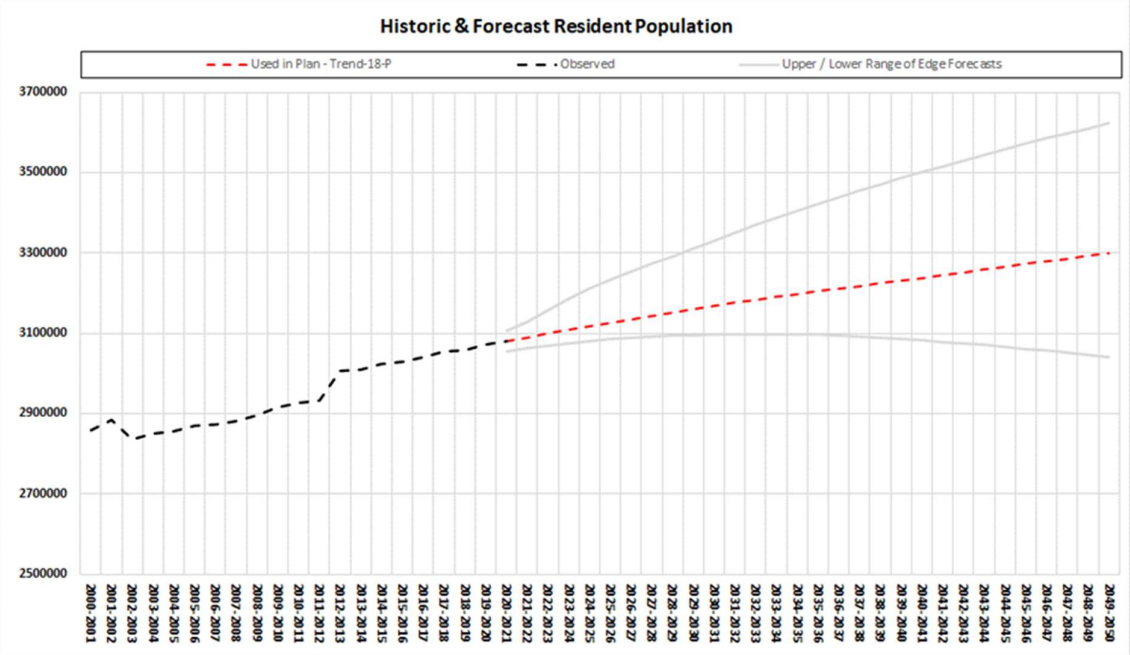
Other plans

Local Plans

6.4.19 Population change in the DCWW operational area has already been considered in the draft WRMP24 along with the potential for further changes in demographics throughout the plan period.

6.4.20 The data used by DCWW to forecast population and dwellings projections has been derived from Local Planning Authority projections as published by Welsh Government. These are apportioned to DCWW water resource zones. As part of this process, DCWW (via appointed consultants – Edge Analytics) directly engaged with all local authorities across the DCWW supply area to obtain site level development data from local development plans and local population projections. Population forecasts that have informed the WRMP are shown within **Figure 6.1.**

Figure 6.1 Forecast population growth using 2018 ONS trend based projections and forecast range



Source: DCWW Draft WRMP24

6.4.21 The draft WRMP24 has therefore been informed by expectations in local plans for new housing (and household) growth and broader development locations within the DCWW supply area.

6.4.22 As a result, the in-combination water-resource effects of growth promoted by other plans (for example, local planning authority local development plans and strategic growth plans) or projects are considered and accounted for during the draft 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).

6.4.23 The draft WRMP24 identifies WRZ in deficit as including SEWCUS, the Tywi Gower, Mid-South Ceredigion (which has a forecast deficit under more extreme scenarios), and Clwyd Coastal (which had a marginal deficit position during year 1 of AMP8).

6.4.24 DCWW tested a range of solutions to address these deficits with a 'best value' approach. The forecast deficit will be offset through the implementation of demand management and supply side options that comprise the preferred programme of WRMP24 options. The preferred programme seeks to implement measures to enhance leakage reduction, reduce smart metering, and increase resilience to other hazards which is expected to help ensure that a continual supply of water is maintained to support future population, household and economic growth within the DCWW region.

National Policy Statements (NPSs)

6.4.25 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 6.11**.

Table 6.11 Current Status of National Policy Statements

National Policy Statement (NPS)	Status	Are Potential Locations of NSIPs included in the NPS?
Overarching Energy EN-1[48]	Designated July 2011	No
Fossil Fuel Electricity Generating Infrastructure EN-2	Designated July 2011	No
Renewable Energy Infrastructure EN-3	Designated July 2011	No
Gas Supply Infrastructure and Oil and Gas Pipelines EN-4	Designated July 2011	No
Electricity Networks Infrastructure EN-5	Designated July 2011	No
Nuclear Power Generation EN-6	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	Draft published November 2018	No
Geological Disposal Infrastructure	Designated July 2019	No

6.4.26 The draft 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 draft WRMP24.

6.4.27 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, one (Wylfa) is located within the Welsh Water WRMP24 area, although it is not in any of the WRZs in deficit and

[48] A revised draft National Policy Statement for Energy (and for EN2 to EN5) was published by the Government for consultation in September 2021.

requiring supply options. Whilst it has been identified for the deployment of a new nuclear power station it is also not currently being progressed.

6.4.28 Given these schemes, no significant cumulative effects in-combination with the implementation of the draft WRMP24 are predicted.

6.4.29 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 DCWW draft WRMP24 area. Similarly, the Airports NPS concerns runway capacity in the South East of England only.

6.4.30 Defra has consulted on a draft NPS for water resources. This will set out the need for NSIPs related to water resources, and the Government's policies to deliver them. Whilst this NPS will not be site specific, implementation of the draft WRMP24 is likely to be compatible with those objectives of the NPS for improving water supply resilience.

Nationally Significant Infrastructure Projects (NSIPs)

6.4.31 A number of other NSIPs that are not detailed in NPSs are listed on the Planning Inspectorate website[49]. At the time of writing, seventeen additional projects in Wales were at various stages (with a further project withdrawn from consideration):

- 4 at pre-application;
- 1 at examination; and
- 12 decided.

6.4.32 These are detailed in **Table 6.12**.

Table 6.12 NSIPs in Wales

Project	Developer	Stage
SP Mid Wales (Electricity) Connections Project (SP Manweb)	SP Manweb	Pre Application
Tidal Lagoon Cardiff	Tidal Lagoon Power	Pre Application
Mona Offshore Wind Farm	Mona Offshore Wind Limited	Pre Application
Mid Wales Electricity Connection (N Grid)	National Grid	Pre Application
Awel y Môr Offshore Wind Farm	Awel y Môr Offshore Wind Farm Limited	Examination
Wrexham Energy Centre	Wrexham Power Limited	Decided
Abergelli Power	Abergelli Power Limited	Decided
North Wales Wind Farms Connection	SP MANWEB	Decided

[49] https://infrastructure.planninginspectorate.gov.uk/projects/wales (Accessed September 2022)

Glyn Rhonwy Pumped Storage	Snowdonia Pumped Hydro Limited	Decided
Internal Power Generation Enhancement for Port Talbot Steelworks	Tata Steel UK limited	Decided
Mynydd y Gwynt Wind Farm	Mynydd y Gwynt Ltd	Decided
Hirwaun Power Station	Hirwaun Power Limited	Decided
South Hook Combined Heat & Power Station	QPI Global Ventures Ltd	Decided
Tidal Lagoon Swansea Bay	Tidal Lagoon (Swansea Bay) PLC	Decided
Brechfa Forest West Wind Farm	RWE Npower Renewables	Decided
Clocaenog Forest Wind Farm	RWE npower renewables	Decided
Brechfa Forest Connection	Western Power Distribution (South Wales) plc	Decided

6.4.33 The majority of NSIPs within the area are renewable infrastructure (wind farms or grid connections) schemes that would not be considered likely to provide pressures on water resources in the DCWW area. There are some schemes that could impact water resource/quality: Tidal Lagoon Cardiff (at pre-application), Tidal Lagoon Swansea Bay (decided), Wrexham Energy Centre and Abergelli Power (both decided) which are to provide gas fired power stations. Where projects have been decided (such as Tidal Lagoon Swansea) the effects on water demands will have been assessed and taken into account. Given the early stage in the development of Tidal Lagoon Cardiff, and that no progress has been taken on examination since 2016, a cumulative effects assessment is premature. However, the impacts on water resources and quality will be considered during the examination into the project (if it proceeds to that stage) and no additional cumulative effects are considered likely at this stage of preparation of the draft WRMP.

6.4.34 Nevertheless, the water demands of all of these projects (and any future NSIPs in the Wales) should be considered in their applications for development consent and if significant demand is forecast, this should be considered by DCWW during monitoring of the WRMP.

Developments of National Significance

6.4.35 Developments of National Significance (DNS) are a category of planning application is considered to be nationally significant within Wales and ensures that larger infrastructure projects (that do trigger the threshold for NSIP) are determined by Welsh Minsters rather than local authorities. The statutory basis for the DNS process is provided by the Planning (Wales) Act 2015, which amends the Town and County Planning Act 1990 ("the Act"), and the Developments of National Significance (Wales) Regulations 2016 (as amended) and subsequent Regulations.

6.4.36 There are currently 66 applications classed as DNS[50]. The majority are at early pre-application stages in the process with 22 considered to be in progress. The majority of

[50] https://planningcasework.service.gov.wales/advancedsearchresults?apt=846040011 (Accessed September 2022)

applications are for renewable energy infrastructure (wind turbines and, solar farms) which are not considered to place additional pressures on water resources. Through examination the potential impacts on water quality will be assessed. Where forthcoming projects could include significant demand for water resources, this should be considered by DCWW during WRMP monitoring.

6.5 Contribution of the Draft WRMP to Wales' Well-being Goals and the Objective for SMNR

6.5.1 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.

6.5.2 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".

6.5.3 The Water Resources Planning Guideline (WRPG)[51] 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*". Whilst the preferred options in the draft WRMP24 do not affect Wales, they could enable water from the Vyrnwy Reservoir to be transferred to other regions where demand has been identified, and so taking a strategic perspective do contain proposals that could affect Wales, and in consequence, on a precautionary basis, the effects of the draft WRMP24 have been considered for their contribution to the well-being goals.

6.5.4 The well-being goals and SMNR objective have been mapped to the SEA objectives that comprise the SEA assessment framework (see **Table 6.13**). Through the assessment of the draft WRMP24 measures against the SEA objectives, it is therefore possible to assess the

[51] EA, OfWAT and NRW (2022) *Water Resources Planning Guideline, 5th bullet point after heading 'Wales' in paragraph 4.1.1.*

contribution that the implementation of the Plan would make to the achievement of the goals and objective.

6.5.5 A matrix has been used to record this assessment and is presented in **Table 6.13** below. Informed by the assessment of the measures against the SEA objectives, as well as the cumulative effects of the draft WRMP24 (as summarised in the preceding section), a judgement has been made regarding whether, and the extent to which, the draft 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 6.13 Assessment of the Contribution of the Draft WRMP24 to the Well-being Goals for Wales

Well-being Goals	Related SEA Objective	Contribution to the Well-being Goal	Commentary
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.	SEA Objectives 9, 10, 11, 14, 15	↕	The assessment of the draft 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. The assessment of the draft 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 and the extensive metering which would include resource use and embodied carbon. For example, in total, the construction of the preferred programme of supply side options will require materials with 2,273 tCO2e embodied carbon and in the operational phase would incur 3,969 tCO2e per annum. The demand management (metering) options would incur 32,535 tCO2e over the plan period. There will be a reduction in operational carbon associated with reduction of energy used equivalent to 2,350 tCO2e per annum.
A resilient Wales: A nation which maintains and 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).	SEA Objectives 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13	↕	Overall, the draft WRMP24 will contribute to increasing resilience and adaptability to the effects of climate change by increasing the capacity of sustainable supply of 62.6 M/d and providing demand management reduction of approximately 69.13 Ml/d. The BNG assessment identifies that there would be a loss of habitat during the construction of the preferred programme of 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. The assessment of the draft 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

Well-being Goals	Related SEA Objective	Contribution to the Well-being Goal	Commentary
			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.
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.	SEA Objectives 11 and 13	↕	The operational phase of the draft WRMP24 will contribute positively to the effects on health from the provision of 62.6 Ml/d of clean drinking water across the DCWW area. This is considered to support the achievement of the well-being goal. 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.
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).	SEA Objectives 11 and 13	↑	As noted above, the draft 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. The assessment of the draft 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.
A Wales of cohesive communities: Attractive, viable, safe and well-connected communities.	SEA Objectives 11 and 13	↕	The draft 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. Emissions to air, alongside noise and vibration disturbance, during construction of the supply-side measures (where applicable) and during the roll out of metering (demand side measures) may have minor adverse effects on host communities 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. For the supply side measures the effects are also likely to be managed through the implementation of best practice construction methods. The assessment of the draft WRMP24 measures against the SEA objectives has also highlighted the potential for direct and indirect adverse environmental effects including in respect of cultural heritage and landscape which could affect the attractiveness of communities. However, any effects in this regard would be temporary and localised.
A Wales of vibrant culture and thriving Welsh language: A society that promotes	SEA Objective 11 and 13	↕	The draft 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

Well-being Goals	Related SEA Objective	Contribution to the Well-being Goal	Commentary
and protects culture, heritage and the Welsh language, and which encourages people to participate in the arts, and sports and recreation.			will provide foundations for the protection and enhancement of this well-being goal. The SEA of the draft 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.
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.	SEA Objectives 1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16 and 17	↔	Taking into account the nature and scale of the draft WRMP24, and that effects associated with their construction and operation would be predominantly felt at a local/sub-regional level, it is not expected that the draft WRMP24 would make a contribution to this well-being goal. 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.

Key

Symbol	Effect
↑	The draft WRMP24 supports the achievement of the well-being goal.
↔	The draft WRMP24 will not make a contribution to the achievement of the well-being goal.
↓	The draft WRMP24 does not support the achievement of the well-being goal.

6.5.6 **Table 6.16** demonstrates that the draft WRMP24 is likely to support the achievement of the majority of the well-being goals for Wales.

6.5.7 The construction (where applicable) and operation of many of the draft WRMP24 measures will unavoidably require the use of natural resources and generate greenhouse gas emissions and could also result in adverse environmental effects, particularly during construction. However, the implementation of the draft 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.

6.6 Mitigation and Enhancement

6.6.1 The potential effects of the draft 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

6.6.2 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;
- 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 and NRW;
- 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 pipe-work.

6.6.3 For all river water bodies that could be impacted by abstraction (either from surface water or groundwater), 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).

6.6.4 For GWDTEs identified as potentially being impacted by abstraction, further review of existing information is required to understand potential hydrological connectivity, as the current conclusions are relatively precautionary.

6.6.5 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 DCWW's management of its land holdings.

Scheme Design and Planning

6.6.6 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
- 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

6.6.7 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.

6.6.8 The best-practice procedures and measures detailed in these documents should be followed for all construction works derived from the draft 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.

6.6.9 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

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

- DCWW 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 DCWW's net zero commitments.

Effects on Human Health and Social and Economic Well-being

6.6.11 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.

6.6.12 To maximise economic benefits in the DCWW 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, DCWW should seek to use locally-sourced materials.

Effects Climate Change and Resource Use

6.6.13 To help DCWW 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 DCWW's commitment to achieve net zero emissions by 2040 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.

6.6.14 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.

6.6.15 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

6.6.16 The potential for adverse impacts on 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.

6.6.17 Proposed draft WRMP24 schemes could have a negative effect on landscape if new infrastructure is required, particularly where development cannot be located on previously developed land and/or where schemes are located within landscapes recognised for their

importance and special qualities (National Parks and AONBs). 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).

7. Next Steps

7.1 Consultation on this Environmental Report

7.1.1 This Environmental Report is being issued for consultation. We would welcome views on any aspect of this report.

7.1.2 Please provide your comments by the 22nd February 2023.

7.1.3 Please provide your comments by 22nd February 2023. Please send any response to Water@gov.wales .

7.2 Next Steps

7.2.1 DCWW's draft WRMP24 and accompanying documents including this Environmental Report has been published for consultation. Following consultation, DCWW will prepare a Statement of Response to the representations received during the consultation period setting out how and why the draft plan has or has not been revised to take account of the consultation responses. DCWW will amend the draft plan and depending on whether changes are considered significant may undertake further consultation supported by further assessment. Subject to approval, DCWW will then publish the final WRMP24. The programme of measures will be implemented 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.

7.3 How Environmental Effects will be Considered During Plan Implementation

7.3.1 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.

7.4 Monitoring the Effects of the WRMP

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

- Were the SEA predictions of effects accurate?

- Are mitigation measures performing as well as expected?
- Are there any adverse effects? Are these within acceptable limits, or is remedial action desirable?

7.4.2 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.

7.4.3 DCWW 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 DCWW or by other relevant organisations such as Natural Resources Wales, the Environment Agency or Natural England. For example, DCWW 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.

7.4.4 **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 draft WRMP24. This list is provisional and indicative only; 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.

Table 7.1 Potential Indicators for Monitoring Effects

SEA Objective	Indicator	Source of Information	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)	Dwr Cymru Welsh Water (DCWW), Environment Agency, Natural England (NE), Natural Resources Wales (NRW)	Additionally, open communication between NRW and DCWW results in up-to-date information and identification of any potential issues. Environment Agency and NE included, given that DCWW also operate within England.
2. To protect and enhance sustainable natural resources and the ecosystem services they provide.	Biological monitoring (macroinvertebrates, macrophytes, fisheries, bird surveys)	DCWW, EA, NRW, Angling clubs, British Trust for Ornithology (BTO)	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.

SEA Objective	Indicator	Source of Information	Commentary
	Number and area of new or restored habitats	DCWW	DCWW could consider recording the number of locations and area of habitats created or restored.
3. To avoid and, where required, manage invasive and non-native species (INNS).	INNS presence	DCWW, NBN Atlas and the EA's Ecology & Fish Data Explorer website	
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	DCWW	DCWW 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	DCWW, NE, NRW	Previous studies may also be used to inform monitoring and assessment.
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	DCWW, EA, NRW	Previous studies may also be used to inform monitoring and assessment.
6. To protect and enhance the quality of surface and groundwater resources.	Water quality of surface and ground water.	DCWW, EA, NRW	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	DCWW, EA, NRW	DCWW 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	DCWW	DCWW could considered recording the number of vehicle movements and distance travelled as an indicator of air quality impacts during implementation.
9. To reduce greenhouse gas emissions.	Quantity of greenhouse gas emissions per megalitre of water supplied.	DCWW	DCWW 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

SEA Objective	Indicator	Source of Information	Commentary
			support of DCWW's net zero commitment.
	Energy use used in the operation of options.	DCWW	DCWW should hold and record energy consumption data e.g. via accounts / invoices.
	Renewable energy generated or purchased.	DCWW	DCWW 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	DCWW, EA, NRW	DCWW report these data to Ofwat as part of the statutory returns process. Potential to supplement with any monitoring information gathered in support of DCWW's net zero commitment.
11. To promote a sustainable economy and maintain and enhance the economic and social well-being of local communities.	Number of DCWW sites with public access which provide sporting, recreational and leisure resources and number of visits per year.	DCWW	DCWW 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.
	Planned residential new development (informing predicted growth forecast to target catchments requiring investigations for potential future capacity constraints).	DCWW	DCWW examine information on planned growth and forecasts across LPA within the area.
12. To maintain and enhance tourism and recreation.	Number of DCWW sites with public access which provide sporting, recreational and leisure resources and number of visits per year.	DCWW	DCWW 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 (%).	DCWW	DCWW reports these data as part of the statutory returns process (Annual Performance Report).

SEA Objective	Indicator	Source of Information	Commentary
	Compliance with water quality standards under the EC Bathing Waters Directive.	NRW, EA	NRW and the EA monitor the compliance of bathing waters and report this annually.
	Number of nuisance-related complaints e.g. noise, dust.	DCWW	DCWW could record the number of nuisance-related complaints made in relation to implementation of the WRMP.
	Pollution and flooding Incidents	DCWW, NRW, EA	DCWW 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	DCWW	DCWW report these data to Ofwat as part of the annual returns process.
15. To minimise waste, promote resource efficiency and move towards a circular economy.	Amount of recycled / reused materials used	DCWW (contractors/consultants)	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	DCWW (services data)	Information on waste disposal to landfill should be held by DCWW.
	Chemical use in water treatment	DCWW (services data)	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.	DCWW, Historic England, Cadw	Cadw and Historic England 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.	DCWW	DCWW could record the number and size of infrastructure built within designated landscape sites.

Appendix A
Quality Assurance Checklist

The Government's Guidance on SEA[52] contains a quality assurance checklist to help ensure that the requirements of the SEA Regulations are met. Those requirements relevant to the scoping stage of the SEA of draft WRMP24 have been set out below.

Quality Assurance Checklist	
Objectives and Context	
The plan's or programme's purpose and objectives are made clear.	The purpose of the draft WRMP24 is set out in **Section 1.3** of this Environmental Report. The objectives of the draft 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.

[52] Office of the Deputy Prime Minister (2005) *A Practical Guide to the Strategic Environmental Assessment Directive*.

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 **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 6.4)**.
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**.

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 6.7** 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 6.7** 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 following consultation on draft WRMP24 and Environmental Report.
An explanation is given of how they have been taken into account.	This will be provided following consultation on the draft WRMP24 and Environmental Report.
Reasons are given for choosing the plan or programme as adopted, in the light of other reasonable alternatives considered.	This will be set out following consultation on the draft WRMP24 and Environmental Report.
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 7.4**.
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 7.4** of the report.

Quality Assurance Checklist	
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 7.4** 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 6.6** of this report and **Appendix G**.

FINAL

Appendix B
Schedule of Consultation Response

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.

Table B.2 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	No Cadw is of the opinion that the following documents should be amended or added as stated. <u>Table 2.1 National Programmes</u> Change: • Welsh Government (2018) Planning Policy Wales (Edition 10) has been replaced by Welsh Government (2021) Planning Policy Wales (Edition 11). Add: • 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 <u>Table 2.2 Cultural Heritage</u> Change: • Welsh Government (2018) Planning Policy Wales (Edition 10) has been replaced by Welsh Government (2021) Planning Policy Wales (Edition 11). Add: • Historic Environment (Wales) Act • 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 The above documents should also be included and reviewed in Appendix E along with the documents below: <u>Regional Plans and Programmes</u> • Welsh Government (2018) Castles and Town Walls of King	Comments noted. 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. 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: • 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 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: • 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

Consultation Question	Section	Consultee Response	Response/Action
		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	Heritage Site Management Plan
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 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	N/A	Yes	Comment noted.

Consultation Question	Section	Consultee Response	Response/Action
questions do you believe should be included?			

Table B.3 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 Ml/d in WR West and 570 Ml/d in WR East at 2050.	Comment noted. 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.
	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.	Comment noted. 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.
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,	N/A	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	Comment noted. 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

Consultation Question	Section	Consultee Response	Response/Action
which issues do you think need to be included or excluded?		i.e. 78% by 2035. WR West plan and the core company WRMP's will need to demonstrate how their actions are helping us achieve this.	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. The review of plans and programmes will be updated in the Environmental Report to reflect the 2019 updates to the Climate Change Act 2008. 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 SEA of the plans, although where such effects occur, these may also be set out in the appropriate Environmental Report.
	Appendix B Section 3. p34	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.	Agreed and will be updated in the relevant Environmental Report.
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?	Appendix F	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 Ml/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.	Comment noted. 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. 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 UUW's WRMP19s; • suggested definitions and thresholds for assessment scoring from the All Company Working Group

Consultation Question	Section	Consultee Response	Response/Action
			(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, • 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). 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 (AQMAs) and water quality (WFD status). These quantified measures address and go beyond the examples cited in the consultee response. 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.
	Table 4.2/Appendix F	Under SEA Table 4.2 & Appendix F there is no mention specifically of geomorphology. Flow abstraction and associated infrastructure is likely to affect fluvial sediment transport regime (transport, erosion, deposition), channel character (morphology) and river behaviour (morpho-dynamics).	Comment noted. 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 "*the need to protect, maintain and enhance geomorphological functions and services*" is identified.

Consultation Question	Section	Consultee Response	Response/Action
		Objective 5 - Request that the following question be included in relation to water resource pressures on geomorphic/sediment systems: • 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?)	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): *Will it alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems?* 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.
	Table 4.2/Appendix F/ Section 3.1 (Appendix D)	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? Same applies to the key issues listed on page 19 of Appendix D.	Comment noted. The following guide question will be added to the assessment framework under Objective 3: *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?* However, it may only be applicable in highly specific circumstances. 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.
	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.	Comment noted. Table 4.2 includes two guide questions under SEA Objective 5, that reference flow:

Consultation Question	Section	Consultee Response	Response/Action
			• *Will it result in changes to river flows, wetted width or river levels?* • *Will it alter the flow regime of surface waters?* In response to a separate comment, the first guide question will be amended to the following '*Will it result in changes to river flows, channel morphologies, wetted width or river levels?*' 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 "*the need to protect, maintain and enhance geomorphological functions and services*" is identified. 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.
	Table 4.2/Appendix F	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?	Comment noted. To ensure it is appropriately reflected in the SEA, the following guide question will be added to the Assessment Framework under Objective 1 (Biodiversity): *Will it alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems?* 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.
	Table 4.4	Table 4.4 – we note that an option cannot be scored as "moderate	Comment noted.

Consultation Question	Section	Consultee Response	Response/Action
		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?	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). 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 for minor, moderate and major/significant effects, are included, which have used information drawn from: • 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). 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.

Consultation Question	Section	Consultee Response	Response/Action
	Table 4.2/Appendix F	Appendix F, Objective 5. Suggest amendment to question 2: • Will it result in changes to river flows, channel morphologies, wetted width or river levels?	Agreed. The second guide question under SEA Objective 5 of the assessment framework will be changed to: *Will it result in changes to river flows, channel morphologies, wetted width or river levels?*
	N/A	WR West should explain the scale being used to decide significance. For example, a 1 Ml/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.	Comment noted. 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: • 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).

Consultation Question	Section	Consultee Response	Response/Action
	Table NTS.2/Table 4.2/Appendix F	Table 2 NTS – Proposed objectives – why only where required for INNS?	Comment noted. 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 lead to INNS being introduced, and so requiring management and mitigation measures prior to the introduction into a new catchment. No change.
	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.	Comment noted. 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: *To reduce greenhouse gas emissions.* 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. No change.
	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.	Comment noted. Contribution to the achievement of WFD objectives is already specifically reflected in the guide questions for Objective 6 (Water Quality.
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?	Comment noted. 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.
	Section 2 (Appendices A, B, C and D)	There is a lack of consistency between the core company lists of relevant plans/programmes that needs to be addressed. Focussing on the companies	Comment noted. The lists of relevant plans and programmes within each of the core company appendices will be checked/cross referenced to ensure

Consultation Question	Section	Consultee Response	Response/Action
		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.	consistency in the Environmental Reports to accompany the WRW Regional Plan and draft WRMP24s.
		Need to ensure consistency with SRO SEAs and other initial assessments. Gate 1 reports will help with this.	Comment noted. 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.
	Section 2/Table 2.1/Appendix E	Refers to some plans/strategies from early 2000's (e.g. BEIS, Defra) – are these still the best available on those topics?	Over 200 international/European, national, regional/sub-regional and local level plans were reviewed during the preparation of the Scoping Report. 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. Should revised or updated plans/programmes become available during the preparation of the Environmental Report, they will be included.
	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.	Comment noted. The following additional plans and programmes will be included in the review of plans and programmes contained within the Environmental Report: • Defra (2020) Drought Plan Direction 2020 • HM Government (2017) 2nd UK Climate Change Risk Assessment (CCRA2) • Centre for Environment Fisheries and Aquaculture Science, Environment Agency and Natural Resources Wales (2019) Assessment of Salmon

Consultation Question	Section	Consultee Response	Response/Action
			Stocks and Fisheries in England and Wales 2019 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.
	Appendix E	See comments about plans/programmes under water company headings. We expect to see a greater degree of consistency in the plans / programmes being considered across the core water companies in WR West and the regional plan as a whole.	Comment noted. Plans and programmes will be reviewed to ensure consistency between the categories of plans considered, noting regional/sub-regional differences.
	N/A	A few further general points cutting across environmental assessments:- • 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.	Comments noted. Where relevant, WRW and individual core member water companies will take such additional issues into account when developing their plans.

3. Historic England

No response was received from Historic England.

Table B.4 Responses to Natural Resources Wales comments on the SEA Scoping Report

Consultation Question	Section	Consultee Response	Response/Action
N/A	N/A	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. 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.	Comment noted.
	N/A	Whilst these considerations and the Welsh aspects of baseline assessment are more comprehensively included within Appendix A (Dŵr Cyrmu 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.	Comment noted. This will be considered at the Environmental Report stage to ensure a consistent baseline across these water companies.
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?		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 is required as to where the SEA of the SROs will sit if not within the WRMP of the individual water companies.	Comment noted. 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. 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.

Consultation Question	Section	Consultee Response	Response/Action
		Biodiversity, flora and fauna 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.	Comment noted Ecosystem resilience will be considered where relevant to the WRW&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. 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.
		Biodiversity, flora and fauna 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.	Comment noted. Regard will be given to non-statutory designations as per the objectives and guide questions of the SEA assessment methodology.
		Biodiversity, flora and fauna 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.	Comment noted. The baseline data for these species are not readily included in reports at a strategic level.
		Biodiversity, flora and fauna 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	Comment noted. These issues will be considered in the HRA

Consultation Question	Section	Consultee Response	Response/Action
		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.	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).
		Geology, land use and soils 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.	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 ALC information for Wales. This will be updated with information from the Predictive Agricultural Land Classification (ALC) Map 2 (DataMapWales (2019).
		Water 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	Comment noted. 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.
		Water 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.	Comment noted. This will be updated as appropriate in the relevant Environmental Reports.
		Water Given the context of the plan(s) being assessed this section in all of the reports would benefit from further integrated with the biodiversity section, considering the full range of freshwater biodiversity and protected sites, including lakes and wetlands.	Comment noted. In undertaking the SEA assessments, regard is given to interrelationships across topics.
		Water	Comment noted.

Consultation Question	Section	Consultee Response	Response/Action
		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.	The following stages of the SEA will continue to consider the inter-relationships across topics. The WFD Regulations 2017 mitigation measures will be considered during the Environmental Reporting stage.
		Water No information is presented on fluvial geomorphology or river dynamics. We recommend that you consider this within your SEA.	Comment noted. Geomorphology is highlighted as a key issue in WRMP specific baselines e.g., Appendix A, where the "*the need to protect, maintain and enhance geomorphological functions and services*" 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: • *Will it alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems? Objective 1.* • '*Will it result in changes to river flows, channel morphologies, wetted width or river levels?*' Objective 5.

Consultation Question	Section	Consultee Response	Response/Action
			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.
		Air quality 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.	Comment noted. 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.
		Population and human health 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.	Comment noted. Data from the 2019 Welsh Index of Multiple Deprivation (WIMD) will be used, where relevant, within the Environmental Report.
	Table 2.1/Appendix E	Material assets and resource use • 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	Comments noted. The following plans/programme will be added to the review of plans and programmes in the Environmental Report: • HM Government (2020) Energy

Consultation Question	Section	Consultee Response	Response/Action
		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.	White Paper: Powering our net zero future 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. 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.
	Table 2.1/Appendix E	<u>Cultural heritage and landscape</u> 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. The review of plans and programmes is comprehensive for landscape.	Comment noted. These issues will be included in the relevant Environmental Report.
Q2. Do you agree that the main environmental issues identified are relevant to the SEAs of the draft of the draft WRW		<u>Biodiversity, flora and fauna</u> 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).	Comment noted. The elements of ecosystem resilience as set out in the Environment (Wales) Act 2016, will be considered in the baseline/key issues

Consultation Question	Section	Consultee Response	Response/Action
Regional Plan and WRMP24s? If not, which issues do you think need to be included or excluded?			section for biodiversity within the relevant Environmental Report (to accompany the WRMP24s).
		Biodiversity, flora and fauna 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.	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).
	Section 3.2/Table 3.1	Geology, land use and soils 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).	Comment noted. An additional guide question will be added against the SEA Objective 4 for the 'Soils, Land Use and Geology' topic: *Will it avoid adverse effects on other land uses (such as forestry)?* In this way, where appropriate, wider impacts on other land-uses will considered in the relevant Environmental Report.
	Section 3.2/Table 3.1	Water 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.
		Water We would recommend that you consider any potential changes to 'fluvial geomorphology' (for example sediment loading) from your WRMP options and therefore any	Comments noted. Geomorphology is highlighted as a key issue in WRMP specific

Consultation Question	Section	Consultee Response	Response/Action
		potential impacts to WFD status or impacts to freshwater ecology.	baselines e.g., Appendix A, where the "*the need to protect, maintain and enhance geomorphological functions and services*" 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: • *Will it alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems? Objective 1.* • *'Will it result in changes to river flows, channel morphologies, wetted width or river levels?'* Objective 5. 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.
		Water 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	Comments noted. These issues will be considered in the WFD

Consultation Question	Section	Consultee Response	Response/Action
		abstractions still have mitigation measures that need to be put in place.	report. Where relevant it may also be included in the appropriate Environmental Report (to accompany either the WRW Regional Plan or WRMP24).
	Table 3.1	Air quality Recommend a wording change from 'minimise emissions' to 'ensure that people and sensitive habitats are protected from emissions by enhancing air quality'.	Comment noted. It is considered that the existing wording (*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.*) 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. No change.
	Table 3.1	Climatic factors 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.	Comment noted. 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 assets and erosion are considered to be appropriately covered within the assessment.
	Table 3.1	Landscape Suggest adding Protect against wildfires (due to extreme weather events linked to climate change) as key issues throughout the reports.	Comment noted. ' Taking into account the nature and scope of the plans being assessed and

Consultation Question	Section	Consultee Response	Response/Action
			the information already provided, the additional information suggested is considered outside of scope for the assessment.
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?		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.	Comment noted. 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. 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.
	Table 4.2/Appendix F	<u>Biodiversity, flora and fauna</u> • 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	Agreed. The wording of Objective 1 (Biodiversity) and Objective 3 (INNS) and corresponding guide

Consultation Question	Section	Consultee Response	Response/Action
		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.	questions will be revised to reflect these comments.
		<u>Geology, land use and soils</u> • 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.	Comment noted. An additional guide question will be added against the SEA Objective 4 for the 'Soils, Land Use and Geology' topic: *Will it avoid adverse effects on other land uses (such as forestry)?* In this way, where appropriate, wider impacts on other land-uses will considered in the relevant Environmental Report. .
	Table 4.2/Appendix F	<u>Water</u> • 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?	Comments noted. 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. The wording of Objective 1 (Biodiversity) and Objective 3 (INNS) and corresponding guide questions will be revised to include 'restoration', to

Consultation Question	Section	Consultee Response	Response/Action
		• These questions would benefit from the inclusion of lakes and wetlands. • Flooding should also be considered as a key ecosystem function of rivers.	ensure, where relevant effects are identified, described and assessed. These issues will be considered in the HRA and the WFD report. Contribution to the achievement of WFD objectives is already specifically reflected in the guide questions for Objective 6 (Water Quality. 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. Comment noted.
	Table 4.2/Appendix F	<u>Air quality</u> • Please see comments from question 2 on air quality for suggested amendment.	Comment noted.
	Table 4.2/Appendix F	<u>Climatic factors</u> • 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.	Comment noted. This guide question already includes reference to impacts on flood risk and water quality. No change.
	Table 4.2/Appendix F	<u>Population and human health</u> • 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.	Comment noted. 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*

Consultation Question	Section	Consultee Response	Response/Action
			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.
	Table 4.2/Appendix F	<u>Landscape</u> • 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'.	Agreed. The wording of the first guide question under Objective 17 (Landscape) has been amended to read: *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?*

Table B.5 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	Natural England applauds the very thorough consideration of plans and programmes that underpin it's plan. Some additional plans that may be relevant: 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. The Land Drainage Act 1991 – ground water levels. The Conservation of Habitats and Species Regulations 2017 – current transposed directive in the UK of The Habitats Directive 1992. The Conservation (Natural Habitats, &c.) Regulations 1994 – imposed a duty on the IDB to develop WLMP for SSSI sites. The Nitrate Pollution Prevention Regulations 2015 Agriculture Act 2020 – changes to farm subsidies could have a significant impact on the farming industry & thus water usage.	Comment noted. The following additional plans and programmes will be included in the Environmental Report: • The Land Drainage Act 1991 • The Conservation (Natural Habitats, &c.) Regulations 1994 • The Nitrate Pollution Prevention Regulations 2015 • The Agriculture Act 2020 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 and in consequence, it is not proposed to include reference to the 1994 regulations. 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. 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.
		We would like to see the key objectives for the Governments	Comment noted.

Consultation Question	Section	Consultee Response	Response/Action
		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.	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. '*Depletion and pollution of* groundwater' is considered to be addressed in the revised key issues included under the water quality topic *'The need to maintain the quantity and quality of groundwater resources taking into account WFD objectives'* 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 rivers into drains, and historic land drainage acts.	Comment noted. The key issues summarised in Table 3.1 relate to the scope of the WRMPs and the assessment. The issues 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	Comments noted. 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

Consultation Question	Section	Consultee Response	Response/Action
		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.	ecosystem services they provide' explicitly seeks to address many of the wide-ranging issues highlighted. 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.
	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 synergistic impacts of schemes but also the multiple benefits from nature-based solutions.	Comment noted. 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; and the inter-relationship between the issues." 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. 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.
Q3. Do you agree with the proposed	Table 4.2/Appendix F	Table 4.2 – Topic. Biodiversity, Flora and Fauna – bullet point 10 references as an example	Comment noted.

Consultation Question	Section	Consultee Response	Response/Action
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?		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?	The following guide question will be added under Objective 2 of the assessment framework: *Will it provide opportunities for climate adaptation and protect the climate resilience of vulnerable and priority sites?*
	?	Table 4.1 – Topic. Water Quality - Highlight the issues of emerging substances (PCPs) & plastic pollution & knowledge gaps within this area.	Comment noted. 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.
	Appendix F	Few semi-quantitative or quantitate 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.	Comment noted. 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. 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 (AQMAs) 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.

Consultation Question	Section	Consultee Response	Response/Action
			These will be set out in the relevant Environmental Reports.

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) *The Bonn Convention on the Conservation of Migratory Species of Wild Animals*	
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. 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. Overarching objectives set for the Parties are: • 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. Setting targets is the responsibility of member states.	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. The SEA assessment framework should include biodiversity, incorporating the importance of conserving migratory species.
Council of Europe (1979) *The Convention on the Conservation of European Wildlife and Natural Habitats (The Bern Convention)*	
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. The principal objectives are: • 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. Targets for Contracting Parties are: • 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;	The WRMP should take into account the habitats and species that have been identified under the Convention, and should include provision for the preservation, protection and improvement of the quality of the environment as appropriate. The SEA assessment framework should incorporate the conservation provisions of the Convention particularly the protection of wild flora, fauna and natural habitats.

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**
Promoting education and disseminating general information on the need to conserve species of wild flora and fauna and their habitats.	
Council of Europe (1985) *The Granada Convention for the Protection of the Architectural Heritage of Europe*	
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.	The SEA assessment framework should include an objective on the conservation and enhancement of heritage and decision making criteria on architectural heritage.
Council of Europe (1992) *Convention on the Protection of Archaeological Heritage (The Valetta Convention)*	
Agreement that the conservation and enhancement of an archaeological heritage is one of the goals of urban and regional planning policy. It is concerned in particular with the need for co-operation between archaeologists and planers to ensure optimum conservation of archaeological heritage.	The SEA assessment framework should include an objective on the conservation and enhancement of heritage and decision making criteria on archaeological heritage.
Council of Europe (2000), *The European Landscape Convention (The Florence Convention)* (became binding March 2007)	
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. The aims of the Convention are to promote landscape protection, management and planning, and to organise European co-operation on landscape issues. 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.	The WRMP should take landscape into account. The SEA assessment framework should include an objective on landscape.
Council of Europe (2003) *European Soils Charter*	
Sets out common principles for protecting soils across the European Union area.	The WRMP should take soils into account. The SEA assessment framework should include an objective on soils.
European Commission (1991) *The Nitrates Directive 91/676/EEC*	
The Nitrates Directive is designed to reduce water pollution caused by nitrate from agriculture. The directive requires Defra and the Welsh Government to identify surface or ground waters that are, or could be high in nitrate from agricultural sources. 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.	The WRMP should be consistent with the aim to reduce water pollution caused by nitrates from agriculture. The SEA assessment framework should include water quality.

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	**Relationships and Influences on the WRMP and the SEA**
European Commission (1991) *Urban Waste Water Treatment Directive 1991/271/EEC*	
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.	The WRMP will need to reflect the guidelines and legislation set out in the directive. The SEA assessment framework should include water quality.
European Commission (1992) *The Habitats Directive 1992/43/EEC*	
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. 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.	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. The SEA assessment framework should incorporate sites protected for their nature conservation importance.
European Commission (1998) *Drinking Water Directive 1998/83/EC*	
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. Standards constitute legal limits. Sets limits for microbiological and chemical parameters in drinking water. Also gives indicator parameters.	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. The SEA assessment should consider the effects on water and human health.
European Commission (2000) *The Water Framework Directive 2000/60/EC*	
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: • 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;	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.

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	**Relationships and Influences on the WRMP and the SEA**
• Promote sustainable water use based on a long-term protection of available water resources; • Enhance protection and improvement of the aquatic environment, inter alias, 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. Key targets and indicators relevant to the WRMP and SEA are: • Achievement of good ecological status and good surface water chemical status by 2015 unless alternative objectives have been identified; • 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.	The SEA assessment framework should include water quality, water resources, sustainable water use, and biodiversity.
European Commission (1999) *Directive on the Landfill of Waste 99/31/EC*	
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. 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 waste, by introducing stringent technical requirements for waste and landfills. 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.	The WRMP should take the effects on waste to landfill into account. The SEA assessment should consider the effects on water, soil, air, human health and waste
European Commission (2001) *Directive on the Assessment of the Effects of Certain Plans and Programmes on the Environment (The SEA Directive) 2001/42/EC*	
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". 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.	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.
European Commission (2002) *Directive on the Energy Performance of Buildings 2002/91/EC*	

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	**Relationships and Influences on the WRMP and the SEA**
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 *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.* The Directive highlights how the residential and tertiary sectors, the majority of which are based in buildings, accounts for 40% of EU energy consumption.	The SEA should highlight any opportunities for new buildings associated with the WRMP to contribute to improved energy performance.
European Commission (2002) *The Environment Noise Directive (END) 2002/49/EC*	
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. The underlying principles of the Directive are similar to those underpinning other overarching environment policies (such as air or waste), i.e.: • 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. • 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.	The WRMP will need to have regard to the requirements of the END. The SEA assessment framework should include for the protection against excessive noise.
European Commission (2004) *Environmental Liability Directive 2004/35/EC*	
The Directive establishes a framework for environmental liability based on the "polluter pays" principle, with a view to preventing and remedying environmental damage.	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.
European Commission (2005) *Thematic Strategy on Air Pollution*	
This strategy supplements legislation. It sets out objectives for air pollution and proposes measures for achieving them by 2020.	The WRMP should be in accordance with the requirements of the strategy.

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	**Relationships and Influences on the WRMP and the SEA**
	The SEA should take into account the need to improve air quality.
European Commission (2006) *The Bathing Waters Directive 2006/7/EC*	
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. The Directive is intended to: • 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. 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. 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. 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.	The WRMP will need to comply with set limits. The SEA assessment should include a guide question relating to the effects of options on the water quality at designated bathing waters.
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*	
The Directive establishes: • 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;	The SEA should take account of the need to maintain or enhance the quality of habitats and biodiversity.

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	**Relationships and Influences on the WRMP and the SEA**
• Minimum measures to be taken in response to suspected or established cases of certain diseases in aquatic animals.	
European Commission (2006) *Directive on the protection of groundwater against pollution and deterioration 2006/118EC*	
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.	The SEA should take account of the need to maintain, protect and improve water quality across the WRMP area.
European Commission (2006) *Fresh Water Fish Directive 2006/44/EC*	
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.	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.
European Commission (2006) *Mining Waste Directive 2006/21/EC*	
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.	The WRMP should have regard to the aim to avoid adverse effects from extractive waste. The SEA assessment framework should include consideration of waste.
European Commission (2006) *Thematic Strategy for Soil Protection*	
The *Thematic Strategy for Soil Protection* consists of a Communication from the Commission to the other European Institutions, a proposal for a framework Directive (a European law), and an Impact Assessment. 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: (1) Preventing further soil degradation and preserving its functions: • when soil is used and its functions are exploited, action has to be taken on soil use and management patterns; and • when soil acts as a sink/receptor of the effects of human activities or environmental phenomena, action has to be taken at source. (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. 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.	The WRMP should take potential effects on soil into account. The SEA assessment framework should include soils.
European Commission (2007) *The Eel Directive 2007/1100/EC*	

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	**Relationships and Influences on the WRMP and the SEA**
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.	The WRMP should ensure that there are no adverse impacts on eel as a result of water resource measures taken.
European Commission (2007) *Floods Directive 2007/60/EC*	
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.	The WRMP should take account of the flood risk management plans. The SEA assessment framework should include flood risk.
European Commission (2008) *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)*	
The Directive: • 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.	The WRMP should contribute towards achieving air quality standards set out in the Directive. The SEA assessment framework should include air quality.
European commission (2008) *Directive on Waste* (Directive 75/442/EEC, 2006/12/EC 2008/98/EC as amended)	
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: • 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; • Movements of waste should be reduced; • Ensure a high level of protection and effective control;	The WRMP should seek to ensure the protection of human health and the environment in relation to waste management. The SEA assessment should include objectives on the protection of human health and the environment.

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	**Relationships and Influences on the WRMP and the SEA**
• 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) *Environmental Quality Standards Directive 2008/105/EC*	
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. 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.	The assessment framework should include assessment criteria relating to water quality.
European Commission (2008) *Marine Strategy Framework Directive 2008/56/EC*	
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 subregions, with UK waters lying in two of these (the Greater North Sea and the Celtic Seas). 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: • 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. The Directive also requires Marine Protected Areas (MPAs) to be established to support the achievement of GES.	The SEA assessment framework should incorporate assessment criteria relating to the quality of the marine environment.
European Commission (2009) *Directive on the Conservation of Wild Birds 2009/147/EC* (codified version of Council Directive 79/409/EEC as amended)	
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: • 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 WRMP should seek to protect and enhance biodiversity, particularly designated sites. The SEA assessment framework should include objectives,

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	**Relationships and Influences on the WRMP and the SEA**
• 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 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). • 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). Requirements to ensure that introduction of non-native birds do not threatened other biodiversity (Article 11).	indicators and targets that cover biodiversity.
European Commission (2009) *Promotion of the use of energy from renewable sources Directive 2009/28/EC*	
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. 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 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. 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%.	The WRMP should seek to contribute towards increasing the proportion of energy from renewable energy sources. The SEA assessment framework should include consideration of use of energy from renewable energy sources.
European Commission (2010) *Energy 2020 - A Strategy for Competitive, Sustainable and Secure Energy*	
EU energy and climate goals have been incorporated into the Europe 2020 Strategy for smart, sustainable and inclusive growth. The energy strategy includes five priorities for Europe: 1. Achieving an energy-efficient Europe; 2. Building a truly pan-European integrated energy market; 3. Empowering consumers and achieving the highest level of safety and security; 4. Extending Europe's leadership in energy technology and innovation;	The SEA assessment framework should include criteria relating to energy where appropriate

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	**Relationships and Influences on the WRMP and the SEA**
5. Strengthening the external dimension of the EU energy market. Energy 2020 is part of Resource-Efficient Europe, one of the seven key initiatives of Europe 2020.	
European Commission (2010) *Europe 2020 - A Strategy for Smart, Sustainable and Inclusive Growth*	
Europe 2020 is the EU's ten-year growth strategy. It aims to change the EU's growth model and create the conditions for growth that is smarter, more sustainable and more inclusive. It contains seven 'flagship initiatives' to provide a framework for innovation, the digital economy, employment, youth, industrial policy, poverty, and resource efficiency. There are also five key target areas for the EU to achieve by 2020: 1. Employment: 75% of the 20-64-year-olds to be employed. 2. R&D: 3% of the EU's GDP to be invested in R&D. 3. Climate change and energy sustainability: greenhouse gas emissions 20% (or even 30%, if the conditions are right) lower than 1990; 20% of energy from renewable; 20% increase in energy efficiency. 4. Education: reducing the rates of early school leaving below 10%; at least 40% of 30-34– year-olds completing third level education. Fighting poverty and social exclusion: at least 20 million fewer people in or at risk of poverty and social exclusion.	The SEA assessment framework should include criteria relating to employment, R&D, climate change and poverty where relevant.
European Commission (2010) *Industrial Emissions Directive (integrated pollution prevention and control) 2010/75/EU*	
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.	The SEA assessment framework should include criteria that ensure the protection of the environment through the prevention of pollution.
European Commission (2011) *Directives on Environmental Impact Assessment* (Codified Directive 2011/92/EU and Revised Directive 2014/52/EU)	
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.	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.
European Commission (2011) *A Resource- Efficient Europe- Flagship Initiative Under the Europe 2020 Strategy*, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions (COM 2011/21)	
This flagship initiative aims to create a framework for policies to support the shift towards a resource-efficient and low-carbon economy which will help to: • Boost economic performance while reducing resource use;	The WRMP should seek opportunities to ensure reductions in resource use. The SEA framework should include

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	**Relationships and Influences on the WRMP and the SEA**
• Identify and create new opportunities for economic growth and greater innovation and boost the EU's competitiveness; • Ensure security of supply of essential resources; and • Fight against climate change and limit the environmental impacts of resource use.	objectives relating to resource use.
European Commission (2011) *A Roadmap for Moving to a Competitive Low Carbon Economy in 2050*	
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. 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.	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. The SEA should have an objective relating to the need to reduce greenhouse gas emissions.
European Commission (2012) *A Blueprint to Safeguard Europe's Water Resources*	
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.	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
European Commission (2012) *Energy Efficiency Directive 2012/27/EU as amended by Directive (EU) 2018/2002*	
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. Specific measures relate to: • 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. The new amending Directive on Energy Efficiency (2018/2002) was agreed to update the policy framework to 2030 and beyond.	The WRMP should seek to contribute towards targets for energy efficiency. The SEA assessment framework should include consideration of energy consumption and efficiency.

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Purpose of the Document, including Objectives and Targets relevant to the WRMP and SEA	**Relationships and Influences on the WRMP and the SEA**
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. 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. 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 Other elements in the amended directive include: • 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) *Towards Social Investment for Growth and Cohesion 2014-2020*	
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.	The WRMP should have regard of the Europe 2020 targets.
European Commission (2014) *The EU Regulation on invasive alien (non-native) species 1143/2014/EU*	
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.	The SEA assessment framework should include guide questions relating to invasive species
European Commission (2014) *A Policy Framework for Climate and Energy in the Period from 2020 to 2030*	
The 2030 climate and energy framework was adopted in 2014 and builds on the 2020 targets. It sets three key targets for 2030: • 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.	The WRMP should support longer term targets for reducing greenhouse gas emissions, increasing renewable energy and energy efficiency. The SEA assessment framework should include the consideration

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The greenhouse gas emissions and renewable energy targets are binding, while the energy efficiency target will be reviewed in 2020.	of energy and greenhouse gas emissions.
European Commission (2015) *'Closing the loop - An EU Action Plan for the Circular Economy' policy package*	
This document sets out actions to implement the European Commission's long-term vision of significantly reducing waste landfilling and increasing recycling.	The SEA should consider opportunities for the WRMP to contribute/enable the circular economy. The SEA assessment framework should contain an objective/guide question relating to material/resource use and waste.
European Commission (2016) *National Emissions reduction Commitments (NEC) Directive 2016/2284/EU*	
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). 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. The directive introduces a number of new reporting requirements for Member States. These include annual information on emissions of a number of pollutants: • the five main air pollutants NOx, NMVOCs, SO2, NH3 and PM2.5 as well as carbon monoxide (CO); • in addition to PM2.5, 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); persistent organic pollutants (POPs) including selected polycyclic aromatic hydrocarbons (PAHs), dioxins and furans, polychlorinated biphenyls (PCBs) and hexachlorobenzene (HCB).	The WRMP should seek to reduce the emissions of the pollutants listed under the directive, where possible. The SEA assessment framework should include an objective and guide questions relating to air pollution/pollutant emissions.
European Commission (2020) *Biodiversity strategy for 2030*	
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. The strategy contains specific commitments and actions to be delivered by 2030. • 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.	The WRMP should seek to protect and enhance biodiversity, particularly designated sites. The SEA assessment framework should include objectives, indicators and targets that cover biodiversity.
European Commission (2022) *Eighth Environmental Action Programme*	

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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. 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.	The SEA assessment framework should, where relevant, reflect the objectives of the proposal for the programme.
European Commission (2021) *EU strategy on adaptation to climate change*	
The strategy sets out how the European Union can adapt to the unavoidable impacts of climate change and become climate resilient by 2050. The Strategy has four principle objectives: • to make adaptation smarter; • to make adaption swifter; • to make adaption more systemic, and; • to step up international action on adaptation to climate change.	The WRMP should seek to contribute towards climate change adaption. The SEA assessment framework should include an objective relating to climate change and consideration of climate change adaption.
ICOMOS (2011) *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties*	
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 underpins the whole World Heritage Convention and all activities associated with properties inscribed on the List.	The SEA Framework should include an objective on the conservation and enhancement of heritage.
IUCN (2013) *World Heritage Advice Note: Environmental Assessment*	
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.	The WRMP should seek to contribute towards the protection of World Heritage Sites. 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.
UNEP (1973) *Convention on International Trade in Endangered Species of Wild Fauna and Flora*	
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	The WRMP should seek to ensure the protection of vulnerable species.

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are listed in three Appendices according to the degree of protection needed, with differing controls for each.	The SEA assessment framework should incorporate the protection of animal and plant species.
UNESCO (1971) *Ramsar Convention on Wetlands of International Importance*	
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-operation for the conservation and wise use of wetlands and their resources, as a means to achieving sustainable development throughout the world. 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. '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). 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: • 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 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.	The WRMP should ensure the protection and wise use of wetlands. The SEA assessment framework should incorporate the protection of wetland sites listed under the Ramsar convention.
UNESCO (1972) *Convention Concerning the Protection of the World Cultural and Natural Heritage*	
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: • Ensure that measures are taken for the protection, conservation and presentation of cultural and natural heritage • 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	The WRMP should seek to protect cultural heritage sites. The SEA assessment framework should include an objective on heritage and archaeological issues.
UNESCO (2001) *Convention on the Protection of Underwater Cultural Heritage*	
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.	The WRMP should seek to protect cultural heritage sites. The SEA assessment framework should include an objective relating to cultural heritage.
United Nations (1992) *Convention on Biological Diversity (The Rio Convention)*	

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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.	The WRMP should seek to protect and enhance biodiversity. The SEA assessment framework should include protection and enhancement of biodiversity
United Nations (1997) *The Kyoto Protocol to the UN Framework Convention on Climate Change*	
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 2020 (the Kyoto second commitment period), pending ratification of the Doha Agreement.	The WRMP should aim to reduce greenhouse gas emissions. The SEA assessment framework should include objectives/guide questions related to 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)*	
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. 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.	The development of the WRMP needs to be a transparent process. 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.
United Nations (2002) *The World Summit on Sustainable Development*	
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. The implementation plan sets out actions to achieve sustainable development such as poverty eradication, changing unsustainable patterns of consumption and production, protecting and managing the natural resource base of economic and social development, sustainable development in a globalizing world and health and sustainable development. Sustainable development in England is delivered through the sustainable development strategy, Securing the Future, and in Wales through One Wales: One Planet, The Sustainable Development Scheme of the Welsh Assembly Government.	The WRMP should promote sustainable development. The SEA should help to deliver sustainable development through the balanced assessment of the WRMP.
United Nations (2016) *The Paris Agreement*	
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	The WRMP should aim to reduce greenhouse gas emissions.

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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.	The SEA assessment framework should include greenhouse gas emissions.
United Nations Framework Convention on Climate Change (UNFCCC) (2011) *The Cancun Agreements*	
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. 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. The Cancun Agreements' main objectives cover: • Mitigation • Transparency of actions • Technology • Finance • Adaptation • Forests • Capacity building	The WRMP should aim to reduce greenhouse gas emissions and support climate change mitigation and adaption. The SEA assessment framework should include greenhouse gas emissions and climate change.
World Commission on Environment and Development (1987) *Our Common Future (The Brundtland Report)*	
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: • 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.	The SEA and WRMP should seek to contribute to sustainable development.
World Health Organisation (2004) *Children's Environment and Health Action Plan for Europe*	
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:	The WRMP should have regard to the requirements of the Action Plan.

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• primary prevention, i.e. policies, programmes and plans aimed at improving the state of the physical environment (air, water, soil, noise), in particular through the integration of children's needs into housing, transport, infrastructure and planning; • 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.	The SEA assessment framework should include for the protection of human health and vulnerable members of the community.

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BEIS (2011*) National Policy Statements for Energy Infrastructure*	
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: 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). 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. The NPSs reiterate and are underpinned by the target to cut greenhouse gas emissions by at least 80% by 2050, compared to 1990 levels.	The WRMP may need to consider the potential impact of major energy proposals water resources in the plan area. The SEA should consider the cumulative effects of the WRMP and any major energy proposals.
BEIS (2013) *UK Renewable Energy Roadmap*	
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. 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. 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	The WRMP should contribute towards increasing the proportion of energy from renewable energy sources. The SEA assessment framework should include consideration of the use of energy from renewable energy sources.
BEIS (2015) *Future Electricity Networks*	

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Overall aims: • ensure the timely, cost-effective and reliable connection of electricity generation to demand • support a low-carbon, secure and affordable national system Specific objectives for future electricity networks: • 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	The WRMP should consider if it can support the delivery of the aims of the strategy. The SEA should include objectives and guide questions relating to energy use.
BEIS (2020) *Energy white paper: Powering our net zero future*	
The Energy White Paper sets out how the UK will clean up its energy system and reach net zero emissions by 2050, building on the Prime Minister's ten-point plan for a green industrial revolution The paper addresses the transformation of our energy system, promoting high-skilled jobs and clean, resilient economic growth as we deliver net-zero emissions by 2050.	Options from the WRMP should consider utilisation of green energy. The SEA should include objectives and guide questions relating to energy use and carbon emissions.
BEIS (2021) *Heat and buildings strategy*	
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. 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. 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.	The WRMP should consider the impact of water supply and usage on carbon emissions from buildings. The SEA should include objectives and guide questions relating to energy use and carbon emissions.
BEIS (2021) *Net Zero Strategy: Build Back Greener*	
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).	The WRMP should consider if it can support the delivery of the aims of the strategy. The SEA should include objectives and guide questions relating to energy use and carbon emissions.
Cadw, CCW and ICOMOS (UK) (International Council on Monuments and Sites) (2001) *Register of Landscapes of Historic Importance*	
Two-volume Register of Landscapes of Historic Interest in Wales. This advisory and non-statutory document highlights what are considered to be the best examples of different types	The WRMP and SEA should consider and take account of any

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of historic landscape in Wales and was the first step towards raising the profile of historic landscapes in Wales.	potential impacts to heritage landscapes and assets.
Canal & River Trust (2015) *Living Waterways Transform Places & Enrich Lives: Our 10 Year Strategy*	
The strategy sets out goals for the organisation for the next ten years. These are themed under: • Waterways, including: '*To encourage and grow the number of people boating, using and enjoying the waterways*' and '*To look after the heritage and wildlife on our canals and rivers for people to enjoy now and in the future'*; • Place, including: '*To provide havens for people to escape to away from the pressures of modern life*' and '*Enhance wildlife habitats and the natural landscape'*; • Prosperity, including: '*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'*; and • People, including: '*Communities to feel ownership of, and get involved with caring for, their local waterway*' and '*To offer something for everyone to enjoy'*. These are in addition to goals relating to Influence and Resources.	The WRMP should avoid causing detrimental effects on canals and rivers. The SEA assessment framework should include objectives which take into account the goals of the strategy and the protection of rivers and canals.
Canal and River Trust (2015) *Water Resources Strategy 2015 – 2020*	
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.	The WRMP should take into consideration the potential impact on the supply of water to the inland waterway network within the DCWW operational area. The SEA should consider the effects of the WRMP on the long-term supply of water to the canal network.
Centre for Environment Fisheries and Aquaculture Science and Natural Resources Wales (2021) Assessment of Salmon Stocks and Fisheries in England and Wales 2020	
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.	The WRMP should consider the information on salmon stocks and fisheries and the potential effects of WRMP measures on stocks and fisheries. The SEA should consider the effects of the WRMP on salmon stocks and fisheries and should include objectives and guide questions relating to the

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	protection of salmon stocks and fisheries.
Climate Change Committee (2020) *The path to Net Zero and progress on reducing emissions in Wales*	
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. One of the reports looks into how Wales is progressing against previous requirements to reduce its carbon footprint. Key to achieving these targets is: • Adopting low-carbon solutions; • Expanding low-carbon energy supplies; • Reduce demand for high-carbon activities; and • Transforming land away from agriculture.	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. The SEA should have an objective relating to sustainable development that references the need to reduce greenhouse gas emissions.
Countryside Council for Wales (CCW) (2003) *Priority Habitats of Wales*	
Provides information about Wales' priority habitats, as identified by UK Biodiversity Action Plans.	The WRMP and SEA objectives will need to consider the protection of priority habitats.
Department for Culture, Media and Sport (DCMS) (2001) *The Historic Environment – A Force for the Future*	
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) *Heritage Protection for the 21st Century*	
The document has three core principles: • 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) *Scheduled Monuments & Nationally Important but Non-Scheduled Monuments*	
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) *The Culture White Paper*	
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:	The WRMP should seek to protect cultural heritage assets.

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• everyone should enjoy the opportunities culture offers, no matter where they start in life; • the riches of our culture should benefit communities across the country; and • the power of culture can increase our international standing. The white paper includes objectives relating to the development of the historic environment sector, and the protection of world heritage.	The SEA assessment framework should include an objective relating to cultural heritage.
Defra (2004) *Rural Strategy*	
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.	The implementation of certain Plan options may have an effect upon rural communities and the countryside. The SEA should also seek to ensure that the quality of the region's landscapes, natural resources and biodiversity are maintained or enhanced.
Defra (2005) *Making space for water: taking forward a new government strategy for flood and coastal erosion risk management in England*	
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. The main objectives of the strategy are: • 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. There are no formal targets or indicators.	The WRMP should seek to support the objectives of the strategy, where possible. The SEA should seek to ensure that coastal erosion in the region is not adversely affected by the implementation of the WRMP.
Defra (2006) *Shoreline Management Plan Guidance*	
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. The guidance includes the following objectives: • 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;	The WRMP should seek to align with the objectives of the guidance where appropriate. The SEA should take into account the effects of the WRMP on areas with a SMP.

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• 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.	
Defra (2007) *Conserving Biodiversity in a Changing Climate: Guidance on Building Capacity to Adapt*	
The guiding principles described in this document summarise current thinking on how to reduce the impacts of climate change on biodiversity and how to adapt existing plans and projects in the light of climate change. The guidance is intended to inform implementation of the UK Biodiversity Action Plan, taking account of climate change is relevant to the fulfilment of many international agreements and obligations affecting the UK.	The SEA must consider the impacts on biodiversity whilst also taking into account the potential for future climate change.
Defra (2007) *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland*	
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.	The WRMP should take account of air quality objectives in the strategy. The SEA should include objectives and guide questions relating to air quality, human health and environmental protection.
Defra (2009) *Safeguarding our Soils – A Strategy for England*	
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. 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.	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) *Air Pollution: Action in a Changing Climate*	
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. 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.	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. The SEA should include guide questions relating to the effects of options on human health and the environment.
Defra (2010) *Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network*	
This independent review of England's wildlife sites and the connections between them sets objectives and recommendations to help achieve a healthy natural environment that will allow our plants and animals to thrive.	The SEA should seek to maintain and enhance the quality of

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	habitats 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.	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: • Provisioning Services: Freshwater • Provisioning Services: Biodiversity • Regulating Services: Water Regulation • Cultural services: Recreation and ecotourism • Cultural services: Cultural heritage values • Cultural services: Aesthetic 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. 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).
Defra (2011) *Water for Life - Water White Paper*	
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. 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.	The WRMP should ensure that future water resources are resilient, efficient and customer focused The SEA should consider resilience to climate change and should consider the human

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	environment to ensure the WRMP remains customer focused.
Defra (2011) *Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services*	
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. The strategy sets 20 targets across 5 strategic goals: • 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 Enhance implementation through participatory planning, knowledge management and capacity building.	The WRMP should contribute towards meeting the targets and objectives within the strategy where possible. The SEA should include objectives to improve status of biodiversity and enhance benefits of biodiversity and its ecosystem services, and reduce pressures on ecosystems.
Defra (2011) *Mainstreaming Sustainable Development*	
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. 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.	The WRMP should seek to be aligned with the principles of sustainable development. The SEA assessment framework should include objectives relating to the principles of sustainable development, including communities, economy and environment.
Defra (2011) *The Natural Choice: Securing the Value of Nature*	
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 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.	Ecosystem services may include: Provisioning Services: Biodiversity Regulating Services: Water Regulation Cultural services: Recreation and ecotourism Cultural services: Cultural heritage values Cultural services: Aesthetic. The SEA should ensure the WRMP meets provisioning services in the least damaging way through WRMP options.
Defra (2011) *Natural Environment White Paper*	
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: • improve the quality of the natural environment across England; • move to a net gain in the value of nature;	The WRMP should reflect the Government's policy intent set out in the White Paper. The SEA assessment framework should include objectives, indicators and targets that reflect

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• 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. 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).	the Government's policy intent set out in the White Paper.
Defra (2012) *National Policy Statement for Waste Water*	
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 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 DCWW operational area or neighbouring areas.	The WRMP should be compliant with the policies set out within 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 DCWW area. 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 DCWW area.
Defra (2013) *The National Adaptation Programme – Making the Country Resilient to a Changing Climate*	
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. It sets out a number of objectives, including: • 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. To ensure infrastructure is located, planned, designed and maintained to be resilient to climate change, including increasingly extreme weather events.	The WRMP should ensure that proposals are resilient to the effects of climate change. Where possible, options should be considered that enhance resilience. The SEA should consider the effects of options on climate change resilience.
Defra (2013) *What nature can do for you*	
This guide is designed to help policy makers across Government to understand: • 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,	The WRMP should consider how to work with natural systems to provide efficient solutions with multiple benefits where possible,

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• How you can work with natural systems to help you deliver efficiently in the future. The guide is focussed on helping policy makers to put this into practice and includes: • 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.	aiming to implement an ecosystems approach. The SEA should consider the effects of the WRMP on nature.
Defra (2015) *The government's response to the Natural Capital Committee's Third State of Natural Capital report*	
This provides a number of recommendations such as: Agreement for the development of a 25 year plan for a healthy natural economy. This includes helping organisations understand the 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. Assigning institutional responsibility for monitoring the state of natural capital. Organisations that manage land and water assets should create a register of natural capital for which they are responsible.	Outputs from the SEA process will help to inform any future potential development by DCWW 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.
Defra (2015) *The Great Britain Invasive Non-native Species Strategy*	
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: • 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. The strategy covers the period 2015 to 2020.	The WRMP should seek to avoid the spread of invasive species. The SEA should consider the effects of the WRMP on biodiversity.
Defra (2016) *Guiding principles for water resources planning for water companies operating wholly or mainly in England*	
The document sets out the key policy priorities the government expects water resources management plans (WRMP) to address. The four key principles are: • Take a long term, strategic approach to protecting and enhancing resilient water supplies; • Consider every option to meet future public water supply needs; • Protect and enhance our environment, acting collaboratively; and • Promote efficient water use and reduce leakage.	The WRMP should consider the guiding principles.

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Defra (2017) *Air Quality Plan for Nitrogen Dioxide (NO2) in UK*	
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.	The WRMP should have regard to the air quality plans and specific local measures. The SEA should consider the effects of the WRMP on air quality.
Defra (2018) *The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting*	
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.	The WRMP should ensure that proposals are resilient to the effects of climate change. Where possible, options should be considered that enhance resilience. The SEA should consider the potential to include adaptive measures for climate change.
Defra (2020) *Drought Plan Direction 2020*	
Sets out the timescales for water companies to develop and consult on Drought Plans.	The WRMP SEA will take account of the statutory requirements of this Direction, where relevant.
Defra (2020) *National food strategy for England*	
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. The report makes recommendations for government, which has promised to respond formally with a White Paper within 6 months.	The implementation of the WRMP may have some indirect links with the food industry, through ensuring the availability of water for food based activities. The SEA should also seek to promote the most effective use of the region's natural resources
Defra (2020) *Natural Capital Committee's Seventh Annual Report*	
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, The Natural Choice. 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.	Outputs from the SEA process will help to inform any future potential development by United Utilities 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.
Defra (2020) *The Path to Sustainable Farming: An Agricultural Transition Plan 2021 to 2024*	

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The path to sustainable farming is aiming to achieve: • 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	The implementation of the WRMP may have some indirect links with the food industry, through ensuring the availability of water for food based activities. The SEA should also seek to promote the most effective use of the region's natural resources, including soil, biodiversity and energy resources.
Defra (2020) *Water abstraction plan: Environment*	
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. The plan states that the current approach to managing abstraction has three main issues: • 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. 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: • 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 develop local solutions to existing pressures and to prepare for the future. These local solutions will: o protect the environment by changing licences to better reflect water availability in catchments and reduce the impact of abstraction o improve access to water by introducing more flexible conditions that support water storage, water trading and efficient use • 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 The supplementary *Environment* provides further information on the work to address unsustainable abstraction set out in the abstraction plan. The supplementary *Catchment Focus* 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. The supplementary *Abstraction Licencing Service* document provides further information on the planned reforms to the abstraction licensing service set out in the abstraction plan.	The WRMP should consider if it can help to address the issues set out in the plan. The SEA should consider the effects of the WRMP on the environment, climate change and the sustainability of options.
Defra (2021) *Waste Management Plan for England*	

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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.	The WRMP may involve the generation of waste (e.g. either through construction requirements or operation of options). The SEA should seek to enhance recycling and minimise the amount of waste going to landfill.
Defra and the Environment Agency (2018) *Resources and Waste Strategy for England*	
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.	The implementation of the WRMP may have an influence upon United Utilities' 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.
Defra, Environment Agency, Natural England, Forestry Commission England (2016) *Creating a great place for living*	
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: • 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; An outstanding organisation – an organisation striving to be the best, focused on outcomes and constantly challenging itself.	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).
Defra and the Law Commission (2018) *Draft National Policy Statement for Water Resources Infrastructure*	
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. 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.	The draft NPS will influence implementation of large scale options identified by the WRMP. The SEA should consider the impacts of these large scale options on various environmental criteria.
Defra and Welsh Government (2014) *River Basin Planning Guidance*	
Aims to give guidance on practical implementation of the Water Framework Directive (WFD).	The WRMP should take into account the contents of this statutory guidance

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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.	
Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2015) ***Renewable and Low Carbon Energy***	
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.	The WRMP should, where possible, contribute towards increasing the proportion of energy from renewable energy sources. The SEA assessment framework should include consideration of the use of energy from renewable energy sources.
Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2015) ***Strategic environmental assessment and sustainability appraisal***	
This guidance provides clarity on the need for sustainability appraisal and strategic environmental assessment in relation to plan development. 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 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.	The SEA should consider the environmental effects of the WRMP.
Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local (2021) ***National Planning Policy Framework 2021***	
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. 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: 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).	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.

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Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local (various) Planning Practice Guidance	
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: • 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.	The WRMP should take into consideration guidance set out in the PPG insofar as it relates to the area covered by the WRMP.
Department for Transport (2022) *UK Electric Vehicle Infrastructure Strategy*	
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: • 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	The WRMP should consider use of zero emission vehicles when delivering options where applicable. The SEA should also promote the use of renewable energy, where relevant.
Environment Agency (2004) *Catchment Flood Management Plans: Guidelines – Volume 1 Policy*	
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: • 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.	The WRMP should seek to support the aims of the plan. The SEA should consider how the WRMP may affect flood risk across the region.
Environment Agency (2007) *Soil: A Precious Resource*	
The soil strategy identifies the Environment Agency's priorities, sets out their role and says what action is to be taken to protect, manage and restore soil. Damaged soil structure can lead to flooding, water pollution and can affect the landscape and archaeological features. The strategy also outlines the part managing soils can play in mitigating climate change.	The WRMP should ensure the sustainable management of soil resources.

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	SEA objectives should reflect and consider relevant priorities from the Soil: A Precious Resource publication.
Environment Agency (2008) *Better Sea Trout and Salmon Fisheries: Our Strategy for 2008-2021*	
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: 1. Self-sustaining sea trout and salmon in abundance in more rivers 2. Economic and social benefits optimised for sea trout and salmon fisheries 3. Widespread and positive partnerships, producing benefits There are twelve more detailed targets lying below these broad goals which relate to salmon and fisheries.	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. 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.
Environment Agency (2009) *Water for People and the Environment - Water Resources Strategy for England and Wales*	
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'. 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. This strategy sets out the following objectives: • 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; • 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;	The objectives for the WRMP should reflect these objectives, where relevant. The SEA should seek to promote the protection and enhancement of water resources and to encourage sustainable management of the resource.

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• 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. The strategy includes a number of actions for Environment Agency and others to develop targets for water reduction and efficiency.	
Environment Agency (2010) *Water Resources Action Plan for England and Wales*	
The strategy has four main aims: • 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) *Areas of Water Stress: Final Classification*	
The report is the Environment Agency's formal advice on which areas in England are of serious water stress.	The WRMP should seek to contribute to addressing the requirements of water stressed areas. The SEA assessment framework should consider the effects of the WRMP on water resources and the associated socio- economic and environmental receptors.

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Environment Agency (2013) *Climate Change Approaches in Water Resources Planning: New Methods*	
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. The SEA should consider the effects of the WRMP on climate change
Environment Agency (2013) *Managing Water Abstraction*	
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) *Drought response: our framework for England*	
This policy paper outlines how the Environment Agency works with government, water companies and others to manage water resources during a drought in England. It does this by setting out: • 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	The WRMP should consider how drought affects different areas and how it can act to mitigate the impacts of drought. The SEA should outline the impacts of potential WRMP options on drought.
Environment Agency (2017) *Groundwater Protection Technical Guidance*	
This guidance is for planners, applicants for environmental permits and abstraction licences, and landowners concerned with the quality and quantity of groundwater. The guidance helps to understand: • inputs of substances and pollutants to groundwater • discernibility of hazardous substances • when geological formations can be determined permanently unsuitable for other purposes	The WRMP should follow the guidance where groundwaters/abstraction are concerned. The SEA should consider the impact of the WRMP on groundwater quality and quantity.
Environment Agency (2018) *The Environment Agency's Approach to Groundwater Protection*	
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. 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.	The WRMP should aim to protect groundwater resources and use the document to aid decision making where groundwaters are concerned. The SEA should consider the impact of the WRMP on groundwater quality and quantity.

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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. 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. 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	
Environment Agency (2020) *EA2025 creating a better place*	
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. 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: • A nation resilient to climate change • Healthy air, land and water • Green growth and a sustainable future	The SEA and the WRMP should consider the Environment Agency's priorities.
Environment Agency (2020) *Meeting our future water needs: a national framework for water resources*	
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 part of the DCWW 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: • public water supplies • agriculture • the power and industry sectors • environmental protection For the Water Resources West Region the framework estimates that additional public water supply needs between 2025 and 2050 are 639 Ml/d. 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 greater reductions in water use can be achieved or further options identified, there is potential to transfer more water to other regions. 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. The plans need to address the following: • Increasing resilience to drought	The WRMP should seek to support the achievement of the aims of the framework. The SEA should include an objective/guide question relating to water resources.

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• Greater environmental improvement • Reducing long term water usage • Reducing leakage • Reducing the use of drought permits and orders • Increasing supplies. The framework states that plans must include: • 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. 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.	
Environment Agency (2020) *National Flood and Coastal Erosion Risk Management Strategy for England*	
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. 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. 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. It has 3 long-term ambitions, underpinned by evidence about future risk and investment needs. They are: • 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.	The WRMP should be prepared in line with the strategy. The SEA framework should consider flooding and coastal erosion.
Environment Agency (2020) *Water Company Drought Plan guideline*	

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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) *Water resources planning guideline supplementary guidance – Environment and society in decision-making*	
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. This supplementary guidance sets out how the environment and society should be considered through: • 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) *Hydroecology: Integration for modern regulation*	
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) *Restoring Sustainable Abstraction Programme*	
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 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.	The WRMP should aim to maintain and implement sustainable abstraction practises. The SEA will assess the impacts of the WRMP and any associated abstraction on water quality and quantity.
Environment Agency (undated) *WFD River Basin Characterisation Project: Technical Assessment Method - River abstraction and flow regulation*	
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.	Implementation of the WRMP may impact river water quality. The SEA should seek to promote the protection and enhancement of biodiversity and river water quality across the region.
Environment Agency, Natural Resources Wales and The Water Services Regulation Authority (2021) *Water Resources Planning Guideline*	
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.	The WRMP should align with the WRMP as suggested in the guideline. The SEA should seek to ensure that water supplies and resources

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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.	are maintained or enhanced in line with the Water Resources Planning Guidelines.
English Heritage (2008) *Climate Change and the Historic Environment*	
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.	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.
English Heritage (2010) *Heritage at Risk*	
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.	The SEA should seek to protect and enhance heritage and landscape and the assessment framework should include an objective relating to cultural heritage.
Future Generations Commissioner for Wales (2020) *The Future Generations Report 2020*	
Producing a Future Generations Report every five years, which provides an assessment of the improvements public bodies should make in relation to their wellbeing objectives, is a statutory duty of the Future Generations Commissioner under the Well-being of Future Generations (Wales) Act 2015. The report includes (as required by the act): • An assessment of how public bodies can better safeguard the ability of future generations to meet their own needs; and take greater account of the long-term impact of the things they do. • A summary of evidence gathered, and activities undertaken, by the Commissioner during the reporting period. • A summary of the reviews conducted by the Commissioner; an account of any research or other study undertaken. • Any other information the Commissioner considers appropriate. This report provides advice, guidance and tools for public bodies involved in making the aspirations set out in the act a reality for people in Wales. It is also showcases actions that are taking in place in Wales and across the world.	The WRMP should consider how it can contribute to the seven well-being goals set out in the Wellbeing of Future Generations Act. The WRMP should take into consideration the recommendations of the report. The SEA Framework should reflect the seven well-being goals.
Historic England (2015) *The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning 3*	
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.	The WRMP and SEA should take account of the need to protect and enhance the setting of heritage assets.
Historic England (2016) *Historic England Advice Note 8: Sustainability Appraisal and Strategic Environmental Assessment*	
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	The SEA should consider the potential effects of the WRMP on the historic environment, particularly designated assets and

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other interested parties. It identifies the recommended list of plans, programmes and policies for review, approach to baseline review, potential sustainability issues.	their settings, and to important wetland areas with potential for paleo-environmental deposits. Historic characterisation can supplement information about designations. Sustainability issues, objectives and indicators identified in this document should be taken into account in the SEA.
The Historic Environment Group (2018) *Historic Environment and Climate Change Sector Adaption Plan*	
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.	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. The SEA assessment framework should consider the effects of the WRMP on climate change and associated effects on the historic environment.
HM Government (1975) *Salmon and Freshwater Fisheries Act 1975*	
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.
HM Government (1975) *Reservoirs Act*	
The Reservoirs Act 1975 provides a legal framework to ensure the safety against failure of large raised reservoirs. The act applies to reservoirs that hold at least 25,000 cubic metres of water above natural ground level. 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. Under the Reservoirs Act 1975 reservoir owners (undertakers) have ultimate responsibility for the safety of their reservoirs. 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).	The WRMP should consider any effects of options on reservoirs capacity, functioning and downstream flows.
HM Government (1979) *Ancient Monuments and Archaeological Areas Act 1979*	
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	The WRMP should consider if there are ways in which they can

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interest by reason of the historic, architectural, traditional, artistic or archaeological interest attaching to it".	contribute to the protection of Scheduled Monuments. The SEA assessment framework should include consideration of Scheduled Monuments.
HM Government (1981) *Wildlife and Countryside Act 1981*	
The Act makes it an offence (with exceptions) to; • Intentionally kill, injure or take any wild bird or their eggs or nests; • 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. 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.	The WRMP must ensure full compliance with the Act. The SEA should ensure a positive contribution to the wildlife within the operational area.
HM Government (1990) *Environmental Protection Act*	
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.	The WRMP must ensure compliance with the Act. The SEA assessment framework should include waste and nuisance.
HM Government (1990) *Planning (Listed Buildings and Conservation Areas) Act 1990*	
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.	The WRMP should seek to avoid adverse impacts on cultural heritage assets. The SEA assessment framework should include specific objectives relating to cultural heritage.
HM Government (1990) *Town and Country Planning Act 1990*	
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.	The WRMP must ensure full compliance with the Act. The SEA should include objectives and guide questions relating to biodiversity, land use, and landscape.
HM Government (1991 and 1994) Land Drainage Act	
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.	The WRMP should be prepared in accordance with the act.

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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. The 1994 Act amends the Land Drainage Act of 1991 in relation to the functions of internal drainage boards and local authorities.	
HM Government (1991) *Water Industry Act 1991* (as amended by the *Flood and Water Management Act 2010*)	
The Water Industry Act sets out the regulatory, competition and consumer representation frameworks for the water sector in England and Wales including the duty for water companies to prepare WRMPs.	The WRMP should be prepared in accordance with the Water Industry Act 1991, where relevant.
HM Government (1991) *Water Resources Act 1991*	
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) The Conservation (Natural Habitats, &c.) Regulations 1994	
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.	The WRMP should seek to protect European sites and species. 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.
HM Government (1994) *UK Biodiversity Action Plan*	
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: • The overall populations and natural ranges of native species and the quality and range of wildlife habitats and ecosystems; • Internationally and nationally important and threatened species, habitats and ecosystems; • Species, habitats and natural and managed ecosystems that are characteristic of Kent;	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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• 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) *Urban Waste Water Treatment (England and Wales) Regulations 1994*	
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 wate; 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.	The WRMP should reflect the requirements set out in the regulations.
HM Government (1995) *Environment Act 1995*	
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.	The WRMP must ensure compliance with the Act. The SEA assessment framework should include waste and air quality.
HM Government (2000) *The Countryside and Rights of Way (CROW) Act 2000*	
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 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.	The SEA must make sure that the Act is supported and that public rights of way and access to the countryside are maintained and where possible enhanced.
HM Government (2002) *The National Heritage Act 2002*	
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) *The Water Act 2003*	
The four broad aims of the Act are: • the sustainable use of water resources; • strengthening the voice of consumers; • a measured increase in competition; and • the promotion of water conservation. It amends the Water Industry Act 1991 so that water companies: • 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.	The WRMP should support the achievement of the aims of the act, where possible. The SEA should include objectives relating to water quality, water resources and sustainable water use.

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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.	
HM Government (2004) *The Environmental Assessment of Plans and Programmes Regulations 2004*	
These regulations only apply to plans and programmes within England and set out the procedures required when undertaking an environmental assessment.	The SEA should take the regulations into account when assessing the WRMP.
HM Government (2005) *Securing the Future; Delivering UK Sustainable Development Strategy*	
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.	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
HM Government (2006) *Climate Change and Sustainable Energy Act 2006*	
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.	The WRMP should take into account carbon emissions associated with the measures. 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.
HM Government (2006) *Natural Environment and Rural Communities Act 2006*	
The Act: • 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 provides for flexible administrative arrangements in connection with functions relating to the environment and rural affairs and certain other functions; and for connected purposes.	The WRMP and SEA should have regard to protected wildlife sites and species, landscapes and rights of way.
HM Government (2007) *Water Resources Management Plan Regulations 2007*	
These Regulations set out the process for the preparation of WRMPs.	The WRMP should considered these regulations, where relevant.
HM Government (2008) *The Climate Change Act 2008 and The Climate Change Act 2008 (2050 Target Amendment) Order 2019*	
This Act aims:	The WRMP should seek contribute towards increasing the

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• 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. 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. 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, 2018-22, 2023-27 and 2028-32, equivalent to 22%, 28%, 34%, 50% and 57% reductions in carbon emissions compared to 1990 levels respectively.	proportion of energy from renewable energy sources. The SEA assessment framework should include consideration of greenhouse gas emissions and use of energy from renewable energy sources.
HM Government (2008) *The Energy Act 2008*	
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. The key elements of the Act: • 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. 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 supply, nuclear regulation and the Oil and Gas Authority, amongst others.	The WRMP should have regard to the provisions in the Act. The SEA should include objectives relating to energy and resource use.
HM Government (2008) *Planning Act 2008*	
This Act introduced a new system for nationally significant infrastructure planning, alongside further reforms to the Town and Country Planning system.	The WRMP should consider any unforeseen NSIP proposals that come forward prior to adoption which may affect water resources in the region.

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	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.
HM Government (2009) *The Eels (England and Wales) Regulations 2009* (as amended 2011)	
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) *The Groundwater (England and Wales) Regulations 2009*	
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. Substances controlled under these regulations fall into two categories: 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 of to the ground, under a permit, but must not reach groundwater. They include pesticides, sheep dip, solvents, hydrocarbons, mercury, cadmium and cyanide. 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.	The WRMP will need to comply with the requirements of the Regulations where appropriate. The SEA assessment should include an objective relating to the effects of options on groundwater quality.
HM Government (2009) *Marine and Coastal Access Act 2009*	
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.	The WRMP should take into account its effects on coastal areas, where appropriate. The SEA assessment should take into account the effects of the actions on the coast where relevant.
HM Government (2009) *Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 SI 3104*	
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. Aligns the Water Resources Act with the hydromorphological requirements of the WFD	The SEA should include objectives that cover hydromorphological aspects and seek to ensure that hydromorphological features within the plan are maintained or enhanced.
HM Government (2009) *The UK Renewable Energy Strategy*	
The Strategy sets out to: • Put in place the mechanisms to provide financial support for renewable electricity and heat worth around £30 billion between up to 2020;	The WRMP should contribute towards increasing the proportion of energy from

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• Drive delivery and clear away barriers; • Increase investment in emerging technologies and pursue new sources of supply; and Create new opportunities for individuals, communities and business to harness renewable energy.	renewable energy sources, where possible. The SEA assessment framework should include consideration of the use of energy from renewable energy sources.
HM Government (2010) *Flood and Water Management Act 2010*	
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. The Act places a number of statutory duties on water companies including: • a duty to act consistently with the National Strategy; and a duty to have regard to the content of the Local Flood Risk Management Strategies. Does not contain any targets.	The WRMP should be in conformity with the Act. The SEA should include objectives relating to flood risk and water use.
HM Government (2011) *Localism Act 2011*	
The Localism Act provides greater devolved powers to councils and neighbourhoods and gives local communities more control over housing and planning decisions.	The WRMP and the SEA Environmental Report will be subject to public consultation.
HM Government (2011) *UK Marine Policy Statement*	
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: • Achieving a sustainable marine economy; • Ensuring a strong, healthy and just society; • Living within environmental limits; • Promoting good governance; • Using sound science responsibly. Does not contain any targets.	The WRMP should take into account its effects on coastal areas. The SEA assessment should take into account the effects of the actions on the coast/marine environment where relevant.
HM Government (2011) *Water for Life: White Paper*	
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. 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.	The WRMP should help to contribute to the resilient and efficient management of water. In order to ensure future water management is resilient SEA should consider resilience to climate change and should consider the human environment.

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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**
HM Government (2013) *The Energy Act 2013*	
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: • Decarbonisation • Electricity Market Reform (EMR) • Nuclear Regulation • Government Pipeline and storage system • Strategy and policy statement • Customer protection	The WRMP should comply with the act, where relevant. The SEA should include guide questions relating to energy use and carbon emissions.
HM Government (2014) *Water Act 2014*	
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.	The WRMP help to ensure that future water management is resilient, efficient and customer focused
HM Government (2015) *The Environmental Damage (Prevention and Remediation) (England) Regulations 2015*	
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. Applies to the most serious categories of environmental damage, including: • 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.	The SEA should seek to ensure that the guidance provided by the regulations is considered when assessing the WRMP.
HM Government (2015) *Infrastructure Act 2015*	
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.	The SEA assessment framework should include guide questions relating to invasive species.
HM Government (2015) *The Nitrate Pollution Prevention Regulations 2015*	
These regulations consolidate and revoke previous regulations on Nitrate Pollution Prevention (namely the 2008 Nitrate Pollution Prevention Regulations and subsequent amendments). 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.	The WRMP should have regard to the requirements of the regulations. The WRMP and the SEA should consider potential effects of WRMP plan measures on Nitrate Vulnerable Zones (NVZs).

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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**
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.	
HM Government (2015) *Ozone-Depleting Substances Regulations 2015*	
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 qualifications for those working on the recovery, recycling, reclamation or destruction of ODS.	The WRMP should have regard to the requirements of the regulations. The SEA assessment framework should include emissions to air.
HM Government (2015) *Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015*	
The regulations implement provisions of the Water Framework Directive (Directive 2000/60/EC), the Environmental Quality Standards Directive (Directive 2008/105/EC) and the priority substances amendment of these directives (Directive 2013/39/EU). This includes directions for the classification of surface water and groundwater bodies, monitoring requirements, standards for ecological and chemical status of surface waters, and environmental quality standards for priority substances.	The WRMP should be aligned with the requirements of the Water Framework Directive. The SEA should include objectives relating to water quality, water resources, sustainable water use, and biodiversity.
HM Government (2016) *Environmental Permitting (England and Wales) Regulations 2016 (as amended 2018)*	
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.	The WRMP should accord with these Regulations.
HM Government (2017) *Conservation of Habitats and Species Regulations 2017* and the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019	
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. 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. New provisions implement aspects of the Marine & Coastal Access Act 2009. These provisions provide for:	The WRMP must ensure full compliance with the Regulations. The SEA should take into account the effects of the actions on biodiversity.

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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**
• 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. 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.	
HM Government (2017) *The Water Environment (WFD) (England and Wales) Regulations 2017*	
These regulations transpose the Water Framework Directive into law in England and Wales (see Water Framework Directive 2000/60/EC above).	The WRMP should be aligned with the requirements of the Water Framework Directive. The SEA should include objectives relating to water quality, water resources, sustainable water use, and biodiversity.
HM Government (2017, updated 2019) *UK Clean Growth Strategy: Leading the way to a low carbon future*	
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: • Power Sector; • Buildings; • Industry; • Natural Resources; • Transport; and, • Devolved Administrations.	The SEA should have an objective/guide questions relating to sustainable development that references the need to reduce carbon emissions across all sectors.
HM Government (2018) *A Green Future: Our 25 Year Plan to Improve the Environment*	
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. 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. The six key areas for action are: • 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	The WRMP may influence the environmental benefits and pressures identified in the Environment Plan, such as: • Clean air • Clean and plentiful water • Thriving plants and wildlife • Reducing risks of harm from environmental hazards

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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**
• 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	• 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 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 taking into account environmental net gain and natural capital approach, which the government have identified as principle themes.
HM Government (2018) *The Water Supply (Water Quality) Regulations 2018*	
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. 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. 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: • 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.	The WRMP should consider the Regulations. The SEA should take into account potential effects of the measures on drinking water quality.
HM Government (2019) *the Invasive Alien species (Enforcement and Permitting) Order 2019*	
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.	The SEA should seek to address any potential issues or effects on existing measures to address invasive alien species.
HM Government (2020) The Agriculture Act 2020	
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	The WRMP should consider the implications of the act.

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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**
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.	
HM Government (2020) *Energy White Paper: Powering our Net Zero Future*	
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: • 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	The WRMP should consider if it can support the delivery of the aims of the white paper. The SEA should include objectives and guide questions relating to energy use and carbon emissions.
HM Government (2021) *The Environment Act*	
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 binding target on species abundance for 2030, to help reverse declines of species like the hedgehog, red squirrel and water vole.	The WRMP should seek to protect and enhance the natural environment, taking into consideration the principals and guidance set out through the Environment Bill.
HM Government (2022) *UK Climate Change Risk Assessment 2022*	
This report outlines the UK government and devolved administrations' position on the key climate change risks and opportunities that the UK faces today. 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. 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.	The WRMP and the SEA should take into consideration the climate risks identified by the assessment.
HM Treasury (2016) *National Infrastructure Delivery Plan*	
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.	The WRMP should consider the content and commitments of the plan.
JNCC and Defra (2012) *UK Post-2010 Biodiversity Framework*	
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	The WRMP should support the protection and enhancement of biodiversity.

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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**
activities to meet this aim are grouped under the categories of International / European context; facilitating and contributing to common country approaches and solutions; evidence provision; and reporting.	The SEA assessment should include criteria relating to the protection of species and habitats.
Ministry for Housing Communities and Local Government (MHCLG, formerly Department for Communities and Local Government (2014) *National Planning Policy for Waste*	
Sets out detailed waste planning policies for local authorities. States that planning authorities need to: • 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.	The WRMP need to consider the potential impact of proposals on waste generation and on waste management facilities in the WRMP plan area. The SEA should consider the effects of the WRMP on waste generation and management capacity.
MHCLG (2019) *National Planning Policy Framework 2019*	
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. 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: 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 plan makers 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).	The WRMP should take into consideration the policies set out in the NPPF insofar as they relate to the areas covered by the WRMP.
National Assembly for Wales (2015) *Well-being of Future Generations Act (2015)*	
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. 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: • A prosperous Wales • A resilient Wales • A more equal Wales • A healthier Wales	The WRMP should seek to contribute towards the achievement of the seven wellbeing goals, where relevant. The SEA assessment framework should include objectives and guide questions relating to the economic effects, human health and wellbeing and climate change.

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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**
• A Wales of cohesive communities • A Wales of vibrant culture and thriving Welsh language • A globally responsive Wales	
National Assembly for Wales (2016) *Historic Environment (Wales) Act 2016*	
The Act improves the existing systems for the protection and sustainable management of the Welsh historic environment. It also gives more effective protection to listed buildings and scheduled monuments and enhances existing mechanisms for the sustainable management of the historic environment. The Act also creates new measures that enables authorities to halt works if protected buildings or monuments are under threat from unauthorised activities and to take action against those who have damaged or destroyed monuments.	The WRMP should have regard to the requirements of the Act. The SEA assessment should include criteria relating to the protection of the historic environment.
National Assembly for Wales (2016) *Environment (Wales) Act 2016*	
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. 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. Some of the specific provisions in the Act include: • 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.	The WRMP should seek to enhance biodiversity, promote resilience in ecosystems and maintain and enhance biodiversity The SEA framework should include consideration of resilience in ecosystems and the maintenance and enhancement of biodiversity and resource use.
National Infrastructure Commission (2018) *Preparing for a Drier Future, England's Water Infrastructure Needs*	
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	The WRMP should take these measure into account where

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efficient use of water, with the aim to halve leakage by 2050, extend metering and develop plans for a national water network.	possible and aim to improve water efficiency.
Natural England (2011) *UK Geodiversity Action Plan*	
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. 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.	The WRMP should take into account the aims of the UKGAP. The SEA assessment should consider effects of options on geodiversity and outline enhancement and mitigation opportunities where these are identified.
Natural England (2016) *A narrative for conserving freshwater and wetland habitats in England*	
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.	The WRMP should take into account the findings of the narrative relating to conservation. The SEA should note the impact of the WRMP on various habitats.
Natural England (2016) *Conservation 21: Natural England's conservation strategy for the 21st century*	
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.	The WRMP24 should take into account the contents of this strategy.
Natural England and the Environment Agency (2014) *Protected Species and Development: Advice for Local Planning Authorities*	
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: • might affect a site of special scientific interest (SSSI) • needs an environmental impact assessment • needs an appropriate assessment under the Habitats Regulations	The WRMP and SEA should consider the impact of any proposed developments on protected species.
Natural Resources Wales (2016) *The State of Natural Resources Report (SoNaRR) for Wales 2020*	
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).	The WRMP should have regard to opportunities to address risks and threats identified in the report and identify integrated solutions. 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.

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Natural Resources Wales (2020) *Salmon and sea trout plan of action for Wales*	
This plan provides details of, the actions required to restore healthy and more sustainable populations of salmon and sea trout in Welsh rivers.	The SEA should seek to maintain or enhance the quality of habitats and biodiversity. The impacts of the WRMP on populations of salmon and sea trout should be addressed.
Ofwat (2008) *Water Supply and Demand Policy*	
Summarised the key areas of water supply and demand, focusing on water efficiency, leakage, metering, and climate change.	The SEA framework should ensure that consideration is given to the socio-economic and environmental impact of any demand and supply policies.
Ofwat (2016) *Water 2020*	
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: • 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 • Support for sustainable improvements in the environment.	The WRMP should take account of the regulatory framework. The SEA assessment should include criteria relating to the provision of water to customers and environmental protection.
Ofwat (2017) *Resilience in the Round*	
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: • 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.	The WRMP should consider the content of the report.
Public Health Wales (2017) *Creating a Healthier, Happier and Fairer Wales*	
This document creates the following commitments: • Improve health and wellbeing and reduce health inequalities; • Improve the quality, equity and effectiveness of healthcare services; and • Protect people from infectious and environmental hazards.	The WRMP should seek to contribute to the improvement of public health. The SEA should have objectives relating to improving health.
UKCP (2018) *UK Climate Projections UKCP18*	

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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. The methodology gives a measure of the uncertainty in the range of possible outcomes; a major advance beyond previous national scenarios. 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 place a new statutory framework on, and provide practical support for, adaptation.	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 affected by the WRMP will also be influenced by climate change.
UKTAG: Phase 3 Review of Environmental Standards	
UKTAG prepares technical guidance designed to facilitate consistent implementation of the WFD in the UK. 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.	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.
Valuing Our Environment Partnership (2010) *Valuing the Welsh Historic Environment*	
This document is a review and does not contain objectives or targets as such. It can be assumed however that the protection and enhancement of the historic environment is a key objective. It showed that in 2010 the historic environment contributes approximately £840 million to Wales's gross value added, some £1.8 billion in respect of output and supports 30,000 full time equivalent jobs.	The WRMP should consider effects of options on historic environment assets. The SEA should include a guide question relating to protecting and enhancing the historic environment.
Wales Biodiversity Partnership (2015) *Nature Recovery Action Plan Wales – the Biodiversity Strategy for Wales*	
The Nature Recovery Action Plan (NRAP) for Wales is the National Biodiversity Strategy and Action Plan for Wales. Part 1: *Our Strategy for Nature*, sets out the commitment to reversing the loss of biodiversity in Wales, and the objectives for action. The Objectives contained in the plan are to: 1. Engage and support participation and understanding to embed biodiversity throughout decision making at all levels. 2. Safeguard species and habitats of principal importance and improve their management 3. Increase the resilience of our natural environment by restoring degraded habitats and habitat creation 4. Tackle key pressures on species and habitats 5. Improve our evidence, understanding and monitoring	The WRMP should consider effects of options on biodiversity, species and habitats and seek to contribute towards the objectives of the plan. The SEA should include a objectives/guide questions relating to the protection of biodiversity, species and habitats and prevention of biodiversity loss.

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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**
6. Put in place a framework of governance and support for delivery It sets out how the United Nations Environment Programme's Convention on Biological Diversity's (CBD) Strategic Plan for Biodiversity (and the associated Aichi Biodiversity Targets for 2011-20 in Wales) is addressed in Wales. Part 2: *Our Action Plan*, sets out those actions which had been specifically identified to meet the objectives to reverse the decline of biodiversity. It has been refreshed for 2020-21 to provide focus and prioritisation within a fast changing policy context and the emerging ecological crisis. The 2015 Strategy for Nature will remain in place until it is realigned to address the post 2020 framework for the UN Convention on Biological Diversity. A number of objectives have been identified to address the issues that are driving the decline in our biodiversity, and to support recovery.	
Waterwise (2017) *Water Efficiency Strategy for the UK*	
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.	The WRMP should take into account their possible impacts on water efficiency and aim to improve water efficiency. The SEA objectives should reflect the need improve water efficiency.
Water UK (2016) *Water Resources Long-term Planning Framework (2015 – 2065)*	
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. To contain the risk of drought extensive measures to manage demand and enhance supplies of water are needed such as (pp. 194-195): • 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.	Measures identified in the framework should be considered as part of the WRMP. The SEA should assess the impact of the WRMP on water resource and availability.
Welsh Government (1998) *Technical Advice Note 14: Coastal Planning*	
TAN 14 seeks to protect the coastline in relation to development, landscape, biodiversity and recreation	The WRMP should take into account its effects on coastal areas. The SEA assessment should take into account the effects of the options on the coast where relevant.
Welsh Government (2004) *Technical Advice Note 15: Development and Flood Risk*	
TAN 15 sets out a precautionary framework to guide planning decisions. The approach seeks to first, direct new development away from those areas which are at high risk of flooding and, second, where development has to be considered in high risk areas (Zone C), allow only those developments which can be justified to be located within such areas.	The WRMP should take account of flood risk management. The SEA should include a guide question relating to flood risk.

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**
Welsh Government (2008) *One Wales One Planet: The Sustainable Development Scheme for Wales*	
One Wales One Planet seeks to build on the two previous Sustainable Development Schemes. It sets out proposals to promote sustainable development, how the Welsh Government will make sustainable development a reality for people in Wales, and the benefits that people will see from this, particularly in less well-off communities. The strategy states that the Welsh Government is committed to working in partnership with others and notes that businesses can: • Develop resource efficiency within the organisation and through supply chains, improving productivity and competitiveness; • Reduce waste; • Develop environmental and sustainability policies and targets; • Monitor performance and resource use and report publicly on them; • Engage with the workforce in both adopting sustainable practices and encouraging employees to become sustainable champions in their own communities; Engage with and support local communities.	The WRMP should consider effects on sustainable development in Wales (where relevant). The SEA should include guide questions relating to improving resource efficiency, reducing waste, monitoring and public reporting, encouraging sustainable practices among the workforce and engaging with and supporting local communities. The SEA should also include proposals for monitoring the effects of the WRMP on the environment and sustainability and could utilise targets that arise from this document.
Welsh Government (2009) *Technical Advice Note 5: Nature Conservation and Planning*	
Technical Advice Note 5 sets out how the planning system should contribute to protecting and enhancing biodiversity and geological conservation. It stipulates that the planning system should: • work to achieve nature conservation objectives through a partnership between local planning authorities, Countryside Council for Wales (CCW), the Environment Agency Wales, voluntary organisations, developers, landowners and other key stakeholders; • integrate nature conservation into all planning decisions looking for development to deliver social, economic and environmental objectives together over time; • ensure that the UK's international and national obligations for site, species and habitat protection are fully met in all planning decisions; • look for development to provide a net benefit for biodiversity conservation with no significant loss of habitats or populations of species, locally or nationally; • help to ensure that development does not damage, or restrict access to, or the study of, geological sites and features or impede the evolution of natural processes and systems especially on rivers and the coast; and • plan to accommodate and reduce the effects of climate change by encouraging development that will reduce damaging emissions and energy consumption and that help habitats and species to respond to climate change.	The WRMP should seek to protect and enhance biodiversity and geodiversity. SEA objectives should reflect the need to conserve and, where possible, enhance, biodiversity and geodiversity.
Welsh Government (2010) *National Transport Plan*	
The Plan sets out five strategic transport priorities for the next 5 years: • Reducing greenhouse gas emissions and other environmental impacts; • Integrating local transport; • Improving access between key settlements and sites; • Enhancing international connectivity; Increasing safety and security.	The WRMP should consider any transport-related implications arising from the options and seek to reflect the transport hierarchy where possible. The SEA assessment should include an objective on improving and/or integrating transport and reducing greenhouse gases.

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**
Welsh Government (2012) *Energy Wales: A Low Carbon Transition*	
Energy Wales and the supporting delivery plan set out what the Welsh Government intends to do to drive the change to a sustainable, low carbon economy for Wales. The Welsh Government commits to: • Engage and support businesses that help to achieve Wales's low carbon ambition; • Ensure that regulatory processes are as simplified and efficient as they can be and provide businesses with clarity and stability; • Engage the UK Government to ensure that there is a credible framework for capital investment to support the transition to a low carbon economy; • Support vital energy intensive industries in the transition to a low carbon economy; • Pursue energy efficiency; • Focus on low carbon sources of energy generation and approaches which will help to deliver lower overall emissions; and • Assist the most vulnerable in Welsh society and work to ensure that costs of reform do not fall disproportionately on poor households. The delivery plan also sets out key delivery themes around low carbon energy, Anglesey Energy Island, energy efficiency and distributed energy generation.	The WRMP should seek to incorporate low carbon energy and energy efficiency. The SEA should include a guide question relating to climate change mitigation.
Welsh Government (2012) *Historic Environment Strategy for Wales*	
This strategy summarises the areas which the Welsh Government will prioritise for action, and aims to protect Wales' heritage whilst encouraging public access, enjoyment and participation. The Strategy sets out the role of the historic environment in delivering tangible social, economic and environmental benefits for Welsh communities. It also aims to further develop the economic role of heritage in Wales and maximise educational, training and leisure opportunities.	The WRMP should seek to protect and enhance the historic environment. The SEA should include assessment criteria relating to protection and enhancement of the historic environment.
Welsh Government (2014, updated 2019) *Energy Wales: A Low Carbon Transition Delivery Plan*	
The Plan seeks to create a stronger, more resilient Wales that has sustainability to its core. The plan states that Wales has many opportunities to do this, including through delivering renewable energy, and should be well place to take advantage of the green transition.	The SEA should have objectives relating to sustainable development, protecting the natural environment and economic growth.
Welsh Government (2014) *Welsh Rural Development Plan Programme document 2014-2020*	
The Programme was adopted by the European Commission in May 2015. It is a 7-year investment programme supporting a wide range of activities which contribute to the following objectives: • fostering the competitiveness of agriculture; • ensuring the sustainable management of natural resources, and climate action; • achieving a balanced territorial development of rural economies and communities, including the creation and maintenance of employment.	The WRMP should consider the effect of options on rural areas. The SEA assessment should note where options will have significant effects on rural areas.
Welsh Government (2015) *Nature Recovery Plan for Wales*	
The Nature Recovery Plan for Wales is aimed at addressing the underlying causes of biodiversity loss by: • putting nature at the heart of decision-making • increasing the resilience of the natural environment • taking specific action for habitats and species.	The WRMP should seek to protect and enhance biodiversity. SEA objectives should reflect the need to conserve and, where possible, enhance biodiversity.

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**
It sets out how Wales will deliver the commitments of the UN Convention on Biological Diversity and the EU Biodiversity Strategy to halt the decline in Wales' biodiversity by 2020 and then reverse that decline. The objectives of the plan are to: • Engage and support participation and understanding to embed biodiversity throughout decision making at all levels. • Safeguard species and habitats of principal importance and improve their management • Increase the resilience of the natural environment by restoring degraded habitats and habitat creation • Tackle key pressures on species and habitats • Improve our evidence, understanding and monitoring • Put in place a framework of governance and support for delivery.	
Welsh Government (2015) *Water Strategy for Wales*	
This Strategy sets out long-term policy direction in relation to water. The aim is to ensure a more integrated and sustainable approach to managing water and associated services in Wales. This Strategy has been developed within this context and will contribute to the implementation of wider Welsh natural resource management policy. A more integrated approach to the way water resources in Wales are managed will help to promote the coordinated management of water, land and related resources. This in turn will enable the maximisation of economic and social benefits, including tackling poverty in an equitable way while protecting vital ecosystems and the environment. The Strategy aims ensure the long-term needs of a sustainable and resilient environment and that there are sufficient, reliable water resources and wastewater services available in Wales. This approach will also drive green growth by providing an essential resource for businesses, as well as providing new opportunities for employment.	The WRMP will have a key role in contributing to the wider objectives of the Strategy. The SEA should include objectives/guide questions relating to sustainable resource use.
Welsh Government (2016) *Energy Efficiency in Wales: A Strategy for the next 10 years 2016-2026*	
This strategy outlines the plan for energy efficiency in Wales. Green growth is predicted to be increasingly important to the Welsh economy and this document encourages such an industries growth. Energy efficiency also often has many economic benefits through reducing energy bills.	The SEA assessment framework should have objectives relating to sustainable development and energy efficiency.
Welsh Government (2016) *Guiding Principles for Developing Water Resources Management Plans (WRMP's) for 2020*	
The Guiding Principles set out the Welsh Government's expectations in terms of the role and content of WRMPs. The link is also made with recent legislation (including the Environment (Wales) Act and the Well-being of Future Generations (Wales) Act 2015. The process for preparing WRMPs is also set out in the document.	The WRMP should be prepared in line with the expectations and processes outlined in the guidance.
Welsh Government (2016) *Taking Wales Forward 2016-2021*	
Sets out how Welsh Government will deliver more and better jobs through a stronger, fairer economy, improve and reform our public services, and build a united, connected and sustainable Wales between 2016 and 2021. The document sets out its priorities under four key themes: • Prosperous and Secure • Healthy and Active • Ambitious and Learning • United and Connected.	The SEA should ensure that the four key themes are embedded within the SEA objectives. The WRMP should ensure it is aligned to, and help deliver against, the priorities grouped under the key themes.
Welsh Government (2016) *Technical Advice Note 12: Design*	

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**
Technical Advice Note 12 sets out the Welsh Government's land use planning policy in respect of promoting sustainability through good design. It advocates a holistic approach to design that considers: Movement - promoting sustainable means of travel; Access- ensuring access for all; Character - sustaining or enhancing local character, promoting legible development, promoting a successful relationship between public and private space, promoting quality, choice and variety, promoting innovative design; Community safety - ensuring attractive, safe public spaces and security through natural surveillance; Environmental sustainability - achieving efficient use and protection of natural resources, enhancing biodiversity and designing for change.	The WRMP should promote good design in the development of any new facilities required as part of plan measure. The SEA objectives should include the promotion of good design.
Welsh Government (2017) *Future Landscapes: Delivering for Wales*	
This report contains a review of all the Areas of Outstanding Natural Beauty and National Parks within Wales. The report highlights the importance of these landscapes to shaping identity. The report seeks to improve the governance of these important natural assets. The report highlights how much of Wales falls within either designation and how many of these designations are at risk.	The SEA should have objectives relating to the protection of important natural assets. The WRMP should seek to ensure that these important natural designations have their resilience improved to ensure they will and seek to support enhancement of Wales' many natural assets, where possible.
Welsh Government (2017) *Natural Resources Policy*	
The Natural Resources Policy (NRP) is the second statutory product of the Environment (Wales) Act. The focus of the NRP is the sustainable management of Wales' natural resources, to maximise their contribution to achieving goals within the Well-being of Future Generations Act. The policy sets out three National Priorities. These are: • Delivering nature-based solutions, • Increasing renewable energy and resource efficiency, • Taking a place-based approach. Nature-based solutions may include developing resilient ecological networks, climate change adaptation and mitigation, flood risk management, green infrastructure, better soil and peat bog management, among others.	The WRMP should have regard to the National Priorities in the NRP. The SEA should include assessment criteria relating to protection and enhancement of the environment, ecology, soils, flooding and climate change.
Welsh Government (2017) *Prosperity for All: National Strategy (2017) and Annual Report 2018*	
This strategy establishes the Welsh government's desire to achieve a prosperous Wales that benefits everyone. The document outlines six areas that will be improved to afford a better life to the population of Wales. These six areas are: • Early Years; • Housing; • Social Care; • Mental Health; • Skills and Employability; and • Decarbonisation.	The SEA should have objectives/guide questions relating to housing, education/skills, sustainable development and providing new healthcare facilities, and decarbonisation. The WRMP should seek to contribute to the improvement of the six key areas set out in the strategy.
Welsh Government (2017) *Prosperity for All: Economic Action Plan*	

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**
This plan is focused upon achieving economic growth whilst ensuring this growth delivers benefits for all. The document provides detail on how the Welsh government will achieve this through reducing economic inactivity, new technologies, decarbonising the employment sector, efficiencies and financing to name a few.	The SEA should have objectives relating to economic growth and sustainable development. The WRMP should look to achieve ambitious economic growth that is managed in a way that ensures the benefits of economic growth are experienced by the population of Wales.
Welsh Government (2017) *Technical Advice Note 24 the Historic Environment*	
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: • world heritage sites • scheduled monuments • archaeological remains • listed buildings • conservation areas • historic parks and gardens • historic landscapes • historic assets of special local interest	The WRMP and SEA should consider the impact of any proposed developments on the historic environment of Wales.
Welsh Government (2018) *Priorities for the Historic Environment of Wales*	
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.	The WRMP and SEA should consider the impact of any proposed developments on the historic environment of Wales.
Welsh Government (2018) *Woodlands for Wales: The Welsh Government's Strategy for Woodlands and Trees*	
This strategy affords protection to the woodlands and trees of Wales, which are identified as being important natural resources. The document stresses the importance that such resources play in maintaining and enhancing the natural environment of Wales.	The SEA should have an objective/guide question related to protecting the natural environment and make mention to the protection of trees. The WRMP should aim to contribute to the protection of woodlands and trees where possible.
Welsh Government (2019) *Prosperity for All: A Low Carbon Wales*	
This document seeks to work with the other documents in the Prosperity for All series but is focused upon reducing the carbon footprint of Wales. This would be achieved through encouraging sustainable development and using more sustainable technologies.	The SEA should have objectives relating to economic growth and sustainable development.

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**
Welsh Government (2019) *Welsh National Marine Plan*	
The Plan sets out how Welsh Government will achieve sustainable development in the Welsh marine area through the sustainable management of marine natural resources. It covers both Welsh inshore and offshore waters and sets out the following vision, which will be achieved through the plan's objectives and policies: • During the 20 year view taken by the plan, Welsh seas are clean, healthy, safe, productive and biologically diverse: • Through an ecosystem approach, our seas are healthy and resilient and support a sustainable and thriving economy. • Through access to and enjoyment of the marine environment, health and wellbeing are improving. • Through Blue Growth more jobs and wealth are being created which is helping coastal communities become more resilient, prosperous and equitable with a vibrant culture. • Through the responsible deployment of low carbon technologies, the Welsh marine area is making a strong contribution to energy security and climate change emissions targets.	The WRMP should take into account its effects on coastal areas. The SEA assessment should take into account the effects of the actions on the coast/marine environment where relevant.
Welsh Government (2020) *Agriculture (Wales) White Paper (2020)*	
This white paper outlines the importance of farming to the Welsh economy whilst also being a source of locally grown food. It highlights the difficulties of Brexit and trade barriers with the EU, whilst also establishing a need to de-carbon the farming industry as much as possible but not in a way that compromises it.	The SEA should have objectives relating to the need to protect rural agriculture.
Welsh Government (2020) *Historic Environment and Climate Change in Wales*	
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. 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.	The WRMP and SEA should consider the impact of any proposed developments on climate change and the historic environment of Wales.
Welsh Government (2020) *National Strategy for Flood and Coastal Erosion Risk Management in Wales*	
This Strategy sets out how Welsh Government intend to manage the risks from flooding and coastal erosion across Wales over the next 10 years, whilst strengthening and clarifying roles and responsibilities. It sets out the policies and direction for all Welsh Flood Risk Management Authorities to follow, with measures to explain how this will be achieved, which can be considered as its action plan. The Welsh Government considers FCERM as a priority area, this is set out through the Strategy. The aim of the strategy is to Reduce the risk to people and communities from flooding and coastal erosion and the strategy contains five objectives: a) Improving our understanding and communication of risk b) Preparedness and building resilience c) Prioritising investment to the most at risk communities d) Preventing more people becoming exposed to risk **e)** Providing an effective and sustained response to events.	The WRMP should consider the aims and objectives of the strategy. The SEA should include objectives and guide questions relating to flooding and coastal erosion.
Welsh Government (2020) *The Nature Recovery Action Plan for Wales 2020 – 21*	
The Nature Recovery Action Plan for Wales refreshes the original plan published in 2015. The Plan sets out five themes for action: Spatial action: • Maintaining and enhancing resilient ecological networks	The SEA should have objectives/guide questions relating to maintaining and enhancing resilient ecological

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**
Transformative: • Increasing Knowledge and Knowledge Transfer; • Realising new Investment and funding; • Upskilling and capacity for delivery; • Mainstreaming, Governance and Reporting our Progress Five immediate priorities are identified for further action: • Aligning the responses to the climate emergency with the biodiversity crisis • Addressing the post EU exit funding gap for agri-environment measures • Providing spatial direction for targeting action for biodiversity • Improving the condition of the Protected Sites Network • Exploring new and sustainable funding mechanisms for biodiversity action.	networks and protecting sites designated for their biodiversity value. The WRMP should support the aims of NRAP and ensure that they help towards maintaining and enhancing resilient ecological networks.
Welsh Government (2020) *Strategic Equality Plan 2020-2024*	
The Plan seeks to tackle inequality within Wales through improving the accessibility of services, seeking fairer outcomes for citizens and being pro-active in tackling all kinds of inequality.	The SEA should have objectives/guide questions relating to cohesion, accessibility, economic wellbeing and human health and well-being.
Welsh Government (2020) *Welcome to Wales: Priorities for the visitor economy 2020 – 2025*	
The strategy identifies the priorities to deliver a prosperous and competitive tourism industry in Wales. Sets out the Welsh Government/Visit Wales' ambition to grow tourism for the good of Wales: generating economic, environmental, cultural and health benefits that enrich the lives of visitors and local communities. The main goals of the plan are: • Economic growth that delivers benefits to people and places • Environmental sustainability • Social and cultural enrichment • Health benefits.	The WRMP could take account of the benefits that tourism can bring to Wales. The SEA should include assessment criteria relating the importance of tourism and/or recreation.
Welsh Government (2021) *Future Wales: The National Plan 2040*	
Future Wales – the National Plan 2040 is the Welsh national development framework, setting the direction for development in Wales to 2040. It is a development plan with a strategy for addressing key national priorities through the planning system, including sustaining and developing the economy, achieving decarbonisation and climate-resilience, developing strong ecosystems and improving the health and well-being of Welsh communities. The document contains development policies that all new developments within Wales are required to adhere to.	The SEA should have objectives relating to economic and social well-being, protection of the historic and natural environment, carbon emissions and climate change/resilience.
Welsh Government (2021) *Our Economic Resilience & Reconstruction Mission*	
Sets out how the Welsh Government plans to recover from the economic damage of the coronavirus (COVID-19) pandemic. The Mission document seeks three outcomes, centred around the vision of a '*well-being economy*': • Prosperous economy • Green economy • Equal economy	The WRMP should seek to support the outcomes of the plan. The SEA should include an objective relating to economic and social well-being.
Welsh Government (2021) *Planning Policy Wales (Edition 11)*	

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**
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. 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.	Measures recommended in the WRMP will need to confirm to LDPs and the policies of the PPW. The SEA objectives should reflect the Welsh Government's commitments to sustainable development.

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**
Water Company (various) Drought Plans	
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 neighbouring Drought Plans relevant to the Dŵr Cymru Welsh Water WRMP are: • Hafren Dyfrdwy Drought Plan; • Albion Water Draft Drought Plan; • Severn Trent Water Drought Plan; • United Utilities Drought Plan; and • Thames Water.	The WRMP should take account of emerging and adopted neighbouring plans where appropriate.
Water Company (various) Water Resources Management Plans	
Water companies in England and Wales, are required to prepare, maintain and publish a WRMP under the Water Industry Act 1991, updated by the provisions in section 37A-D of the Water Act 2003 and the Water Act 2014 and the Environment (Wales) Act 2016. The plan must set out how a water company intends to maintain the balance between supply and demand for water over a minimum of a 25 year period. This is complemented by a water company drought plan, which sets out the short-term operational steps a company will take as a drought progresses. Those neighbouring Water Resource Management Plans relevant to the Dŵr Cymru Welsh Water WRMP are • Hafren Dyfrdwy; • Severn Trent Water; • United Utilities; • Bristol Water; and, • Thames Water.	The WRMP will need to be in accordance with neighbouring WRMPs and take into account options which are relevant to the Welsh Water area. The SEA should include an objective/guide question relating to water resources.
Dŵr Cymru Welsh Water (2018) *Welsh Water 2050*	
Welsh Water 2050 identifies the significant trends that will face Welsh Water over the next 30 years and how it will impact the company and their customers. Opportunities and challenges related to the trends have been identified within the document and the company's strategic responses to respond to these challenges have been set out.	The WRMP should consider the challenges and strategic responses set out within Welsh Water 2050.

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**
The document is set within the policy context of the Welsh Government's Wellbeing of Future Generations Act (Wales) 2015 and Environment Act (Wales) 2015.	The SEA objectives should consider the future trends and challenges.
Dŵr Cymru Welsh Water (2019) *Final Water Resources Management Plan 2019*	
As set out above, Water companies in England and Wales, are required to prepare, maintain and publish a WRMP under the Water Industry Act 1991, updated by the provisions in section 37A-D of the Water Act 2003 and the Water Act 2014 and the Environment (Wales) Act 2016. The plan must set out how a water company intends to maintain the balance between supply and demand for water over a minimum of a 25 year period. This is complemented by a water company drought plan, which sets out the short-term operational steps a company will take as a drought progresses. For operational purposes, Welsh Water divides its supply area into three regions (North Wales, South West Wales and South East Wales), however, for water resources planning purposes, Welsh Water divides its supply area into 24 WRZs. A WRZ is defined as the largest area in which all resources can be shared such that all customers, with some limitations, experience the same risk of supply failure. The Welsh Water WRMP forecasts that two WRZs will be in deficit during the plan period (Tywyn Aberdyfi and Pembrokeshire).	The WRMP will need to align with the WRMP and will need to take account of any WRMP measures which may interact with options/measures set out in the WRMP. The SEA should include an objective/guide question relating to water resources.
Dŵr Cymru Welsh Water (2020) *Making time for nature 2020: Welsh Water's revised plan for maintaining and enhancing biodiversity*	
The plan highlights what Welsh Water is doing across its business to support nature and biodiversity. It also outlines additional actions Welsh Water intend to take up to 2025. The plan sets out a series of 30 commitments for supporting biodiversity and nature Some of these are short term which will be delivered by 2022. Others are medium to long term commitments which will aim to influence longer term positive changes to 2025 and beyond. It is a statutory plan published under section 6 of the Environment (Wales) Act 2016.	The WRMP should seek to protect and enhance biodiversity. SEA objectives should reflect the need to conserve and, where possible, enhance biodiversity.
Dŵr Cymru Welsh Water (Undated) *Our Plan PR19 Business Plan 2020-2025*	
This document summarises Welsh Water's business plan for 2020-25 and beyond. The PR19 business plan includes performance targets for all aspects of Dŵr Cymru Welsh Water's business across a suite of 47 'Measures of Success'. 14 of these measures were pre-defined by Ofwat. These measures of success cover 7 outcomes: • Safe, clean water for all • Safeguard our environment for future generations • Put things right if they go wrong • Personal service that's right for you • Fair bills for everyone • A better future for all our communities • Colleague promises The key performance improvements set out in the business plan include the following: • a 15% reduction in leakage levels (which have already been roughly halved in the last 20 years) • a reduction in the numbers of customers experiencing temporary discolouration or taste and odour issues with their water supply, from 2.8 to 2.0 (contacts per 1,000 customers) • a reduction in supply interruptions, which are particularly important for businesses as well as households, from 12 to eight minutes a year per customer	The WRMP should seek to support the delivery of the business plan. The objectives and guide questions that comprise the SEA Framework should, where appropriate, reflect the priorities set out in this plan.

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**
• a 10% reduction in incidents of sewer flooding of customer premises each year, which would otherwise be on an upward trend due to climate change, from 300 to 273 a year • a 20% reduction in pollution incidents (which are predominantly minor 'category 3' incidents), from 112 to 90 a year and • an 18% reduction in the number of customers receiving a service below our defined minimum-threshold levels, from 1,500 to 1,230, meaning fewer "worst-served" customers suffering from repeated water supply outages, sewer flooding or low water pressure	
Natural England (Various) Site Improvement Plans	
The various plans provide a high-level overview of the issues (both current and predicted) affecting the condition of the Natura 2000 features on sites (in both England and Wales) and outline the priority measures required to improve the condition of the features. The plans do not cover issues where remedial actions are already in place or ongoing management activities which are required for maintenance.	The WRMP should support the protection and enhancement of biodiversity, including helping to support addressing the issues that affect the features that contribute to the designation. The SEA assessment should include criteria relating to the protection of species and habitats.
Natural Resources Wales (2015) (Various) River Basin Management Plans	
Natural Resources Wales as the responsible authority for river basin planning in Wales. The plans are a requirement of the Water Framework Directive (WFD) (2000/60/EC). The plans describe the pressures facing the water environment and set objectives for rivers, lakes, estuaries, coastal and ground waters to cover the period 2015-2021. They outline the priority actions ('Measures') that are needed to improve the environment, the benefits those actions could achieve and who is best placed to deliver them. The measures seek to address the significant water management issues. Relevant River Basin Management Plans managed by Natural Resources Wales are set out below: • Dee River Basin Management Plan • Western Wales River Basin Management Plan In addition, the Severn River Basin Management plan also falls within part of the Welsh Water area however is managed by the Environment Agency.	The WRMP should consider how it can contribute to the priority actions set out in the river basin management plans. The SEA objectives should reflect the need to manage water resources in a sustainable manner.
Natural Resources Wales (Various) Area Statements	
Each Area Statement outlines the key challenges facing that particular locality, what can be done by people to meet those challenges, and how natural resources can be better managed for the benefit of future generations. The following Area Statements apply to areas located within the Welsh Water supply area: • South East Wales Area Statement • South Central Wales Areas Statement • South West Wales Area Statement • Mid Wales Area Statement • North East Wales Area Statement • North West Wales Area Statement • Marine Area Statement	The WRMP and the SEA should consider how the challenges facing each of the areas might be impacted by the implementation of the plan and how they can contribute to the addressing the challenges, where appropriate.
Regional Transport Plans (Various)	

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**
Four Regional Transport Consortia were established in Wales following the additional powers conferred on the Welsh Assembly Government under the Transport Wales Act 2006 and the Railways Act 2005: • North Wales • Mid Wales • South west Wales • South east Wales The four Regional Transport Consortia, made up of local authorities, are responsible for delivering *One Wales: Connecting the nation* at a regional level. The Regional Transport Plans were developed to strengthen inter-authority co-operation, whilst helping to ensure local transport planning is consistent with Connecting the nation. The Regional Transport Plans elaborate details of transport policies, schemes and other interventions that the Consortia wish to develop in their respective regions, as well as contributing to transport planning at a wider level.	The WRMP should consider the regional plans, where relevant.
Torfaen County Borough Council (2011) *Blaenavon Industrial Landscape World Heritage Site Management Plan*	
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: 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.	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.
Welsh Government (2018*) Castles and Town Walls of King Edward in Gwynedd World Heritage Site: World Heritage Site Management Plan 2018 – 28*	
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 development plans, and new primary legislation in respect of the historic environment and the well-being of future generations in Wales. 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.	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.

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**
AONB Management Units (various) AONB Management Plans	
The following AONBs are present in the Welsh Water area: • Anglesey; • Clwydian Range; • Gower; • Llyn; • Wye Valley. The management plans for AONBs contain actions to ensure the protection and enhancement of the landscape.	WRMP Measures within AONBs should be consistent with the management plan. The SEA assessment framework should consider the effects of options on landscapes, including designated landscapes.
Defra (Various) Eel Management Plans	
Eel management plans describe the current status of Eel populations across river basin districts and assesses compliance with targets set out in EU Council Regs 110/2207. Relevant Eel Management Plans are set out below: • Eel Management Plan for Western Wales River Basin District • Eel Management Plan for Severn River Basin District; • Eel Management Plan for Dee River Basin District.	The WRMP should take Eel management plans into account. The SEA assessment framework should include an objective and guide questions relating to the protection of biodiversity.
Environment Agency/Natural Resources Wales (various) *Catchment Flood Management Plans*	
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 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. Those CFMPs present in the Welsh Water area are: • Wye and Usk; • Eastern Valleys; • Taff and Ely; • Ogmore to Tawe (including Thaw and Cadoxton); • Loughor to Taf; • Pembrokeshire and Ceredigion Rivers; • North West Wales; • Conwy and Clwyd; • River Dee.	The WRMP should take CFMPs into account. The SEA should include a guide question relating to flood risk.
Environment Agency/Natural Resources Wales (various) River Basin Management Plans	

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**
River Basin Management Plans (RBMPs) set out how the water environment will be managed and provide 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: • 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; • 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. RBMPs in the Welsh Water area are Severn, Western Wales and Dee.	The WRMP should reflect the broad objectives of these plans. The SEA objectives should reflect the need to manage water resources on a catchment basis in a sustainable manner.
Environment Agency, Natural Resources Wales and Natural Scotland (2016) River Basin District Flood Risk Management Plans	
Flood risk management plans (FRMP) explain the risk of flooding from rivers, the sea, surface water, groundwater and reservoirs, and set out how risk management authorities will work with communities to manage flood risk over the next six years.	The WRMP should take FRMPs into account. The SEA should include a guide question relating to flood risk.
Environment Agency (undated) Wye Waterway Plan 2017-2022	
The Wye waterway plan addresses the Environment Agency's responsibilities and aspirations (as the navigation authority responsible for the Rivers Wye and Lugg) for recreation and navigation on the Rivers Wye and Lugg. The plan's vision is to develop and promote appropriate navigation and recreational activities for all waterway users on the River Wye and Lugg, while protecting, maintaining and enhancing the unique conservation status of these waterways. The plans core objectives are to: • protect, maintain and enhance the unique conservation status of the waterway; • manage, improve and enhance navigation opportunities for the waterway; • protect the interests of those navigating and using the principal rivers; • encourage the appropriate use and enjoyment of the waterway by walkers, anglers and other recreational users; • promote better access and information for canoeists, rafters and users of small craft; • contribute to enhanced biodiversity, heritage and landscape values of the waterway; • develop the health, economic and social benefits of navigation, to the advantage of everyone • enable more people to enjoy the natural environment.	WRMP measures in the Wye catchment should be consistent with the aims of the Wye Waterway Plan. The SEA assessment should consider the effects of options on recreational use of waterways.
Environment Agency and Natural Resources Wales (various) Salmon Action Plans	

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**
Salmon action plans have been produced for the following river catchments in Wales; • Cleddau; • Clwyd; • Conwy; • Dee; • Dwyfor; • River Dyfi; • Dysynni; • Glaslyn and Dwyryd; • Mawddach; • Nevern; • Ogmore; • Ogwen; • Rheidol; • Taf; • Taff and Ely; • Tawe; • Teifi; • River Usk; • River Wye. 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. Individual targets are set out in each action plan	The WRMP should consider its effects on salmon populations. The SEA assessment framework should include a guide question relating to the effects of options on fish.
Local Biodiversity Action Plans (LBAPs), including Species and Habitats Action Plans (various)	
27 LBAPs in Wales and one for Herefordshire. 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. 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. 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.	The WRMP should take into account LBAP objectives. The SEA assessment should consider effects of options on biodiversity and outline enhancement and mitigation opportunities where these are identified
Local Geodiversity Action Plans (LGAPs) (Various)	
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 in a scientific, educational, recreational and cultural setting, • promote geological sites and make geo-conservation relevant to people,	Any WRMP measures that affect areas with Geodiversity Action Plans should be consistent with the respective plan. The WRMP should seek to

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**
• provide a local geodiversity audit (an audit of sites and skills) and influence local planning policy. The following areas are within the Welsh Water area and have Local Geodiversity Action Plans: • Anglesey • Clwydian Range AONB	conserve and enhance geodiversity. The SEA assessment should consider effects of options on geodiversity and outline enhancement and mitigation opportunities where these are identified.
Local Planning Authority (various) Land Use Plans	
The Welsh Water area covers a large number of Local Planning Authorities. These have been identified as: • Conwy; • Blaenau Gwent; • Brecon Beacons National Park; • Bridgend • Caerphilly; • Cardiff; • Carmarthenshire; • Ceredigion; • Denbighshire; • Flintshire; • Gwynedd; • Herefordshire; • Merthyr Tydfil; • Monmouthshire; • Neath Port Talbot; • Newport; • Pembrokeshire; • Pembrokeshire Coast National Park; • Powys; • Rhondda Cynon Taff; • Snowdonia National Park; • Swansea; • Torfaen; • Vale of Glamorgan; • Wrexham; • Ynys Mon.	Measures identified in the WRMP should be consistent with the Land Use Plans of those local authorities that will be affected by the plans.

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**
The main objectives of the existing and emerging Land Use Plans in these areas are related to the sustainable development of the area.	
National Park Management Plans (various)	
The following National Parks are present in the Welsh Water area: • Snowdonia; • Brecon Beacons; • Pembrokeshire Coast. The management plans for National Parks contain actions to ensure the protection and enhancement of the landscape and natural environment of these areas.	WRMP measures that affect National Parks should be consistent with the respective management plan. The SEA assessment framework should consider the effects of options on landscapes and the natural environment, including designated areas.
Natural Resources Wales (Various) Catchment Abstraction Management (Licencing) Strategies (CAMS)	
Catchment Abstraction Management Strategies (CAMS) to assess how much water is available for abstraction, and where. Therefore, highlighting where water abstraction licences can be granted. A water abstraction licence is required to remove more than 20 cubic metres (4,400 gallons) of water per day from a river or stream, reservoir, lake or pond, canal or spring. The strategies aim to meet the water needs of the environment and to allow water users to sustainably exploit any surplus. Within the Welsh Water area the following Catchment Abstraction Management Strategies (CAMS) are in place: • River Wye CAMS • Thaw and Cadoxton CAMS • The Teifi and North Ceredigion CAMS • The Cleddau and Pembrokeshire Coastal Rivers CAMS • The Carmarthen Bay CAMS • The Swansea Bay CAMS • Anglesey Catchment CAMS • Clwyd Catchment CAMS • Conwy Catchment CAMS • River Dee CAMS • Llŷn and Eryri CAMS • Meirionnydd CAMS • River Usk CAMS • South East Valleys CAMS	The WRMP should take the CAMS into account. The SEA assessment should consider the effects of options on the availability and sustainability of water supply.
Public Services Boards (PSBs) (Various) PSB Assessments and Local Well-being Plans	
The purpose of Public Services Boards (PSBs) is to improve the economic, social, environmental and cultural well-being in its area by strengthening joint working across all public services in Wales.	The WRMP should take into account the objectives of the PSBs and the Local Well-

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**
The Well-being of Future Generations (Wales) Act 2015 establishes statutory PSBs which will replace the voluntary Local Service Boards in each local authority area. Each board will: • assess the state of economic, social, environmental and cultural well-being in its area • set objectives that are designed to maximise the PSBs contribution to the well-being goals. Each PSB must prepare and publish a plan setting out its objectives and the steps it will take to meet them. This is called a Local Well-being Plan. It must say: • why the PSB feels their objectives will contribute within their local area to achieving the well being goals • how it has had regard to the assessment of Local Well-being in setting its objectives and steps to take. Each PSB will carry out an annual review of their plan showing their progress. When producing their assessments of local well-being and Local Well-being plan, PSBs must consult widely. The following PSB areas are within the Welsh Water area: • Anglesey and Gwynedd PSB • Bridgend PSB • Blaenau Gwent PSB • Caerphilly PSB • Cardiff PSB • Carmarthenshire PSB • Ceredigion PSB • Conwy and Denbighshire PSB • Cwm Taf PSB • Flintshire PSB • Powys PSB • Neath Port Talbot PSB • Monmouthshire PSB • Newport PSB • Pembrokeshire PSB • Swansea PSB • Torfaen PSB • Vale of Glamorgan PSB • Wrexham PSB	being Plans and seek to contribute to their achievement, where appropriate. The SEA should include objectives and guide questions relating to economic, social, environmental and cultural well-being.
Shoreline Management Plans (various)	
Shoreline Management Plans are prepared in England and Wales. They are developed by Coastal Groups with members drawn from local authorities and other stakeholders. They identify the most sustainable approach to managing the flood and coastal risks to the coastline in the short term (up to 20 years), medium term (20 to 50 years) and long term (50 to 100 years). Relevant plans include: • North West England and North Wales Shoreline Management Plan	The WRMP should take into account the policies and actions of the SMP. Where appropriate, the SEA should consider the cumulative effect of SMP

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**
• Severn Estuary Shoreline Management Plan Review • Lavernock Point to St Ann's Head Shoreline Management Plan • West of Wales Shoreline Management Plan	policies and actions and WRMP measures.
World Heritage Site Management Plans (Various)	
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 the plan period, and what will be done to explain its significance to visitors. To be included on the World Heritage List, sites must have Outstanding Universal Value (OUV). The statement of OUV gives a clear, shared understanding of the reasons for the site's inscription and identifies what it is about the site that needs to be managed over the long-term Within the Welsh Water operational area there are three World Heritage Sites, each with their own management plan: • Blaenavon Industrial Landscape World Heritage Site Management Plan 2018 – 2023 • Castles and Town Walls of King Edward in Gwynedd World Heritage Site: World Heritage Site Management Plan 2018 -28 • Pontcysyllte Aqueduct and Canal World Heritage Site Management Plan 2019-2029	The SEA should ensure that there are no negative direct or indirect impacts, for example during construction, on the world heritage sites situated within the Welsh Water area.

Appendix D
Baseline Analysis

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. All ecological processes are the product of interactions between different groups of organisms and are dependent upon there being a range of these present. In this sense, biodiversity – the variety and variability of living organisms – ultimately underpins the functioning of all ecosystems and thereby the delivery of all ecosystem services (which are critical in: providing clean air and water, food and raw materials; helping to regulate the climate; and providing space for recreation and amenity). Protected sites are key in the protection of semi-natural habitats and species and can act as excellent examples of natural resource management. The importance of preserving biodiversity is recognised from an international to a local level.

Protected sites

In the Welsh Water area, there are a large number of sites that are designated as internationally, nationally or locally important for biodiversity.

There are four categories of protected site:

- Protected areas that are established through International Agreements (including Ramsar Sites, which are wetlands of international importance designated under the Ramsar Convention and afforded the same degree of protection as European sites);
- Protected areas that are established under European Union Directives of other European Initiatives (including Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) identified as making significant contribution to conserving designated habitats and species);
- Protected areas that are established under National Legislation (Sites of Special Scientific Interest (SSSIs) and National Nature Reserves)); and
- Marine Protected Areas.

Sites of European importance (SPAs and SACs) are designated to conserve natural habits and wildlife which are rare, endangered or vulnerable in the European Community. In the UK, these form part of the 'Natura 2000' network of sites protected under the Habitats Directive (92/43/EEC). Interest features associated with European sites can be vulnerable (a function of sensitivity and exposure) to water resource permissions.

The importance of biodiversity in Wales is reflected by the number and variety of international, national and local nature conservation designations. More than 10 per cent of Wales' land cover is designated for nature conservation. Approximately 70 per cent of the Welsh coastline is designated as either SAC or SPA, with a range of habitats such as coastal saltmarsh, grazing marsh, mudflats, reedbeds, cliffs, dunes and shingle. Management of the coast including shoreline reinforcements, flood defence, drainage and land reclamation have threatened coastal habitats and create challenges for future management.

Important nature conservation sites (Ramsar sites, SPAs and potential SPAs, SACs and possible SACs, and SSSIs and NNR) across the Welsh Water supply area are shown in **Figures D.1 to D.4**. These figures are based on Geographical Information System (GIS) layers available in July 2022.

Figure D.7.1 Ramsar sites in the Welsh Water Supply Area

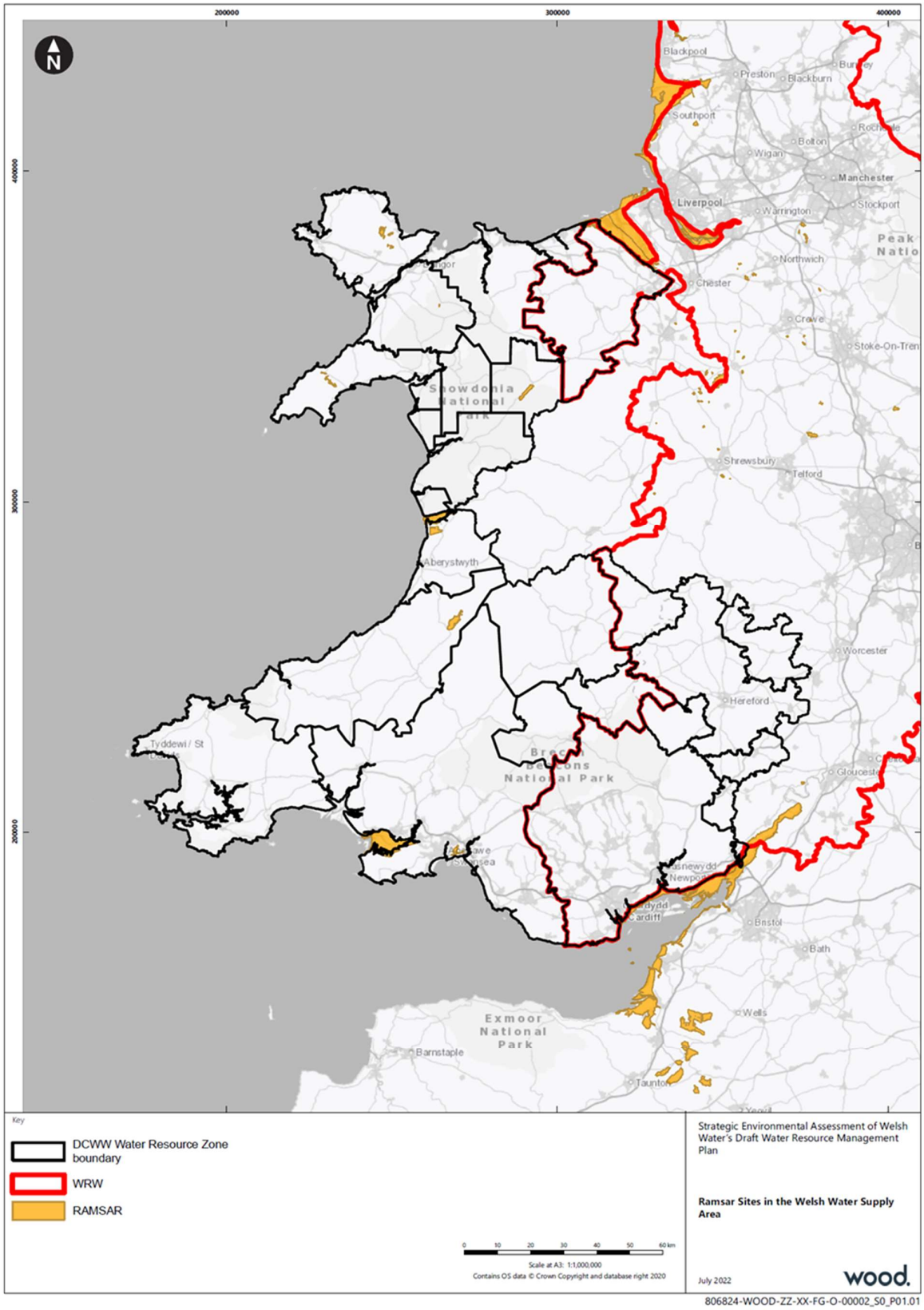


Figure D.2 SPAs and potential SPAs sites in the Welsh Water Supply Area

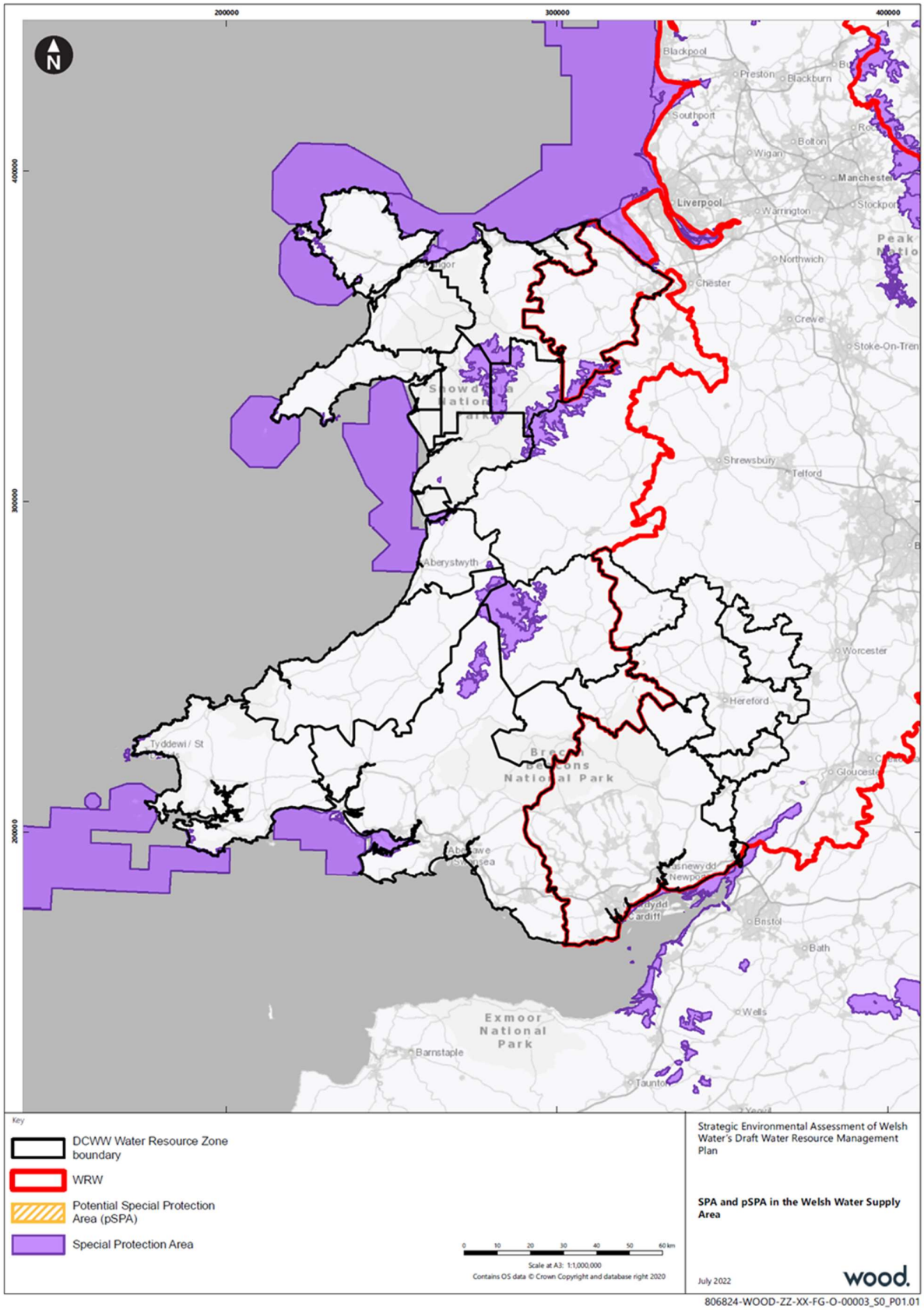


Figure D.3 SACs and possible SACs sites in the Welsh Water Supply Area

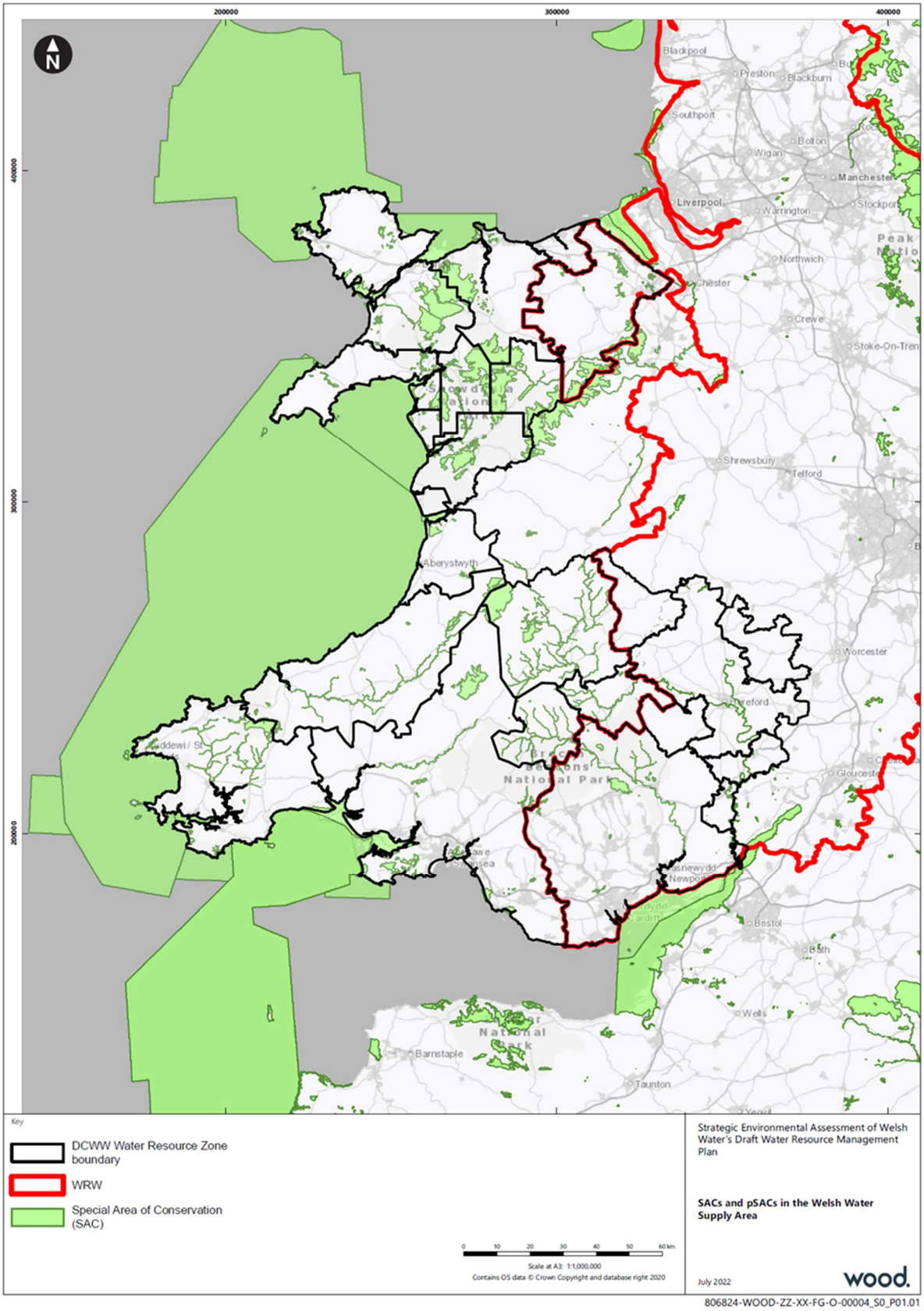
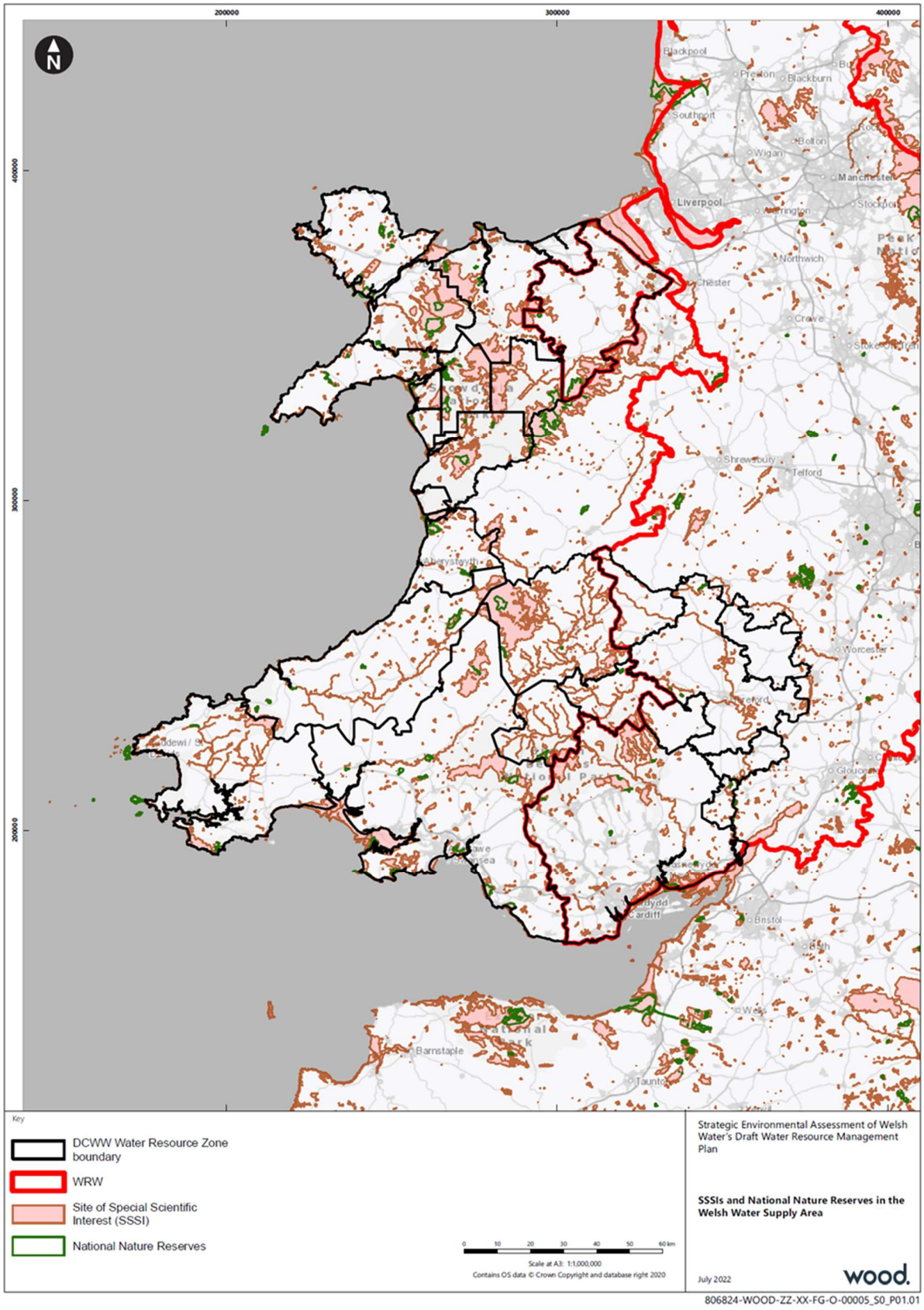


Figure D.4 SSSIs and National Nature Reserves in the Welsh Water Supply Area



As shown in **Table D.1**, within the Welsh Water supply area there are 10 Ramsar sites, 95 SACs, and 19 SPAs. Other internationally important sites to consider include the Rhinog Biogenetic Reserve in North Wales (Blaenau Ffestiniog WRZ) and the UNESCO biosphere reserve at Cors Fochno in the Dyfi estuary near Borth in Ceredigion (West Wales)[53].

Table D.1 Designations in Wales and the Welsh Water Supply Area

Designated Site Classification	Number of Sites within Welsh Water supply area (wholly or partially)	Total Area (hectares, ha) within Welsh Water supply area	Number of sites in Wales (including cross border sites with England)
Ramsar	10	7,051	10
Special Area of Conservation (SAC)	95	110,104	95
Special Protection Areas (SPA)	19	62,318	21
Site of Special Scientific Interest (SSSI)	1,091	200.387	1,078
National Nature Reserve	72	6,309	76
Local Nature Reserve	100	3,114	93

Source: JNC July 2022 GIS data[54] and SoNaRR 2020[55]

The majority of SAC and SPA habitats were reported to be in unfavourable condition (75 per cent) in 2016 with the exception of caves (100 per cent in favourable condition).

The condition of SAC and SPA species features on sites is mostly unfavourable (55 per cent), with the exception of birds and mammals of which 86 per cent and 68 per cent were in favourable condition, respectively in 2016.[56] The fourth Article 17 UK report (JNCC, 2019a), submitted to the EU in August 2019, found that 46 per cent of listed species were in favourable conservation status at the UK level. The figure is the same for species occurring in Wales. In Wales, 44 per cent of species are reported as stable, while 17 per cent are shown to be deteriorating.[57]

[53] The UNESCO Biosphere Reserve status is awarded in recognition of the way a local community lives sustainably in an area of special landscape quality with a rich wildlife. The designated area includes Aberystwyth, Llanbrynmair, Llanymawddwy, Corris Uchaf, and Aberdyfi.

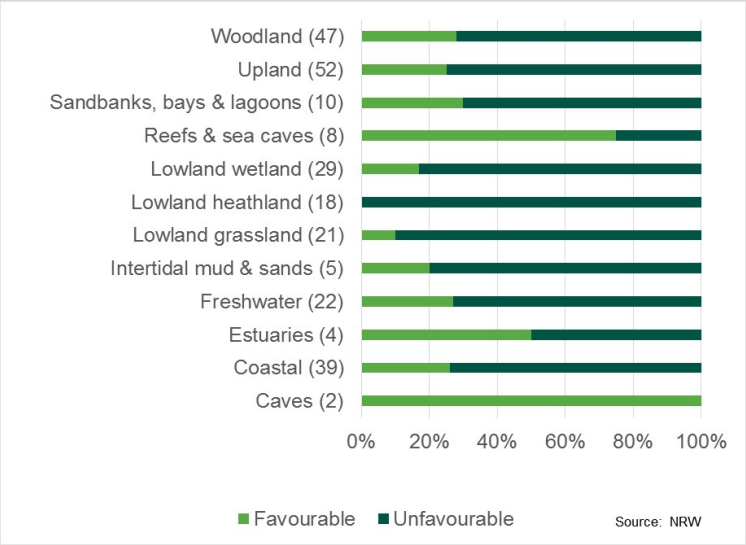
[54] JNCC (2022 GIS data) *Protected Sites data.* Available online: www.jncc.gov.uk

[55] Natural Resources Wales (2020) *State of Natural Resources Report for Wales*. Available online: https://cdn.cyfoethnaturiol.cymru/media/693305/sonarr2020-theme-biodiversity.pdf [Accessed March 2021]

[56] Natural Resources Wales (2016) *State of Natural Resources Report for Wales 2016*

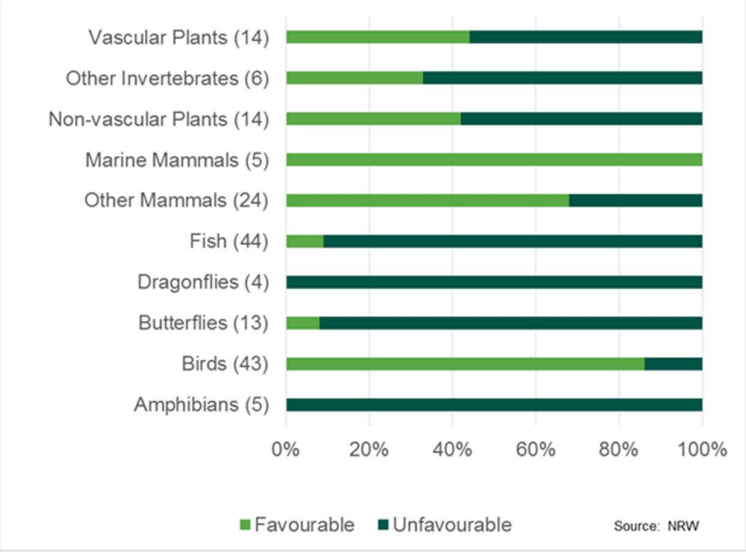
[57] Natural Resources Wales (2020) *The Second State of Natural Resources Report (SoNaRR2020): Assessment of Biodiversity*. Available online: https://cdn.cyfoethnaturiol.cymru/media/693305/sonarr2020-theme-biodiversity.pdf [Accessed April 2021]

Figure D.5 Percentage of Special Area of Conservation (SAC) habitat features in favourable and unfavourable condition (Number of habitat features in assessment shown in brackets)



Source: SoNaRR2016[58]

Figure D.6 Overview of condition of Habitat and Bird Directive species features on SACs and SPAs (Number of features in assessment shown in brackets)



Source: SoNaRR2016[59]

As of 2019, there were 1,078 SSSIs within Wales. A 2006 Rapid Review recorded the condition of SSSIs reported in Wales. Approximately 47 per cent of SSSIs were assessed to high confidence levels and the results showed that 32 per cent of sites were in favourable condition and 68 per cent were in unfavourable condition. Of the individual features for which SSSIs were designated:

[58] NRW (2016) *State of Natural Resources Report (SoNaRR): Assessment of the Sustainable Management of Natural Resources. Technical Report.*
[59] Ibid.

- 47 per cent of all features were in favourable condition;
- 72 per cent of geological features were judged to be in favourable condition;
- 53 per cent of species features (individual species and assemblages) were judged to be in favourable condition;
- 29 per cent of habitat features were judged to be in favourable condition.

Non-statutory protected sites and other biodiversity

Ancient woodlands are areas of woodland that have persisted since 1600 (see **Figure D.7**). They are relatively undisturbed and include unique and complex communities of plants, fungi, insects and other microorganisms. The Ancient Woodland Inventory (AWI) (AWI 2011) indicates that there are around 95,000ha of ancient woodland (AW) in Wales, compared to the 62,000ha identified in the AWI 2004.[60] SoNaRR2020 identified a range of threats to woodland: changing weather patterns; air pollution; built development and infrastructure; competing land use; insufficient management; pests and diseases; and herbivore pressure.

Non-statutory protected sites and other biodiversity

Throughout Wales there are around 90 Local Nature Reserves (LNRs) identified for their local importance to biodiversity; there are 100 LNRs within Welsh Water's supply area. Local Nature Reserves are shown in **Figure D.7**.

In Wales, 55 habitats and 557 species are identified under Section 7 of the Environment (Wales) Act 2016, as of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales. The species comprise:

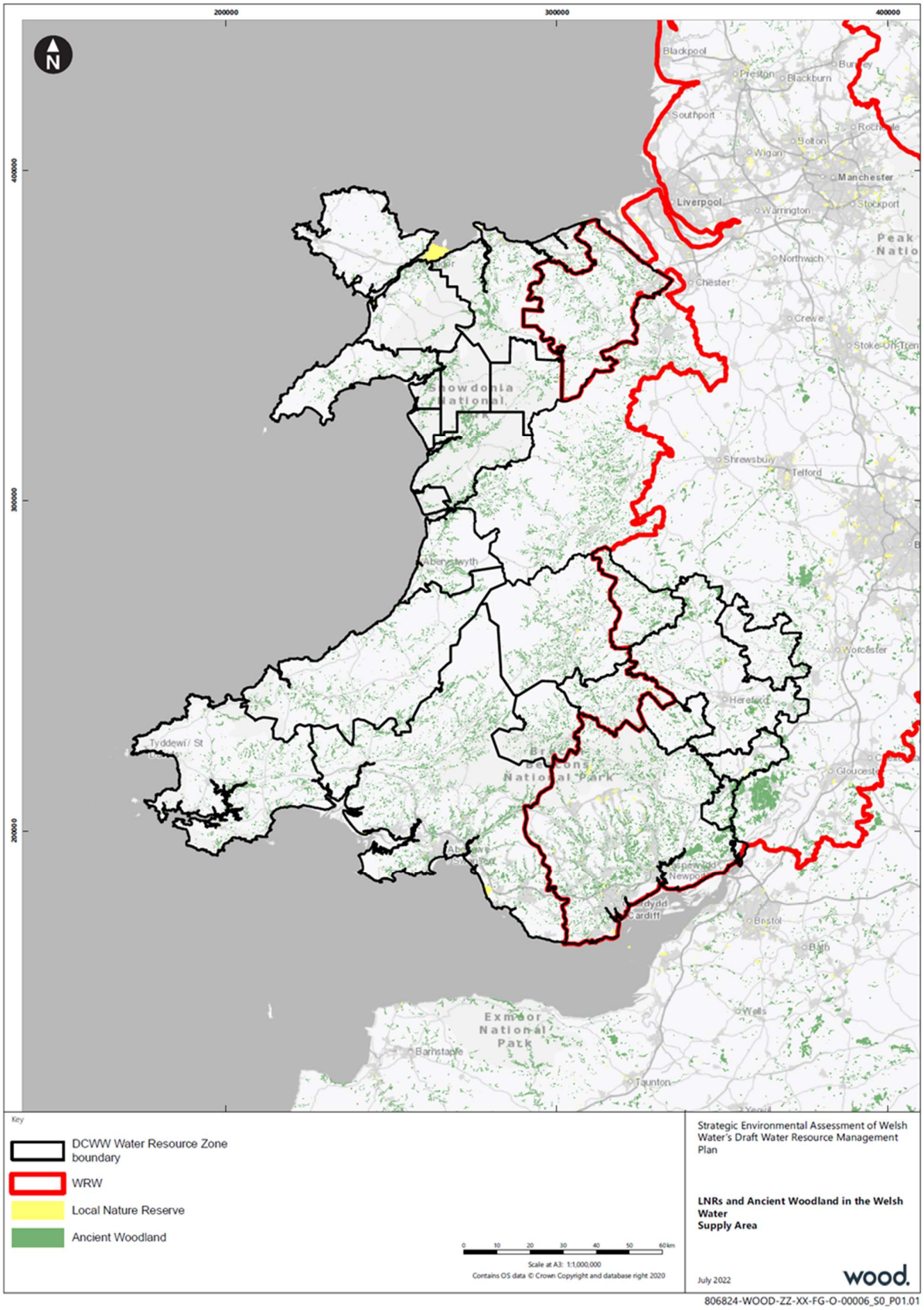
- 188 invertebrates;
- 67 lichens;
- 77 vascular plants;
- 51 birds;
- 55 marine species;
- 52 mosses and liverworts;
- 27 fungi;
- 5 stoneworts;
- 17 mammals;
- 10 fish; and
- 8 amphibians and reptiles.[61]

[60] NRW Ancient Woodland Inventory. Available via: https://naturalresources.wales/evidence-and-data/research-and-reports/ancient-woodland-inventory/?lang=en [Accessed July2022]
[61] Wales Biodiversity Partnership (2021) *Section 7 lists: Section 7 Priority species* [available at: https://www.biodiversitywales.org.uk/Environment-Wales-Act (accessed July 2022)].

SoNaRR2020[62] states that mechanisms to provide future reporting of status will be developed. The 2016 Report noted that between 2002 and 2008, fewer than half of the species on the interim list were considered stable or increasing.

[62] Available via: https://naturalresources.wales/evidence-and-data/research-and-reports/state-of-natural-resources-report-sonarr-for-wales-2020/?lang=en [Accessed July 2022]

Figure D.7 Local Nature Reserves and Ancient Woodland in the Welsh Water Supply Area



Likely Evolution of the Baseline without the WRMP

SoNaRR2020 states that the overall trend is one of serious decline in biodiversity, reflecting the global situation and internationally recognised nature emergency. Deterioration in habitat condition remains a significant concern with more than 50 per cent of Biodiversity Action Plan (BAP) habitats in decline in Wales.

SoNaRR2020 identifies that semi-natural habitats and functioning ecosystems have reduced in extent, becoming more fragmented, and are often in poor ecological condition. This has been affected by the loss of more than 90% of semi-natural grassland habitats since the 1930s. SoNaRR2020 highlights that many species of wild pollinator such as bumble bees, solitary bees and hoverflies are under threat. The Report also notes that many coastal habitats and species are threatened by sea level rise and shoreline development and shoreline habitats are unable to migrate inland due to natural or man-made barriers. This could result in the loss of habitats, such as mudflats and saltmarshes, which are critical for wildfowl and wader species.

SoNaRR2020 and the 2019 *State of Natural Resources Interim Report*[63] identify that nature and climate emergencies are interlinked and highlight the following issues:

- climate change is driving species to move location;
- Arctic-alpine species within mountain habitats could disappear from Wales as their habitats are lost;
- where coastal plants and wildlife cannot move inland, sea-level rise and increased land erosion could lead to widespread loss;
- the ecosystem services these habitats provide - like flood defence and carbon dioxide removal - will also be lost; and
- the number and range of invasive non-native species is likely to increase with the changing climate.

The *Nature Recovery Action Plan for Wales 2020-21*[64] sets out a series of actions for addressing growing evidence about the scale of loss of biodiversity, the escalating ecological crisis and the need to respond to that alongside the response to the climate emergency.

Welsh Water proactively manages a number of sites, implementing biodiversity action plans to develop ongoing conservation work. This work is ongoing and has included providing or improving habitat for key species and monitoring of species and habitat; the company runs both a Biodiversity Fund and a Water Framework Directive fund for projects that meet both of these drivers and support Welsh Water activities. Welsh Water has also implemented catchment management initiatives such as "Pest Smart" and "Weed Wiper" which have worked well in addressing the effects of excessive nutrient input. Welsh Water also work with others to maintain and enhance biodiversity, including:

- working with partners across 23 Safeguard Zones;
- working with NRW and the Brecon Beacons National Park Authority to deliver two peat restoration projects and leading on the Brecon Beacons "Mega catchment" project;
- supporting charitable organisations to develop and deliver actions at a local level, contributing to the wider national effort to ensure 'good ecological status' of watercourses under the Water Framework Directive.

[63] Natural Resources Wales (2019) *State of Natural Resources Interim Report*. Available via https://naturalresources.wales/evidence-and-data/research-and-reports/state-of-natural-resources-interim-report-2019/challenges/?lang=en [Accessed 04 March 21]
[64] Available via: https://gov.wales/sites/default/files/publications/2020-10/nature-recovery-action-plan-wales-2020-2021.pdf [Accessed March 2021]

Welsh Water has published a revised *Making Time for Nature* (2020)[65] strategy which sets out how, in the exercise of its functions, it proposes to comply with its duty to maintain and enhance biodiversity and in so doing promote the resilience of ecosystems.

Key Issues Relevant to the WRMP

The key sustainability issues relevant to the WRMP arising from the analysis of the biodiversity baseline are:

- the need to maintain and enhance biodiversity and the resilience of ecosystems, including sites designated for their nature conservation value;
- the need to address the climate emergency and nature emergencies together;
- 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 protected species;
- the need to prevent the spread/introduction of invasive non-native species;
- the need to maintain/enhance ecological connectivity;
- the need to sustainably manage biodiversity assets, taking into account the effects of climate change;
- the need to recognise the key role that green infrastructure plays in supporting (*inter alia*) biodiversity, landscape, wellbeing and climate change resilience;
- the need to protect and enhance the green infrastructure network;
- the need to continue monitoring biodiversity and ecological indicators; and
- the need to work within environmental limits and capacities.
- The need to prevent depletion and pollution of groundwater

Geology, Land Use and Soils

Baseline Characteristics

Geology

Wales has some of the most varied geology in the world representing all geological periods and spanning 1.4 billion years of the Earth's history. This diverse geology not only underpins biodiversity and landscape but also provides important mineral resources[66]. The bedrock geology of Wales is extremely varied and comprises sandstone, limestone and igneous rock. As a broad overview, the following rock types exist in a progression from North West to South East (predominant rock types): Ordovician; Silurian; and Devonian. 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.

Coal and metal mining have been very important to Wales historically. The South Wales Coalfield stretches across a large part of South Wales and is still mined to some extent, although less than previously (and from

[65] Welsh Water (2020) *Making time for Nature. Welsh Water's revised plan for maintaining and enhancing biodiversity*. Available online: https://www.dwrcymru.com/-/media/Files/Environment/2017/Biodiversity-booklet---Final-English---Single-pages.pdf [Accessed March 2021]

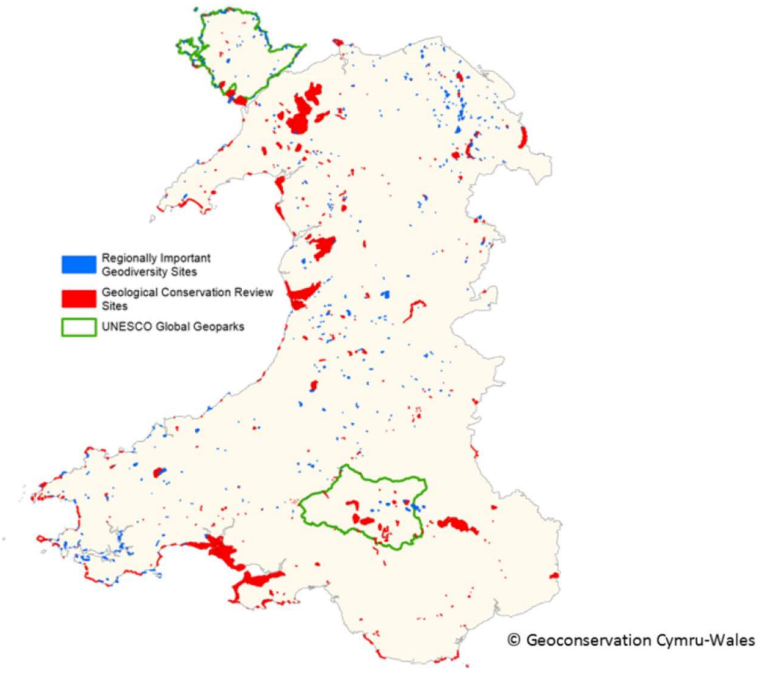
[66] NRW (2020) *The Second State of Natural Resources Report (SoNaRR2020).* Technical Report. Natural Resources Wales. Available online: https://naturalresources.wales/evidence-and-data/research-and-reports/state-of-natural-resources-report-sonarr-for-wales-2020/?lang=en [Accessed March 2021]

opencast or drift mines rather than deep mines). Lead and silver were once produced from mines in mid-Wales, from a series of mines inland from Aberystwyth. Copper, meanwhile, was mined in Snowdonia and at Parys Mountain on Anglesey, whilst gold was exploited around Dolgellau and Pumpsaint. A number of other metals were produced including zinc, arsenic, antimony and manganese.

The geodiversity of Wales has led to the forming of landscapes and environmental settings that have strong cultural service value. For example, the mountains of Snowdonia attract tourists to Wales whilst coal mining has helped to define the cultural identity of the South Wales Valleys. Following a long history, metal mining has ceased and there is only localised coal mining and slate quarrying in Wales. The aggregates industry is now the main mineral extraction industry in Wales, including marine and terrestrially derived aggregates[67].

Within Wales, there are approximately 300 SSSIs designated for geology and earth science features covering 48,815 ha and containing some 500 geological features; 93 per cent of these features are in favourable condition. There are also 480 Geological Conservation Review (GCR) sites, 700 Regionally Important Geological / geomorphological Sites (RIGS), and two UNESCO Global Geoparks. The location of the geodiversity sites is shown on **Figure D.8**. Fforest Fawr Global Geopark is within the Brecon Beacons National Park in South Wales and its geological heritage is of European significance. The GeoMôn Global Geopark is located on Anglesey, northwest Wales[68].

Figure D.8 Welsh Geodiversity Sites



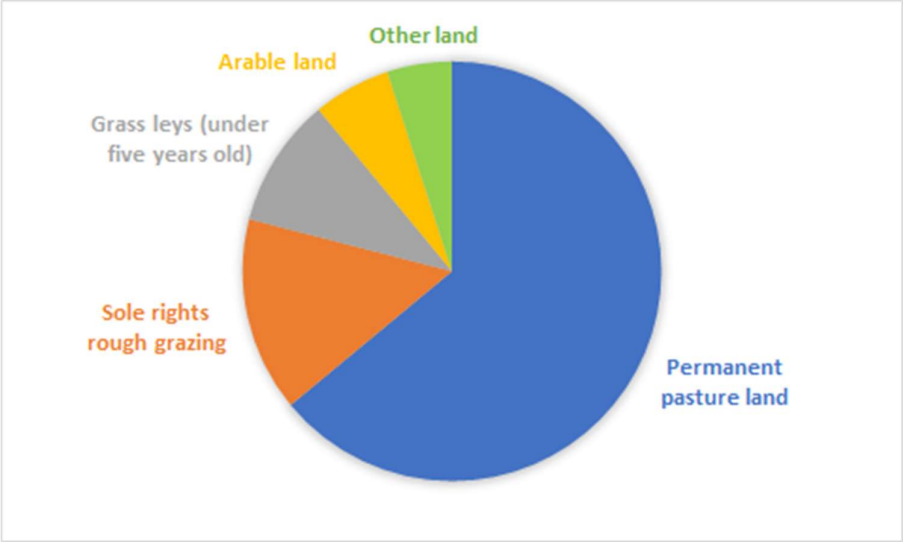
Source: SoNaRR[69]

[67] NRW (2016) *State of Natural Resources Report (SoNaRR): Assessment of the Sustainable Management of Natural Resources*. Technical Report. Natural Resources Wales. Available online: https://naturalresources.wales/evidence-and-data/research-and-reports/the-state-of-natural-resources-report-assessment-of-the-sustainable-management-of-natural-resources/?lang=en [Accessed July 2022]
[68] NRW (2016) *State of Natural Resources Report (SoNaRR): Assessment of the Sustainable Management of Natural Resources*. Technical Report. Natural Resources Wales. Available online: https://naturalresources.wales/evidence-and-data/research-and-reports/the-state-of-natural-resources-report-assessment-of-the-sustainable-management-of-natural-resources/?lang=en [Accessed July 2022]
[69] NRW (2016) *State of Natural Resources Report (SoNaRR): Assessment of the Sustainable Management of Natural Resources*. Technical Report. Natural Resources Wales. Available online: https://naturalresources.wales/evidence-and-data/research-and-reports/the-state-of-natural-resources-report-assessment-of-the-sustainable-management-of-natural-resources/?lang=en [Accessed July 2022]

Land use and soil

Land use in Wales is dominated by agricultural land under pasture grassland and rough grazing with a small proportion under a crop type[70]. This is illustrated in the split of the land on agricultural holdings by usage, as shown in **Figure D.9**. These characteristics reflect the climate, relief and soil type. Recent changes (2016-19) in land use area include an increase in tree cover on farms, woodland, permanent grassland, arable land and grass leys, and a decline in sole rights rough grazing and horticulture[71]. A total of 5.1 per cent of Wales is urban/suburban (compared to 7.2 per cent in the UK) whilst 15.6 per cent is woodland (compared to 12.5 per cent in the UK)[72].

Figure D.9 Split of Land on Agricultural Land in Wales (2019)



Source: SoNaRR2020[73]

There are over 400 different soil types in Wales (**Figure D.10**) which are contributing to, reflecting, and supporting the geodiversity and biodiversity, landscapes and land uses in Wales. The soils of best quality and most productive agricultural land are a scarce and finite resource in Wales. Soil quality has deteriorated across all habitats apart from woodlands where there has been some improvement. Most of the peatland resource is in poor condition, reducing the ability to mitigate climate change and benefit from the many regulating services that peatlands in good condition can provide[74].

[70] UK Centre for Ecology and Hydrology (2015) *Land Cover statistics derived from LCM2015* (Rowland, C.S.; Morton, R.D.; Carrasco, L.; McShane, G.; O'Neil, A.W.; Wood, C.M. (2017). Land Cover Map 2015 (25m raster, GB). NERC Environmental Information Data Centre. https://doi.org/10.5285/bb15e200-9349-403c-bda9-b430093807c7). Available online: https://www.ceh.ac.uk/land-cover-map-2015-statistics [Accessed March 2021]

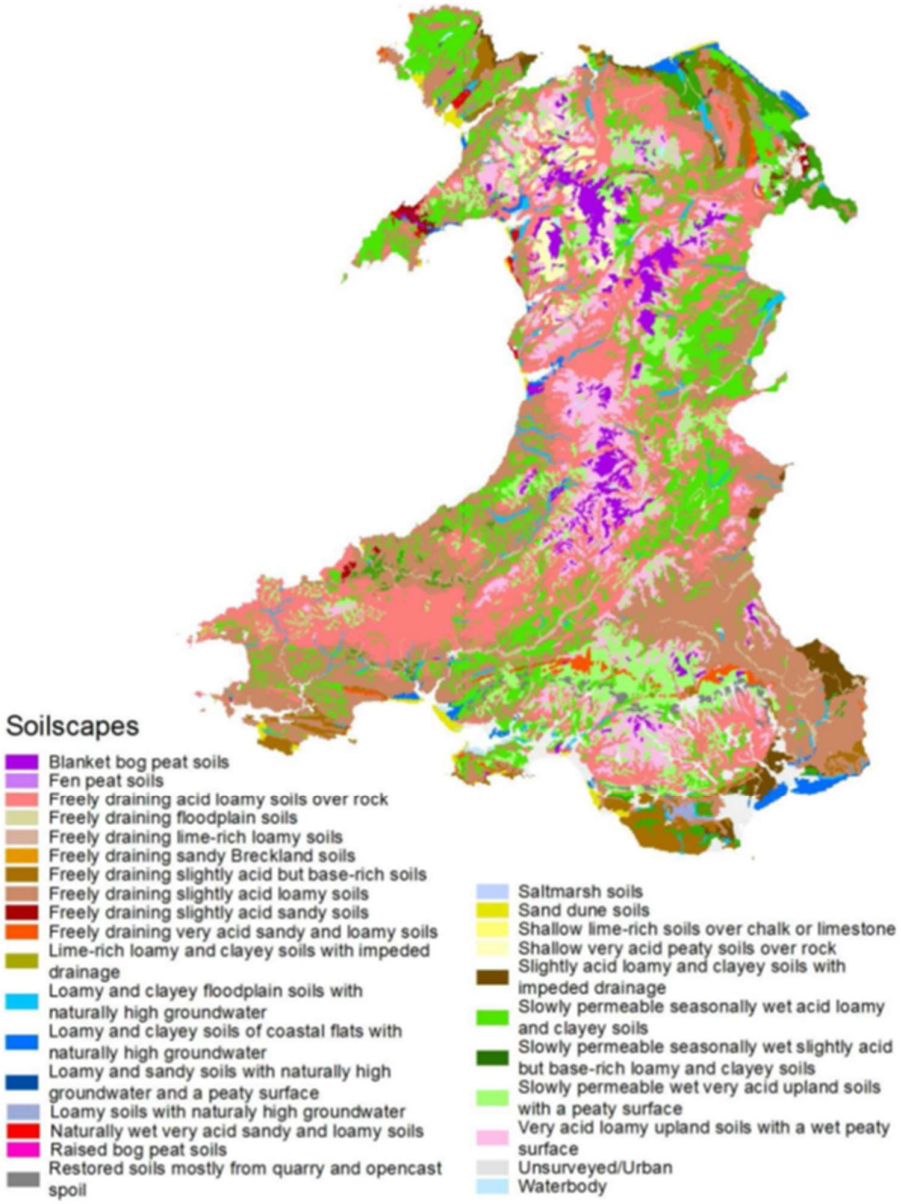
[71] NRW (2020) *The Second State of Natural Resources Report (SoNaRR2020).* Technical Report. Natural Resources Wales. Available online: https://naturalresources.wales/evidence-and-data/research-and-reports/state-of-natural-resources-report-sonarr-for-wales-2020/?lang=en [Accessed July 2022]

[72] UK Centre for Ecology and Hydrology (2015) *Land Cover statistics derived from LCM2015* (Rowland, C.S.; Morton, R.D.; Carrasco, L.; McShane, G.; O'Neil, A.W.; Wood, C.M. (2017). Land Cover Map 2015 (25m raster, GB). NERC Environmental Information Data Centre. https://doi.org/10.5285/bb15e200-9349-403c-bda9-b430093807c7). Available online: https://www.ceh.ac.uk/land-cover-map-2015-statistics [Accessed March 2021]

[73] NRW (2020) *The Second State of Natural Resources Report (SoNaRR2020).* Technical Report. Natural Resources Wales. Available online: https://naturalresources.wales/evidence-and-data/research-and-reports/state-of-natural-resources-report-sonarr-for-wales-2020/?lang=en [Accessed March 2021]

[74] NRW (2020) *The Second State of Natural Resources Report (SoNaRR2020).* Technical Report. Natural Resources Wales. Available online: https://naturalresources.wales/evidence-and-data/research-and-reports/state-of-natural-resources-report-sonarr-for-wales-2020/?lang=en [Accessed March 2021]

Figure D.7.2 National Soil Map of Wales



Source: SoNaRR 2016 [75]

The Agricultural Land Classification (ALC) System developed by Defra provides a method for assessing the quality of farmland. There are five grades of agricultural land quality plus non-agricultural and urban categories. **Table D.2** shows agricultural land quality in Wales and England by ALC grade.

Wales is characterised by significant areas of grades 4 and 5 agricultural land (poor to very poor quality) and at a much higher proportion than in England. Agricultural land quality is lower in the upland areas of Wales (See **Figure D.11)**. The English areas of the Welsh Water supply area are generally of a higher

[75] NRW (2016) *State of Natural Resources Report (SoNaRR): Assessment of the Sustainable Management of Natural Resources*. Technical Report. Natural Resources Wales. Available online: https://naturalresources.wales/evidence-and-data/research-and-reports/the-state-of-natural-resources-report-assessment-of-the-sustainable-management-of-natural-resources/?lang=en [Accessed March 2021]

agricultural quality. Poor soil quality combined with a hilly/mountainous landscape and wet climate means that the majority of agricultural land in Wales is restricted to the grazing of sheep and cattle[76].

Table D.6 Agricultural Land Quality (as a percentage of land area)

Agricultural Land Grade	Wales	England
Grade 1 – Excellent	0.49	4.10
Grade 2 – Very Good	5.38	38.73
Grade 3 – Good / Moderate	32.86	39.51
Grade 4 – Poor	18.86	12.37
Grade 5 – Very Poor	23.38	1.32
Non agricultural	14.67	2.76
Urban	4.37	1.21

Source: Data.gov.uk[77]

Alongside their agricultural use, soils and particularly peats store a significant amount of carbon. Soils also provide storage for water, foundations for urbanisation and woodlands, provision of minerals and metals and for biodiversity acting as both a habitat and a foundation for a range of habitats. However, soil erosion and acidification are prominent pressures. Fertile topsoil develops at a rate of less than 1 cm/century. An estimated 2.2 million tonnes of topsoil is eroded on an annual basis in the UK. Some agricultural practices (e.g. harvesting in wet conditions, leaving fields bare after harvest) result in large volumes of productive topsoil being compacted and degraded as well as eroded and deposited in adjacent water courses. There are also many impacts on the water environment as a result of eroded soils entering waterways.[78]

Wales' peat habitats have been adversely affected by climate change, land management and atmospheric pollution and it is estimated that the extent of deep peat soils (≥0.5m) is now 90,995 ha.[79]

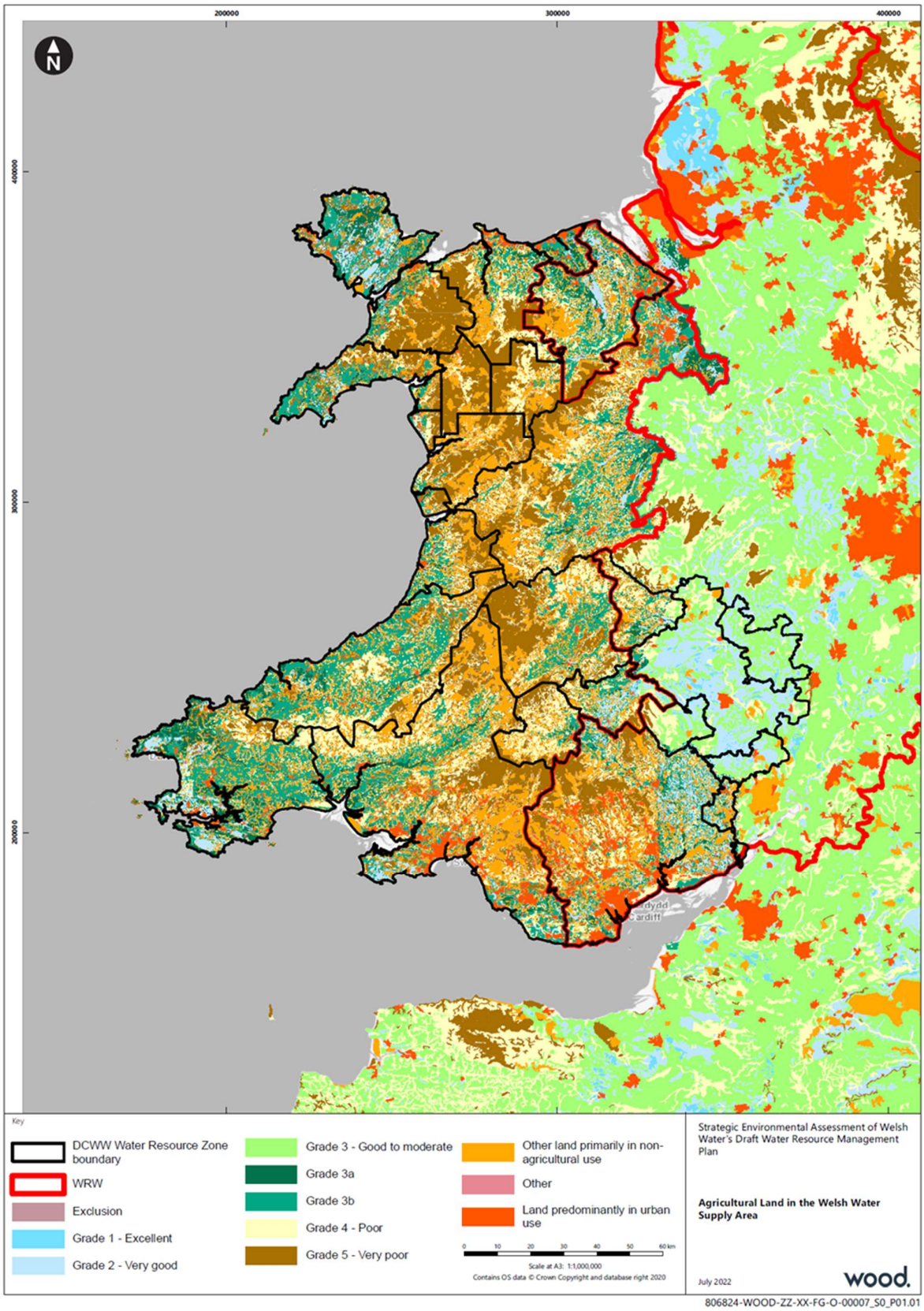
[76] NRW (2020) *The Second State of Natural Resources Report (SoNaRR2020).* Technical Report. Natural Resources Wales. Available online: https://naturalresources.wales/evidence-and-data/research-and-reports/state-of-natural-resources-report-sonarr-for-wales-2020/?lang=en [Accessed March 2021]

[77] DATA.GOV.UK (2020) Provisional Agricultural Land Classification (ALC) Available online: https://data.gov.uk/dataset/provisional-agricultural-land-classification-alc2 [Accessed March 2021]

[78] NRW (2015) *A Snapshot of the State of Wales' Natural Resources – June 2015.* Available online: http://naturalresources.wales/media/4798/snapshot-report.pdf [Accessed March 2021].

[79] Evans, C., Rawlins, B., Grebby, S., Scholefield, P. & Jones, P. (2015) *Glastir Monitoring & Evaluation Programme. Mapping the extent and condition of Welsh peat*. Welsh Government, NERC/Centre for Ecology & Hydrology.

Figure D.7.3 Agricultural Land Classification



Likely Evolution of the Baseline without the WRMP

Geological hazards may change as a response to climate change; for example, coastal erosion, landslides and pollution from former mine sites. Climate change is the biggest threat to soils. From 2050, predicted changes to the extent and distribution of the ALC grade and the best and most versatile (BMV) agricultural land will be largely driven by seasonal drought risk through changes in soil wetness and water availability.

Soil contamination is an additional threat posed by industry, urbanisation and mineral extraction which can affect biological processes of soil formation. Degradation in soil structure can also potentially be a factor in flooding whilst dissolved organic carbon (DOC) concentrations have increased in upland waters which suggests soil carbon stocks may be destabilising due to climate change. [80].[81]

Woodlands are a fundamental part of the environment in Wales and there are a number of pressures on them. Pests and diseases are some of the major pressures which have had a significant impact on Welsh woodlands in recent years. The rate of new planting increased between 2009 and 2014 but from 2014 to 2018 new planting has fallen[82], and many of the best examples of semi-natural woodland (on protected sites) are in poor condition[83].

The '*Natural Resources Policy*' identifies a number of aims of relevance to land use and soil, including:[84]

- better management of soil for carbon storage and sequestration;
- safeguarding the best and most versatile agricultural land to improve soil quality, productive capacity and its resilience to degradation;
- increasing green infrastructure in and around urban areas;
- increasing canopy cover and well located woodland; and
- peat bog management.

Key Issues Relevant to the WRMP

The key sustainability issues relevant to the WRMP arising from the analysis of the baseline for geology, land use and soils are:

- the need to protect, maintain and enhance geomorphological functions and services;
- the need to influence how land is managed, promoting sustainable patterns of land use;
- the need to conserve and enhance soil quality and function (including carbon sequestration);
- the need to protect and avoid damage to Wales' geodiversity and conserve and enhance sites designated for geological interest; and
- the need to manage impacts on soil resources, including control of pollution and remediation of contaminated land.

[80] NRW (2020) *The Second State of Natural Resources Report (SoNaRR2020).* Technical Report. Natural Resources Wales. Available online: https://naturalresources.wales/evidence-and-data/research-and-reports/state-of-natural-resources-report-sonarr-for-wales-2020/?lang=en [Accessed March 2021]

[81] NRW (2015) *A Snapshot of the State of Wales' Natural Resources – June 2015*. Available online: http://naturalresources.wales/media/4798/snapshot-report.pdf [Accessed March 2021].

[82] Welsh Government (2019) *Woodlands for Wales Indicators 2017-18*. Available online: https://gov.wales/woodlands-wales-indicators-april-2017-march-2018 [Accessed March 2021].

[83] UK National Ecosystem Assessment (2011) *The UK National Ecosystem Assessment (NEA): Technical Report*. UNEP-WCMC, Cambridge. Chapter 20: Status and Changes in the UK's Ecosystems and their Services to Society: Wales. Pg 979-1044. Available at http://uknea.unep-wcmc.org/LinkClick.aspx?fileticket=StRD4fVq72c%3d&tabid=82 [Accessed March 2021]

[84] Welsh Government (2017) *Natural Resources Policy*. Available online: http://gov.wales/docs/desh/publications/170821-natural-resources-policy-en.PDF [Accessed March 2021]

Water

Baseline Characteristics

The number and type of water bodies in Wales is summarised in **Table D.3**. Water is abstracted from water bodies for many purposes, including public water supply, agriculture, industry and electricity generation. In Wales, most of the water licensed for abstraction is from surface water rather than groundwater, with electricity generation being the sector abstracting the most (82 per cent), followed by public water supply (13 per cent), other industry (0.03 per cent) and fish farming and amenity ponds (0.01 per cent). Spray irrigation, other agriculture and private water supplies account for a very low percentage of the total water abstracted[85].

Table D.7 Number and Type of Water Bodies in Wales

Water body category	Natural	Artificial	Heavily modified	Total
Rivers and Canals	629	14	93	736
Lakes	32	2	80	114
Transitional and Coastal	37	n/a	18	55
Groundwater	38	n/a	n/a	38
Total	698	16	191	943

Source: NRW[86]

Wales has relatively high rainfall compared to the rest of the UK, receiving on average 1,400 mm per year. There are, however, geographical differences across the Welsh Water supply area. Across Anglesey, the borders of Wales and Herefordshire, rainfall is around 700 mm per year, whilst the mountainous areas of the Brecon Beacons and Snowdonia receive substantially more rainfall, with the latter typically receiving more than 3,000mm of rainfall per year[87]. Rainfall patterns combined with sources of demand drive the nature of the water resource system operated by Welsh Water. Only around 3 per cent of the rainfall in Wales is used for public water supply, which is very different to the rest of the UK where up to 50 per cent of rainfall is used for public water supply.

Welsh Water manages its water supplies and demands across 24 water resource zones (WRZs). Welsh Water provides water and sewerage services to some 3 million customers in much of Wales and small parts of Cheshire and Herefordshire in England. It also has over 100,000 business customers, and in total delivers more than 800 million litres of drinking water every day. This can increase by up to 20 per cent during a hot summer. Most of the water Welsh Water abstracts is supplied from impounding reservoirs although significant volumes are abstracted from lowland river sources such as those on the Rivers Wye and Usk in South East Wales, the River Towy in South West Wales and the River Dee in North Wales. Groundwater accounts for less than 5 per cent of water supplies by Welsh Water but at a local level, may be the whole supply[88]. River abstractions are the dominant supply in the Tywyn Aberdyfi, Llyswen, Hereford CUS, Whitbourne, Ross on Wye, and Monmouth zones. Reservoir supplies dominate the rest of Welsh Water's

[85] Environment Agency (2011) *The Case for change – current and future water availability*. Available online: http://webarchive.nationalarchives.gov.uk/20140328084622/http:/www.environment-agency.gov.uk/research/planning/135501.aspx [Accessed March 2021].
[86] NRW (2022) *Water Watch Wales Map Gallery: Cycle 3 (2021) Rivers and Waterbodies Map*. Available online: https://waterwatchwales.naturalresourceswales.gov.uk/en/ [Accessed July 2022].
[87] Met Office (2016) *Wales: Climate*. Available online: http://www.metoffice.gov.uk/climate/uk/regional-climates/wl [Accessed July 2022].
[88] Welsh Water (2019) *Final Water Resources Management Plan 2019. Technical Report. March 2019.* Available online: https://www.dwrcymru.com/en/our-services/water/water-resources/final-water-resources-management-plan-2019 [Accessed March 2021].

company area, with the remainder drawn from the ground through springs, wells and boreholes. There are groundwater sources in the Pilleth, Brecon, Clwyd Coastal, Pembrokeshire, Hereford and Vowchurch zones.

Water availability

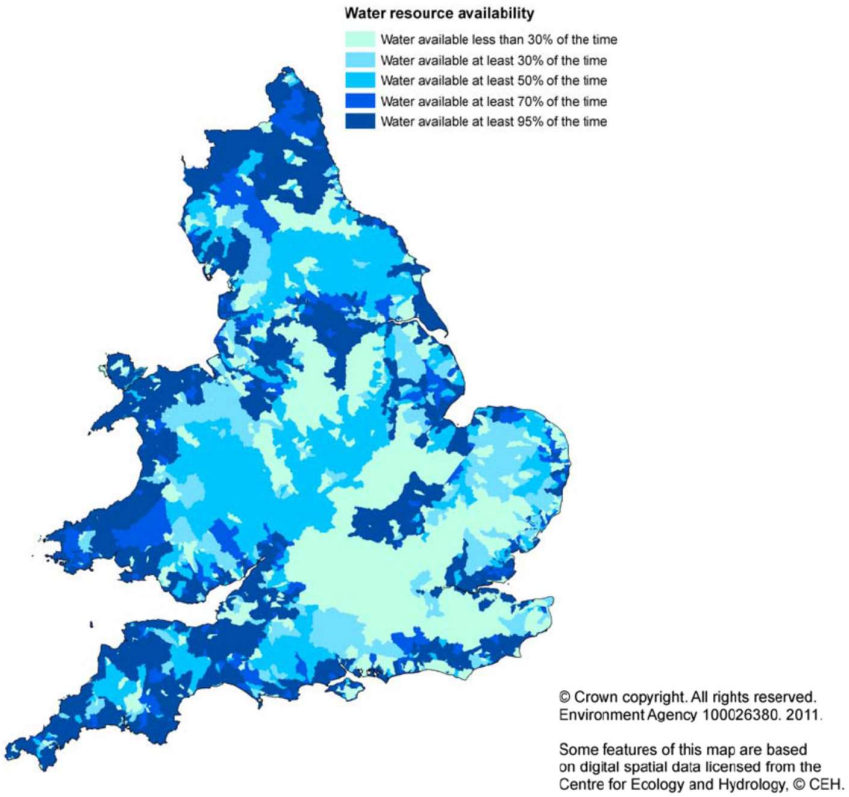
NRW has produced a series of Catchment Abstraction Management Strategies (CAMS) for the catchments within Wales and those that cross the England / Wales border. These CAMS set out how water resources will be managed in each catchment and provide information on how existing abstraction licences are managed 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 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.

Figure D.12 shows how reliable new surface water and groundwater licences are, using the CAMS assessment. About 60 per cent of water bodies in Wales can provide a reliable source of water for new abstractions for at least 95 per cent of the time. Approximately 10 per cent of water bodies in Wales can only provide water for new abstractions 30 per cent or less of the time (less than 100 days a year)[89].

[89] Environment Agency & NRW (2013) *Current and future water availability – addendum: A refresh of the Case for Change analysis, December 2013.* Available online: http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/research/planning/135501.aspx [Accessed March 2021].

Figure D.7.4 Water Resource Reliability: percentage of time water would be available for abstraction of new licences

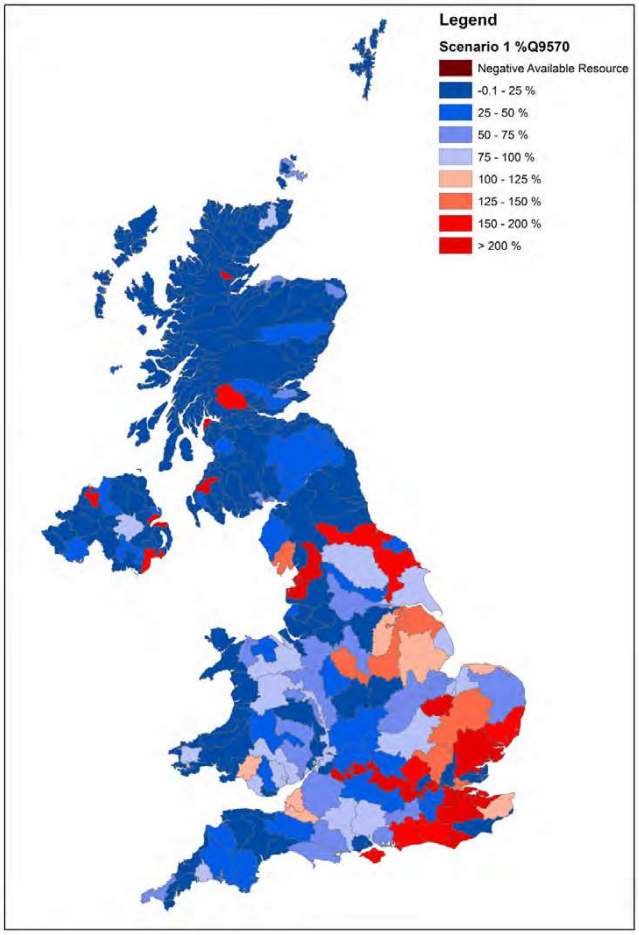


Source: Environment Agency[90]

The majority of UK catchments, including those in Wales, are not currently using 100 per cent of the available resource of water at average low flow conditions i.e., there is a surplus of water available for human uses (**Figure D.13**). However, abstraction is more than the available resource in average low flow conditions in catchments mostly located in the east and south of the UK, although there are also a small number of catchments similarly affected in Scotland, Northern Ireland and the North West of England.

[90] Environment Agency (2011) *The Case for change – current and future water availability*. Available online: http://webarchive.nationalarchives.gov.uk/20140328084622/http:/www.environment-agency.gov.uk/research/planning/135501.aspx [Accessed March 2021].

Figure D.7.5 Present-day abstraction demand as a percentage of the available resource at average of low flow conditions (Q95 and Q70 flows)



Source: HR Wallingford (2015)[91]

Sustainability Reductions - Review of Consents

Under the Habitats Directive, NRW and the Environment Agency completed a review of all the consents (the RoC) that they regulate to ensure there were no detrimental impacts on the conservation interests in designated sites including SPAs and SACs. Discharge consents and water abstraction licences were included within this review.

The presence of a large number of SPAs and SACs in and adjacent to Welsh Water's supply area meant that a number of Welsh Water abstraction licences required modification in order to achieve the desired environmental outcomes for the primarily riverine European-designated sites (SACs) (River Wye, River Usk, River Teifi, River Towy, Cleddau Rivers, Rhinog, Migneint-Arenig-Dduallt, Afon Gwyrfai and Llyn Cwellyn). The negative impacts of the licences on designated sites, as determined by the regulator, included impacts on river flow and lake levels, fish entrainment through intake structures, groundwater level impacts and obstructions to fish passage.

[91] HR Wallingford (2015) *CCRA2: Updated projections of water availability for the UK*. Available online: https://www.theccc.org.uk/wp-content/uploads/2015/09/CCRA-2-Updated-projections-of-water-availability-for-the-UK.pdf [Accessed March 2021].

National Environment Programme (NEP) in Wales and the Water Industry National Environment Programme (WINEP) in England

WINEP represents a set of actions that the Environment Agency have requested all water companies operating in England (including Welsh Water's supply area in England) to complete between 2020 and 2025, in order to contribute towards meeting their environmental obligations. A similar National Environment Programme (NEP) applies in Wales. The WINEP actions will see up to £5 billion of investment by water companies in the natural environment through 2020 to 2025 (PR19). The investment comprises about 40% for meeting Water Framework Directive drivers, 40 per cent for meeting Urban Waste Water Treatment Directive drivers and 10% for meeting other drivers (including biodiversity). The investment aims to[92]:

- protect and improve at least 6,000 km of waters;
- protect and improve 24 Bathing Waters and 10 Shellfish sites;
- protect and improve 1,800 ha of protected nature conservation sites; and
- enhance nearly 900 km of river and 4,276 ha through wider biodiversity improvements.

WINEP will help tackle some of the biggest challenges facing the water environment, from the spread of invasive species, low flows and unsustainable abstraction to the effects of chemical and nutrient pollution. The measures in WINEP represent the actions required by water companies to meet their environmental obligations under their AMP7 investment plans. However, this also presents an opportunity for the industry to develop innovative approaches which will benefit customers, communities, the environment and natural capital.

Welsh Water's PR19 investment plan (September 2018) identifies an overall £2.3 billion capital investment programme. This includes £370 million of funding for the NEP that will:

- upgrade 25 wastewater treatment works;
- replace 7 wastewater treatment works in the Gwili Gwendraeth catchment; and
- improve 15 high risk catchments.

The NEP will improve the quality of 400km of river. This will be complemented through a combination of a Drainage and Wastewater Management Plans and increasingly a Sustainable Management of Natural Resources approach, which will be piloted in four catchments in Welsh Water's supply area during AMP7.

Supply and demand

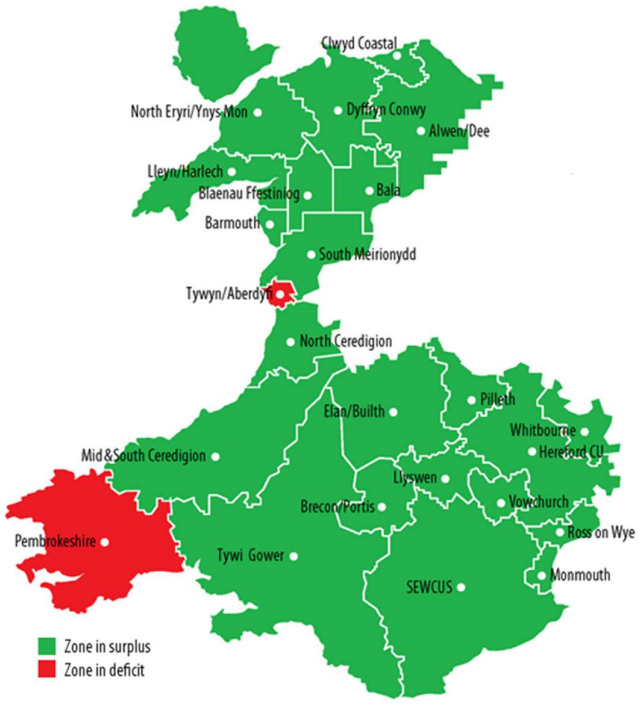
Welsh Water forecasts water supply and demand in all of the 24 water resource zones (WRZs) taking into account the RoC and the NEP or WINEP. To account for future uncertainties, an additional amount of water is included in the assessment of the supply demand balance called 'Target Headroom'. For the WRZ to have a 'surplus', the water available for supply must be equal to or greater than the sum of the total forecast demand plus the target headroom. Where a shortfall against demand plus target headroom occurs (i.e., the WRZ has a supply demand deficit) measures are required to address the shortfall. These could include measures to increase supply such as new abstractions or measures to reduce demand through additional leakage detection.

Welsh Water's Water Resources Management Plan 2019 presents the outcome of this assessment and identifies that two of the 24 WRZs are forecast to have a supply demand deficit over the planning period to 2050 unless management interventions such as demand management measures or new resources are

[92] Defra (2018) *£5 billion investment by water companies to benefit the natural environment.* Available online: https://www.gov.uk/government/news/5-billion-investment-by-water-companies-to-benefit-the-natural-environment [Accessed March 2021].

implemented[93]. The two WRZs are Pembrokeshire and Tywyn/Aberdyfi and are shown in red on **Figure D.14**. The Water Resources Management Plan 2019 ensures that a surplus of supply over demand is maintained in all WRZs.

Figure D.7.6 Welsh Water WRZs with supply demand deficit over the planning period to 2050



Source: Welsh Water (2019) Final Water Resources Management Plan [94]

Wastewater treatment

Welsh Water collects wastewater, including surface water from homes and businesses across the Welsh Water area. The wastewater is transported by the 36,249 km of sewer to one of the 562 wastewater treatment works (WwTWs) for treatment before being returned to the surface water system (rivers and the sea)[95].

WwTW discharge consent standards are set to maintain good water quality. In 2021, Welsh Water's WwTWs achieved 98.3 per cent compliance with their environmental permit conditions. NRW gives water companies a star rating for their overall performance in protecting the environment (including during return of treated water to rivers and the sea). Welsh Water was awarded a three ('good') out of four-star Environmental Performance Assessment (EPA) rating in the latest assessment in 2021[96].

[93] Welsh Water (2019) *Final Water Resources Management Plan, Technical Report*. Available online at: https://www.dwrcymru.com/en/our-services/water/water-resources/final-water-resources-management-plan-2019 [Accessed March 2021]

[94] Welsh Water (2019) Final Water Resources Management Plan, Technical Report. Available online at: https://www.dwrcymru.com/en/our-services/water/water-resources/final-water-resources-management-plan-2019 [Accessed March 2021]

[95] Welsh Water (2022) *Annual environmental performance report for Dŵr Cymru Welsh Water 2021.*. Available online: https://cdn.cyfoethnaturiol.cymru/media/695181/external-dcww-performance-report-2021-english-final.pdf?mode=pad&rnd=133016650650000000 **Error! Hyperlink reference not valid.**[Accessed July 2022].

[96] Natural Resources Wales (2022) Annual environmental performance report for Dŵr Cymru Welsh Water 2021. Available online: https://cdn.cyfoethnaturiol.cymru/media/695181/external-dcww-performance-report-2021-english-final.pdf?mode=pad&rnd=133016650650000000 [Accessed July 2022)

Water quality

The quality of the water body that receives the output from the WwTW is important and the Water Framework Directive (2000/60/EC) provides a mechanism for management of the water environment to ensure sustainable use of water. The Water Framework Directive also seeks to protect and improve the quality, both ecological and chemical, of inland surface waters, ground waters and coastal waters. Under the Water Framework Directive, River Basin Management Plans (RBMP) were prepared for each River Basin District in 2009 (first cycle) and 2015 (second cycle). NRW issued the draft 2021 RBMPs (third cycle) for a 6 month consultation on 22nd December 2020. The RBMP for the Welsh part of the Severn River RBMP is due to be reviewed and updated by the EA by the end of 2021. Proposed updates to the draft plans were put out for consultation in October 2022, ending April 2022.

Table D.4 shows the overall status of the water bodies in each River Basin District within Wales in the three RBMP cycles (as a percentage of the total water bodies). In Wales, the most up to date classification is the 2021 classification for both surface waters and groundwaters.

Table D.8 Overall status of water bodies in Wales as a percentage in 2009, 2015, 2018 and 2021

River Basin District	2009					2015						2018					2021				
	Bad	Poor	Moderate	Good	High	Not Assessed	Bad	Poor	Moderate	Good	High	Bad	Poor	Moderate	Good	High	Bad	Poor	Moderate	Good	High
Dee	0	11	58	30	0	0	0	8	65	28	0	0	11	50	39	0	3	10	48	39	0
Western Wales	0	7	63	30	0	0	0	8	52	39	1	0	9	48	43	<1	1	11	47	42	<1
Severn River*	1	12	50	37	0	1	1	8	47	43	0	-	-	-	-	-	2	1	53	43	0
Average	0.3	10	57	32	0	0.3	0.3	8	55	37	0.3	0	10	49	41	<0.3	2	7	49	41	0.1

Notes* Welsh part of Severn River Basin District

Source: Welsh Government and NRW[979899]

In 2009, 10 per cent of all water bodies were in poor condition, 57 per cent were in moderate condition and 32 per cent were in good condition. Since then, many improvements have been made both in monitoring and data collection and assessment. The percentage of water bodies achieving good or better status has increased to 37 per cent in 2015 and 41 per cent in both 2018 and 2021.

The main reasons for water body failure in Wales are pollution from abandoned mines and contaminated land, agricultural pollution, barriers to fish migration and impoundments. Sewage discharges, acidification,

[97] Welsh Government (2015) *River Basin Planning Progress Report for Wales 2009-2015. Updated December 2015*. Available online: http://naturalresources.wales/media/676155/progress-report-for-wales-2009-2015-english.pdf [Accessed March 2021]

[98] NRW (2020) *Consultation on updating the Western Wales River Basin Management Plan for the third cycle (2021-2027).* Available online: https://ymgynghori.cyfoethnaturiol.cymru/evidence-policy-and-permitting-tystiolaeth-polisi-a-thrwyddedu/western-wales-rbmp/user_uploads/draft-western-wales-urbmp-consultation-2020-1.pdf [Accessed March 2021] and NRW (2020) *Consultation on updating the Dee River Basin Management Plan for the third cycle (2021-2027).* Available online: https://ymgynghori.cyfoethnaturiol.cymru/evidence-policy-and-permitting-tystiolaeth-polisi-a-thrwyddedu/dee-river-rbmp/user_uploads/draft-dee-urbmp-consultation-2020.pdf [Accessed March 2021]

[99] NRW (2022) *Water Watch Wales Map Gallery: Cycle 3 (2021) Rivers and Waterbodies Map*. Available online: https://waterwatchwales.naturalresourceswales.gov.uk/en/ [Accessed July 2022].

forestry, flood protection and land drainage, surface water drainage from urban and transport development, abstraction and industrial discharges are also factors[100].

The Marine Strategy Framework Directive (MSFD) aims to achieve Good Environmental Status (GES) of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend. The Directive sets out 11 high level descriptors of GES and the status of these in Welsh waters is monitored for assessment of progress towards achieving GES. The Wales National Marine Plan will be a key tool for ensuring that the targets and measures to be determined by the UK for the MSFD can be implemented. Parts 1 and 2 of Welsh Government's Marine Strategy set out targets for achieving GES and the monitoring programmes that will help in assessing this. Part of the strategy 3 is currently being worked on[101]

Bathing waters are very important for coastal communities, visitors and the economy in Wales. In 2021, all of the 105 designated Welsh bathing waters met the standards set by the Bathing Water Directive (2006/7/EC). Of the 105 bathing waters assessed in Wales, 85 were of an excellent standard, 14 achieved a good standard and 6 were classified as the minimum, sufficient, standard[102].

Across England and Wales, new drinking water standards came into force, *The Water Supply (Water Quality) Regulations 2018* (which revised earlier versions of the regulations). Welsh Water's performance against the water quality tests (known as Compliance Risk Index (CRI)) for 2020 is 4.17, which is higher than the average level for England and Wales (2.62)[103].

Nitrate Vulnerable Zones

Nitrate Vulnerable Zones (NVZs) are areas of land that drain into surface or ground water where nitrate levels are already high (greater than 50mg/l as NO_3), or may have high levels of nitrate in the future. It is important to manage nitrate concentrations in coastal waters, estuaries, rivers, lakes and groundwater as high nitrate concentrations can contaminate drinking water sources and can contribute to an overall deterioration in water quality leading to eutrophication.

Currently, NVZs account for some 2.4 per cent of land area in Wales. The Welsh Government consulted on NVZ's and Action Programme requirements from September to December 2016, seeking views on the current measures for reducing pollution caused by nitrates from agricultural sources. On 27th January 2021, the Welsh Government announced *The Water Resources Control of Agricultural Pollution Regulations 2021* covering the whole of Wales to protect water quality from agricultural pollution[104]. The Regulations introduce a NVZ across the whole of Wales and came into force from 1st April 2021 with transitional periods for some elements to allow farmers time to adapt and ensure compliance[105].

Flood risk

Flood risk in Wales is a significant issue with many urban settlements built alongside rivers and streams and on river and coastal floodplains (see **Figure D.15**). The loss of natural coastal flood defences through coastal erosion, habitat loss and development pressure is also a key challenge. Climate change is likely to increase

[100] Welsh Government (2015) *River Basin Planning Progress Report for Wales 2009-2015. Updated December 2015*. Available online: http://naturalresources.wales/media/676155/progress-report-for-wales-2009-2015-english.pdf [Accessed March 2021]
[101] Welsh Government (2019) Guidance: UK Marine Strategy. Available online: https://gov.wales/uk-marine-strategy [accessed July 2022]
[102] NRW (2019) *Wales Bathing Water Quality Report 2021*. Available online: https://naturalresources.wales/evidence-and-data/research-and-reports/water-reports/wales-bathing-water-quality-report-2021/?lang=en[Accessed July 2022].
[103] DiscoverWater.co.uk (2019) *Water quality results for all water companies*. Available online: https://www.discoverwater.co.uk/quality [Accessed July 2022]
[104]Welsh Government (2021) *Cabinet Statement: Written Statement: Control of Agricultural Pollution Regulations*. Available online: https://gov.wales/written-statement-control-agricultural-pollution-regulations. [Accessed March 2021]
[105] Legislation.gov.uk (2021) *The Water Resources (Control of Agricultural Pollution) (Wales) Regulations 2021.* Available online: https://www.legislation.gov.uk/wsi/2021/77/contents/made [Accessed March 2021]

the frequency of extreme weather events resulting in more frequent and severe flooding. Coupled with rising sea levels, this is likely to affect Wales' natural resources, economy and communities.

The second National Strategy for Flood and Coastal Erosion Risk Management in Wales[106] was published by the Welsh Government in 2020. The National Strategy provides the framework for flood and coastal erosion risk management in Wales. Since the last National Strategy in 2011, over £600 million has been invested across Wales, reducing flood risk to communities.

Within the National Strategy, Flood Risk Management Plans (FRMPs) were prepared by NRW and the Environment Agency setting out what measures will be taken to help manage the risk of flooding to people, the environment and economic activity at a River Basin District level. The published FRMPs provide a comprehensive overview of flood risk to people, economic activity and the natural and historic environment for the period December 2015 to December 2021. The 2015 FRMPs were due to be reviewed and updated by the end of 2021, however due to Covid related delays It is anticipated that the updated FRMPs will be ready for consultation in Spring 2022[107].

Table D.5 provides a summary of flood risk to people from rivers and the sea based on the information contained in the published FRMPs for the Western Wales[108], Severn River[109] and Dee River[110] River Basin Districts. Local Flood Risk Maps for Wales are available online from NRW[111], which incorporates the Welsh Government's Development Advice Map, in addition to separate local flood mapping for England[112].

Table D.9 People at risk from flooding from rivers and the sea in Wales

River Basin District	High Risk	Medium Risk	Low Risk	Very Low Risk
Western Wales	16,857	24,095	105,719	1,170
Severn	32,600	62,100	240,650	33,050
Dee	3,300	2,500	20,500	150
Total	52,757	88,695	366,869	34,370

Data from the FRMPs for each River Basin Districts (2016)

[106] Welsh Government (2020) *National Strategy for Flood and Coastal Erosion Risk Management in Wales.* Available online: https://gov.wales/sites/default/files/publications/2021-03/the-national-strategy-for-flood-and-coastal-erosion-risk-management-in-wales.pdf [Accessed March 2021]

[107] Natural Resources Wales (2021) *Flood Risk Management Plans. Available online: https://naturalresources.wales/evidence-and-data/research-and-reports/flooding-reports-evidence-and-data/flood-risk-management-plans/?lang=en [Accessed July 2022]*

[108] NRW (2016) *Western Wales Flood Risk Management Plan*. Available online: https://naturalresources.wales/media/675146/final_frmp_-western-wales_pk26b82.pdf [Accessed March 2021]

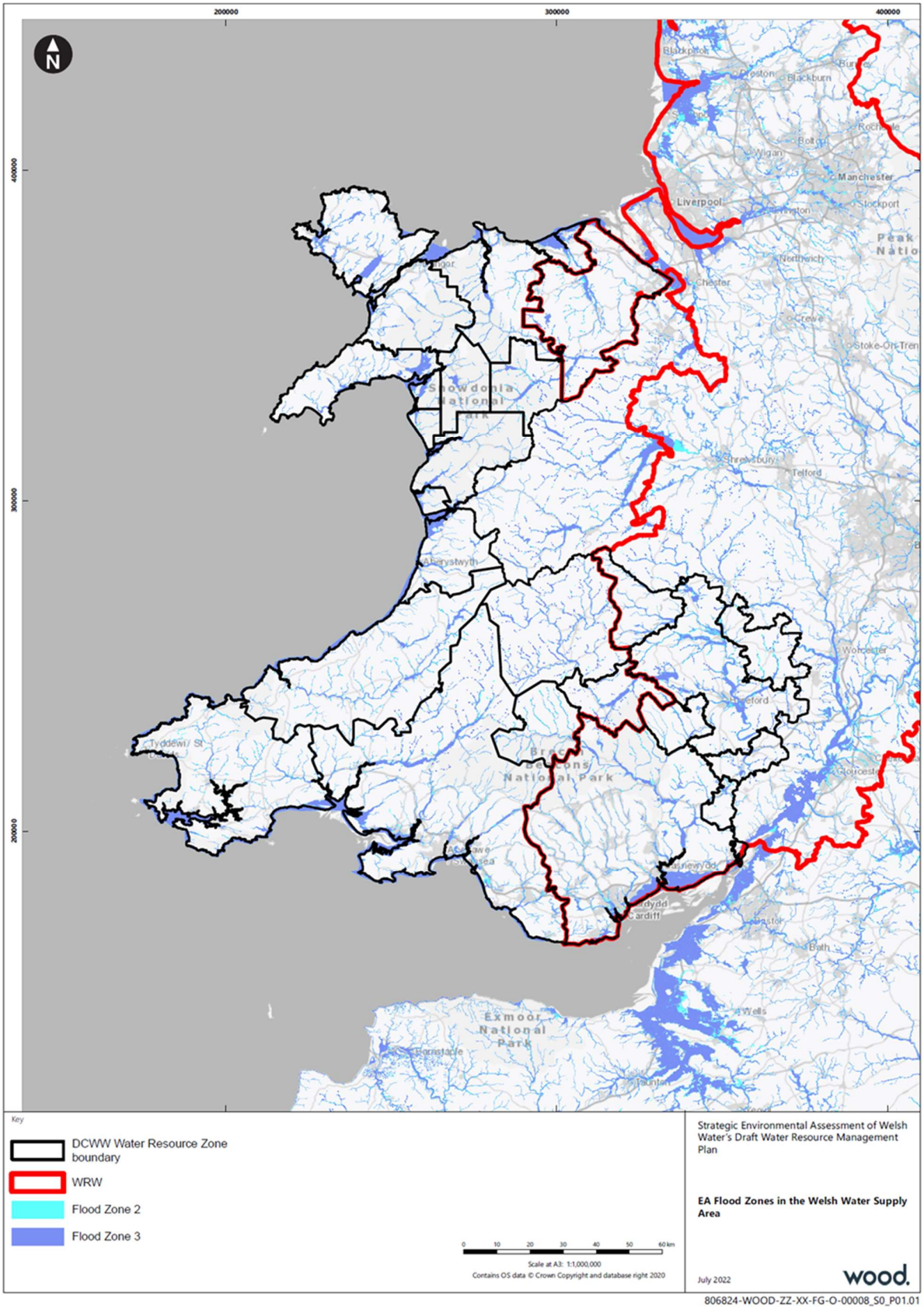
[109] NRW and Environment Agency (2016). *Severn River Basin District Flood Risk Management Plan 2015-2021. Part A – Background and River basin District wide information*. Available online: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/507832/LIT_10213_SEVERN_FRMP_PART_A.pdf [Accessed March 2021]

[110] NRW and Environment Agency (2016) *Dee River Basin District Flood Risk Management Plan 2015-2021*. Available online: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/507153/LIT_10199_DEE_FRMP.pdf [Accessed March 2021

[111] NRW (2018) *Long term flood risk*. Available online: https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en [Accessed March 2021]

[112] GOV.UK (2018) *Learn more about flood risk*. Available online: https://flood-warning-information.service.gov.uk/long-term-flood-risk/map [Accessed March 2021]

Figure D.7.7 EA Flood Zones in the Welsh Water supply Area



Likely Evolution of the Baseline without the WRMP

Wales records some of the highest rainfall levels in the UK, which is collected in the rivers, lakes and reservoirs which are relied upon as sources of water supply. However, in significant parts of Wales, there are no further reliable supplies of water available for new abstractions.

Whilst population increase estimates are lower for Wales than for many other parts of the UK, growth will place further pressure on water resources. Climate change is also expected to have significant effects on river flows in Wales, with most major watercourses predicted to see a 50-80 per cent decrease in summer flows. These predictions are generally more pronounced than in England, primarily due to the lack of groundwater storage capacity in Wales.

Under the Water Framework Directive, rivers in England and Wales 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. The second RBMPs cycle, 2015 – 2021 recognised the large degree of uncertainty about achieving such significant increases to achieve good status or better by 2021. NRW will reassess improvements and deterioration from the 2015 baseline in the third cycle RBMPs against the most recent classification data.

In 2015, 28 per cent and 40 per cent of water bodies in the Dee River Basin District and Western Wales River Basin District respectively achieved good or better overall status. NRW predicted that this would rise to 35 per cent in the Dee and 44 per cent in Western Wales districts by 2021. The most recent classification results (2021) indicate that 39 per cent in the Dee River Basin District and 42 per cent in Western Wales River Basin District of water bodies achieved good or better overall status. However, there are also 2 and 3 per cent more water bodies at poor overall status than in 2015, and an additional 3 and 1 per cent at bad status where previously none, in the Dee and Western Wales districts respectively[113]. Work is ongoing for cycle 3 of the River Basin Management Plans.

Reducing the risk of flooding is a key challenge in the future. Increased soil sealing and compaction from farming practices and urban development resulting in loss of water storage capacity and more surface water run-off will increase flood risk. The loss of natural coastal flood defences is also considered to be an important issue. Climate change is likely to exacerbate coastal erosion and flooding as a result of sea level rise and increased intensity, severity and frequency of storms over the next 100 years. The most recent information for Wales from the UK Climate Impacts Programme (UKCP18) forecasts that by the 2070s, there will be an increase in winter precipitation of up to 19 per cent (under a low emission scenario) and 29 per cent (under a high emission scenario) whilst sea levels are forecast to increase by 27 to 69cm (low emission scenario) and 51 to 113cm (high emission scenario) compared to 1981-2000 levels.[114]

According to the second UK Climate Change Risk Assessment evidence report, there are also projected to be large deficits in the provision of public water supplies by the 2050s, with projected deficits becoming more acute and widespread by the 2080s. Under a lower bound scenario (a low population and medium climate change projection), Wales is projected to be in surplus at a national scale, with deficits more locally[115]. The third UK Climate Change Risk Assessment evidence report indicates that by 2080 there will be a medium risk

[113] NRW (2020) *Consultation on updating the Western Wales River Basin Management Plan for the third cycle (2021-2027)*. Available online: https://ymgynghori.cyfoethnaturiol.cymru/evidence-policy-and-permitting-tystiolaeth-polisi-a-thrwyddedu/western-wales-rbmp/user_uploads/draft-western-wales-urbmp-consultation-2020-1.pdf [Accessed March 2021] and NRW (2020) *Consultation on updating the Dee River Basin Management Plan for the third cycle (2021-2027).* Available online: https://ymgynghori.cyfoethnaturiol.cymru/evidence-policy-and-permitting-tystiolaeth-polisi-a-thrwyddedu/dee-river-rbmp/user_uploads/draft-dee-urbmp-consultation-2020.pdf [Accessed March 2021]

[114] Met Office (2018) *UK Climate Projections Headline findings*. Available at https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index [Accessed March 2021].

[115] HR Wallingford (2015) *CCRA2: Updated projections for water availability for the UK*. Available online at: https://www.theccc.org.uk/publication/climate-change-risk-assessment-ii-updated-projections-for-water-availability-for-the-uk/ [Accessed March 2021]

of water supply issues in the UK by 2080[116]. Additionally, the Water Resources Long-Term Planning Framework highlights a significant and growing risk of severe drought, with impacts arising from climate change, population growth and environmental drivers to reduce abstraction.[117]

There are 4 areas in Wales that are of concern due to climate change issues with supply and demand; North Eyri/Ynys Mon in North Wales, the SEWCUS area in South Wales covering Cardiff, Newport and the Valleys, Tywyn Aberdyfi in West Wales, and Pembrokeshire[118].

Key Issues Relevant to the WRMP

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

- the need to maintain and improve water quality;
- the need to maintain seasonal flows in groundwater and surface water;
- the need to ensure that the continued risk of flooding is reduced or where this is not possible, mitigated effectively;
- the need to restore sustainable and appropriate abstraction levels and water flow/levels in Wales' waters across the full range of regimes from low to high conditions;
- the potential effects of climate change and the need to build climate change resilience into the water environment and water management; and
- the need to prevent the deterioration of Water Framework Directive waterbodies, achieve protected area objectives and achieve water body status objectives.
- The need to increase resilience to pressures on public water supply

Air Quality

Baseline Characteristics

Good air quality is essential to ensure people and ecosystems are healthy, productive and balanced. 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). Air quality within this context concerns the levels of pollutants emitted into the air and their significance, in terms of the risk of adverse effects on the environment and/or human health.

Emissions of gases into the air from transport, industry and agriculture can be transported significant distances by prevailing weather patterns and, via precipitation and deposition, eventually cause diffuse water pollution, the effects of which may be very long term. Pollutants may persist in groundwaters or sediments for decades or centuries and nutrient-enriched lakes and acidified waters may take many years to recover.

[116] UK Climate Change Risk Assessment 2022 Evidence Report. 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]
[117] Water UK (2016) *Water Resources Long-Term Planning Framework (2015-2065*). Available online at: https://www.water.org.uk/water-resources-long-term-planning-framework [Accessed March 2021]
[118] UK Climate Change Risk Assessment 2022 Evidence Report. 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]

All sectors will be required to make cuts in air emissions to meet the targets of the National Emissions Ceilings Directive and the Water Framework Directive.

The UK Government and Devolved Administrations are required to produce a national ambient air quality strategy, outlining objectives and standards for improving air quality. Local authorities must regularly assess air quality in their area against the standards and objectives of the National Air Quality Strategy[119]. Air Quality Management Areas (AQMAs) are declared by local authorities in specific locations where atmospheric concentrations of one or more pollutants (including pollutants such as nitrogen dioxide (NO_2), sulphur dioxide (SO_2) volatile organic compounds (VOCs) and fine particles (known as 'particulates') are either close to or exceeding statutory objectives set out within the National Air Quality Strategy.

As of 2020, there are 44 AQMAs in Wales[120]. **Table D.6** outlines the AQMAs in Wales by source and all but one AQMA is in place around roads. As shown in **Table D.7**, Rhondda-Cynon-Taff Council has the most active AQMAs in place (16) of all local authorities in Wales, all for nitrogen dioxide and with half having been in place for more than seven years.

Table D.10 Number of AQMAs in Wales by source

Source	Number of current AQMAs
County or Unitary Authority Road	21
Road transport unspecified	15
Mixture of road types	5
Highways Agency Road	2
Industrial Source	1

Source: Defra (2021) Summary AQMA data.[121]

Table D.11 Number of AQMAs per local authority

Local Authority	Number of Active AQMA	Pollutant AQMA in place for
Bridgend County Borough Council	1	Nitrogen dioxide NO2
Caerphilly County Borough Council	2	Nitrogen dioxide NO_2
Cardiff County Council	4 (and 3 now revoked)	Nitrogen dioxide NO_2
Carmarthenshire County Council	3	Nitrogen dioxide NO_2
City and County of Swansea	1	Nitrogen dioxide NO_2
Merthyr Tydfil County Borough Council	1	Nitrogen dioxide NO2
Monmouthshire Council	2	Nitrogen dioxide NO_2
Neath Port Talbot County Borough Council	1	Particulate Matter PM_{10}
Newport City Council	11 (and 2 now revoked)	Nitrogen dioxide NO_2
Pembrokeshire Council	2	Nitrogen dioxide NO_2

[119] Defra (2007) *Air Quality Strategy for England, Scotland, Wales and Northern Ireland*. Available online at: www.defra.gov.uk/publications/2011/03/28/air-quality-strategy-vol2-pb12670/ [Accessed February 2017]
[120] Defra (2021) Summary AQMA data. Available online at: https://uk-air.defra.gov.uk/aqma/summary [Accessed July 2022]
[121] Available online at: https://uk-air.defra.gov.uk/aqma/summary [Accessed July 2022]

Local Authority	Number of Active AQMA	Pollutant AQMA in place for
Powys County Council	(1 now revoked)	Nitrogen dioxide NO_2
Rhondda-Cynon-Taff Council	16 (and 2 now revoked)	Nitrogen dioxide NO_2
Vale of Glamorgan Council	(1 revoked)	Nitrogen dioxide NO2
Total	44 (and 9 now revoked)	

Source: Defra (2021) Summary AQMA data.[122]

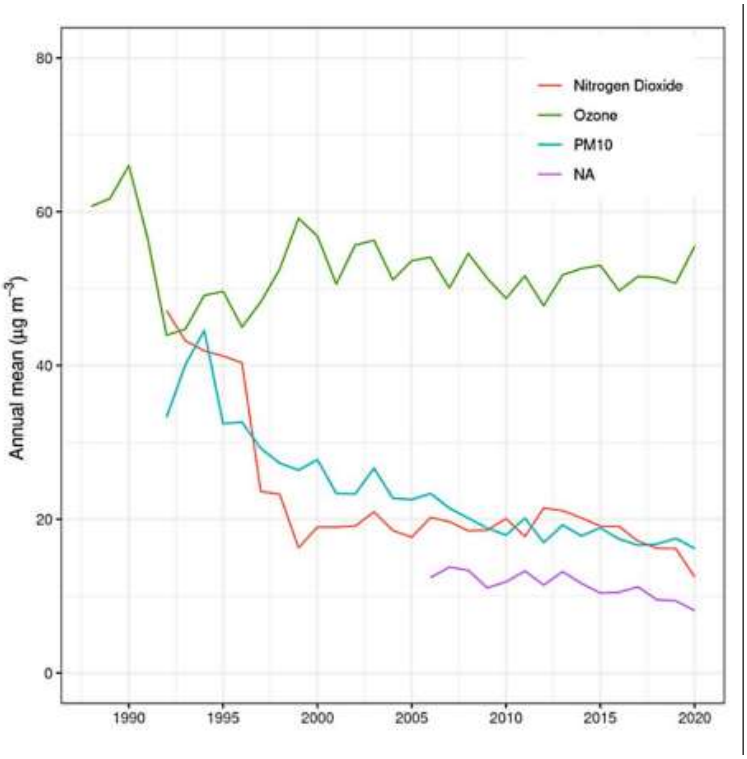
Levels of individual pollutants are measured at National Automated Monitoring Network sites across Wales with concentrations of the pollutants analysed to determine the number of days at each site on which the pollution is moderate or higher i.e., when concentrations for at least one of the pollutants exceeds the National Air Quality Standards (AQS). In 2020, the overall pollution levels for Wales were very high for 2 days, high for 10 days, moderate for 75 days and low for 279 days.[123]

As shown in **Figure D.16**, the longer-term trend is a reduction in nitrogen dioxide and particulate matter up to 10µm in size (PM_{10}) in Wales. This trend shows a steady improvement in air quality in Wales confirming that the local measures being put in place for in nitrogen dioxide and PM_{10} are having the desired result, all be it on a national scale. The Welsh Government Air Quality Report 2020[124] notes that ozone is a regional pollutant, transboundary in nature, making it more difficult to manage.

Urban air quality in Wales is generally worse than in rural areas. The main causes of pollution at urban sites are fine particles (PM_{10}) and ozone (O_3) whilst the main cause of pollution in rural areas is the variation in ozone levels, which is affected by the weather. The Welsh Government Air Quality Report identifies that no monitoring sites in Wales showed exceedance of Air Quality Strategy (AQS) Objectives for $PM10_{10,}$ carbon monoxide, sulphur dioxide, benzene or lead in 2020. Two monitoring sites (Bridgend Park Street and Hafod-yr-ynys) exceeded the annual mean objective of 40µg m^{-3} for nitrogen dioxide. Nine sites (Aston Hill, Cardiff Centre, Cwmbran, Marchlyn Mawr, Narberth, Port Talbot Margam, Swansea Cwm Level Park, Swansea Morriston Roadside and Swansea St Thomas DOAS) exceeded the AQS objective for ozone on more than the permitted 10 occasions.

[122] Ibid.
[123] Welsh Government (2020) *Air Pollution in Wales 2020*. Available online: https://airquality.gov.wales/sites/default/files/documents/2021-10/AQ-Wales-2020_English_Final.pdf [Accessed July 2022].
[124] Ibid.

Figure D.7.8 Ambient Pollutant Trends in Wales 1990 – 2020



Source: Welsh Government (2021) Air Pollution in Wales[125]

Poor air quality is a significant public health issue. The Committee on the Medical Effects of Air Pollutants (COMEAP) estimated that the burden of particulate air pollution in the UK in 2008 was equivalent to nearly 29,000 deaths at typical ages and an associated loss of population life of 340,000 years, by 2019 this had dropped to 15,000 deaths[126]. It has been estimated that removing all fine particulate air pollution would have a bigger impact on life expectancy in England and Wales than eliminating passive smoking or road traffic accidents. The economic cost from the impacts of air pollution in the UK is estimated at £9-19 billion every year; this is comparable to the economic cost of obesity (over £10 billion) [127].

Some of the most widespread and significant effects on ecosystems are damage from air pollution such as exposure to ozone and acidification. For example, emissions to air of sulphur and nitrogen containing pollutants from heavy industry, power generation and transport have caused acidification of freshwaters across Wales. A 2015 NRW Water Framework Directive assessment estimated that 21 per cent of Welsh rivers

[125]Welsh Government (2021) Air Quality in Wales 2020. Available online: https://airquality.gov.wales/sites/default/files/documents/2021-10/AQ-Wales-2020_English_Final.pdf [Accessed July 2022]

[126] Statista (2020) Number of deaths attributable to air pollution in the United Kingdom (UK) from 1990 to 2019. Available online: https://www.statista.com/statistics/827669/air-pollution-deaths-united-kingdom-uk/ [Accessed July 2022]

[127] Defra (2015) Appendix 5: international, European and national standards for air quality in 2010 to 2015 Government policy: Environmental quality. Policy Paper. Available at: https://www.gov.uk/government/publications/2010-to-2015-government-policy-environmental-quality/2010-to-2015-government-policy-environmental-quality [Accessed July 2022].

and 36 per cent of Welsh lake water bodies were at risk of acidification[128], however it is expected that the impact of air quality on water quality will reduce over the next 2 decades[129]

Likely Evolution of the Baseline without the WRMP

The majority of air pollutants have declined in Wales in recent decades; however, concentrations of ammonia and ozone are trending upwards[130]. In Wales (and the rest of the UK), nitrogen dioxide is the pollutant that most widely exceeds the AQS Objective. PM_{10} concentrations have generally decreased in recent years, at both urban background and urban traffic sites. Ozone concentrations, meanwhile, have tended to be highest at rural locations, although there are no clear trends as concentrations vary considerably from year to year because of variation in meteorological factors[131].

The Welsh Government supplemental plan to the UK plan for tackling roadside nitrogen dioxide concentrations (2017) set out actions the Welsh Government will take to reduce concentrations of nitrogen dioxide around roads where levels are above legal limits in Wales. These managed roads include:

- A494 at Deeside; (North Wales Zone);
- A483 near Wrexham; (North Wales Zone);
- M4 between junctions 41 and 42 (Port Talbot);(Swansea and South Wales Zone);
- M4 between junctions 25 and 26 (Newport); (South Wales Zone); and
- A470 between Upper Boat and Pontypridd. (South Wales Zone).

Implementation of measures such as enforcing a 50 miles per hour speed limit is predicted to reduce nitrogen dioxide emissions by up to 18%. Data for 2019 shows that the annual nitrogen dioxide concentrations have reduced at the five sites with the A494 at Deeside dropping below the 40µg/m^3 regulatory limit and A483 close to that[132].

Following the publication of Defra's 2019 Clean Air Strategy[133], the Welsh Government published The Clean Air Plan for Wales in 2020[134]. The Clean Air Plan for Wales seeks to improve air quality and reduce the impacts of air pollution on human health, biodiversity, the natural environment and economy. The Plan includes a series of actions including:

- Development of evidence-based and effective air quality targets.
- Introduction of Local Air Quality Management (LAQM) policy changes by 2023 to ensure the regime is public health focused and proactively finding and tackling areas of pollution.

[128] NRW (2015) *A Snapshot of the State of Wales' Natural Resources – June 2015*. Available at http://naturalresources.wales/media/4797/snapshot-report.pdf [Accessed March 2021].
[129] Natural Resources Wales (2021) The Second State of Natural Resources Report (SoNaRR2020)Assessment of the achievement of sustainable management of natural resources: Freshwater. Available at: https://cdn.cyfoethnaturiol.cymru/media/693312/sonarr2020-ecosystem-freshwater.pdf [Accessed July 2022]
[130] NRW (2021) *State of Natural Resources Report (SoNaRR): Assessment of the achievement of sustainable management of natural resources. Air Quality*. Available online: https://cdn.cyfoethnaturiol.cymru/media/693285/sonarr2020-theme-air-quality.pdf [Accessed July 2022]
[131] Welsh Government (2021) *Air Pollution in Wales 2020*. Available online at: AQ-Wales-2020_English_Final.pdf (gov.wales) [Accessed July 2022].
[132] Welsh Government (2020) *Tackling roadside nitrogen dioxide concentrations in Wales. Annual Data.* Available online: https://gov.wales/sites/default/files/publications/2020-03/annual-data-on-no2-concentrations-for-the-motorway-and-trunk-road-2018-to-2019.pdf [Accessed March 2021]
[133] Defra (2019) *Clean Air Strategy 2019*. Available online: https://www.gov.uk/government/publications/clean-air-strategy-2019 [Accessed March 2021].
[134] Welsh Government (2020) *The Clean Air Plan for Wales: Healthy Air, Healthy Wales*. Available online: https://gov.wales/clean-air-plan-wales-healthy-air-healthy-wales [Accessed March 2021]

- Designation of Clean Air Zones/Low Emission Zones.

Key Issues Relevant to the WRMP

The key issues relevant to the WRMP arising from the analysis of the air quality baseline are:

- the need to minimise emissions of pollutant gases and particulates and enhance air quality;

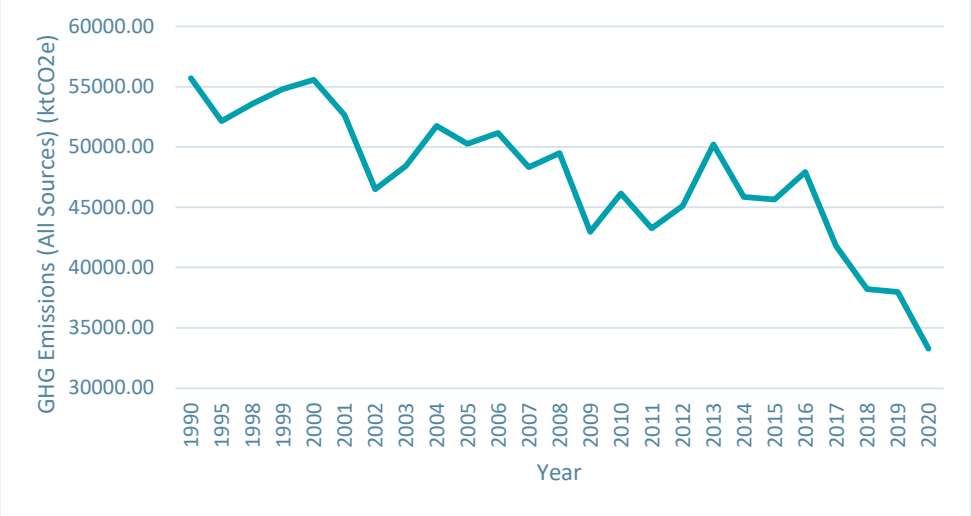
Climatic Factors

Baseline Characteristics

Greenhouse gas (GHG) emissions including carbon dioxide (CO_2) emitted from human actions are a major contributor to climate change. The Climate Change Act 2008 (as amended) commits the UK to bring all GHG emissions to net zero by 2050. The Environment (Wales) Act 2016 (as amended), meanwhile, places a duty on the Welsh Ministers to reduce GHG emissions in Wales by at least 100 per cent in 2050[135]. The target of net zero emissions (rather than 80% as originally stated in the Climate Change Act) reflected the and Welsh Government's acceptance of the independent Climate Change Committee's (CCC) recommendation[136] that Wales could achieve a net zero reduction in emissions.

Total GHG emissions in 2018 in Wales were 33,284 $tkCO_2e$[137]. Since 1990, GHG emissions in Wales have reduced by approximately 40%, although there have been fluctuations in annual emission reduction, as shown in Error! Reference source not found.**17**.

Figure D.7.9 GHG emissions from 1990 to 2020



Source: BEIS National Atmospheric Emissions Inventory (2022)

[135] The Environment (Wales) Act 2016 (Amendment of 2050 Emissions Target) Regulations 2021 which change the statutory target within the Environment Act from 80% to 100% came into force on 19 March 2021.
[136] Climate Change Committee's (2020) The path to Net Zero and progress on reducing emissions in Wales. Available via: https://www.theccc.org.uk/publication/the-path-to-net-zero-and-progress-reducing-emissions-in-wales/
[137] National Atmospheric Emissions Inventory (2022), Greenhouse Gas Inventories for England, Scotland, Wales & Northern Ireland: 1990-2020. Available online: https://naei.beis.gov.uk/reports/reports?report_id=1080 [Accessed July 2022]

The amount of CO_2 emitted in Wales between 2015 and 2020 is shown in **Table D.8**, although not all figures are available. The table highlights that emissions have reduced since from 30.2 million tonnes (Mt) CO_2 in 2018 to 27.3 Mt CO_2 in 2020, principally because of declines in emissions from the industry and commercial and domestic sectors. Industrial emissions remained the largest source of CO_2 emissions in the region. Overall emissions across all sectors have decreased, however less significantly in Agriculture and Waste Management. Overall, since 2005, emissions in Wales have dropped by 36 per cent (which is significantly lower to the UK average of 43 per cent).[138]

On a per capita basis, Wales emitted 8.6 tonnes (t) CO_2 per person in 2020. Across the UK as a whole, this averaged at 5.6 with figures ranging from 3.2 tCO_2 per person in London to 11.2 tCO_2 per person in Northern Ireland, which is the highest in the UK. Only 5 regions, other than Northern Ireland, out of a possible 40 had higher per capita emissions that Wales in 2020, this reflects the significant industrial base in Wales which resulted in a high contribution from industrial and commercial emissions.

Table D.12 End User Estimates of Carbon Emissions (kt CO2), Wales 2015-2020

End User	2015	2016	2017	2018	2019	2020
Industrial	12,779.4	11,441.9	11,360.8	10,627.8	10,829.6	10,151.6
Commercial	1,525.1	1,332.9	1,260.4	1,155.9	1,057.1	877.8
Public Sector	662.1	599.7	607.9	578.8	522.3	466.1
Domestic	5,770.4	5,503.3	5,176	5,108.4	4,907.3	4,839.4
Transport	6,605.4	6,789.8	6,761.2	6,768.4	6,629.4	5,253.3
LULUCF	-350.1	-395.3	-404.3	-406	-449.6	-404.3
Agriculture	X	X	X	5,492	5,496.8	5,364.6
Waste Management	X	X	X	860.7	845.7	754.6
Total	**X**	**X**	**X**	**30,186.1**	**29,838.7**	**27,303**
Per Capita Emissions (t)	*X*	*X*	*X*	*9.6*	*9.5*	*8.6*

Increasing the amount of renewable energy generation is one response to the need to reduce CO_2 emissions, and Wales has shown a steady year-on-year increase in renewable electricity generation from 2003 to 2020. The most recent data from the Department for Business, Energy & Industrial Strategy (BEIS) shows that in 2020, Wales generated 8,790.7 GWh electricity from renewable sources, an increase of 393.8 per cent compared to 2010[139]. In 2020, Wales had a total renewable energy installed capacity of 3,589.6 MWe, equivalent to 7.5 per cent of the UK total (47,813.5 MWe).[140]

[138] BEIS (2022) *UK Local Authority and Regional Carbon Dioxide Emissions National Statistics: 2005-2020* [available at: https://www.gov.uk/government/statistics/uk-local-authority-and-regional-greenhouse-gas-emissions-national-statistics-2005-to-2020[Accessed July 2022]

[139] BEIS (2021) *Regional Statistics 2003-2020: Generation.* Available online: https://www.gov.uk/government/statistics/regional-renewable-statistics [Accessed July 2022].

[140] BEIS (2021) Regional statistics 2003-2020: Installed Capacity.. Available online: https://www.gov.uk/government/statistics/regional-renewable-statistics [Accessed July 2022].

Likely Evolution of the Baseline without the WRMP

UKCP18 provides the following predictions on changes in climate in Wales for the period 2060 to 2079 (based on a high emissions scenario for a location in central Wales):

- winter temperature: a change in temperature of between 0.7 and 4.1ºC;
- summer temperature: a change in temperature of between 0.9 and 5.9ºC;
- winter precipitation: an increase of up to 29 per cent; and
- summer precipitation: 38 per cent drier to 3 per cent wetter.

Sea levels are also forecast to rise, with relative sea levels in Cardiff forecast to increase by up to 113 cm (by 2100, compared to the 1981 to 2000 period)[141]. The changes in climate are expected to result in an increase in the number of flash flooding events, increased pressure on the capacity of the sewerage system, increased frequency of summer water shortages and low flows in rivers which will result in the loss of habitats and species[142]. These risks are addressed in Welsh Government's *Prosperity for All: A Climate Conscious Wales* (2019)[143] which sets out how Wales will adapt to climate change from 2020–2025.

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;
- increased summer water shortages as summer rainfall decreases;
- growth in summer tourism; and
- 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

[141] 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 March 2021].
[142] Welsh Government (2010) *Climate Change Strategy for Wales*. Available online: http://gov.wales/docs/desh/publications/101006ccstratfinalen.pdf [Accessed November 2018]
[143] Available via: https://gov.wales/sites/default/files/publications/2019-11/prosperity-for-all-a-climate-conscious-wales_0.pdf [Accessed March 2021]

- 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 scenario[144]. 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 GHG emissions development. The 2021 UNCCC Glasgow Climate Pact (COP26)[145] 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 Government 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 Wales, the carbon budgets have been set for 37 per cent lower than the baseline over 2021-25 and an average of 58% lower than the baseline for 2026-30[146]. For the UK, the Climate Change Committee has recommended that the sixth carbon budget[147] has a 78 per cent reduction in emissions between 1990 and 2030.

There is a degree of conflict between increasing the level of treatment of waste water required to meet stricter environmental quality standards and the energy use and associated emissions that result from the improved treatment processes.

Welsh Water has reduced its carbon emissions by 65 per cent since 2010-11. This reflects Welsh Water's investment in energy efficiency and renewable generation and reduced grid imports. In 2021–22, Welsh Water's total net operational carbon emissions stood at 110.7 $ktCO_2e$, a slight increase from 106.0 $ktCO_2e$ in 2020/21[148]. Increases were seen in scope 1 and 3 emissions but a significant decrease in Scope 3 emissions from 103.6 $ktCO_2e$ in 2020-21 to 91.3 $ktCO_2e$ in 2021-22.

Key Issues Relevant to the WRMP

The key sustainability issues relevant to the WRMP arising from the analysis of the air climatic factors baseline are:

- the need to reduce travel and promote sustainable modes of transport;
- the need to reduce GHG emissions arising from implementation of the WRMP;
- the need to take into account, and where possible adapt to, the potential effects of climate change; and

[144] UK Climate Change Risk Assessment 2022 Evidence Report. 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]
[145] UNCCC (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]
[146] Welsh Government (2017) Wales' commitment to tackling climate change. Available online: https://gov.wales/sites/default/files/publications/2021-12/our-commitment-to-tackling-climate-change-infographic.pdf [Accessed July 2022]
[147] Climate Change Committee (2020) *The Sixth Carbon Budget: The UK's path to Net Zero*. Available online https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf [Accessed July 2022]
[148] Welsh Water (2020) *Glas Cymru Report & Accounts 2021-2022*. Available online: https://corporate.dwrcymru.com/en/library/group-annual-report-and-accounts/glas-cymru-cyfyngedig [Accessed July 2022]

- the need to increase environmental resilience to the effects of climate change.

Population and Human Health

Baseline Characteristics – Population

Demographics

The population of Wales at the time of the 2011 Census was 3,107,500 people an increase of 1.89% from the 2011 Census (3,063,800). The 2021 Census also indicate that population density in Wales had increased from 147.8 people per square kilometre in 2011 to 150.0 people per square kilometre in 2021. There were 1,347,100 households in Wales in 2021 an increase of 3.32% from the 2011 Census (1,303,826 households).[149]

Welsh Water provides water supply and sewerage services to approximately 3 million people in total with the majority within Wales. The change in Wales' population between 2001 and 2021 and percentage change from 2011 to 2021 is shown in **Table D.9**. The table includes all counties in Welsh Water's area, in both Wales and England[150].

Table D.13 Population of Welsh Waters Area by County

County	2001 Population	2011 Population	2021 Population	Population change between 2011 and 2021 (%)
Isle of Anglesey	67,898	69,833	68,900	-1.34%
Gwynedd	116,699	121,155	117,400	-3.10%
Conwy	108,651	114,682	114,800	0.10%
Denbighshire	92,525	94,152	95,800	1.75%
Flintshire	147,930	152,080	155,000	1.92%
Wrexham	127,653	134,009	135,100	0.81%
Powys	126,134	132,878	133,200	0.24%
Ceredigion	74,942	75,217	71,500	-4.94%
Pembrokeshire	112,538	121,974	123,400	1.17%
Carmarthenshire	172,874	183,004	187,900	2.68%
Swansea	224,475	237,311	238,500	0.50%
Neath Port Talbot	134,834	139,638	142,300	1.91%
Bridgend	128,224	138,471	145,500	5.08%

[149] ONS (2022) Population and household estimates, England and Wales: Census 2021. https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/populationandhouseholdestimatesenglandandwales/census2021#population-sizes-and-changes-for-regions-and-local-authorities Available online: [Accessed July 2022]

[150] Ibid.

County	2001 Population	2011 Population	2021 Population	Population change between 2011 and 2021 (%)
Vale of Glamorgan	119,276	126,435	131,800	4.24%
Cardiff	311,443	341,402	362,400	6.15%
Rhondda Cynon Taf	232,370	234,459	237,700	1.38%
Merthyr Tydfil	56,218	58,493	58,800	0.52%
Caerphilly	169,045	178,101	175,900	-1.24%
Blaenau Gwent	70,537	69,798	66,900	-4.15%
Torfaen	91,214	91,060	92,300	1.36%
Monmouthshire	84,458	91,016	93,000	2.18%
Newport	136,932	144,803	159,600	10.22%
WALES	2,906,870	3,049,971	3,107,500	1.89%
Herefordshire	174,900	183,600	187,100	2.00%

Table D.10 provides information in relation to changes in population density between 2011 and 2021. Overall, densities have increased although there are eight instances (Isle of Anglesey, Gwynedd, Conwy, Wrexham, Ceredigion, Merthyr Tydfil, Caerphilly, Blaenau Gwent) where densities have fallen.

Table D.14 Population Density per square Kilometre of land area by Welsh Authorities

	Population Density Mid-year 2011	Population Density Mid-year 2021	Change 2011-2021	% Change 2011-2021
Wales	147.8	150.0	2.2	2.9
Isle of Anglesey	98.3	97.0	0.1	-1.32%
Gwynedd	47.9	46.0	1.2	-3.97%
Conwy	102.4	102.0	1.7	-0.39%
Denbighshire	112.2	114.0	2.2	1.60%
Flintshire	349.0	352.0	6	0.86%
Wrexham	268.1	268.0	1.8	-0.04%
Powys	25.7	26.0	-0.1	1.17%
Ceredigion	42.2	40.0	-1.5	-5.21%

	Population Density Mid-year 2011	Population Density Mid-year 2021	Change 2011-2021	% Change 2011-2021
Pembrokeshire	75.7	76.0	2	0.40%
Carmarthenshire	77.6	79.0	2	1.80%
Swansea	628.7	632.0	25.4	0.52%
Neath Port Talbot	317.0	322.0	7.8	1.58%
Bridgend	556.0	580.0	30.4	4.32%
Vale of Glamorgan	382.6	398.0	20.8	4.03%
Cardiff	2451.7	2,572.0	152.3	4.91%
Rhondda Cynon Taf	552.6	560.0	16.2	1.34%
Merthyr Tydfil	528.1	528.0	13.2	-0.02%
Caerphilly	644.5	634.0	8.3	-1.63%
Blaenau Gwent	642.1	615.0	0.4	-4.22%
Torfaen	725.5	734.0	22	1.17%
Monmouthshire	107.8	110.0	3.6	2.04%
Newport	765.2	838.0	47.3	9.51%

Source: ONS Census 2021[151]

Economy and employment

Employment rates for the three months to May 2022 show that Wales had a slightly lower percentage of economically active people in employment (73.7%) than the rest of the UK (75.9%)[152]. Economically active in this context is defined by the ONS as those persons of working age who are employed or looking to be employed. This reflects historic trends where Wales has generally had a slightly lower percentage of people employed than the UK as a whole.

Unemployment rates amongst the economically active population have declined in Wales and the UK since 2012 but increased in the second half of 2020. The decline in the percentage in employment, and increase in rates of unemployment for both Wales and UK in the second half of 2020, largely reflects the impacts of the COVID-19 pandemic. The unemployment rate has now declined again from a high point February 2021 (4.9%). In the three months to May 2022 Wales had a 3.8% unemployment rate which is the same as the UK as a whole[153].

The breakdown of the workforce by industry sector as at March 2022 is shown in **Table D.11**. The largest proportion of jobs in Wales are in human health and social work activities, and wholesale and retail trade;

[151] Ibid.
[152] Nomisweb (2022) *Labour Market Profile*. Available online: https://www.nomisweb.co.uk/reports/lmp/gor/2013265930/report.aspx?town=Wales [Accessed July 2022]
[153] Ibid.

repair of vehicles, similar to UK trends. A total of 16,000 jobs (1.1%) in Wales are within the water supply, sewerage and waste management sector, which is slightly higher than the proportion of jobs in this sector for the UK as a whole (0.7%).[154] In 2022, Welsh Water directly employed just over 3,500 people[155].

Table D.15 Workforce jobs by industry – seasonally adjusted (March 2022)

Industry Sector	Wales	Wales (%)	UK	UK (%)
A : Agriculture, Forestry And Fishing	26,000	1.7	329,000	0.9
B : Mining And Quarrying	2,000	0.1	56,000	0.2
C : Manufacturing	151,000	10.1	2,606,000	7.3
D : Electricity, Gas, Steam And Air Conditioning	6,000	0.4	138,000	0.4
E : Water Supply; Sewerage, Waste Management	16,000	1.1	233,000	0.7
F : Construction	113,000	7.6	2,259,000	6.3
G : Wholesale And Retail Trade; Repair Of Vehicles	188,000	12.6	4,803,000	13.5
H : Transportation And Storage	54,000	3.6	1,811,000	5.1
I : Accommodation And Food Service Activities	126,000	8.5	2,475,000	7
J : Information And Communication	34,000	2.3	1,562,000	4.4
K : Financial And Insurance Activities	25,000	1.7	1,082,000	3
L : Real Estate Activities	19,000	1.3	614,000	1.7
M : Professional, Scientific And Technical Activities	80,000	5.4	3,297,000	9.3
N : Administrative And Support Service Activities	125,000	8.4	3,182,000	8.9
O : Public Administration And Defence	96,000	6.4	1,637,000	4.6
P : Education	135,000	9.1	3,038,000	8.5
Q : Human Health And Social Work Activities	212,000	14.2	4,587,000	12.9
R : Arts, Entertainment And Recreation	46,000	3.1	975,000	2.7
S : Other Service Activities	34,000	2.3	863,000	2.4
T : Activities Of Households As Employers;...	1,000	0.1	52,000	0.1

Source: Nomisweb[156]

[154] Ibid.
[155] Glas Cymru (2020) *Report & Accounts 2019-2020*. Available online: https://corporate.dwrcymru.com/en/library/group-annual-report-and-accounts [Accessed March 2021]
[156] Labour Market Profile – Wales. Available online: https://www.nomisweb.co.uk/reports/lmp/gor/2013265930/report.aspx [Accessed July 2022]

In 2020, there were 104,445 active business enterprises in Wales[157]. This compares to 90,435 active businesses in 2010, representing a 15.5% increase. The percentage change varies across local authorities; Cardiff has seen the largest percentage increase (29.4%) whilst three areas have seen reductions in the number of businesses (Gwynedd -0.2%; Ceredigion -6.1%; Powys -4.1%).

Transport and traffic

The total combined length of roads in Wales in 2020/21 was approximately 35,020km (a 0.4% increase on the previous year. In 2020/21, 6.4% of the motorway network and 2.9% of the trunk road network required close monitoring of structural condition. Powys contains the largest road network of all the Welsh local authorities. It also accounts for the highest proportion of all A Trunk roads (27.3%), B and C roads (21.1%) and minor surfaced roads (12.2%).[158]

In 2020, the total volume of motorised traffic in Wales was 24.60 billion (a substantial decrease from 32.11 billion vehicle kilometres in 2019 which was the highest level ever recorded and reflects the COVID-19 pandemic impacts)[159]. Within this total volume of traffic, cars accounted for 18.5 billion (75.2%) of the total. Vehicles travelled mostly on the major roads, with 14.3 billion (58.0% of motor traffic) in Wales either on motorways or A roads.[160]

Transport accounted for 25% of energy used in 2019 (23.4 TWh) in Wales. This is similar to the 2005 total of 22.3 TWh but represents a higher percentage of total energy use compared to 20 per cent in 2005[161].

The number of rail passenger journeys has increased steadily in recent years and stood at 20.5 million 2019-20. However, this fell substantially in 2020-21 to 3.5 million, which reflects the impact of the COVID-19 pandemic[162]. Private vehicles are expected to provide the dominant mode of transport over the short and medium term[163].

Tourism and recreation

In Wales, 10.7 million domestic tourism trips were taken during 2019, which represents an increase of 6.8 per cent on the previous year. 5.7 million of the 9.0 million domestic tourism visits were holiday trips, which is an increase on the 5.6 million in 2016. The total spend attributed to domestic tourism trips in Wales in 2019 was £2 billion, an increase of 8.1 per cent from £1.85 billion spent in 2018[164]. The latest data available pre-dates the COVID-19 pandemic.

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. There may be an increasing (short term) trend in the near future in light of the expected increase in domestic holidays due to the current economic situation and potential for more 'staycations' following the COVID-19 pandemic.

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[157] StatsWales (2022) *Active Business Enterprises by area and year*. Available online: https://statswales.gov.wales/Catalogue/Business-Economy-and-Labour-Market/Businesses/Business-Demography/activebusinessenterprises-by-area-year [Accessed July 2022]
[158] Welsh Government (2019) *Road lengths and conditions*. Available online: https://gov.wales/road-lengths-and-conditions-april-2020-march-2021-html [Accessed July 2022]
[159] StatsWales (2022) *Volume of road traffic by road classification and year*. Available online: https://statswales.gov.wales/Catalogue/Transport/Roads/Road-Traffic/volumeofroadtraffic-by-roadclassification-year [Accessed July 2022]
[160] StatsWales (2022) *Volume of road traffic by type of vehicle and year*. Available online: https://statswales.gov.wales/Catalogue/Transport/Roads/Road-Traffic/volumeofroadtraffic-by-typeofvehicle-year [Accessed July 2022]
[161] Regen for the Welsh Government (2022), Energy Use in Wales Second Edition. Available online: https://www.regen.co.uk/wp-content/uploads/Energy-Use-Wales-Report-Final.pdf [accessed July 2022]
[162] StatsWales. Available via: https://statswales.gov.wales/Catalogue/Transport/rail/rail-transport/railpassengerjourneys-by-localauthority-year [accessed July 2022]
[163] Welsh Government (2017) Future Trends Report
[164] Welsh Government (2020) *Wales Tourism Performance Report January to December 2019*. Available online: https://gov.wales/sites/default/files/statistics-and-research/2020-06/wales-tourism-performance-january-to-december-2019-208.pdf [Accessed July 2022]

Welsh Water manages 91 reservoirs and 40,000 hectares of land which includes four visitor centres, sporting recreational and leisure facilities that between them attract nearly one million visitors each year, making a valuable contribution to tourism and the local economy.[165]

Welsh Water's wastewater management activities influence the tourist industry due to the impacts on River and Bathing Water quality.

Housing

Table D.12 shows that there has been a decline in household size in all areas of Wales between 2011 and 2020 except for Merthyr Tydfil which has remained the same. The largest change of -3.13% was experienced within Powys.

Table D.16 Change in household size (2011-2020)

	2011	2020	Change	% change
Wales	2.31	2.26	-0.05	-2.16%
Isle of Anglesey	2.25	2.2	-0.05	-2.22%
Gwynedd	2.24	2.2	-0.04	-1.79%
Conwy	2.2	2.16	-0.04	-1.82%
Denbighshire	2.28	2.26	-0.02	-0.88%
Flintshire	2.38	2.33	-0.05	-2.10%
Wrexham	2.34	2.27	-0.07	-2.99%
Powys	2.24	2.17	-0.07	-3.13%
Ceredigion	2.25	2.18	-0.07	-3.11%
Pembrokeshire	2.27	2.2	-0.07	-3.08%
Carmarthenshire	2.3	2.26	-0.04	-1.74%
Swansea	2.26	2.2	-0.06	-2.65%
Neath Port Talbot	2.3	2.28	-0.02	-0.87%
Bridgend	2.34	2.3	-0.04	-1.71%
Vale of Glamorgan	2.32	2.26	-0.06	-2.59%
Rhondda Cynon Taf	2.33	2.25	-0.08	-3.43%

[165] Welsh Water (2022) *Welsh Water Report and Accounts 2021-22.* Available online: https://corporate.dwrcymru.com/en/library/group-annual-report-and-accounts/glas-cymru-cyfyngedig [Accessed July 2022]

	2011	2020	Change	% change
Merthyr Tydfil	2.4	2.4	0	0.00%
Caerphilly	2.39	2.34	-0.05	-2.09%
Blaenau Gwent	2.28	2.21	-0.07	-3.07%
Torfaen	2.34	2.3	-0.04	-1.71%
Monmouthshire	2.34	2.29	-0.05	-2.14%
Newport	2.35	2.33	-0.02	-0.85%
Cardiff	2.34	2.29	-0.05	-2.14%

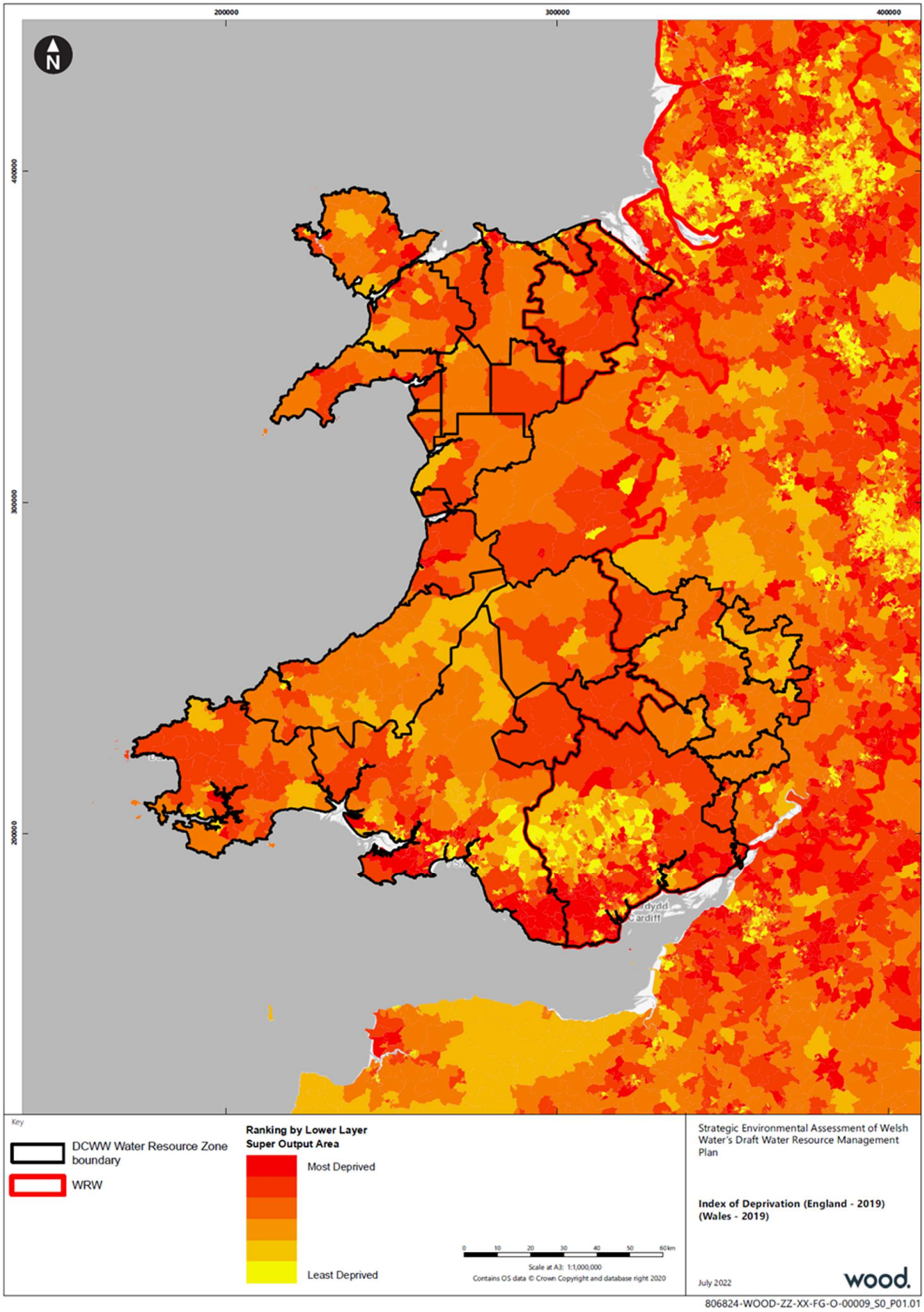
Source: StatsWales[166]

Deprivation

The *Welsh Index of Multiple Deprivation (WIMD)* (2019)[167] measured relative deprivation in all local authority Lower Super Output Areas (LSOA) areas (see **Figure D.18)**.

[166] Available via: https://statswales.gov.wales/Catalogue/Housing/Households/Estimates/averagehouseholdsize-by-localauthority-year [Accessed July 2022]
[167] Available via: https://gov.wales/welsh-index-multiple-deprivation-full-index-update-ranks-2019 [Accessed July 2022]

Figure D.7.10 Index of Deprivation for LSOAs in the Welsh Water Supply Area



The WIMD 2019 identified pockets of high relative deprivation in the South Wales cities and valleys, and in some North Wales coastal and border towns. The local authority with the highest proportion of LSOAs in the most deprived 10 per cent in Wales was Newport (24.2 per cent). Blaenau Gwent had the highest percentage of areas in the most deprived 50 per cent in Wales (85.1 per cent). Analysis shows that 26 LSOAs across ten local authority areas are in deep rooted deprivation due to being in the top 50 most deprived areas over the last 15 years.

The percentage of individuals living in relative income poverty for the period 2017-18 to 2019-20 stood at 23%. This was higher than all of the other UK countries and the UK average of 22 per cent. However, this percentage has been stable since 2000-01 and is lower than previous reporting periods 2014-15 to 2017-18 where it was 24 per cent.[168]

Levels of deprivation, particularly income deprivation, affect the ability of customers to pay for water and may also impact on total water usage. In 2021-22, Welsh Water helped more than 144,000 customers who were struggling to pay their bills with over 127,000 customers benefitting from social tariffs to reduce bill amounts.[169]

Baseline Characteristics – Health

Life expectancy is used as a broad measure of the health of an area and where a person is born largely influences how long they will live. In Wales, the average life expectancy at birth for the period 2018-20 was 78.3 for men and 82.1 for women, compared to 79.0 and 82.9 years respectively for the UK. Life expectancy at birth has decreased in 2018-20 related to the COVID-19 pandemic[170].

The National Survey for Wales 2021-22[171] reported that 72% of people were in good or very good health which was similar to 2019-20 (71%). 33% of people reported having a life limiting illness, disability or infirmity which was lower than the previous year (47%).

The survey identified that 13% of adults' smoke, with 6% using e-cigarettes. A total of 16% of adults drank alcohol over the weekly guidelines and 30% ate five or more portions of fruit and vegetables a day. Just over half of the people surveyed, 56%, were active for 150 minutes or more the previous week. With regards to obesity, 62% of people were found to be overweight or obese. Taking into account all of these indicators of health, 30% of people were found to have four or five healthy behaviours (not smoking, health weight, eat five fruit or veg, not drinking above guidelines, active).

The survey also identified:

- Healthcare providers:
  - 77% of people had visited a dentist for two dental checks in the last 12 months;
  - 73% visited an optician at least once every two years; and
  - 58% had seen GP in the last 12 months.
- Medicines:

[168] DWP Household Below Average Income (HBAI) via StatsWales. Available via: https://statswales.gov.wales/Catalogue/Community-Safety-and-Social-Inclusion/Poverty/householdbelowaverageincome-by-year [Accessed July 2022]
[169] Glas Cymru (2022) *Annual Report and Accounts 2021-2022*. Available online: https://corporate.dwrcymru.com/en/library/group-annual-report-and-accounts/glas-cymru-cyfyngedig [Accessed July 2022]
[170] ONS (2021) *Statistical bulletin: National life tables, UK: 2018 to 2020*. Available online: https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/bulletins/nationallifetablesunitedkingdom/previousReleases [Accessed March 2022]
[171] Welsh Government (2022) *National Survey for Wales 2021-22*. Available at: https://gov.wales/national-survey-wales-results-viewer [Accessed July 2022]

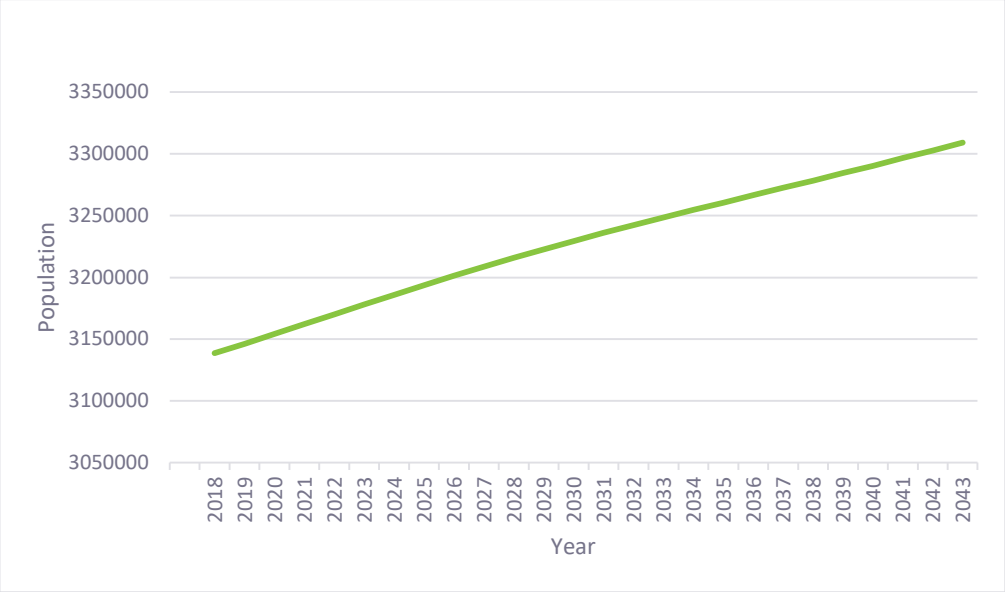
- 54% of people had purchased conventional medicines in the latest reporting data (2017-18); and
- 65% received prescription medicine in the last 12 months.

- Drug support services:
  - Overall 81% of adults felt they were well-informed about drugs the effect of drugs in the latest reporting data (2017-18); and
  - People were most likely to seek advice on drugs from parents, friends or their GP. They were less likely to use online services.

Likely Evolution of the Baseline without the WRMP

The latest 2018 based population projections show that the population of Wales is projected to rise to 3,309,153 by 2043 (the latest projection date).[172] **Figure D.19** shows the projected steady population increase up to 2043.

Figure D.7.11 Population projection to 2043



The population is projected to increase in 18 of the 22 local authorities in Wales with the largest percentage increases in the population projected to be in Newport (up 7.2 per cent), the Vale of Glamorgan (up 6.0 per cent) and Bridgend (up 4.6 per cent) by 2028. The population is projected to decrease in four local authorities: Ceredigion (by 3.3 per cent), Wrexham (by 1.5 per cent), Blaenau Gwent (by 0.7 per cent) and the Isle of Anglesey (by 0.4 per cent) by 2028[173]. For 2043, the same authorities are expected to experience increased/decreased populations but there is greater uncertainty about the figures.[174]

[172] StatsWales (2020) Population projections by local authority and year. Available online: https://statswales.gov.wales/Catalogue/Population-and-Migration/Population/Projections/Local-Authority/2018-based/populationprojections-by-localauthority-year [Accessed July 2022]
[173] Welsh Government (2020) *Subnational population projections (local authority): 2018 to 2043*. Available online: https://gov.wales/sites/default/files/statistics-and-research/2020-08/subnational-population-projections-2018-based-280.pdf [Accessed July 2022]
[174] Ibid.

The 2018-based household projections show that, by 2043, the number of households in Wales is projected to increase by 14.6 per cent to 1,486,247. By 2028, all local authority areas (with the exception of Ceredigion) are expected to increase in the number of households with the largest percentage increases in the number of households projected to be in the Vale of Glamorgan (up 8.6 per cent), Newport (up 8.6 per cent) and Bridgend (up 6.3 per cent). By 2043, all local authorities are expected to see growth in households with the exception of Blaenau Gwent, Ceredigion, Isle of Anglesey and Wrexham which are expected to decrease. There is greater uncertainty for the figures for 2043.

In addition to population growth driving household demand, economic growth is likely to increase water use by businesses.

The Welsh Government's Future Trends Report[175] outlines some key trends:

- the number of older people will rise significantly;
- life expectancy is expected to continue to increase;
- the number of children is projected to rise in the medium term, before falling slightly in the longer term;
- the number of households is growing faster than the population, and there is a long term trend to smaller households (with a large increase in the number of single person households);
- rates of house building are not keeping pace with growth in the number of households, and on current trends this gap will widen, contributing to further house price inflation in the long term;
- all other things remaining unchanged, the projected increase in population and ageing demographic profile means the number being treated for illnesses such as dementia will increase whilst levels of obesity is also expected to increase; and
- health inequalities within Wales are widening.

Key Issues Relevant to the WRMP

The key sustainability issues relevant to the WRMP arising from the analysis of the population and human health baseline are:

- the need to ensure that water resource requirements of people and visitors can be met at all times, in a sustainable way;
- the need to ensure that water resources remain affordable;
- the need to ensure that measures to manage water resources do not adversely affect the health and well-being of any member of the community;
- the need to ensure that vulnerable people are not affected by implementation of measures to manage water resources;
- the need to ensure that measures undertaken to manage water resources do not have an adverse economic impact;
- the need to avoid disruption through effects on the transport network; and
- the need to ensure resilience of water supply/treatment infrastructure against climate change effects.

[175] Welsh Government (2017) Future Trends Report https://gov.wales/sites/default/files/statistics-and-research/2018-12/170505-future-trends-report-2017-en.pdf [Accessed March 2021]

Material Assets and Resource Use

Baseline Characteristics

Assets

Welsh Water supplies water to 1.4 million homes and businesses and to a population of over 3 million people across most of Wales, Herefordshire and parts of Deeside[176]. To facilitate this, Welsh Water operates a large network of infrastructure assets[177,178] including:

- 91 reservoirs;
- 62 Water treatment works;
- 2,477 network pumping stations;
- 446 service reservoirs and seven water towers;
- some 27,400 km of water mains;
- over 30,000km of sewers;
- over 800 sewage treatment works; and
- over 40,000 ha of land, much of which has high nature conservation and recreational value.

In 2011, as a requirement of the *Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011*, approximately 17,000km of private sewers and lateral drains transferred to Welsh Water, almost doubling Welsh Waters' sewer network. In 2013, Welsh Water commenced a process of adopting the 800 or more private pumping stations in its operating area by 2016. In total, 115 private sewer pumping stations were adopted in 2014, many in a poor state of repair.

Between 2010 and 2015, Welsh Water:

- rebuilt, refurbished or upgraded 12 water treatment works (investing £120 million);
- replaced or upgraded 40 wastewater treatment works (investing £29 million);
- built a new watersports and visitor centre at Llandegfedd Reservoir (investing £2.5 million);
- provided two new laboratories in Glaslyn, Newport and Bretton, North Wales (investing £11 million);
- implemented 'RainScape' urban drainage project at Llanelli and Gowerton (investing £15 million).

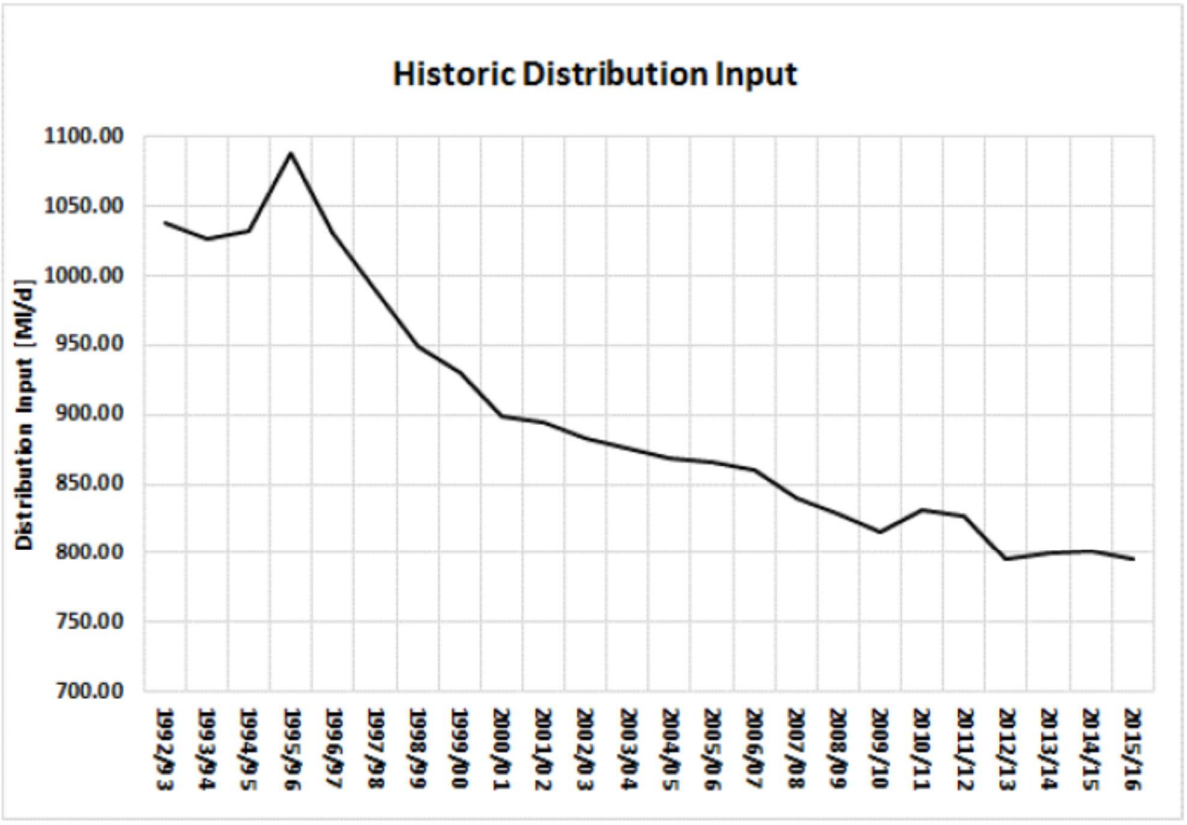
[176] Welsh Water (2019) *Final Water Resources Management Plan, Technical Report.* Available on line at: https://www.dwrcymru.com/en/our-services/water/water-resources/final-water-resources-management-plan-2019 [Accessed July 2022]
[177] Welsh Water ((2019) *Our Plan: PR19 Business Plan 2020 – 2025.* Available online: https://corporate.dwrcymru.com/en/about-us/our-plans/water-2020 [Accessed July 2022]
[178] Welsh Water (2020) *Annual Performance Report 2019-20 Part 4 – Additional regulatory information* Available online at: https://corporate.dwrcymru.com/en/library/annual-performance-reports [Accessed July 2022]

Water demand

Welsh Water[179] currently abstracts around 800 Ml/d from the environment for public water supply. This increases by 15-20 per cent during the summer. During extreme conditions, demands on the Welsh Water supply system can increase by over 25 per cent, and in some localised areas by more than this. The geographical variation within the Welsh Water area results in regional variation in water source. The source of supply can be divided into two broad categories, storage (e.g. a reservoir) and non-storage (e.g. a river). Welsh Water's supplies are almost entirely made up from upland reservoir and river sources with groundwater being the primary source of water in only three WRZs,

There has been a long-term steady decline in water demand in the Welsh Water area (**Figure D.20**) and this trend continues.

Figure D.7.12 Welsh Water long term water demand



Source: Welsh Water WMRP 2019

During the 2020/21 period, the average daily water usage in the Welsh Water area was 163 litres per person per day (l/p/d)[180], which is above the average for England and Wales for the same period (145 l/p/d). As shown in **Table D.13**, the average daily water usage for Welsh Water is above the average for England and Wales over the past three years.

[179] Welsh Water (2019) Final Water Resources Management Plan, Technical Report. Available on line at: https://www.dwrcymru.com/en/our-services/water/water-resources/final-water-resources-management-plan-2019 [Accessed July 2022]
[180] Discover Water. The amount we use. Available online at: http://www.discoverwater.co.uk/amount-we-use [Accessed July 2022]

Table D.17 Average daily water usage (litres per person)

	2018-19	2019-20	2020-21
England and Wales Average (l/p/d)	143	142	145
Welsh Water (l/p/d)	157	160	163

Source: *Discover Water. The amount we use.*

There is a difference between usage for metered and non-metered customers. For metered customers, the average use for Welsh Water for 2020/21 was 145 l/p/d compared to non-metered customers where the average use for Welsh Water was 195 l/p/d.[181]

Leakage

Leakage levels[182] are affected by a number of factors including the length, age and condition of the water mains network as well as weather conditions. The change in climate to hotter, drier summers, combined with a growing population means water resources need to be manged more efficiently. In 2021/22 Welsh Water had a reduced leakage of 157.4 million litres per day (Ml/d)[183] which is a reduction from 2020/21 (163.2 Ml/d), 2019/20 (168 Ml/d) and a significant reduction from 260 Ml/d in 2001[184].

A pipe burst is the most common cause of loss of water and water supply. Welsh Water estimates that around 75 per cent of water lost is due to leaks within its network of water mains, the rest being lost from customers' pipes. The number of Welsh Water pipe bursts has generally decreased in recent years however in 2020-21 the figure has increased with 154 pipe bursts per 1,000km. As shown in **Table D.14**, the figure for 2020-21 is slightly higher than the average for England and Wales as it was in 2019-20.

Table D.18 Number of pipe bursts in company pipe network (per 1,000 kilometre of pipe)

	2018-19	2019-20	2020-21
England and Wales Average (l/p/d)	172	137	140
Welsh Water (l/p/d)	154	139	154

Source: Discover Water. Number of pipe (mains) bursts

Sewer flooding is unpleasant and distressing and the worst situation is where properties become flooded. For Welsh Water, the number of incidents of internal sewer flooding per 10,000 sewer connections in 2021-22 stood at 1.36 which represents a fall from 2.05 in 2020-21. Welsh Water met the target of 1.60 in 2021-22.[185]

Variations are likely in the number of incidents each year as there are a number of causes, with blockages becoming a more frequent cause. Also, changes in climate resulting in heavier, more intense rainfall can overwhelm the sewer and drainage system. Whilst newer systems keep drainage separate from sewer systems, in locations such as cities these systems are often combined. Pressure on the sewerage/drainage system also poses a risk of more frequent localised flooding as a result of exceeding network capacity.

[181] Ibid.
[182] Leakage - The water lost between the treatment works and the customer.
[183] Welsh Water (2022) Annual Performance Report 2021-2022 https://corporate.dwrcymru.com/en/library/annual-performance-reports [Accessed July 2022]
[184] Welsh Water (2022) *Glas Cymru Report & Accounts 2021-2022*. Available online: https://corporate.dwrcymru.com/en/library/group-annual-report-and-accounts/glas-cymru-cyfyngedig [Accessed July 2022]
[185] Ibid.

Water efficiency

Welsh Water's water efficiency initiatives save a combined 1.5 million litres of water per day. Welsh Water currently supplies 17,500 domestic customers a water efficiency 'Welcome Pack' when they opt for a water meter, or where a new property is connected the network. Around 40% of customers are on a metered supply[186].

To reduce leakages across the network, Welsh Water aims to develop methods to regularly survey 10,000 km of trunk mains using new technology, and to progress the 'Toilet and tap' initiative to get a better understanding of leakages beyond the customer boundary. Welsh Water will undertake free repairs or replacements on a targeted proportion of customer supply pipe leaks and invest in water efficiency messaging and education. Overall, Welsh Water intends to meet Ofwat's target of a 15% reduction in total leakage by the end of AMP7.[187]

Energy use

Wales is a net exporter of electricity. In 2020, Wales generated approximately 23.1TWh yet consumed approximately 13.8 TWh of electricity (~40 per cent of energy generated in Wales is exported). Since 2005, electricity consumption has fallen by 21%[188]. Energy generation is from fossil fuel (including gas and diesel) and renewable sources (including onshore wind, offshore winds, solar PV and others). Renewable sources contribute approximately 33% of electricity generation[189] which is lower than the UK average of 45.5% in Quarter 1 2022[190].

Since 2005, renewable electricity generation has increased by over 500% in Wales. This is predominantly due to large-scale onshore and offshore wind. The three sectors with the greatest energy use are industry (37%), domestic (28%) and transport (25%) in 2019. There has been steady decline in energy use in all these sectors since 2005. 40% of energy used provides heat to homes, businesses and industry.[191]

To supply drinking water and remove and treat wastewater requires energy. Topography and volumes can increase or decrease this energy demand further. The topography and size of the Welsh Water area means water and wastewater have to be pumped over large areas, and Welsh Water is one of the largest energy users in Wales. In 2021/22, Welsh Water used 582 GWh of energy in total to pump and treat wastewater. This was a slight decrease on 593 GWh in 2020/21[192]. In 2021/22, Welsh Water achieved a total of 122 GWh of renewable generation (water and wastewater) a slight increase on 2020/21[193].

Material use and waste generation

Municipal waste volumes in Wales have been steadily decreasing from a peak of 1.93 million tonnes in 2004/05 to 1.49 million tonnes in 2020/21 (see **Table D.15**). The percentage of local authority municipal

[186] Welsh Water (2019) Final Water Resources Management Plan, Technical Report. Available on line at: https://www.dwrcymru.com/en/our-services/water/water-resources/final-water-resources-management-plan-2019 [Accessed July 2022]
[187] Welsh Water (2018) *Welsh Water 2050*. Available online: https://corporate.dwrcymru.com/en/about-us/our-plans/water-2050 [Accessed July 2022]
[188] Regen for Welsh Government (2022) Energy Generation in Wales 2020, available at: https://www.regen.co.uk/wp-content/uploads/Energy-Generation-in-Wales-2020-Final.pdf [Accessed July 2022]
[189] Ibid.
[190] BEIS (2022), Energy Trends: UK , January to March 2022. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1086767/Energy_Trends_June_2022.pdf [Accessed July 2022].
[191] Regen for Welsh Government (2022), Energy Use in Wales 2020, Available online: https://www.regen.co.uk/wp-content/uploads/Energy-Use-Wales-Report-Final.pdf [accessed July 2022]
[192] Welsh Water (2022) *Glas Cymru Report & Accounts 2021-2022.* Available online: https://corporate.dwrcymru.com/en/library/group-annual-report-and-accounts/glas-cymru-cyfyngedig [Accessed July 2022]
[193] Welsh Water (2022) *Glas Cymru Report & Accounts 2021-2022.* Available online: https://corporate.dwrcymru.com/en/library/group-annual-report-and-accounts/glas-cymru-cyfyngedig [Accessed July 2022]

waste that was prepared for reuse, recycled or composted in Wales has continued to increase from around 5 per cent in 1998/99 to 65.37% in 2020/21.

Table D.19 Annual management of municipal waste by management method (tonnes)

Method	2016-17	2017-18	2018-19	2019-20	2020-21
Total Municipal Waste Collected/Generated	1,589,794.99	1,549,683.62	1,542,486.99	1,512,100.84	1,488,253.31
Total Waste Reused/Recycled/Composted (Statutory Target)	1,014,454.76	971,112.03	968,512.86	984,935.01	972,862.73
Waste sent for other recovery	1,010.14	1,934.95	6,647.99	7,660.58	4,924.08
Waste Incinerated with Energy Recovery	389,599.30	374,457.53	385,764.13	387,469.39	422,801.92
Waste Incinerated without Energy Recovery	495.59	677.00	743.32	1,249.53	1,271.46
Waste Landfilled	150,984.28	170,509.75	155,198.48	114,101.45	72,200.08
Percentage of Waste Reused/Recycled/Composted (Statutory Target)	63.81	62.67	62.79	65.14	65.37

Source: StatsWales[194]

The latest available data shows that Welsh industrial and commercial sectors, meanwhile, generated an estimated 2.9 million tonnes of waste in 2018 split equally between the sectors. Around 1.3 million tonnes or 45 per cent was recycled, 413 thousand tonnes or 14 per cent was prepared for re-use and 218 thousand tonnes or 8 per cent was composted. 306 thousand tonnes or 11 per cent was disposed of via landfill.[195]

Operationally, Welsh Water requires materials in the water treatment processes including a wide range of chemicals for both water and wastewater treatment. Welsh Water are exploring chemical free treatment processes, for example, through catalysis.[196]

Likely Evolution of the Baseline without the WRMP

Water efficiency

Welsh Water is investing £2.2 billion between 2020 and 2025 to maintain and improve the extensive network of its assets.[197] The quantity of water supplied in the Welsh Water area in a normal year reduced from around

[194] StatsWales (2022) *Annual management of waste by management method (tonnes)*. Available online: https://statswales.gov.wales/Catalogue/Environment-and-Countryside/Waste-Management/Local-Authority-Municipal-Waste/annualwastemanagement-by-management-year [Accessed July 2022]
[195] Natural Resources Wales (2019) *Industrial and Commercial Waste Survey 2018.* Available online: https://naturalresources.wales/evidence-and-data/research-and-reports/waste-reports/industrial-commercial-waste-survey/?lang=en [Accessed July 2022]
[196] Welsh Water (2022) *Glas Cymru Report & Accounts 2021-2022.* Available online: https://corporate.dwrcymru.com/en/library/group-annual-report-and-accounts/glas-cymru-cyfyngedig [Accessed July 2022]
[197] Welsh Water (2018) *Our Plan: PR19 Business Plan 2020-2025*. Available online: https://corporate.dwrcymru.com/en/about-us/our-plans/water-2020 [Accessed July 2022]

1,000 Ml/day to 800 Ml/day in the last 25 years. This is down to a reduction in leakage, reduction in demand from heavy industry, reduced use by customers.[198]

In its Final WRMP19, Welsh Water predict that two WRZs will fall into a potential supply deficit over this period. The WRMP19 contains measures to address these forecast deficits. **Table D.16** outlines the WRZ and the likely deficit.

Table D.20 Welsh Water WRMP deficit zones (taken from WRMP19)

Water Resource Zone	Max. deficit over planning period (Ml/d)	First year of deficit	Reasons for deficit	Measures in WRMP19 to address forecast deficit in WRZ
Pembrokeshire	14	2022	• Review of Consents driven licence changes • Climate Change impact on Target Headroom and DO • Revised demand forecast and base year position	Welsh Water is proposing asset upgrades at Canaston Bridge raw water pumping station which would allow finer control of abstraction volumes from the Afon Cleddau, and hence reduce unnecessary over-release of compensation flows from Llys y Fran reservoir.
Tywyn Aberdyfi	1.52	2020	• Climate Change impact on Target Headroom and DO • Revised demand forecast and base year position • Single source zone	Welsh Water is proposing a new abstraction from Afon Dysynni at Pont y Garth, with transfer to Pen y Bont Water Treatment Works (WTW) via a new raw water transfer main. A new pumping station would also be required. This will operate within the maximum WTW capacity.

Welsh Water manages leakage control through the establishment of District Metering Areas (DMA). DMAs have been used to target planned interventions to detect leakage, monitoring over 5,000 data signals on a 30 minute basis. Through the Asset Management Policy (AMP) 6 period, Welsh Water embarked on a project to coordinate water efficiency and customer side leakage on an area by area basis (Project Cartref). Welsh Water seeks to make a 15 per cent reduction in leakage over the course AMP 7 period.[199]

Energy use

Wales' energy consumption has declined since 2005 and this trend is expected to continue due to energy efficiency improvements. There is also expected to be an increase in energy use from renewables and in this context, the UK and the Welsh Government has a legally binding target for net zero emissions in 2050.

Welsh Water aim to be 35% energy self-sufficient by 2025 and to achieve a 90% reduction in total carbon emissions by 2030. [200]

Materials and waste

In 2010, the Welsh Government launched the 'Towards Zero Waste' (TZW) initiative, which set out the aim to be recycling 70 per cent of waste in Wales by 2025 and to be a zero waste nation by 2050. This has been

[198] Welsh Water (2019) *Final Water Resources Management Plan, Technical Report.* Available on line at: https://www.dwrcymru.com/en/our-services/water/water-resources/final-water-resources-management-plan-2019 [Accessed July 2022]
[200] Welsh Water (2022) *Glas Cymru Report & Accounts 2021-2022.* Available online: https://corporate.dwrcymru.com/en/library/group-annual-report-and-accounts/glas-cymru-cyfyngedig [Accessed July 2022]
[200] Welsh Water (2022) *Glas Cymru Report & Accounts 2021-2022.* Available online: https://corporate.dwrcymru.com/en/library/group-annual-report-and-accounts/glas-cymru-cyfyngedig [Accessed July 2022]

refreshed by *Beyond Recycling: A strategy to make the circular economy in Wales a reality* (2020)[201]. The July 2015 Towards Zero Waste progress report[202] stated that total waste arisings per annum had decreased from 14.5 million tonnes in 2007 to 8.4 million tonnes in 2012. This is an 8.4 per cent reduction per year, against a target of a 1.4 per cent reduction per year. In 2012, the 50 per cent of commercial waste and 68 per cent of industrial waste was sent to recycling.

Beyond Recycling[203] sets the target of a 26 per cent reduction in waste and zero waste to landfill by 2025, a 33 per cent reduction in waste by 2030 and 62% reduction in waste by 2050.

Key Issues Relevant to the WRMP

The key sustainability issues relevant to the WRMP arising from the analysis of the material assets and resource use baseline are:

- the need to promote water efficiency measures (including metering);
- the need to ensure that leakage is managed at a sustainable economic level;
- the need to maintain the balance between supply and demand for water;
- the need to reduce energy consumption and support low carbon and renewable energy production;
- the need to ensure the sustainable and efficient use of resources such as construction materials; and
- the need to minimise waste arisings, promote reuse, recovery and recycling and minimise the impact of wastes on the environment and communities.

Cultural Heritage

Baseline Characteristics

The historic environment of Wales is both unique and irreplaceable, contributes greatly to the Welsh sense of identity and culture and is an important economic and social asset. In Wales, there are three UNESCO World Heritage Sites recognised for their universal value:

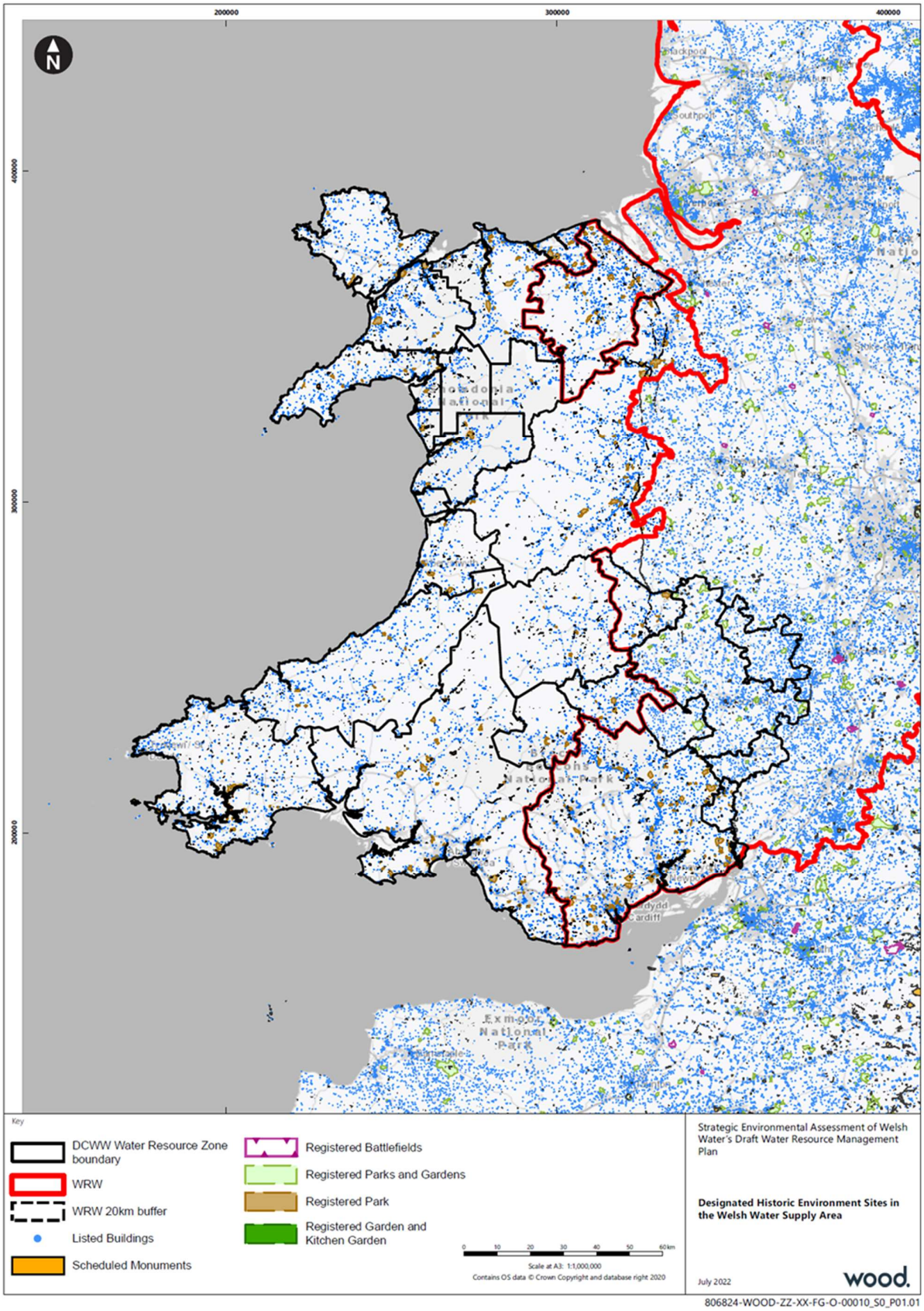
- Pontcysyllte Aqueduct and Canal;
- Blaenavon Industrial Landscape; and
- The Castles and Town Walls of King Edward in Gwynedd.

There are 4,225 scheduled monuments, 30,077 listed buildings, 384 registered parks and gardens[204] and around 700 battlefields and 500 conservation areas within Wales. There are also a large number of undesignated heritage assets (including archaeological remains) and locally listed buildings identified by local authorities that contribute to the character of local areas.

Figure D.21 shows the designated heritage assets within the Welsh Water supply area.

[201] Welsh Government (2010) *Towards Zero Waste. One Wales: One Planet. June 2010*. Available online at: https://gov.wales/sites/default/files/publications/2019-05/towards-zero-waste-our-waste-strategy.pdf [Accessed July 2022]
[202] Welsh Government (2015) *Towards Zero Waste 2010-2015. Progress report. July 2015*. Available online at: https://gov.wales/towards-zero-waste-progress-report-july-2015 [Accessed July 2022]
[203] Available online: https://gov.wales/sites/default/files/publications/2021-03/beyond-recycling-strategy-document.pdf [Accessed July 2022]
[204] Cadw records can be searched via: https://cadw.gov.wales/advice-support/cof-cymru/search-cadw-records [Accessed July 2022]

Figure D.7.13 Historic environment designations in the Welsh Water Supply Area



The Historic Landscapes Register for Wales has identified some 58 landscapes which are regarded as representing the best examples of the variety of historic landscapes in Wales[205]. 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 national importance in the Welsh context. The following section of this Appendix provides more detail on the extent of 'outstanding' and 'special' landscape areas.

Cadw maintains a record of designated heritage assets and are working towards identifying all those that are at risk from decay, neglect or development pressure. The latest data from 2015[206] suggests that some 8 per cent of listed buildings are at risk which is a slight decrease from 9 per cent identified in 2013. Those classed as 'vulnerable' fell slightly from 14 per cent to 12 per cent over the same period and those classed as 'not at risk' increased slightly from 77 per cent to 79 per cent. The percentage of listed buildings in 'Very bad' condition remained at around 2 per cent over the period whilst those in 'Good' condition increased from 53 per cent to 55 per cent. Buildings in 'Poor' or 'Fair' condition decreased from 2013 to 2015.

Likely Evolution of the Baseline without the WRMP

Wales' cultural heritage assets are vulnerable to disturbance from development, land management and the effects of climate change, which can present physical, economic and/or cultural challenges for the historic environment[207]. However, (as a broad indicator) the percentage of listed buildings classified as 'At risk' or 'Vulnerable' by Cadw fell between 2013 and 2015 (as outlined above).

Managing water resources can impact on, or enhance, the historic components of the Welsh landscapes and built assets including historic woodlands, field systems and hedgerows, traditional buildings and ancient monuments and archaeological sites. The protection, preservation and settings of cultural heritage assets needs to be considered when locating any new development including water resources management infrastructure.

Key Issues Relevant to the WRMP

The key sustainability issues relevant to the WRMP 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 and landscapes of archaeological and cultural heritage interest, and their settings;
- the need to promote access to Wales' cultural heritage sites within Welsh Water's ownership where possible and safe to do so; and
- the need to avoid damage to important wetland areas with potential for paleoenvironmental deposits.

[205] Cadw (2007) *Caring for Historic Landscape*. Available online: https://cadw.gov.wales/sites/default/files/2019-05/Caring_for_Historic_Landscapes_EN_CY.pdf [Accessed July 2022]
[206] Cadw (2013) *The Condition and Use Survey of Listed Buildings in Wales 2013.* Available online: https://cadw.gov.wales/advice-support/historic-assets/listed-buildings/listed-buildings-risk#section-the-condition-of-listed-buildings-in-wales- [Accessed July 2022]
[207] Historic Environment Group (HEG) (2020) *Historic Environment and Climate Change in Wales*. Available via: https://cadw.gov.wales/advice-support/climate-change/adapting-to-climate-change [Accessed March 2021]

Landscape

Baseline Characteristics

Landscape is defined by The European Landscape Convention as *"an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors"*. This definition is stated as covering natural, rural, urban and peri-urban (i.e., the urban-rural fringe) and includes land, inland water and marine areas.

Wales is characterised by a beautiful and rugged landscape, which ranges from the mountains and lakes of Snowdonia and the estuaries of the mid-Wales coast, to the beaches and cliffs of Pembrokeshire, and the industrial heritage of the South Wales Valleys. Wales is generally a predominantly pastoral landscape with agriculturally improved grassland being the single most extensive habitat type, followed by semi-improved grassland.

There are three National Parks covering 20 per cent (287,830 ha) of Wales (Brecon Beacons, Snowdonia and Pembrokeshire Coast National Parks) and five Areas of Outstanding Natural Beauty (AONBs) (Anglesey, Gower, Llŷn, the Clwydian Range and Dee Valley and Wye Valley, which straddles England and Wales), covering 65,926 ha (**see Figure D.22**). Collectively, these are referred to as 'designated landscapes', which have specific Special Qualities that should be protected and enhanced. In total, 25 per cent of Wales is designated as either a National Park or an AONB.

Other areas designated for their landscape quality include 495 km of Heritage Coast and 58 landscapes of outstanding/special historic interest (see **Figure D.22**).[208] In total, over 52 per cent of Wales is nationally or internationally valued for its scenic quality and character, often recognised as iconic landscapes providing a clear sense of place and identity.[209]

The National Landscape Character Area map of Wales[210] recognises 48 sub-regional Landscape Character Areas across Wales, as shown in **Figure D.23**. 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.

The large area of designated landscapes throughout Wales demonstrates their value to people as a cultural service. Many people find beauty, tranquillity or aesthetic value in the landscapes and seascapes of Wales and which in-turn promotes social and mental wellbeing as well as the physical benefits of recreational ways of appreciating such landscapes (such as walking, climbing and cycling). Additionally, the landscape is an important aspect of the tourism offer in Wales.[211]

Cadw and other stakeholders produced the Register of Landscapes of Historic Interest in Wales[212] as a means of identifying, and to provide information on, the most important and best-surviving historic landscapes in

[208] Cadw (2007) *Caring for Historic Landscape*. Available online: https://cadw.gov.wales/sites/default/files/2019-05/Caring_for_Historic_Landscapes_EN_CY.pdf [Accessed July 2022]
[209] NRW (2018) *Updated All Wales LANDMAP Statistics 2017: Visual and Sensory Aspect*. Available online: https://cdn.cyfoethnaturiol.cymru/media/684055/landmap-visual-and-sensory-all-wales-stats-2017.pdf?mode=pad&rnd=131625599140000000 [Accessed July 2022]
[210] Natural Resources Wales. Wales environmental information portal. Available at https://naturalresources.wales/evidence-and-data/accessing-our-data/beta-wales-environmental-information-portal/?lang=en [Accessed July 2022]]
[211] Welsh Government (2020) *Welcome to Wales: Priorities for the Visitor Economy 2020-2025*. Available online: https://gov.wales/sites/default/files/publications/2020-02/welcome-to-wales-priorities-for-the-visitor-economy-2020-2025.pdf [Accessed July 2022]
[212] *Cadw, Welsh Government and Countryside Council for Wales (2007) Historic Landscapes, 2007*. Available online at: https://cadw.gov.wales/advice-support/historic-assets/conservation-areas-and-other-historic-assets/other-historic-assets-0 [Accessed July 2022]

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 national importance in the Welsh context[213]. **Figure D.24** shows the extent of the areas.

In 2009, over 11,5600 km^2 of Wales (55 per cent of the total area) was identified as 'tranquil', as defined by the Countryside Council for Wales (now NRW) Wales Tranquil Areas Map. The 2009 Tranquil Areas Map is shown in **Figure D.25**. Factors that contribute to how tranquil a place feels include the presence of nature, feeling safe, low noise, visually pleasing surroundings and a relaxing atmosphere[214]. The two largest tranquil areas in Wales are both over 1,000 km^2. These areas are part of the Berwyn Mountains, bordered by the towns of Dolgellau, Bala, Llangollen and Welshpool, and the southern part of the Cambrian Mountains, bordered by Llangurig, Rhayader, Llandovery, Lampeter and Tregaron. Between 1997 and 2009, there was a loss of tranquil areas of nearly 1,500km^2 of land. This is over 6 per cent of the total land area of Wales and is greater than the area of the Brecon Beacons National Park[215].

213 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

[214] NRW (2017) Tranquil Areas Wales 2009. Available online: https://data.gov.uk/dataset/35a4cb9e-0dcc-4e25-93b0-6a0a04305940/tranquil-areas-wales-2009 [Accessed July 2022]

[215] Landscape Institute Technical Information Note (2017) Tranquillity – An Overview. Available online: https://www.landscapeinstitute.org/technical-resource/tranquillity/ [Accessed July 2022]

Figure D.7.14 Landscape Designations in Wales

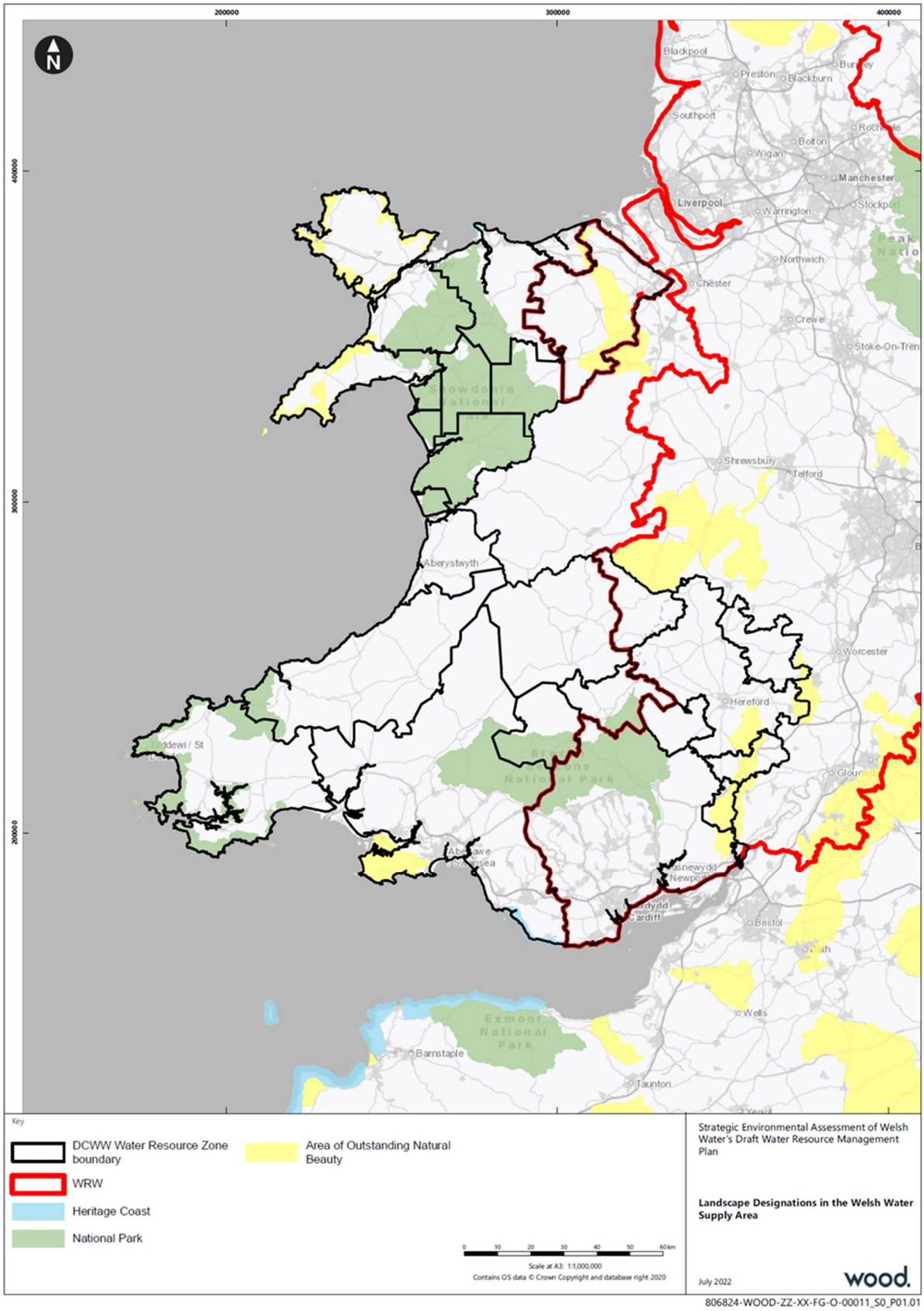
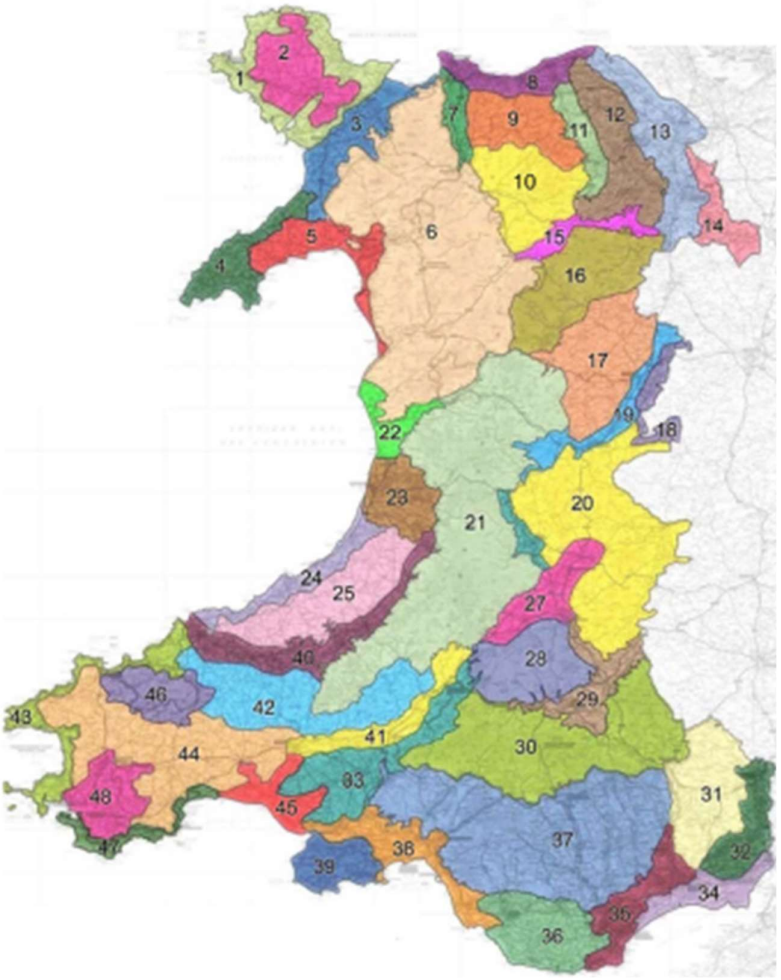


Figure D.7.15 National Landscape Character Areas of Wales



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
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)

Figure D.7.16 Landscape of Historic Interest in Wales

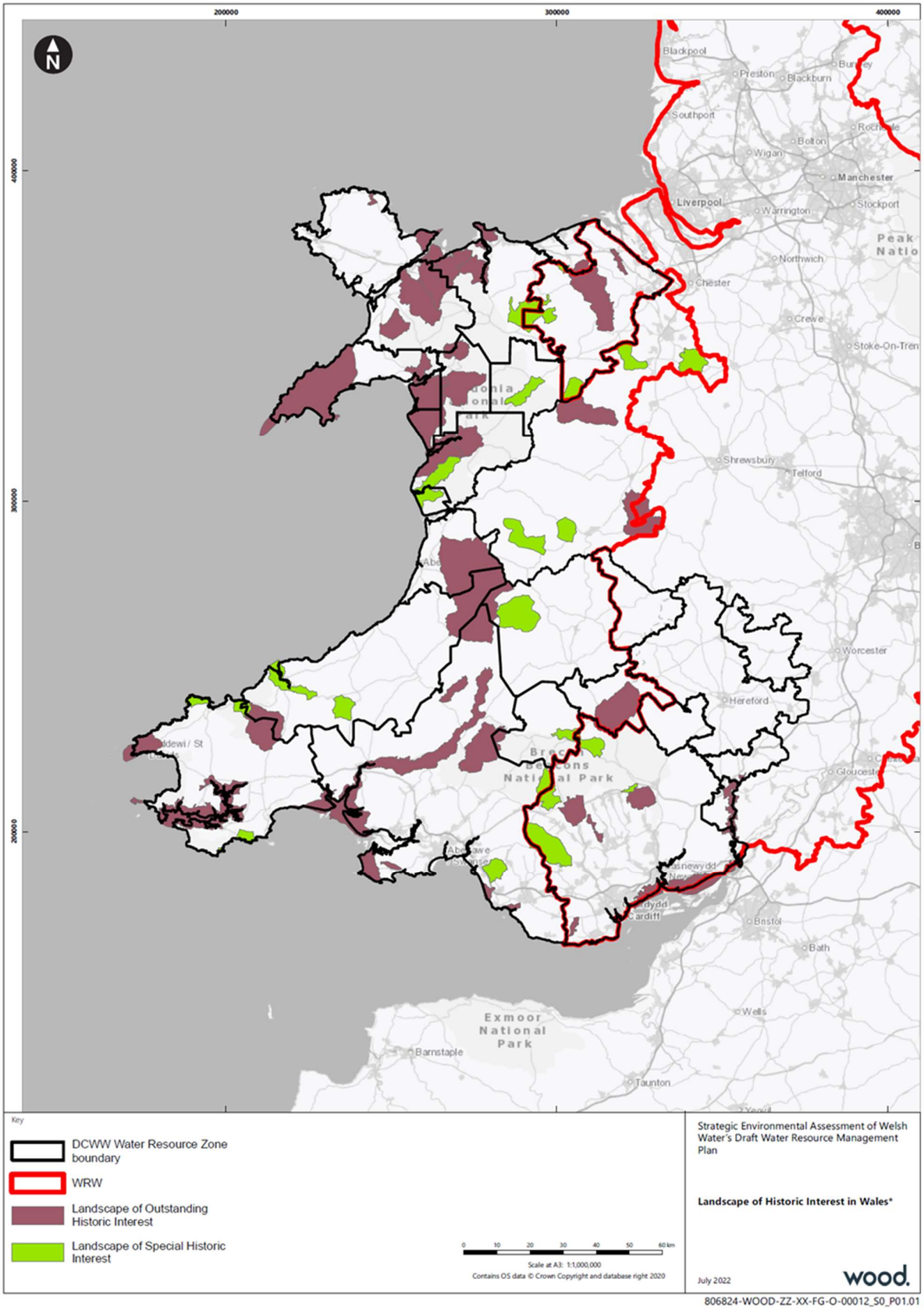
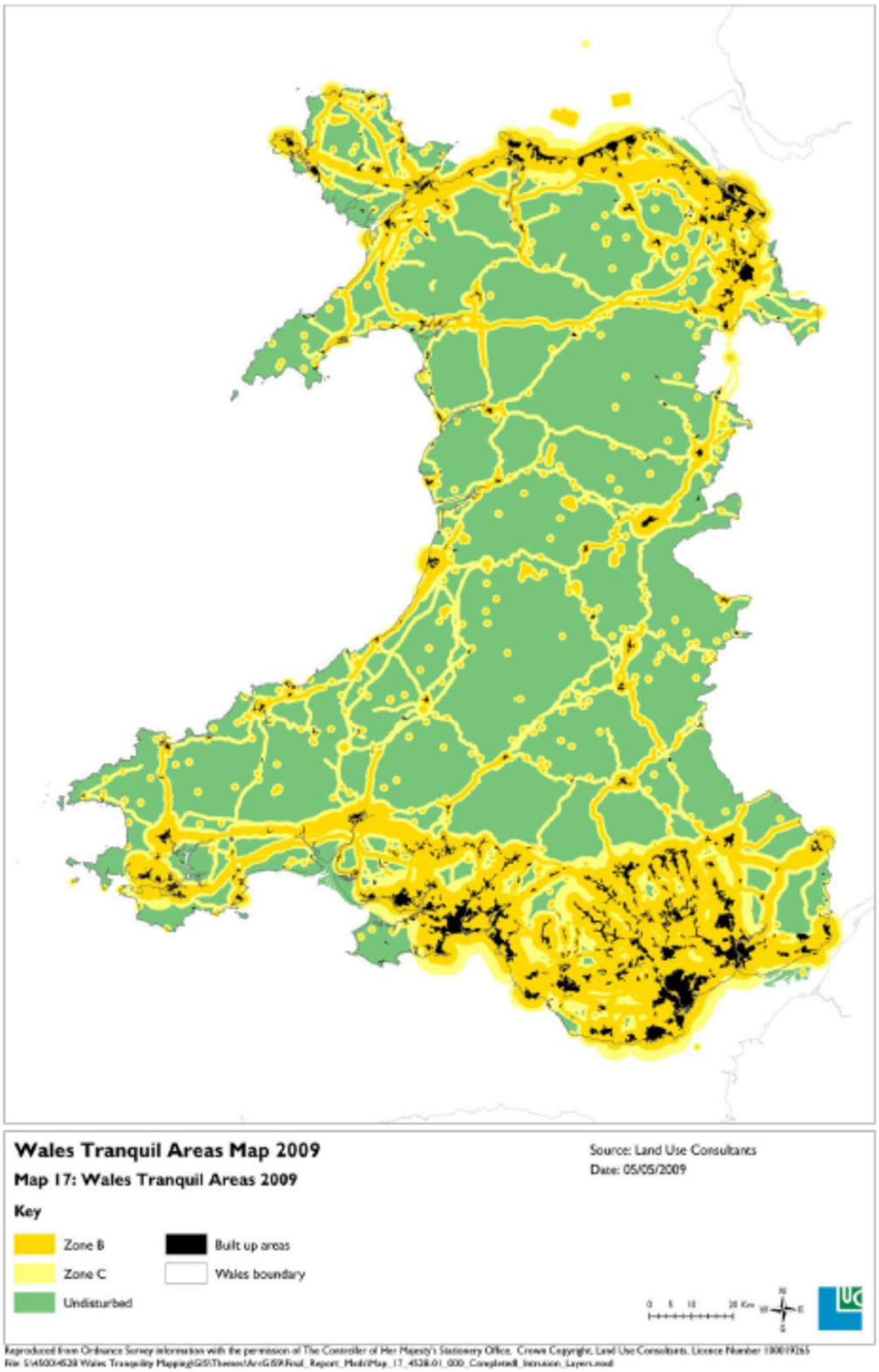


Figure D.7.17 2009 Wales Tranquil Areas Map



Source: Countryside Council for Wales (2009) Wales Tranquil Areas Map 2009.

Likely Evolution of the Baseline without the WRMP

Recent key factors determining landscape change in Wales are, in particular, the expansion of settlements, commercial and industrial development, road improvements, onshore windfarms and turbines and recreational related developments. Key changes in the natural environment affecting landscape character include the felling of conifers and replanting with broadleaves, woodland expansion, changing bracken cover, reduced habitat diversity in places and reduced bog.

Climate change over time is likely to have significant impacts on landscape character, local distinctiveness and quality in Wales. This is likely to be directly through changing land cover (migrating habitat and species ranges) and indirectly by influencing land use decisions. There may also be landscape changes resulting from mitigation measures, such as renewable energy generation, water resource management and adaptation through the planned expansion of woodland. There are also risks to landscapes from pests, pathogens and invasive species and from changes in frequency and/or magnitude of extreme weather and wildfire events. Hotter drier summers are also likely to have significant effects on tree cover and vegetation through increasing stress, and lead to reductions in visibility and availability of surface water, especially in upland areas. Wetter winters and more intense storms, meanwhile, are likely to create issues including soil waterlogging, increased run-off and higher potential for flooding, affecting lowland and coastal edge areas in particular[216].

Key Issues Relevant to the WRMP

The key sustainability issues relevant to the WRMP arising from the analysis of the landscape baseline are:

- the need to protect, conserve and enhance landscape character, taking into account the effects of climate change;
- the need to ensure the special qualities of designated landscapes are protected; and
- the need to minimise any adverse impacts upon landscape that may result from measures in the WRMP.

[216] NRW (2019) *LANDMAP, Landscape and a Changing Climate*. Available online: https://cdn.naturalresources.wales/media/688626/eng-landmap-landscape-and-a-changing-climate.pdf?mode=pad&rnd=131989289330000000 [Accessed July 2022]

FINAL

Appendix E
Definitions of Significance

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.	• 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. 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.

SEA Objectives	Guide Questions	Score		Description
		---	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.	• 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? • Will it provide opportunities for climate adaptation and protect the climate resilience of vulnerable and priority sites	+++	Major/Significant Positive	The option would lead to a major increase in natural capital/ecosystem resilience and enhancement (as measured by the NCA). The option would lead to a biodiversity net gain of greater than 10% (as measured by the BNG assessment). 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).
		++	Moderate Positive	The option would lead to a moderate increase in natural capital/ecosystem resilience and enhancement (as measured by the NCA). The option would lead to a biodiversity net gain of 10% (as measured by the BNG assessment). The option would protect and enhance at least three categories of ecosystem services identified in the NCA (with neutral effects on the remaining services).
		+	Minor Positive	The option would lead to a minor increase in natural capital/ecosystem resilience and enhancement (as measured by the NCA). The option would lead to a biodiversity net gain of less than 10% (as measured by the BNG assessment). The option would protect and enhance at least one category of ecosystem services identified in the NCA (with neutral effects on the remaining services).
		0	Neutral	The option would have no effect on natural capital, biodiversity net gain or ecosystem services.
		-	Minor Negative	The option would lead to a minor decrease in natural capital/ecosystem resilience (as measured by the NCA). The option would lead to a biodiversity net loss of less than 10% (as measured by the BNG assessment). The option would adversely affect at least one category of ecosystem services identified in the NCA (with neutral effects on the remaining services).

SEA Objectives	Guide Questions	Score		Description
		--	Moderate Negative	The option would lead to a moderate decrease in natural capital/ecosystem resilience (as measured by the NCA). The option would lead to a biodiversity net loss of 10% (as measured by the BNG assessment). The option would adversely affect at least three categories of ecosystem services identified in the NCA (with neutral effects on the remaining services).
		---	Major/Significant Negative	The option would lead to a major decrease in natural capital/ecosystem resilience (as measured by the NCA). The option would lead to a biodiversity net loss of greater than 10% (as measured by the BNG assessment). The option would adversely affect all categories of ecosystem services identified in the NCA.
		?	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).	• 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.

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.
4. To protect and enhance soil quantity, quality and functionality and geodiversity and ensure the appropriate and efficient use of land.	• 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.

SEA Objectives	Guide Questions	Score		Description
				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.
		?	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.	• 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.

SEA Objectives	Guide Questions	Score		Description
6. To protect and enhance the quality of surface and groundwater resources.	• 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.
7. To reduce or manage flood risk.	• 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	+++	Major/Significant Positive	The option would result in a major improvement to flood risk.
		++	Moderate Positive	The option would result in a moderate improvement to flood risk.

SEA Objectives	Guide Questions	Score		Description
	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? • Wil it promote the use of sustainable drainage systems? • Will it promote opportunities for collaborative working with other risk management authorities?	+	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.	• 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.
		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)

SEA Objectives	Guide Questions	Score		Description
		--	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.	• 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.
		-	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.

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.
10. To adapt and improve resilience to the threats of climate change.	• 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?	+++	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
		-	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	• Will it ensure that sufficient water resources infrastructure is in place to support predicted population increases?	+++	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).

SEA Objectives	Guide Questions	Score		Description
social well-being of local communities.	• 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?	+	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.
		--	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.	• 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.

SEA Objectives	Guide Questions	Score		Description
		--	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.
		?	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.	• 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 Ml/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 (5Ml/d to <25Ml/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 (1Ml/d to <5Ml/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

SEA Objectives	Guide Questions	Score		Description
14. To promote and enhance the sustainable and efficient use of resilient water resources.	• 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?	+++	Major/Significant Positive	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 Ml/d. The option would result in a major improvement in water efficiency and resilience.
		++	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 10Ml/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 Ml/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.	• 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)?	+++	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.
		+	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.

SEA Objectives	Guide Questions	Score		Description
		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 archaeological important sites.	• 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	+++	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.
		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.

SEA Objectives	Guide Questions	Score		Description
	culturally/historically important assets in the region? • Will it protect or enhance (where relevant) Welsh language and culture?	---	Major/Significant Negative	The option would diminish the significance of designated heritage assets and/or their setting such as: • 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. 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.
		?	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.	• 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?	+++	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.
		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.

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

FINAL

Appendix F
Revised Feasible Options Assessment Matrices

wood.

FINAL

SEWCUS Resource Zone

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW005a
Option Name	Great Spring - Court Farm
Water company	DCWW
Option Description	Up to 30Ml/d of additional water will be abstracted from the Great Spring and the existing Network Rail pumps will pump it to a new pumping station at DCWW's Sudbrook WTW. This will deliver 30Ml/d of raw water to a new collection chamber at Court Farm, via 22km of new 700mm dia raw water main, running south of the M4. From the new chamber 30Ml/d will treated at an extension to the WTW. This will be built on DCWW owned land in the field to the west of the WTW. The treatment process will include nanofiltration combined with a GAC to produce 27Ml/d of softened water. A cost has been allowed for upgrading 200m of rising main under the River Usk, in order to free up the current restriction of 29-30Ml/d maximum east towards Catsash, due to an old concrete main. The main scheme elements are: pumpstation (347l/s at 88m head) built at existing DCWW Sudbrook WTW to transfer water to Court Farm Raw Water Reservoir; 22km rising main from the Great Spring to Court Farm Raw Water reservoir; extension to Court Farm WTW to treat approximately 30Ml/d (Nanofiltration, GAC) and provide 27Ml/d of treated water; pumps to get water through new WTWs; and, 2No 200m 400mm dia rising main to upgrade Usk crossing.
Yield	Up to 30Ml/d
WRZ	SEWCUS

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

SEW005a	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

Construction
Objective 1: Moderate negative effect - Within 10km of the option there is: 1 SPA and 5 SACs, including the River Usk/Afon Wysg SAC (also a SSSI) which the pipeline would cross, and the Severn Estuary SAC (approximately 74m from the works) (the remaining SACs are all over 5.2km from the works); 1 Ramsar (Severn Estuary) approximately 0.07km from the option; 40 SSSIs, including 3 that the pipelines would cross (Gwent Levels - Magor and Undy; Gwent Levels - Redwick and Llandevenny; and, River Usk (Lower Usk)/Afon Wysg (Wysg Isaf)), and a further 4 within 1km of the option (Magor Marsh (approximately 11m from the works); Severn Estuary (74m); Langstone-Llanmartin Meadows (212m); and, Rectory Meadow - Rogiet (933m)); 2 NNRs, the closest of which is Penhow Woodlands (approximately 1.6km from the option); and 8 LNRs, the closest of which is St. Julian's Park (approximately 2.6km from the option). Construction of the pumping station and the WTW extension would not be located within any ecological international or nationally designated sites. As noted above, the pipeline route enters the edge of the Gwent Levels - Redwick and Llandevenny SSSI, which has the potential to disturb species and habitats during construction. Other sections of the pipeline route cross areas of undesignated greenfield land and four areas of ancient woodland, which may also result in temporary disturbance to ecology. However, with appropriate sympathetic routing and construction safeguards (such as dust suppression, spill containment, emergency response procedures and timing construction to avoid key migration periods) and due to the very limited extent of the works within the SSSI, effects are likely to be minor. There are also several watercourse crossings which introduce risks from the construction works including direct effects as well as increased suspended sediment and contamination. It is anticipated that standard best practice construction measures would be implemented to minimise such effects. The HRA highlights that, whilst the proposed water main crosses the River Usk / Afon Wysg SAC, effects on this will almost certainly be avoidable with established measures. The HRA also highlights that lesser and greater horseshoe bats associated with Wye Valley Woodlands/ Coetiroedd Dyffryn Gwy SAC and Wye Valley and Forest of Dean Bat Sites/ Safleoedd Ystlumod Dyffryn Gwy a Fforest y Ddena SAC are also vulnerable to construction works and that site specific detailed design would be required to avoid any likely effects, and on this basis the HRA identified that construction effects on the SACs can be avoided. Greenfield land would be required for the extension to the WTW, which is also expected to a have a minor negative effect on biodiversity due to the permanent loss of habitat.
Objective 2: Moderate negative effect. The BNG assessment concludes that there would be a moderate negative effect during the construction period, associated with the temporary and permanent loss of habitats associated with the excavation of the pipeline, and more minor permanent loss of habitats associated with the construction of the extension to the WTW (PS would not result in the loss of any units).

Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Minor positive effect - The new pumping station at Sudbrook WTW will be constructed within the existing operational site such that new pumping infrastructure should not significantly impact land/soil quality Objective 4: Minor negative effect - Construction of the extension to the WTW at the Court Farm site will take place on greenfield agricultural land (Grade 2/3a), however, this land is already owned by DCWW and would not require additional land acquisition. Excavation of the pipeline route would traverse areas of agricultural land in grades 2, 3a and 3b as well as areas of poor agricultural quality, and non-agricultural and urban land. Although land required for the excavation of the pipeline would be reinstated following the construction phase.
Objective 5: Neutral effect - It is not expected that construction would affect water resources.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures).
Objective 7: Minor Negative effect - The new pumping station at Sudbrook WTW and sections of the pipeline route (including the River Usk crossing) fall within areas of Flood Zone 3. Construction of these scheme components could therefore be liable to flooding depending on the timing of works; however, such risks could be minimised and the extension to Court Farm WTW and much of the new pipeline route would be located in areas of low flood risk. Construction is not expected, however, to cause or exacerbate flooding in the area or elsewhere.
Objective 8: Moderate negative uncertain effect - The construction of the option could result in traffic congestion during the 2 year construction period (particularly on the M4, A4810, A48 and the A449 (all of which the pipeline would cross), the M48 (which the route of the pipeline would be in close proximity to) and more generally, the local road network within the vicinity of the scheme and where there would be pipeline crossings) which, together with emissions associated with the use of plant and machinery, may have a negative effect on local air quality. It is noted, however, that the option would utilise directional drilling where the pipeline route would cross the M4 and A449, which should minimise the effects on these routes. The option is not located within any AQMAs.
Objective 9: Significant negative effect - Due to the scale of the option, the construction of the option would require considerable quantities of concrete, steel and plastic, with 16,185tCO2e embodied carbon. Furthermore, the construction of the option would result in additional vehicle movements (over the 2 year construction phase) and would require the operation of machinery and plant, which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, the new pumping station at Sudbrook and a number of sections of the pipeline would be located within an area of high flood risk. In consequence, construction could be vulnerable to the effects of climate change (flooding).
Objective 11: Significant positive effect - Construction would involve a significant sized capital expenditure (£57.06m), resulting in a significant positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy. Construction would take place over a 2-year period, which may provide opportunities for local businesses to have sustained involvement in the development of the scheme. Objective 11: Moderate negative effect - Works could result in increased congestion and disruption/driver delay on the road network (as set out under

objective 8) due to associated vehicle movements and pipeline crossing of roads which could affect the road network within the vicinity of the scheme. Construction of the new pipeline would also involve a railway crossing, however, as noted under objective 8, where the pipeline crosses the M4 and A449, directional drilling would be utilised, and it is assumed that where the pipeline would cross the railway and other major roads, this technique would also be utilised (where possible) to minimise/avoid effects on infrastructure.
Objective 12: Moderate negative effect - the route of the pipeline would cross through the Twenty Ten Golf Course at the Celtic Manor Resort, which could have a negative effect on the resort and operation of the golf course and recreational users of the facilities, however, crossing of the golf course would utilise directional drilling which should avoid the need for significant excavation of the surface of the golf course, but may still have effects on the facilities, such as vibration. Pipeline works may also cause negative effects to recreational users of Rogiet Countryside Park and Magor Marsh Nature Reserve (both of which the pipeline route would cross), St Marys Church, Wilcrick, Penhow Autograss Club, Langstone Local Nature Reserve. The route of the proposed pipeline would also cross route number 4 of the National Cycle Network in two places. More generally, construction works may impact upon publicly accessible land and public greenspaces, and users of such spaces (e.g. walking and cycling) where the scheme crosses or it is situated in close proximity.
Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the construction of the new PS and pipeline excavation which could affect residential receptors within close proximity to the works, such as at Ponthir, Langstone, Underwood, Wilcrick, Magwyr/Magor, Gwndy/Undy, Rogiet, Cil-Y-Coed/Caldicot and Sudbrook as well as the scattered residential dwellings and farmsteads within the vicinity of the scheme, however, these effects would be temporary.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Significant negative effect - The construction of the option would require significant amounts of raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Moderate negative effect - Within 1km of the overall scheme, there are 32 Scheduled Monuments, including 9 within 100m of the 22km pipeline works. Approximately a 50m length of the pipeline would cross the Great Bulmore Roman Settlement Scheduled Monument, however, the location at which the pipeline crosses is on the edge of the monument site, and it is anticipated that detailed routing of the pipeline at the project stage would avoid the need to traverse this site, however, there may be some temporary effects on the setting of the monument during the excavation of the pipeline route. There may also be temporary effects on the setting of other monuments in very close proximity to the works (Langstone motte and enclosure (approx. 17m from scheme); Deserted Medieval Village W of St Mary's Church (approx. 21m from the scheme); Wilcrick Hill Camp (approx. 23m from the scheme); and Sudbrook Camp and Sudbrook Chapel (approx.. 46m from the scheme)). All other Scheduled Monuments at least 75m from the scheme and may experience some effects on setting (albeit to a lesser degree). Also within 1km of the option there are 70 listed buildings including 4 which are located less than 100m from the proposed works (Great House Farmhouse including attached range of Farm Buildings (<10m from the pipeline route); Sudbrook Pump House and Fanhouse at Sudbrook Pumping Station (28m and 45m from the end of the pipeline respectively/adjacent to the new pumping station at Sudbrook); and Cat's Ash Farmhouse (incorporating remains of St Curig's chapel) (approximately 75m from the pipeline)). A further 8

Listed Buildings are within 200m of the scheme. Listed Buildings within close proximity to the scheme may experience some temporary effects on setting, however, it is anticipated that detailed routing at the project stage would avoid physical damage to any heritage assets. Construction of the pumping station at Sudbrook would be located in close proximity to the aforementioned Scheduled Monument and Listed Buildings and construction of this element, in addition to pipeline works at this location may therefore affect the setting of these assets. There are also 4 conservation within 1km of the option: Magor (28m from the 22km pipeline); Llanhennock (130m from the pipeline); Rogiet (276 from the pipeline); and Caldicot (548m from the pipeline). However, it is considered that these are either sufficiently set back from the works (Rogiet and Caldicot) or separated by existing rail/road infrastructure (Magor and Llanhennock) such that no significant effects would be anticipated. There are also three Parks and Gardens within 1km of the option: Pencoed Castle (594m); Llanwern Park (600m); and, Glen Usk (843m). It is not anticipated there would be any significant effects on these sites, due to there relative distance between the sites and construction works.
Objective 17: Minor negative effect - The option would be situated approximately 4.2km from the Wye Valley AONB, however, no significant effects are anticipated on the setting of this landscape due to the relative distance between the construction works and the AONB. The pipeline would cross the Gwent Levels Historic Landscape, which may have a minor effect on the character of the landscape during construction (an effect on the setting of the landscape as a result of the excavation of the pipeline route) , however, this would be temporary, with soils excavated during the construction of the pipeline being reinstated after the completion of the pipeline construction. More generally the option may have a temporary minor effect on the local landscape and views in the vicinity of the scheme, particularly where elements of the scheme pass through more rural areas. The new PS and extension to the WTW are not expected to have a significant effect on landscape as they would be situated adjacent to similar existing infrastructure.
Operation
Objective 1: Minor negative uncertain effect -The Great Spring is a conduit in a limestone aquifer that was intersected during the construction of the Severn rail tunnel; water from the spring still enters the tunnel and is pumped to Sudbrook for direct discharge into the estuary. Discharges from the Great Spring fluctuate seasonally, varying from around 80 – 90Ml/d in winter to around 40Ml/d in summer. The option would transfer a proportion of this water to Court Farm WTW for treatment and distribution. The abstraction of groundwater is located close to the Severn Estuary (the Network Rail pumps abstract between 30 and 80 Ml/d as dewatering requirements of the Severn Tunnel). The option will not have any additional effects on the aquifer over the status quo (i.e. additional water will not be extracted from it), therefore any effects would be associated with the reductions in freshwater discharge at Sudbrook. The HRA concludes that given the relatively small contribution of the Great Spring to freshwater inputs to the estuary, and the high tidal flux, it is likely that the influence of the discharge on the habitats and species of the estuary is largely local to the Sudbook outfall only. The HRA notes that with regard to the habitats of the Severn Estuary/ Môr Hafren SAC and Severn Estuary Ramsar, and supporting habitats for the SPA species, the local distribution of habitats near the outfall is not known and it is likely that some may have developed or adapted to the freshwater input from this location; however, it is evident that there is a short mud foreshore with localised patches of saltmarsh, and that the immediate vicinity is heavily modified by retaining walls for the channel, and so whilst effects would likely be considered 'significant' in HRA terms, they would not necessarily affect the integrity of these sites. The HRA also notes that with regard to the Severn Estuary SPA species, previous work at other estuary sites in the UK has suggested that there may be a relationship between certain waterbirds and intertidal freshwater flows or channels although there is little evidence to suggest this is related to flow volumes per se. The HRA notes that the diadromous fish species of the Severn (and hence the River Wye SAC and River Usk SAC) may periodically use the areas of the estuary near the outfall, although it would seem unlikely that this is fundamental to the integrity of these species

populations for the reasons noted. The HRA concludes that consequently there would appear to be a reasonable prospect of a 'no adverse effects' conclusion following appropriate assessment, but that the data requirements may be challenging in the timescales of the WRMP (hence a moderate negative uncertain effect).
Objective 2: Moderate positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - The option would utilise the Great Spring groundwater source with water transferred to a new collection chamber, prior to treatment at an extension to the existing WTW, hence the INNS risk would be neutral, as there is no new pathway (and water would treated).
Objective 4: Neutral effect - There would be no operational effects on soils/geodiversity/land use.
Objective 5: Neutral effect - This option would include the abstraction of groundwater from the Great Spring, which is located in the southeast corner of a large groundwater waterbody. The abstraction of up to 30Ml/d could have some minor localised effects by reducing the volume of water entering the local groundwater system, although this is expected to be controlled with the use of an abstraction licence. The WFD assessment concludes that the abstraction of 30 Ml/d is unlikely to have an adverse effect on the hydrological regime of the Severn Estuary or result in significant changes to high and low flows and concludes that the option would be WFD compliant.
Objective 6: Neutral effect - No significant operational effects on water quality or change in WFD status are anticipated, on the assumption that the requirements of environmental permits and best practice are adhered to. The WFD assessment concludes that as the volume of abstraction will be relatively small compared with flows in the estuary, impacts on water quality will be negligible and the option would be WFD compliant.
Objective 7: Minor negative effect - The new pumping station at Sudbrook WTW falls within an area of Flood Zone 3, so may be at risk of flooding during operation, however, it is not anticipated that the option would cause or exacerbate flooding elsewhere.
Objective 8: Neutral effect - There would be no operational effects on air quality given the low volume of expected traffic associated with the extended WTW and new pumping infrastructure.
Objective 9: Significant negative effect - Operational energy demand and chemical dosing would generate 3,049tonnes CO2e/a. This has been assessed as having a significant negative effect on this objective.
Objective 10: Significant positive effect - The increased capacity (30Ml/d) provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Significant positive effect - The additional 30Ml/d capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a significant positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.

Objective 12: Neutral effect -The operation of the option is not expected to impact upon opportunities for recreation or tourism.
Objective 13: Significant positive effect- The scheme would not adversely affect human health due to increased noise, nuisance or disruption. The increased capacity of up to 30Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Significant positive effect - This option is not a leakage reduction or water efficiency option, however it does efficiently utilise abstraction of groundwater from the Great Spring which is already undertaken for dewatering requirements of the Severn Tunnel. The option would increase the resilience of water resources within the DCWW supply area, though the provision of an extra 30Ml/d of deployable output.
Objective 15: Significant negative effect - The operation of the option would require the ongoing use of chemicals to treat water as well as significant ongoing energy use to pump and treat water which would likely require the use of fossil fuels for energy.
Objective 16: Neutral effect - There would be no operational effects on designated cultural heritage assets.
Objective 17: Neutral effect - No significant effects on landscape are expected during the operational phase of this option.

wood.

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW005c
Option Name	Great Spring to Llandegfedd
Water company	DCWW
Option Description	Up to 30Ml/d of additional water will be abstracted from the Great Spring and the existing Network Rail pumps will pump it to a new pumping station at DCWW's Sudbrook WTW. This will deliver up to 30Ml/d of raw water to Court Farm reservoir, via 22km of new 700mm dia raw water main, running south of the M4. From Court Farm reservoir, 30Ml/d will be transferred up to Llandegfedd reservoir, along a new 700 dia raw water main. It will be treated at Sluvad with the option to send raw water to Court Farm. Any additional water at Court farm will reduce the requirement for other sources to supply Court Farm. The main elements of this scheme would be: 22km of new 700mm rising main from the Great Spring to Court Farm Raw Water reservoir; pumpstation built at Sudbrook to transfer water to Court Farm Raw Water Reservoir; pumpstation built at Court Farm WTW pumping to Llandegfedd Reservoir; 6.5km of new 700mm rising main from Court Farm to Sluvad WTW; instrumentation at Sluvad to monitor impact on reservoir hardness; and, new acid dosing at Sluvad and Court Farm.
Yield	30Ml/d
WRZ	SEWCUS

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
SEW005c	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

Construction
Objective 1: Moderate negative effect - Within 10km of the option there is: 1 SPA and 5 SACs, including the River Usk/Afon Wysg SAC (also a SSSI) which the pipeline would cross, and the Severn Estuary SAC (approximately 74m from the works) (the remaining SACs are all over 5.2km from the works); 1 Ramsar (Severn Estuary) approximately 0.07km from the option; 44 SSSIs, including 3 that the pipelines would cross (Gwent Levels - Magor and Undy; Gwent Levels - Redwick and Llandevenny; and, River Usk (Lower Usk)/Afon Wysg (Wysg Isaf)), and a further 5 within 1km of the option (Magor Marsh (approximately 11m from the works); Severn Estuary (74m); Llandegfedd Reservoir (83m); Langstone-Llanmartin Meadows (212m); and, Rectory Meadow - Rogiet (933m)); 2 NNRs, the closest of which is Penhow Woodlands (approximately 1.6km from the option); and 8 LNRs, the closest of which is St. Julian's Park (approximately 2.6km from the option). Construction of the Sudbrook pumping station and the pumps at Court Farm reservoir would not be located within any ecological international or nationally designated sites. As noted above, the 22km raw water pipeline route enters the edge of the Gwent Levels - Redwick and Llandevenny SSSI, which has the potential to disturb species and habitats during construction. Other sections of the pipeline route cross areas of undesignated greenfield land and four areas of ancient woodland, whilst the 6.5km pipeline would cross two further areas of ancient woodland, which may also result in temporary disturbance to ecology. However, with appropriate sympathetic routing and construction safeguards (such as dust suppression, spill containment, emergency response procedures and timing construction to avoid key migration periods) and due to the very limited extent of the works within the SSSI, effects are likely to be minor. There are also several watercourse crossings which introduce risks from the construction works including direct effects as well as increased suspended sediment and contamination. It is anticipated that standard best practice construction measures would be implemented to minimise such effects. The HRA highlights that, whilst the proposed water main crosses the River Usk / Afon Wysg SAC, effects on this will almost certainly be avoidable with established measures. The HRA also highlights that lesser and greater horseshoe bats associated with Wye Valley Woodlands/ Coetiroedd Dyffryn Gwy SAC and Wye Valley and Forest of Dean Bat Sites/ Safleoedd Ystlumod Dyffryn Gwy a Fforest y Ddena SAC are also vulnerable to construction works and that site specific detailed design would be required to avoid any likely effects, and on this basis the HRA identified that construction effects on the SACs can be avoided. There may also be minor negative effects (e.g. noise, air quality, dust) on other sites that are located in very close proximity (e.g. under 100m) to the works (as listed above). It is not certain where the Court Farm pumps would be located, however it is possible that a small amount of greenfield land would be required which has the potential to cause a loss of habitat.
Objective 2: Moderate negative effect. The BNG assessment concludes that there would be a moderate negative effect during the construction period, associated with the temporary and permanent loss of habitats, largely associated with the excavation of the pipelines, and more minor permanent loss of habitats associated with the construction of the PS.
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.

Objective 4: Minor positive effect - The option would utilise the existing National Rail Pumping infrastructure to pump water to the Sudbrook WTW site. Construction of the pumping stations at Sudbrook and Court Farm would take place within the existing DCWW operational sites such that these elements of the scheme would not significantly impact land/soil quality. Modifications/upgrades to the Court Farm and Sluvad WTWs would also take place within the existing operational sites. Objective 4: Minor negative effect - Excavation of the pipelines would take place on land predominantly in ALC grades 2, 3b, 4 and non-agricultural and Urban land, with some small areas within grade 3a and one small section of the pipeline would be directly adjacent to/within ALC grade 1 land. however, any soil displaced during construction/excavation of the pipeline would be reinstated following completion of the works.
Objective 5: Neutral effect - It is not expected that construction would affect water resources.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures).
Objective 7: Minor negative effect - The new pumping station at Sudbrook and a number of sections of the 22km raw water main pipeline route would be located within areas within Flood Zone 3 and could therefore be liable to flooding depending on the timing of works. Construction is not expected, however, to cause or exacerbate flooding in the area or elsewhere.
Objective 8: Moderate negative effect - The construction of the option could result in traffic congestion during the construction period (particularly on the M48, M4, A449 and A4810 (the latter three of which the pipeline would cross, however, the crossings of the M4 and A449 would utilised directional drilling, thereby minimising effects on road traffic) and the local road network in close proximity/leading to the scheme, or crossed by the pipeline routes) which, together with emissions associated with the use of plant and machinery, may have a negative effect on local air quality. However, none of the construction works would take place within an AQMA.
Objective 9: Significant negative effect - The construction of the option would require concrete, steel and plastic, with 12,984tCO2e embodied carbon. Furthermore, the construction of the option would result in additional vehicle movements (over the 2 year construction period) and would require the operation of machinery and plant, which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, the pumping station at Sudbrook and a number of sections of the 22km raw water main would be located within an area of high flood risk. In consequence, construction could be vulnerable to the effects of climate change (flooding).
Objective 11: Significant positive effect - Construction would involve a significant capital expenditure (£51.20m), resulting in a significant positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy. Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated vehicle movements (particularly on the M48, M4, A449 and A4810 (the latter three of which the pipeline would cross, however, the crossings of the M4 and A449 would utilised directional drilling, thereby minimising effects on road traffic) and the local road network in close proximity/leading to the scheme, or crossed by the pipeline routes)

Objective 12: Moderate negative effect - the route of the pipeline would cross through the Twenty Ten Golf Course at the Celtic Manor Resort, which could have a negative effect on the resort and operation of the golf course and recreational users of the facilities, however, crossing of the golf course would utilise directional drilling which should avoid the need for significant excavation of the surface of the golf course, but may still have effects on the facilities, such as vibration. Pipeline works may also cause negative effects to recreational users of Llandegfedd Reservoir (e.g. associated with the Sailing Club and Visitor ad Water sports Centre). as well as Rogiet Countryside Park and Magor Marsh Nature Reserve (both of which the pipeline route would cross), St Marys Church, Wilcrick, Penhow Autograss Club, Langstone Local Nature Reserve. The route of the proposed 22km raw water main would also cross route number 4 (in two places) of the National Cycle Network whilst the 6.5km pipeline between Court Farm and Sluvad would cross route 423. More generally, construction works may impact upon publicly accessible land and public greenspaces, and users of such spaces (e.g. walking and cycling) where the scheme crosses or it is situated in close proximity.
Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the construction of the new PS at Sudbrook and pipeline excavation which could affect residential receptors within close proximity to the works, such as at Ponthir Langstone, Underwood, Wilcrick, Magwyr/Magor, Gwndy/Undy, Rogiet, Cil-Y-Coed/Caldicot and Sudbrook as well as the scattered residential dwellings and farmsteads within the vicinity of the scheme, however, these effects would be temporary. - There may be noise/vibration disturbance and air quality impacts associated with the construction of the new pumping station at Sudbrook and pipeline excavation which could affect residential receptors within Sudbrook, southern Caldicot (e.g. West End and Gray Hill View), Rogiet and the scattered residential dwellings and farmsteads within the vicinity of the scheme.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Significant negative effect - The construction of the option would require significant amounts of raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Moderate negative effect - Within 1km of the overall scheme, there are 32 Scheduled Monuments, including 9 within 100m of the 22km pipeline works. Approximately a 50m length of the pipeline would cross the Great Bulmore Roman Settlement Scheduled Monument, however, the location at which the pipeline crosses is on the edge of the monument site, and it is anticipated that detailed routing of the pipeline at the project stage would avoid the need to traverse this site, however, there may be some temporary effects on the setting of the monument during the excavation of the pipeline route. There may also be temporary effects on the setting of other monuments in very close proximity to the works (Langstone motte and enclosure (approx. 17m from scheme); Deserted Medieval Village W of St Mary's Church (approx. 21m from the scheme); Wilcrick Hill Camp (approx. 23m from the scheme); and Sudbrook Camp and Sudbrook Chapel (approx.. 46m from the scheme)). All other Scheduled Monuments at least 75m from the scheme and may experience some effects on setting (albeit to a lesser degree). Also with 1km of the scheme are 87 Listed Buildings, including 4 within 100m of the proposed 22km raw water main, these include: Great House Farmhouse including attached range of Farm Buildings (<10m from the pipeline route); Sudbrook Pump House and Fanhouse at Sudbrook Pumping Station (28m and 45m from the end of the pipeline respectively/adjacent to the new pumping station at Sudbrook); and Cat's Ash Farmhouse (incorporating remains of St Curig's chapel) (approximately 75m from the pipeline). A further 10 Listed Buildings are within 200m of the scheme. Listed Buildings within close proximity to the scheme may experience some temporary effects on setting,

however, it is anticipated that detailed routing at the project stage would avoid physical damage to any heritage assets. Construction of the pumping station at Sudbrook would be located in close proximity to the aforementioned Scheduled Monument and Listed Buildings and construction of this element, in addition to pipeline works at this location may therefore affect the setting of these assets. There are also 4 conservation within 1km of the option: Magor (28m from the 22km pipeline); Llanhennock (130m from the pipeline); Rogiet (276 from the pipeline); and Caldicot (548m from the pipeline). However, it is considered that these are either sufficiently set back from the works (Rogiet and Caldicot) or separated by existing rail/road infrastructure (Magor and Llanhennock) such that no significant effects would be anticipated. There are also three Parks and Gardens within 1km of the option: Pencoed Castle (594m); Llanwern Park (600m); and, Glen Usk (843m). It is not anticipated there would be any significant effects on these sites, due to there relative distance between the sites and construction works. Blaenavon Industrial Landscape is the closest World Heritage Site to the construction works, however, this is located approximately 8.3km from the option and no effects on this feature are therefore expected.
Objective 17: Minor negative effect - The option is not located in close proximity to any statutory designated landscapes. The closest statutory designated Landscapes are the Brecon Beacons National Park (approx. 2.8km from the option) and the Wye Valley AONB (Approximately 4.2km from the option). However, it is not anticipated that there would be any significant effects on these landscapes due to the distance between the works and these landscapes. A section of the pipeline would, however, be located within the Gwent Levels Historic Landscape, and therefore construction of the pipeline may have a negative effect on the setting of this non-statutory landscape. More generally, much of the construction works would be located within greenfield land and construction works may adversely impact the amenity of the surrounding rural greenfield setting.
Operation
Objective 1: Moderate negative uncertain effect -The Great Spring is a conduit in a limestone aquifer that was intersected during the construction of the Severn rail tunnel; water from the spring still enters the tunnel and is pumped to Sudbrook for direct discharge into the estuary. Discharges from the Great Spring fluctuate seasonally, varying from around 80 – 90Ml/d in winter to around 40Ml/d in summer. The option would transfer a proportion of this water to Court Farm WTW for treatment and distribution. The abstraction of groundwater is located close to the Severn Estuary (the Network Rail pumps abstract between 30 and 80 Ml/d as dewatering requirements of the Severn Tunnel). The option will not have any additional effects on the aquifer over the status quo (i.e. additional water will not be extracted from it), therefore any effects would be associated with the reductions in freshwater discharge at Sudbrook. The HRA concludes that given the relatively small contribution of the Great Spring to freshwater inputs to the estuary, and the high tidal flux, it is likely that the influence of the discharge on the habitats and species of the estuary is largely local to the Sudbook outfall only. The HRA notes that with regard to the habitats of the Severn Estuary/ Môr Hafren SAC and Severn Estuary Ramsar, and supporting habitats for the SPA species, the local distribution of habitats near the outfall is not known and it is likely that some may have developed or adapted to the freshwater input from this location; however, it is evident that there is a short mud foreshore with localised patches of saltmarsh, and that the immediate vicinity is heavily modified by retaining walls for the channel, and so whilst effects would likely be considered 'significant' in HRA terms, they would not necessarily affect the integrity of these sites. The HRA also notes that with regard to the Severn Estuary SPA species, previous work at other estuary sites in the UK has suggested that there may be a relationship between certain waterbirds and intertidal freshwater flows or channels although there is little evidence to suggest this is related to flow volumes per se. The HRA notes that the diadromous fish species of the Severn (and hence the River Wye SAC and River Usk SAC) may periodically use the areas of the estuary near the outfall, although it would seem unlikely that this is fundamental to the integrity of these species

populations for the reasons noted. The HRA concludes that consequently there would appear to be a reasonable prospect of a 'no adverse effects' conclusion following appropriate assessment, but that the data requirements may be challenging in the timescales of the WRMP (hence a moderate negative uncertain effect).
Objective 2: Moderate positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Moderate negative effect - The WFD assessment highlights that the Great Spring has Angiosperms present and as such the transfer of water from the Great Spring to Llandegfedd Reservoir could potentially lead to the transfer of INNS into the reservoir.
Objective 4: Neutral effect - There would be no operational effects on soils/geodiversity/land use.
Objective 5: Minor positive uncertain effect - This option would include the abstraction of groundwater from the Great Spring, which is located in the southeast corner of a large groundwater waterbody. The abstraction of up to 30Ml/d could have some minor localised effects by reducing the volume of water entering the local groundwater system, although this is expected to be controlled with the use of an abstraction licence. The WFD assessment concludes that the abstraction of 30 Ml/d is unlikely to have an adverse effect on the hydrological regime of the Severn Estuary or result in significant changes to high and low flows and concludes that in terms of effects on the Severn (Lower) the option would be WFD compliant. In terms of the effect on water quantity in Llandegfedd Reservoir the WFD assessment notes that it anticipated that the volume of water transferred to the reservoir would be balanced by water abstracted for supply, so changes to the overall quantity of water in the reservoir and the hydrological regime would be minimal. Any additional water at Court Farm beyond that transferred to Llandegfedd Reservoir would reduce the requirement for other sources to supply Court Farm. This has the potential for a positive effect on river flows and groundwater levels elsewhere, however, the significance of any effect in this regard is currently uncertain.
Objective 6: Moderate negative effect - The WFD assessment concludes that in terms of the effect on the Severn Estuary (lower) waterbody, as the volume of abstraction will be relatively small compared with flows in the estuary, impacts on water quality will be negligible and the effect of the option on the waterbody would be WFD compliant. However, the WFD assessment concludes that in terms of the effects on Llandegfedd Reservoir, the option would be WFD non-compliant (medium confidence) due to the fact that in terms of phys-chem status the Great Spring has Angiosperms, and has a 'fail' chemical status, due to Mercury and its compounds and BDPE. As such changes to the water quality of the reservoir and transfer of INNS are possible as a result of the transfer, which could impact on the ecological status of the reservoir water body. Furthermore, the WFD assessment highlights that the transfer from the Great Spring could potentially be of a different physio-chemical composition (e.g. TP, BOD, DO, pH, temperature), potentially causing a deterioration in status of the reservoir. Additionally, the WFD assessment highlights that the option has the potential to introduce new priority or priority hazardous chemicals to the reservoir from the source of raw water.
Objective 7: Minor negative effect - The new pumping station at Sudbrook would be located in an area of Flood Zone 3 and therefore could be liable to flooding during operation. However, it is anticipated that existing on site mitigation would be present at the Sudbrook WTW site where the PS would be constructed, such that risk would be minimised.

Objective 8: Neutral effect - There would be no operational effects on air quality given the low volume of expected traffic associated with the extended WTW and new pumping infrastructure.
Objective 9: Significant negative effect - Operational energy demand and chemical dosing would generate 3,282tonnes CO2e/a. This has been assessed as having a significant negative effect on this objective.
Objective 10: Minor negative effect - The pumping station at Sudbrook would be located in an area prone to flooding (Flood Zone 3) and therefore would be at risk to the effects of climate change (flooding) during operation. Objective 10: Significant positive effect - The increased capacity (30Ml/d) provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Significant positive effect - The additional 30Ml/d capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a significant positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect -The operation of the option is not expected to impact upon opportunities for recreation or tourism.
Objective 13: Significant positive effect- The scheme would not adversely affect human health due to increased noise, nuisance or disruption. The increased capacity of up to 30Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Significant positive effect - This option is not a leakage reduction or water efficiency option, however it does efficiently utilise abstraction of groundwater from the Great Spring which is already undertaken for dewatering requirements of the Severn Tunnel. The option would increase the resilience of water resources within the DCWW supply area, though the provision of an extra 30Ml/d of deployable output.
Objective 15: Significant negative effect - The operation of the option would require the ongoing use of chemicals to treat water as well as significant ongoing energy use to pump and treat water which would likely require the use of fossil fuels for energy.
Objective 16: Minor negative effect - The option would result in the construction of a new pumping station at Sudbrook (assessed under the construction phase). This would introduce new permanent above ground infrastructure which may result in a minor effect on the setting of the Scheduled Monument and Listed Buildings at Sudbrook (set out in the assessment of the construction phase). However, it is noted that the new PS would be constructed at the existing DCWW Sudbrook WTW site, so would be in keeping with the character/use of the existing site, and as such any effects would likely be minor.
Objective 17: Neutral effect - No significant effects on landscape are expected during the operational phase of this option.

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW007
Option Name	Talybont Raising
Water company	DCWW
Option Description	This scheme would raise Talybont Reservoir by 0.5m to increase storage capacity. The depth-volume curve indicates that capacity would be increased by about 630 Ml. Capacity gained from raising would be abstracted for treatment at Talybont WTW. The scheme assumes that any upgrades necessary at the WTW, or in the network, are dealt with elsewhere. The main scheme elements would be: strip existing crest; raise crest and core by 0.5m; reinstate wave wall, road etc; raise overflow cill by 0.5 m; reinforcement of Recorder Building to make lower walls water-retaining; construct RC retaining wall to retain water where earthworks not possible (at Recorder Building); and, works to footbridge: raise, reinforce and waterproof.
Yield	630Ml capacity increase
WRZ	SEWCUS

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
SEW007	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**

Construction
Objective 1: Moderate negative effect - Within 10km of the proposed scheme there are: four SACs, including the River Usk/Afon Wysg (SAC/SSSI) which is immediately downstream of the reservoir (all other SACs are over 2.6km from the option); 19 SSSIs (the closest of which is the aforementioned Afon Wysg (Isafonydd) / River Usk (Tributaries) (all other SSSIs are over 1.9km from the option); one NNR (Craif Y Cilau, 8.5km from the option); five LNRs, including the Talybont Reservoir LNR which covers the whole of the reservoir itself (all other LNRS are over 7.9km from the option); and, a number of areas of ancient woodlands including immediately adjacent to the reservoir. The Talybont reservoir sits at the head of the Caerfanell stream, which forms part of the River Usk / Afon Wysg SAC and which will be vulnerable to construction effects (e.g. runoff, spillages and suspended sediment-related effects such as smothering or reduction in light on fish, macrophytes/phytobenthos and invertebrates both in the reservoir and downstream), however, the HRA highlights that adverse effects on the SAC can almost certainly be prevented with appropriate scheme-level design and avoidance / mitigation measures - e.g. timing works according to salmon migration and spawning. The HRA also highlights that lesser horseshoe bats (associated with Usk Bat Sites/ Safleoedd Ystlumod Wysg SAC) may also be vulnerable to construction-stage environmental changes, although these will be manageable at the scheme level. Heavy equipment would be required on site causing potential disturbance to species. Construction would result in some land take. Whilst the actual area of land built on would be small, there would be a need for construction compounds, material storage, welfare facilities etc. which could cause localised disturbance to habitats and species, particularly in the Talybont Reservoir LNR and surrounding ancient woodland and more generally non - designated habitats and species in the vicinity of the works.
Objective 2: Moderate negative effect. The BNG assessment concludes that there would be a moderate negative effect on biodiversity net loss, associated with the permanent loss of habitats resulting from raising the reservoir.
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Neutral effect - Whilst works could have temporary impacts on land use and soils, given the nature of the option (i.e. raising/reinforcing existing infrastructure and construction of retaining walls on existing site), no significant negative effects are anticipated in relation to geology and soils during the construction phase. Objective 4: Minor positive effect - The option would be constructed on the existing reservoir site, which is considered to have a positive effect on objective 4.
Objective 5: Neutral effect - Given the nature of the option, no effects are anticipated in relation to water quantity during the construction phase.
Objective 6: Neutral effect - There is the potential for the disturbance of contaminated sediments during construction of the new weir crest, in addition to direct effects on water quality as result of accidental spillage or leakage of PAHs. Appropriate precautions would need be taken during the construction

to protect the quality of the water environment and it is anticipated that standard best practice construction measures would manage these effects such that there would be no overall change in waterbody status with any effects likely to be temporary and localised.
Objective 7: Significant negative effect - The reservoir lies within Flood Zone 3, therefore construction works at the reservoir could be liable to flooding, depending on the timing of works.
Objective 8: Neutral effect - Works are unlikely to significantly affect the local transport network, given the location and nature of the scheme and the short term and temporary (0.5 years) nature of construction works. Effects on air quality are therefore expected to be negligible. The option is not located within an AQMA.
Objective 9: Moderate negative effect - Construction of the option would require the use of raw materials with a moderate amount of embodied carbon (1,208.3tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Neutral effect - The scheme lies within Flood Zone 3, therefore could be liable to the effects of climate change (flooding), depending on the timing of works. However, whilst is an above ground scheme, the reservoir can be drawn down to provide a buffer against storm events, and a neutral effect has therefore been identified.
Objective 11: Minor positive effect - The scheme would result in a minor increase in construction jobs associated with the £2.65m capital spend during the 0.5-year construction period. Works are unlikely to affect the local transport network, given the location and nature of the scheme.
Objective 12: Minor negative effect - Access to Danywenallt YHA would be restricted or prevented during construction, which may affect a limited number of visitors to the area and recreational activity. More generally, construction of the option may impact upon recreational activities such as walking and cycling near and around the reservoir (effects of construction noise and dust and construction traffic).
Objective 13: Neutral effect - There may be noise/vibration disturbance and air quality impacts associated with the construction of the option on the scattered residential dwellings and farmsteads within the vicinity of the scheme, however, due to the rural location of the scheme and minimal number of such receptors in the vicinity of the works, any effects in this regard are anticipated to be negligible.
Objective 14: Neutral effect - the construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The construction of the option would require concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is also the opportunity for the reuse of masonry materials as part of construction, or re-use/recycling of materials such as steel and plastic, however, the significance of this effect is currently uncertain.
Objective 16: Minor negative effect - There is one scheduled monument within 1km of the scheme (Tor y Foel Deserted Rural Settlement, approximately 880m from the scheme), there are four additional Scheduled Monuments between 1-1.4km from the option). Additionally, there are nine listed buildings within 1km of the option, the closest of which is a Group of 7 chest tombs in Aberclydach chapel cemetery (approximately 760m from the scheme). Due to the relative distance between these features and the construction works, no significant effects on their setting or integrity are expected as a result of construction works, however, the aforementioned listed buildings are located along roads leading to the reservoir site that may therefore be used by

construction traffic, thereby leading to a minor temporary negative effect on their setting.
Objective 17: Minor negative effect - The reservoir lies in the Brecon Beacons National Park, and the Brecon Beacons and Black Mountains Landscape Character Area Construction may have short term, temporary negative effects on local landscape features and other receptors in the vicinity of the reservoir (including walkers and visitors to the reservoir) however, adverse effects would be over a short timescale.
Operation
Objective 1: Moderate negative uncertain effect - As noted above, the scheme would raise the level of the Talybont Reservoir by 0.5m to increase storage capacity. The reservoir has areas of ancient woodland up to the water's edge, such that there may be a small loss of ancient woodland habitat when the reservoir is raised. It is assumed that the dam raising will reduce overtopping events and hence spills to the Caerfanell, but that this will be mitigated by corresponding alterations to the compensation release regime; the HRA notes that if this is pursued as a preferred option it will be necessary to quantify and / or confirm this arrangement, this hence the overall HRA risk is categorised as 'uncertain'). The HRA highlights that if flows in the Usk remain essentially unchanged then effects on the Severn Estuary sites would not be expected. The HRA also notes that lesser Horseshoe bats associated with the Usk Bat Sites/ Safleoedd Ystlumod Wysg SAC may periodically use habitats near the reservoir and so it will be necessary to estimate the effects of the raised water levels on the marginal habitats of the reservoir (including areas of woodland), although based on mapping contours is unlikely that substantial areas of terrestrial habitat will be lost, and it is unlikely that the habitats of the reservoir margins will be a core or significant habitat resource for this species of bat (additional investigation of this aspect may be required but it seems likely that the risks of inclusion will be small). Objective 1: Minor positive uncertain effect - As noted above, the reservoir itself is a designated LNR. This scheme would see the surface area/level of the reservoir increased in size which may have beneficial effects for the LNR, as it would effectively increase the size of the lake habitat associated with the LNR. The future operating parameters for the reservoir are uncertain, but it is likely that the current flow regime will be maintained and the additional water should allow greater flexibility in operation, including release of compensation flows. The HRA identifies that this may increase the resilience of the Usk. The dam is thought to act as a barrier to some fish species, and if the option could include a modification to permit fish/eels to pass as an additional measure.
Objective 2: Moderate positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - The option is for an increase in the storage capacity of Talybont reservoir with a change to existing infrastructure, but with no change to pathways for INNS release.
Objective 4: Minor negative effect - Once operational, the option would result in a loss of land around the entire reservoir which has been identified as a minor negative effect with respect to geology and soils. However, it is noted that this land would be either non- agricultural or poor/very poor grade agricultural ground.

Objective 5: Moderate negative effect - The WFD assessment highlights that raising the reservoir level and capacity could change the hydrological regime and morphological conditions within the reservoir, and water edge conditions with resulting impacts on ecological populations, particularly shoreline habitats. The WFD also notes that the raised levels/increased flooded areas around the reservoir perimeter could lead to impacts on benthic communities and could potentially lead to a deterioration in plant communities. The WFD assessment also highlights that in terms of effects on the Caerfanell downstream of the reservoir, raising the reservoir embankment crest and overflow sill will cause a short term decrease in overtopping while the reservoir fills to its new capacity and that longer term there would be a change to the pattern of overtopping which would reflect the new storage capacity, but it is difficult to anticipate what this would be without further evidence. The WFD notes that it is assumed that there would be no changes to compensation released from the reservoir, but the ALS indicates that there is no water available within the catchment across the flow regime, so the change in overtopping regime may impact high flows in the river, which in turn could impact fish, invertebrate and macrophyte/phytobenthos populations.
Objective 6: Moderate negative effect - The WFD assessment concludes that increasing the volume, depth and residency time of water in the Talybont reservoir could result in changes to physico-chemical quality elements (e.g. TP, BOD, DO, pH, temperature) in the reservoir, as well as the downstream waterbody (the Caerfanell) potentially causing a deterioration in status. However, the option would not introduce new priority or priority hazardous chemicals to the reservoir or the Caerfanell downstream of the reservoir. Operation of the option is unlikely to have an impact on the chemical status of the reservoir and would only affect high flows in the Caerfanell, so would not have an impact on dilution.
Objective 7: Moderate positive effect - The scheme lies within Flood Zone 3 and is an above ground scheme that could help alleviate flooding in the catchment. The alleviation of flooding may increase resilience to the effects of climate change, including more frequent and severe rainfall events and increases in flash flooding.
Objective 8: Neutral effect - no operational effects on air quality are anticipated.
Objective 9: Neutral effect - Operational energy usage is currently unknown but is expected to be negligible. The operation of the option is not expected to result in any discernible carbon emissions.
Objective 10: Moderate positive effect - As noted above, the scheme lies within Flood Zone 3 and is an above ground scheme that could help alleviate flooding in the catchment. The alleviation of flooding may increase resilience to the effects of climate change, including more frequent and severe rainfall events and increases in flash flooding. The scheme would also help to ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Minor positive effect - The additional capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect -The operation of the option is not expected to impact upon opportunities for recreation or tourism

Objective 13: Minor positive effect- The scheme would not adversely affect human health due to increased noise, nuisance or disruption . The increased capacity would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the DCWW supply area, though the provision of extra deployable output.
Objective 15: Neutral effect - The operation of the option would not have any effect on waste and resource use.
Objective 16: Neutral effect - Given the location of the scheme in relation to heritage features, no effects are anticipated during the operational phase of the option in relation to cultural heritage.
Objective 17: Minor negative effect - Earthworks, concreting and masonry walling to raise the reservoir has been identified as having a minor negative effect with respect to landscape, as it will introduce additional above ground infrastructure into the Brecon Beacons National Park, however, would be in keeping with the character of the existing reservoir infrastructure, hence the effect has been assessed a minor negative.

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW009
Option Name	Utilisation of Grwyne as Usk compensating reservoir
Water company	DCWW
Option Description	Grwyne Reservoir previously supplied water to the Abertillery area. The reservoir has been mothballed since 2004. This option would release 10 Ml/d of water into the Usk on a put & take arrangement for subsequent abstraction at Prioress Mill. Raw water would be transferred, around sensitive fishing grounds, to the confluence with the Grwyne Fechan using part of the existing 16" outlet main and a 4.6 km extension. The existing 16" main is currently used as a distribution main and would be replaced with a smaller new supply pipe. The elements of this scheme would be: 4.6 km of new 450mm OD HDPE extension of the existing raw water main to transfer water to the confluence of the Grwyne Fechan; a new 12.1km 80mm DI potable water supply to properties in the Grwyne Valley, requiring 1 No. 10bar Booster station; renovation of outlet penstocks at the Grwyne Reservoir; discharge headwall and stilling basin; and, 4 No. Pressure reducing/maintaining valves along the existing and new pipeline with telemetry.
Yield	10Ml/d
WRZ	SEWCUS

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
SEW009	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

	Operation (positive)	**0**	**+++**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**++**	**++**	**0**	**++**	**++**	**0**	**0**	**0**

Construction
Objective 1: Moderate negative uncertain effect - There are 6 SACs within 10km of the option including the River Usk/Afon Wysg SAC, which covers both the Grwyne Fawr and Grwyne Fechan (both of which are tributaries of the Usk and also part of the Afon Wysg (Isafonydd)/River Usk (Tributaries) SSSI designation) and the River Usk/Afon Wysg (also an SSSI (Upper Usk)/Afon Wysg (Wysg Uchaf) SSSI)) which the Grwyne Fawr and Grwyn Fechan flow in to. Both the new raw water main and the new supply pipeline would cross/be routed within close proximity to the Grwyne Fawr and the raw water main would also be constructed near to the Grwyne Fechan (the downstream end of the pipeline would be at the confluence of the Grwyne Fawr and Grwyne Fechan). As such there is potential for negative effects on the habitats in the SAC/SSSIs (e.g. from dust, contaminated soil or chemicals from plant being introduced to the waterbody with associated effects on water quality), however, it is anticipated that construction best practise (such as dust suppression, soil containment and emergency response procedures) would mitigate these effects. The HRA highlights that adverse effects on the River Usk/ Afon Wysg SAC would probably be avoidable with standard measures (although these are likely to be complex and expensive to implement) and construction of an outfall (etc.) that will directly affect the water course. The Coed Y Cerrig SAC/SSSI is located approximately 230m from both of the new pipelines, and there construction works may lead to negative effects on the SAC/SSSI such as noise/vibration and air quality/dust issues, however, the HRA notes that the features of the SAC would not be exposed to construction or operation. All other SACs are located over 1.4km from the overall scheme and therefore these sites and their features are unlikely to experience any significant negative effects from construction, with the possible exception of lesser horseshoe bats associated with Usk Bat Sites/ Safleoedd Ystlumod Wysg SAC, which the HRA notes are likely to periodically use habitats close to the pipeline construction areas for foraging and dispersal (although the HRA concludes that potential effects would almost certainly be avoidable at the project level). Within 10km of the option there are also 35 SSSIs, including the Black Mountains SSSI, which the reservoir and a section of the new supply pipeline would be located within, and the aforementioned Afon Wysg (Isafonydd)/River Usk (Tributaries) SSSI. Three other SSSIs would be located within 1km (Caeau Ffern (approximately 140m from the new supply pipeline; Coed Y Cerrig (located approximately 230m from both pipelines (also an SAC as previously described and partially covered by LNR and NNR designations)); and, Coed Ynys Faen (located approximately 360m from the downstream end of the raw water main (at the confluence of the Grwyne Fawr and Grwyne Fechan)). Due to the proximity of these sites to the construction works/ construction works taking place within/crossing these sites, these sites may experience negative effects such as noise/vibration and air quality/dust/ effects on water quality. All of the other SSSIs are located at least 1.5km from the works and therefore no significant effects are anticipated, however, the aforementioned River Usk (Upper Usk)/Afon Wysg (Wysg Uchaf) SSSI is approximately 3.2km downstream of confluence of the Grwyne Fawr and Grwyne Fechan, therefore any effects on these rivers (previously described) may cause effects on the Usk downstream, however, it is assumed that construction best practice /mitigation should mitigate these effect. There are also 3 LNRs within 10km of the option; the closest of which is Coed-Y-Cerrig (also an SAC/SSSI/NNR as previously described; and, 3 NNRs, the closest of which is the aforementioned Coed-Y-Cerrig. All other LNRs and NNRs are located over 9.2km and 6.3km (respectively) from construction works and therefore are not anticipated to experience any significant effects. There are a number of areas of ancient woodland within 10km of the option including a number of areas which the pipelines would cross or be routed in very close proximity to,

which could potentially lead to loss/disturbance of such areas. More generally, construction would take place in a rural setting and may have negative effects on non-designated habitats and species proximate to construction works
Objective 2: Significant negative effect - The BNG assessment concluded a significant negative effect due to the temporary and more minor permanent loss of habitats associated with the construction of the pipeline.
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Neutral effect - This option is not expected to require any land take as works would be undertaken on an existing reservoir and along an existing road route, with any soil displaced during excavation of pipelines being reinstated following completion of the construction of the pipelines. In consequence, effects on geology and soils have been identified as neutral.
Objective 5: Neutral effect - No effects on water quantity are anticipated during the construction phase of the option.
Objective 6: Minor negative effect - There is the potential for effects on the WFD status, particularly where the trenching for the pipelines runs close watercourses and where drilling under water courses would be required for watercourse crossings potentially resulting in suspended sediment increase and the potential for, dust, contaminated soil or chemicals from plant to be introduced to the waterbody. It is anticipated that standard best practice construction measures (such as dust suppression, soil containment and emergency response procedures) would mitigate these effects; however, in the short term, a potential negative effect has been identified on water quality. At the reservoir, the refurbishment/renovation could lead to some minor water quality effects from the release of suspended solids into the reservoir. However, if the works are within the current footprint of the structure and only require minor works then no effect on water quality of the reservoir itself would be expected. Overall the potential for localised and temporary effects on water quality as a result of construction has been identified as a minor negative effect with respect to water quality.
Objective 7: Minor negative effect - The reservoir and a number of sections of the pipeline would be located within/adjacent to areas of Flood Zone 3/2 associated with the reservoir (works at the reservoir) and Grwyn Fawr/Grwyn Fechan (pipeline works). Construction may be liable to flooding depending on the timing of work. It is not anticipated, however, that construction would result in, or exacerbate, flooding elsewhere during the construction period.
Objective 8: Minor negative effect - The option is not located within any AQMAs. It is not expected that there would be a significant amount of construction traffic during the 2 year construction period, however, there may be minor temporary impact upon local roads used to access the construction works, due to the small scale of roads that would be used to access the construction works, which may have a minor impact on local air quality. However, it is noted that there are a very limited number of residential receptors in close proximity to the scheme.
Objective 9: Moderate negative effect - Construction of the option would require the use of raw materials with a moderate amount of embodied carbon (1,557 tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Minor negative effect - It is not anticipated that construction of the option would have any effect on climate resilient, however, as noted above, the reservoir and sections of the pipeline are located within areas of Flood Zone 3/2. In consequence, construction work would be vulnerable to the effects of climate change (increased risk of flooding).

Objective 11: Moderate positive effect - Construction would involve a moderate capital expenditure (£8,16) which could have a moderate positive effect on the local economy. The construction period would be 2 years long, which may provide the potential for a number of local businesses and SMEs to have sustained involvement and opportunities. Individual spend by contractors and workers could also provide some local benefit to business. Objective 11: Minor/Moderate/Major positive uncertain effect - due to....
Objective 12: Minor negative effect - The option is not expected to significantly affect opportunities for recreation and tourism during the construction period, although works could result in temporary disruption (noise/air quality) to users of local open space/footpaths including along the Grwyne Fawr Valley and visitors to the Brecon Beacons National Park (the entire scheme would be located within the National Park).
Objective 13: Minor negative effect - Construction activities and HGV movements could affect the limited number of residential receptors along the pipeline route; however, any impacts (e.g. noise/air quality impacts) would be temporary in nature and would not continue after the construction phase has been completed.
Objective 14: Neutral effect - the construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Moderate negative effect - The construction of the new pipelines (and associated infrastructure), booster station and renovations to the reservoir would require raw materials, such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Minor negative effect -There are 5 scheduled monuments within 1km of the scheme, however the closest of these is approximately 430m from the pipeline works (Llwyn y Brain Deserted Rural Settlement) and it is not anticipated that it would maintain views of the works, therefore no effects on the setting of this site would be expected. All other Scheduled monuments are set back further from the works and no effects are anticipated. There are 65 listed buildings within 1km of the scheme, including 11 within 100m, the closest of which is the grade II Pont Newydd Bridge, which the route of the pipeline crosses, however it is anticipated that the pipeline would be routed under the river at this point, instead of crossing the bridge itself, in order to avoid damage to the bridge, however, it is anticipated that construction works may have a temporary effect on the setting of the bridge, as well as the setting of other listed buildings within very close proximity to the works: Telephone Call-box at Forest Coalpit (<10m from the pipeline route); Pwll-y-hwyaid Farmhouse (approximately 15m from the works); Dyffryn (approximately 30m from the pipeline route); and, Y Coed including attached former byre (approximately 30m from the pipeline route. The remaining 6 listed buildings within 100m of the scheme are all over 50m away from the works, so may to a lesser degree experience some negative effects on setting. Objective 16: Minor/Moderate/Major positive uncertain effect - due to....
Objective 17: Minor negative effect - The option would be located within the Brecon Beacons National Park, however, works at the reservoir would be located within the existing operational footprint of the reservoir site and pipeline works would follow existing roads, such that impacts on the designated landscape, would be minimised, however, there would be a temporary negative effect on the setting of the National Park from construction works and

traffic. The construction of the booster pumping station would result in the introduction of new above ground infrastructure, however, the scale of this is element is anticipated to be minor.
Operation
Objective 1: Moderate negative uncertain effect - Once operational, there is the potential for negative effects on biodiversity. There is a historical problem with algal blooms in the Grwyne Reservoir, and abstracting water at times of low levels could exacerbate any water quality issues and affect local ecology of the reservoir (not part of the Black Mountains SSSI). The 'put and take' abstraction from the river should take place during times of high flow and avoid sensitive fishing grounds to mitigate any significant impacts. The HRA highlights that the option would directly affect the River Usk/ Afon Wysg SAC through operation and whilst the scheme has been designed to avoid the more sensitive reaches of the river that are used for spawning, and may have some benefits re. supporting flows in the river, it would nevertheless involve the discharge of up to 10Ml/d into the Grynwe. The average flow at the point of discharge is around 180 Ml/d, based on CEH data, and so this addition would not be entirely negligible and it will be necessary to understand possible effects on local geomorphology and physio-chemical parameters (e.g. temperature), therefore additional investigation would be required.
Objective 2: Significant positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect- Whilst the option would release water into the Usk for abstraction at Prioress Mill, there would be no new pathway for INNS transfer, as the compensation flow from the reservoir already feeds into the Grwyne Fawr, which subsequently feeds into the Usk, hence no new pathways.
Objective 4: Neutral effect - There would be no operational effects on land use/soils.
Objective 5: Moderate negative effect – The WFD assessment highlights that with regard to the Grwyne Fawr Reservoir, the ALS indicates that there is restricted water available for licensing across the entire flow regime, noting that the proposal is not for daily abstraction but for the use of a 'put and take' operation. It is assumed that this would be mainly used during times of low flow on the River Usk and hence may coincide with lower water levels in the reservoir, and the WFD assessment highlights that this would increase drawdown in a reservoir that has been used to a relatively natural regime in recent years since it has not been used operationally. Such a change could have an impact on biological communities. It is assumed that compensation releases to the watercourse immediately downstream of the reservoir (Grwyne Fawr) will be maintained, however, abstraction from the reservoir may result in delayed reservoir refill and resulting spill, therefore having potential impacts on high flow conditions in the Grwyne Fawr. The WFD highlights that the option would result in an increase in flows in the waterbody that the pipeline will discharge into (Grwyne Fawr - conf Grwyne-Fechan to conf River Usk) and that there could also be some resulting change to the high flow balance. This increase in flow, particularly at low flows, could affect flow regimes with potential impacts on water quality composition and ecology. The option could also lead to deterioration and/or impediments to reaching good status in terms of fish. These impacts could be positive, providing extra flow during dry periods, but further detail and mitigation may be needed. However, the WFD highlights that the minor change to flows in the River Usk downstream of the Grwyne Fawr is unlikely to have an adverse impact on biology, water quality or chemical dilution in the Usk.

Objective 6: Moderate negative effect - The WFD assessment highlights that there is a historical problem with algal blooms in this reservoir, therefore abstracting water at times of low levels could exacerbate any water quality issues, which could impact on WFD status. The WFD also highlights that new abstraction from the reservoir, particularly at times of low levels, could result in changes to physico-chemical quality elements in the reservoir (e.g. TP, BOD, DO, pH, temperature) due to reduced dilution, potentially causing a deterioration in status. Furthermore, the WFD notes that any decrease in flow in the Grwyne Fawr downstream of the reservoir could result in changes to physico-chemical quality elements (e.g. P, BOD, DO, pH, temperature), potentially causing a change in status. The WFD also notes that lower flows could result in a minor reduction in dilution of chemicals already present in the beck, and potentially further deterioration in status. However, the WFD does note that passing the sensitive fishing areas located on this watercourse (by pipeline) will mitigate any potential changes in water chemistry/quality due to reservoir releases. Furthermore, the WFD notes that the minor change to flows in the River Usk downstream of the Grwyne Fawr is unlikely to have an adverse impact on biology, water quality or dilution of chemicals in the Usk.
Objective 7: Minor negative effect - The new/renovated above ground infrastructure at the reservoir may be at risk of flooding during operation, however, it is not anticipated that the option would cause or exacerbate flooding elsewhere.
Objective 8: Neutral effect - no operational effects on air quality are anticipated.
Objective 9: Neutral effect - Operational energy demand associated with pumping infrastructure would result in 7.3tCO2e/a which in line with the definitions of significance is considered to be a neutral effect on this objective.
Objective 10: Moderate positive effect - The increased capacity (10Ml/d) provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11:Moderate positive effect - The additional 10Ml/d capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a moderate positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect -The operation of the option is not expected to impact upon opportunities for recreation or tourism
Objective 13: Moderate positive effect- The scheme would not adversely affect human health due to increased noise, nuisance or disruption. The increased capacity of up to 10Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Moderate positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the supply area, though the provision of an extra 10Ml/d deployable output.
Objective 15: Neutral effect - The operation of this option would not involve additional infrastructure or resources and would require only minor energy usage, therefore the effect on this objective has been assessed as neutral.

Objective 16: Neutral effect - The operation of the option would not have any effect on cultural heritage.
Objective 17: Neutral effect - The operation of the option would not have any effect on the landscape of the National Park, beyond the introduction of the new above ground infrastructure (booster pumping station), assessed during the construction phase.

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW022
Option Name	Ponthir and Wentwood
Water company	DCWW
Option Description	30 MLD final effluent from Ponthir WwTW to be treated to drinking water quality in a new reverse osmosis plant at Court Farm. This will be built on DCWW owned land in the field to the west of the WTW. The treatment process will include DAF and sand filtration as pre-treatment for reverse osmosis to produce 30 Ml/d of treated water. It will be combined with 7Ml/d water from the newly reinstated Wentwood Reservoir. The main scheme elements would be: an extension to Court Farm WTW to treat approximately 37Ml/d (DAF, sand filtration, Reverse Osmosis and Clean Water Tank) and provide 30Ml/d of treated water; 1 pumpstation at Ponthir to transfer final effluent to Court Farm; pumps to get water through new WTWs; 1200m of 800mm diameter pipeline from Ponthir to the new treatment facilities; a new pumping station at Wentwood and pumps; and 10.9km of 450mm diameter rising main to deliver up to 7Ml/d of raw water from Wentwood to Llantrisant pumping station. The existing pipeline running from Llantrisant pumping station to Court Farm Raw Water reservoir will be utilised. Modifications will be made to upgrade the Llantrisant RWPS and to feed the Wentwood raw water source into it.
Yield	37Ml/d
WRZ	SEWCUS

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
SEW022	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
	Operation (positive)	0	++	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0

Construction

Objective 1: Moderate negative effect - Within 10km of the works at Court Farm WTW, the new PS at Ponthir and the new pipeline connection between Ponthir and Court Farm WTW, there are 2 SACs, the closest of which is the River Usk/Afon Wysg (also designated as a SSSI), approximately 1.8km from the works, with the other being the Severn Estuary (approximately 8.7km from the works), which also designated as a Ramsar, SPA and SSSI (and the only Ramsar/SPA within 10km of the pipeline works). Furthermore, within 10km of the new pumping station at Wentwood and the 10.9km raw water main there are: 6 SACs (the closest of which being the River Usk/ Afon Wysg SAC/SSSI which is approximately 80m from the existing Llantrisant pumping station, with all other SACs being situated at least 3.7km from the works); 1 SPA and 1 Ramsar (Severn Estuary SPA/SAC/Ramsar/SSSI, approximately 6.9km from the pipeline works/new PS). Furthermore Ponthir WwTW is approximately 3.5km upstream of the confluence between the Lwyd and the River Usk SSSI and SAC and approximately 18km from the River Usk SAC, Severn Estuary SAC, SPA and Ramsar.

As mentioned above, the existing Llantrisant pumping station lies adjacent to the River Usk/ Afon Wysg SAC and River Usk (Lower Usk)/Afon Wysg (Wysg Isaf) SSSI. The construction of the new water main from the Wentwood reservoir to the Llantrisant pumping station and in particular its point of entry to the pumping station will occur adjacent to the designated site. The construction works have the potential for localised effects on the designated site arising from disturbance and limited dust and sediment deposition, however, the HRA states that effects are unlikely. Lesser and greater horseshoe bats associated with Wye Valley and Forest of Dean Bat Sites/ Safleoedd Ystlumod Dyffryn Gwy a Fforest y Ddena SAC (approximately 3.7km from the works) are also potentially vulnerable to construction works, however, the HRA states that effects should be easily avoidable with normal measures and more generally the HRA concludes that the HRA risk to other international sites during construction is negligible as there would be not effect or clearly no likely significant effects alone (e.g. no impact pathways; features not sensitive; etc.).

Within 10km of the works at Court Farm WTW, the new PS at Ponthir and the new pipeline connection between Ponthir and Court Farm WTW, there are also 17 SSSIs, the closest of which is the aforementioned River Usk (Lower Usk)/Afon Wysg (Wysg Isaf) (1.8km from the works); 2 NNRs (both over 8.3km from the works); and, 10 LNRs, the closest of which is St. Julian's Park (approximately 2.9km from the works). Due to the distance between these sites and the proposed pipeline works/, it is not anticipated that construction would lead to any disturbance (e.g. noise, vibration, dust).

Within 10km of the new pumping station at Wentwood and the 10.9km raw water main there are also 41 SSSIs including the aforementioned River Usk SSSI and two others within 1km of the works (Golden Hill Quarry, Devauden approximately 530m from the works, and Coombe Valley Woods, approximately 970m from the works) as well as the aforementioned Severn Estuary SSSI (, with all other SSSIs being located at least 1.7km from the works); 1 NNR (Penhow Woodlands, approximately 2.2km from the works); and 1 LNR (St. Julians Park, approximately 8.8km from the works). Those sites that within close proximity to works (e.g. within 1km) may experience some minor effects (e.g. noise, dust deposition).

There are a number of areas of ancient woodland within 10km of Court Farm WTW, the new PS at Ponthir and the new pipeline connection between Ponthir and Court Farm WTW with the closest (0.75ha) being located approximately 0.5km from the Ponthir WTW and approximately 0.1km from Court Farm. Construction of the reverse osmosis plant would require agricultural land to the west of the Court Farm WTW and involve excavation for a 1.2km pipeline from Ponthir WwTW to Court Farm. Construction activities would occur within the confined rural setting of the WwtW and WTW sites which may cause minor short-term disturbance to the proximate woodland and grassland habitats. New land would be required for the pumping station at the Wentwood reservoir (within the existing Wentwood reservoir site and adjacent to existing buildings on site), which in addition to disturbance of local wildlife, may have a minor negative effect on biodiversity due to the permanent loss of habitat. The pipeline Wentwood to Llantrisant pipeline would also cross through 4 areas of Ancient Woodland, with a further 14 areas of Ancient Woodland being within 100m of the PS/pipeline works (a large section of the pipeline would be routed around Wentwood Forest, which is the largest area of Ancient Woodland in Wales). Construction of the pipeline may therefore result in the loss/disturbance to these areas. Additionally, some sections of the pipeline route pass through open fields which may result in temporary disturbance to ecology. The option would also require crossings of watercourses which also introduces risks to ecology through increased suspended sediment and contamination. However, with appropriate construction safeguards (such as dust suppression, spill containment and emergency response procedures) and timing of works to avoid sensitive times of the year, overall effects should be temporary and limited.
Objective 2: Moderate negative effect. The BNG assessment concludes that there would be a moderate negative effect during the construction period, largely associated with the temporary and permanent loss of habitats associated with the excavation of the pipeline, and more minor permanent loss of habitats associated with the construction of the extension to the WTW.
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Minor positive effect - Works on the Ponthir WwTW would be contained within an existing operational site such that new ancillary infrastructure should not significantly impact land/soil quality. Furthermore, the new pumping station at Wentwood Reservoir would be constructed within the existing Wentwood reservoir site, adjacent to existing WTW buildings onsite (offline). Objective 4: Minor negative effect - The construction of the reverse osmosis plant in the field adjacent to the Court Farm WTW and the Ponthir to Court Farm pipeline would lead to the development of ALC grade 3 and 4 with the effects on the new Osmosis plant permanent. Furthermore, the majority of the Wentwood to Llantrisant pipeline would be constructed on ALC grade 2, 3a and 3b land (greenfield), as well as some smaller pockets of poor quality (grade 5) and non-agricultural land. However, any soil displaced during the excavation of the pipeline route would be reinstated following completion.
Objective 5: Neutral effect - It is not expected that construction would affect water resources. The WFD assessment notes that whilst construction of new infrastructure will require appropriate consenting and permitting, WFD compliance is unlikely to be a barrier to implementation of the option.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures), to avoid effects on nearby watercourses/waterbodies.

The WFD assessment notes that whilst construction of new infrastructure will require appropriate consenting and permitting, WFD compliance is unlikely to be a barrier to implementation of the option.
Objective 7: Minor negative effect - Ponthir WwTW is located in an area of Flood Zone 3 and furthermore, a small number of sections of the Wentwood to Llantrisant pipeline (including where it enters the Llantrisant pumping station site) are also within of the Flood Zone 3. However, Court Farm WTW, the land in the Ponthir to Court Farm pipeline route and the new PS at Wentwood Reservoir, are located in areas of low flood risk (less than 0.1% chance each year). Construction of the scheme components at the Ponthir WwTW and sections of the Wentwood to Llantrisant pipeline could therefore be liable to flooding depending on the timing of works; however, such risks could be minimised and the majority of the scheme activities is located elsewhere. Construction is not expected, however, to cause or exacerbate flooding in the area or elsewhere.
Objective 8: Minor negative effect - The construction of the option could result in traffic congestion during the 1.5-year construction period (particularly on the A449 (which the Wentwood to Llantrisant pipeline would cross) and the local road network in close proximity to, or crossed by (in the case of the Wentwood to Llantrisant pipeline) the various elements of the scheme, which, together with emissions associated with the use of plant and machinery, may have a negative effect on local air quality. However, none of the construction works would take place within an AQMA.
Objective 9: Significant negative effect - The construction of the option would require materials such as concrete, steel and plastic, with 10,174tCO2e embodied carbon. Furthermore, the construction of the option would result in additional vehicle movements (over the 1.5 year implementation stage) and would require the operation of machinery and plant, which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, the WwTW site, a small number of sections of the Wentwood to Llantrisant pipeline are located within an area of high flood risk. In consequence, construction could be vulnerable to the effects of climate change (flooding).
Objective 11: Significant positive effect - Construction would involve a significant capital expenditure (£41.45m), resulting in a significant positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy. Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated vehicle movements, particularly on the A449 (which the pipeline would cross) and the local road network in close proximity/leading to, and crossed by the scheme.
Objective 12: Moderate negative effect - Much of the Wentwood to Llantrisant pipeline would be routed in close proximity to and potentially pass through small areas of Wentwood Forest. Wentwood Forest is the largest area of Ancient Woodland in Wales and offers opportunities for recreational activities such as walking, cycling and horse riding across a number of paths throughout the woodland. Construction in close proximity to the woodland may therefore cause some disturbance to recreational users of the woodland, e.g. noise, vibration, dust. The pipeline would also cross National Cycle Route 32 and Route 42 in two places (both routes are on-road routes). Excavation of the pipeline route may therefore have a negative effect on cycling on these routes, if they require closure, due to the construction works, however, any effects in this regard would be very short term/temporary. Wentwood reservoir has an active angling club, which may be affected by construction of the new PS and pipeline route in close proximity to the reservoir (e.g. noise, dust). Furthermore, the Griffiths Millbrook Farm horse riding facility is located directly adjacent to the site of the new Wentwood PS site and a section of the new pipeline (the pipeline potentially crosses some of the field that the horse riding facility occupies). Construction of the new PS and pipeline in this

location is likely to cause disturbance to activities during construction, particularly construction noise may limit the ability of the facility to operate, due to the noise sensitive nature of activities on site (i.e. risk to horse riders if horses are disturbed by construction noise). There may also be disruption to footpath users from construction of reverse osmosis plant at Court Farm WtW. However, uncertain as to the extent to which it is used. More generally, construction works may have a negative effect on recreational users (e.g. walking/cycling) of the area surrounding the works.
Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the construction of the new reverse osmosis plant and pipeline excavation which could affect residential receptors within Ponthir and the scattered residential dwellings and farmsteads within the vicinity of the scheme. Construction of Wentwood pumping station and pipeline leading away from the pumping station may have a minor effect (e.g. noise and dust) on the village of Llanvaches, however, the village is situated approximately 750m from the works so any effects are likely to be very minor. Pipeline works may also have a minor effect on residential receptors in Llanvair-Discoed (approximately 600m from pipeline works) and more significantly at Llantrisant (approximately 100m from pipeline works) as well as the scattered residential dwellings and farmsteads in close proximity to the scheme.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Significant negative effect - The construction of the option would require significant quantities of materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Minor negative effect - Neither Court Farm, Ponthir WwTW site or the site of the new pumping station are within any historic designations, however, there are three Grade ll Listed Buildings (the closest if which is the Barn at Pen-Twyn Farm, approximately 170m from the works) and two scheduled monuments are within 1km of the WTW and proposed Ponthir to Court Farm pipeline. Camdwr Camp Iron Age fort and Penrhos Civil War earthworks are approximately 0.8km from the Court Farm WtW site. Due to the relative distance between these sites and the proposed works, it is not expected that construction would result in any adverse effects beyond a minor temporary loss of visual amenity regarding their settings during construction. There are however, historic assets within close proximity to the Wentwood to Llantrisant pipeline works, including the Grade II listed Tile Farm (Ysgubor Kemeys) (approximately 10m from pipeline works) and the Grade II Twmp Farmhouse (approximately 70m from the pipeline works). Due to the proximity of these heritage assets the pipeline works, it is anticipated that there will be more significant temporary effects on their setting. There may also be minor temporary effects on the setting of other listed buildings near to the Wentwood to Llantrisant pipeline works/new PS (another 15 listed buildings are within 500m of the works, however, all are at least 100m away from the works, so any effects are anticipated to be minor). There are also 6 Scheduled Monuments within 1km of the PS and Wentwood to Llantristant pipeline construction works, however, the closest of these is Llanvair Castle, approximately 570m from the works, and as such it is not expected that there will be any significant effects on their setting, due to the distance between works and these sites. Additionally, two registered parks and gardens are within 1km of the works (Penhein (approximately 80m from the pipeline works) and Llangybi House (approximately 230m from the works)) which may experience some minor effects on their setting during the construction phase.

Objective 17: Minor negative effect - Neither the Court Farm or the Ponthir WwTW site are within or in proximity to any landscape designations with the Wye Valley AONB approximately 15km distant. Construction works associated with the new pumping station at Wentwood reservoir and the new pipeline from the pumping station to Llantrisant pumping station, would not take place within or in close proximity to any landscape designations with the closest designated areas being the Wye Valley AONB and the Bryniau Clwyd A Dyffryn Dyfrdwy/Clwydian Range and Dee Valley AONB (both approximately 3km from the works). Additionally, the Brecon Beacons National Park is approximately 9.5km from the works. Due to the distance between these areas and the construction works, no significant negative effects are expected. Construction works may, however, adversely impact the amenity of the surrounding rural greenfield setting that much of the pipeline would be routed through. Construction of the new pumping station would be confined within the existing Wentwood site, adjacent to existing similar buildings, whilst construction at the WTW site would be confined within the existing site footprint such that any adverse impact on the landscape would be limited.
Operation
Objective 1: Moderate negative uncertain effect - The Afon Lwyd is a tributary of the River Usk, joining below the tidal limit. Effluent re-use usually considered low impact however, it would be necessary to understand precise operation and extent to which this is essentially consumptive for the Afon Lwyd (i.e. what proportion of Lwyd flow is currently effluent from Ponthir, what proportion afterwards assuming treated water does not stay within Lwyd catchment / is not returned to Ponthir for treatment. It is noted that the CAMS suggests water is available for licencing at Q85=10.9Ml/d, and at Q95=6.3Ml/d on the Lwyd. The confluence of Lwyd with Usk is below Usk tidal limit (so the Usk CAMS is not relevant), and the HRA notes that this would suggest effects on the Usk are likely to be limited, although mobile species (i.e. diadromous fish associated with Severn Estuary SAC / River Usk SAC, and the Severn Estuary Ramsar) may be exposed to environmental changes either in the Usk or the Lwyd. These environmental changes are likely to be small (esp. relative to tidal influence / main flow of the Usk) but the extent to which the Lwyd might be considered 'functional habitat' for these species is unknown and may require discussion with NRW (although the Lwyd is not noted in the Usk Management Plan). It should be noted that a DCWW drought option relating to the Lwyd was not pursued due to uncertainties over the effects on salmon, which is likely to require additional exploration (hence the HRA concludes an uncertain risk). The HRA notes that effects on the Severn Estuary sites are unlikely due to the distance downstream. The WFD Assessment notes that new abstraction from this reinstated reservoir may cause further deterioration by lowering water levels (particularly during dry weather conditions) and increasing the concentration of any water quality determinands, or be a potential impediment to improvement. Any such effects would have the potential to impact on plants, fish and invertebrates. The lowering of water levels may also impact on shoreline conditions with an affect on associated ecology.
Objective 2: Moderate positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Moderate negative effect - The reuse of effluent from Ponthir WwTW would not have any effect on INNS risk, as it would involve effluent reuse therefore there would be no pathway for INNS (and treatment). However, the abstraction of raw water from Wentwood Reservoir and transfer, through a pumped rising main, to Llantrisant pumping station where water would be pumped onwards to Court Farm reservoir, with raw water undergoing an additional coagulation and DAF stage prior to discharge into Court Farm reservoir, would have a moderate risk of transfer of INNS, as water would be transferred between WFD surface water catchments, however, with some treatment prior to discharge into Court Farm reservoir.

Objective 4: Neutral effect - There would be no operational effects on soils/geodiversity/land use.
Objective 5: Moderate negative effect - The option would make use of final effluent from Ponthir WwTW, which would usually discharge into the Usk. The WFD assessment concludes that a reduction in volume (30 Ml/d) of final effluent discharging to the Usk estuary will have a negligible effect flows/water quantity as the Usk is tidal at the discharge location. The option would also make use of water from the newly reinstated Wentwood Reservoir. The ALS indicates that Wentwood Reservoir is located in the Usk Estuary and Coastal Area, however, this area is not assessed using the CAMS resources assessment so it is not possible to determine water availability. However, the WFD assessment concludes that the abstraction from this reinstated reservoir may lead to a lowering of water levels (particularly during dry weather conditions) which may impact on water quality and shoreline conditions with an effect on associated ecology.
Objective 6: Moderate negative effect – The WFD assessment notes that overall the WFD water body status of the Wentwood Reservoir is moderate, with the driving elements identified as phytoplankton and total P. The WFD concludes that the new abstraction from the reinstated reservoir may cause further deterioration by lowering water levels (particularly during dry weather conditions) and increasing the concentration of any water quality determinands, or be a potential impediment to improvement. Any such effects would have the potential to impact on plants, fish and invertebrates. The WFD assessment concludes that new abstraction from the reservoir could result in changes to physico-chemical quality elements (e.g. TP, BOD, DO, pH, temperature), due to reduced dilution, especially during dry weather conditions, thus potentially causing a deterioration in status. However, the WFD assessment notes that the option would not introduce new priority or priority hazardous chemicals to the reservoir.
Objective 7: Minor negative effect - The WwTW site and the existing Llanstrisant pumping station that would be utilised as part of this option is located within an area of Flood Zone 3 and therefore would be at risk of flooding during operation. A negative effect has therefore been identified in respect of flood risk.
Objective 8: Neutral effect - There would be no operational effects on air quality given the very low volume of expected traffic associated with the operation/maintenance of the option.
Objective 9: Significant negative effect - Operational energy demand and chemical dosing would generate 4,482tonnes CO2e/a. This has been assessed as having a significant negative effect on this objective.
Objective 10: Minor negative effect - As noted above, the WwTW site and the existing Llanstrisant pumping station that would be utilised as part of this option is located within an area of high flood risk (Flood Zone 3) and therefore would be at risk to the effects of climate change (flooding) during operation. Objective 10: Significant positive effect - The increased capacity (37Ml/d) provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Significant positive effect - The additional 37Ml/d capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a significant positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.

Objective 12: Minor negative uncertain effect - As noted above, Wentwood Reservoir has an active angling club. If the abstraction from the reservoir leads to the lowering of reservoir levels during the year (i.e. times of low rainfall), this may have a negative effect on the water dependent activities, such as angling. However, as noted under Objectives 5 and 6, this could partly be mitigated by appropriate use of the abstraction. Objective 12: Minor positive uncertain effect - Catchment management, if implemented would benefit the raw water quality in Wentwood reservoir, which could have a positive effect for the angling club.
Objective 13: Significant positive effect- The scheme would not adversely affect human health due to increased noise, nuisance or disruption . The increased capacity of up to 37Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Significant positive effect - The option would involve the reuse of effluent (30 Ml/d) and would increase the resilience of water resources within the DCWW supply area, though the provision of an extra 37Ml/d of deployable output.
Objective 15: Significant negative effect - The operation of the option would require the use of the chemicals (dosing) and materials (membranes and filters), ongoing energy use which would likely require the use of fossil fuels for energy.
Objective 16: Neutral effect - There would be no operational effects on designated cultural heritage assets.
Objective 17: Neutral effect - The operational sites are not within or in proximity to any landscape designations. There would be no operational effects on local setting of features, given the presence of WwTW and WTW. Permanent visual effects from the new pumping station at the Wentwood are considered negligible given the existing water supply infrastructure at the site and the potential to mitigate effects through design.

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW022a
Option Name	Ponthir WwTW
Water company	DCWW
Option Description	Up to 30 MLD final effluent from Ponthir WwTW to be treated to drinking water quality in a new reverse osmosis plant at Court Farm. This will be built on DCWW owned land in the field to the west of the WTW. The treatment process will include DAF and sand filtration as pre-treatment for reverse osmosis to produce 24 Ml/d of treated water.
Yield	Up to 30 Mld
WRZ	SEWCUS

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
SEW022a	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**	**0**

Construction
Objective 1: Minor negative effect - Ponthir WwTW is approximately 3.5km upstream of the confluence between the Lwyd and the River Usk SSSI and SAC and approximately 18km from the River Usk SAC, Severn Estuary SAC, SPA and Ramsar. As such the HRA concludes that there is a negligible HRA risk during construction as there would be 'no effects' or clearly no LSE alone (no impact pathways). There are a number of areas of ancient woodland within 10km of the option, with the closest (0.75ha) being located approximately 0.5km from the Ponthir WTW and approximately 0.1km from Court Farm. Construction of the reverse osmosis plant would require agricultural land to the west of the Courts Frame WTW and involve excavation for a 1.2km pipeline from Ponthir WwTW to Courts Farm. Construction activities would occur within the confined rural setting of the WwtW and WTW sites which may cause minor short-term disturbance to the proximate woodland and grassland habitats. Overall, this option has been assessed as having a minor negative effect on Objective 1.
Objective 2: Minor negative effect - The BNG assessment concludes that there would be a minor negative effect due to the minor permanent loss of habitats during the construction period, associated with the construction of the WTW and temporary loss of habitats associated with the construction of a small section of pipeline.
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Minor positive effect - Works on the Ponthir WwTW would be contained within an existing operational site such that new ancillary infrastructure should not significantly impact land/soil quality. Objective 4: Minor negative effect - The construction of the reverse osmosis plant in the field adjacent to the Courts Farm WTW and the pipeline would lead to the development of ALC grade 3 and 4 with the effects on the new Osmosis plant permanent.
Objective 5: Neutral effect - It is not expected that construction would affect water resources. The WFD assessment notes that whilst construction of new infrastructure will require appropriate consenting and permitting, WFD compliance is unlikely to be a barrier to implementation of the option.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). The WFD assessment notes that whilst construction of new infrastructure will require appropriate consenting and permitting, WFD compliance is unlikely to be a barrier to implementation of the option.
Objective 7: Neutral effect - Ponthir WwTW is located in an area of high risk of flooding (>3.3% chance per annum). However, Courts Farm WTW and the land in the pipeline route are located in areas of low flood risk (less than 0.1% chance each year). Construction of the scheme components at the Ponthir WwTW could therefore be liable to flooding depending on the timing of works; however, such risks could be minimised and the majority of the scheme activities is located elsewhere. Construction is not expected, however, to cause or exacerbate flooding in the area or elsewhere.

Objective 8: Minor negative uncertain effect - The construction of the option could result in traffic congestion during the construction period (particularly on the local road network within the vicinity of the scheme) which, together with emissions associated with the use of plant and machinery, may have a negative effect on local air quality..
Objective 9: Moderate negative effect - The construction of the option would require concrete, steel and plastic, with 6,496tCO2e embodied carbon. Furthermore, the construction of the option would result in additional vehicle movements (over the 1.5 year implementation stage) and would require the operation of machinery and plant, which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, the WwTW site is located within an area of high flood risk. In consequence, construction could be vulnerable to the effects of climate change (flooding).
Objective 11: Significant positive effect - Construction would involve a significant capital expenditure (£26.31m), resulting in a significant positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy. The majority of the spend would be within one year. Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated vehicle movements, which could affect the local road network within the vicinity of the scheme.
Objective 12: Minor negative effect - due to disruption to footpath users from construction of reverse osmosis plant at Courts Farm WtW. However, uncertain as to the extent to which it is used.
Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the reconstruction of the new reverse osmosis plant and pipeline excavation which could affect residential receptors within Ponthir and the scattered residential dwellings and farmsteads within the vicinity of the scheme.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Moderate negative effect - The construction of the option would require concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Minor negative effect - Neither Courts Farm or the Ponthir WwTW site are within any historic designations, however, there are several Grade ll Listed Buildings and scheduled monuments are within 1km of the scheme. Camdwr Camp Iron Age fort and Penrhos Civil War earthworks are approximately 0.8km from the Courts Farm WtW site. Due to the relative distance between these sites and the proposed works, it is not expected that construction would result in any adverse effects beyond a minor temporary loss of visual amenity regarding their settings during construction.
Objective 17: Neutral effect - Neither Courts Farm or the Ponthir WwTW site are within or in proximity to any landscape designations with the Wye Valley AONB approximately 15km distant. Construction works may adversely impact the amenity of the surrounding rural greenfield setting; however, construction would be confined within the existing site footprint such that any adverse impact on the landscape would be limited.
Operation

Objective 1: Moderate negative uncertain effect - The Afon Lwyd is a tributary of the River Usk, joining below the tidal limit. Effluent re-use usually considered low impact however, it would be necessary to understand precise operation and extent to which this is essentially consumptive for the Afon Lwyd (i.e. what proportion of Lwyd flow is currently effluent from Ponthir, what proportion afterwards assuming treated water does not stay within Lwyd catchment / is not returned to Ponthir for treatment. It is noted that the CAMS suggests water is available for licencing at Q85=10.9Ml/d, and at Q95=6.3Ml/d on the Lwyd. The confluence of Lwyd with Usk is below Usk tidal limit (so the Usk CAMS is not relevant), and the HRA notes that this would suggest effects on the Usk are likely to be limited, although mobile species (i.e. diadromous fish associated with Severn Estuary SAC / River Usk SAC, and the Severn Estuary Ramsar) may be exposed to environmental changes either in the Usk or the Lwyd. These environmental changes are likely to be small (esp. relative to tidal influence / main flow of the Usk) but the extent to which the Lwyd might be considered 'functional habitat' for these species is unknown and may require discussion with NRW (although the Lwyd is not noted in the Usk Management Plan). It should be noted that a DCWW drought option relating to the Lwyd was not pursued due to uncertainties over the effects on salmon, which is likely to require additional exploration (hence the HRA concludes an uncertain risk). The HRA notes that effects on the Severn Estuary sites are unlikely due to the distance downstream.
Objective 2: Minor positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - The option involves effluent reuse, therefore no pathway for INNS (and treatment).
Objective 4: Neutral effect - There would be no operational effects on soils/geodiversity/land use.
Objective 5: Neutral effect - The option would make use of final effluent from Ponthir WwTW, which would usually discharge into the Usk. The WFD assessment concludes that a reduction in volume (30 Ml/d) of final effluent discharging to the Usk estuary will have a negligible effect flows/water quantity as the Usk is tidal at the discharge location. The option is considered to be WFD compliant.
Objective 6: Neutral effect - The WFD assessment concludes that a reduction in volume (30 Ml/d) of final effluent discharging to the Usk estuary will have a negligible effect on water quality, and as the Usk is tidal at the discharge location, the impact of flow reduction from Ponthir WwTW (and any associated dilution effect in the Usk) will also be negligible, therefore the option is WFD compliant.
Objective 7: Neutral effect - It is not anticipated that the operation of the option would not be liable for flooding or cause or exacerbate flooding elsewhere.
Objective 8: Neutral effect - There would be no operational effects on air quality given the very low volume of expected traffic associated with the reverse osmosis plant operation.
Objective 9: Significant negative effect - Operational energy demand would generate 3,561tonnes CO2e/a. This has been assessed as having a significant negative effect on this objective.

Objective 10: Significant positive effect - The increased capacity (30Ml/d) provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Significant positive effect - The additional 30Ml/d capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a significant positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect -The operation of the option is not expected to impact upon opportunities for recreation or tourism.
Objective 13: Significant positive effect- The scheme would not adversely affect human health due to increased noise, nuisance or disruption . The increased capacity of up to 30Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Significant positive effect - The option would involve the reuse of effluent (30 Ml/d) and would increase the resilience of water resources within the DCWW supply area, though the provision of an extra 30Ml/d of deployable output.
Objective 15: Moderate negative effect - The operation of the option would require the use of the chemicals (dosing) and materials (membranes and filters), ongoing energy use which would likely require the use of fossil fuels for energy.
Objective 16: Neutral effect - There would be no operational effects on designated cultural heritage assets.
Objective 17: Neutral effect - The operational sites are not within or in proximity to any landscape designations. There would be no operational effects on local setting of features, given the presence of WwTW and WTW.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW036a
Option Name	Utilisation of Pany-yr-Eos
Water company	DCWW
Option Description	An additional 13.7Ml/d is supplied to Court Farm WTW from Pant-yr-Eos reservoir, gravitating through a new pipe connected to the existing LG Main which transfers to Court Farm. The main will become dual purpose, retaining its function as an emergency washwater discharge. This option does not include for any increased treatment costs at Court Farm (assumed to have capacity). The main elements of the scheme would be: 2.5km of new 560mm gravity raw water main to the LG Main connection; valve complex at LG Main connection to allow for bi-directional flow; valve complex and 500m of 700mm DI pipe extension at Court Farm to allow for the LG main to discharge into Court Farm reservoir
Yield	13.7Ml/d
WRZ	SEWCUS

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
SEW036a	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**	**0**

Construction
Objective 1: Minor negative effect - Within 10km of the proposed raw water main/LG connection point construction works, there are: 2 SACs, the closest of which is the River Usk/Afon Wysg, approximately 3.6km from the works, with the other being the Severn Estuary (approximately 7km from the works), which also designated as a Ramsar, SPA and SSSI (the only Ramsar/SPA within 10km of the pipeline works); 15 SSSIs, the closest of which is Henllys Bog (approximately 1.1km from the works); 1 NNR Newport Wetlands (approximately 7.9km from the works); and, 10 LNRs, the closest of which is Henllys Open Space (approximately 2.3km from the works). Due to the distance between these sites and the proposed pipeline works/location of the new valve complex at the LG connection, no effects are expected. There are however, two areas of ancient woodland which would be crossed by the pipeline and therefore, pipeline works may result in a loss/damage of some sections of woodland in theses areas: as the pipeline leads away from the reservoir approximately a 350m section of the pipeline passes through an area of ancient woodland; and, a further 70m section would be crossed at Maes-Y-Coed. A further 15 areas of ancient woodland would be located within 100m of the pipeline works (with the closest being less than 10m from the works) however, it is not anticipated that works would cause any harm to these areas, although may cause minor disturbance (e.g. noise, vibration, dust) on wildlife within these habitats. Pant-Yr-Eos sits at the head of a small stream that ultimately feeds into the Usk Estuary, although the HRA concludes that construction effects on the Usk and more generally on international sites in general can be avoided with normal best practice. More generally, construction works may have a minor negative effect (e.g. from noise disturbance or effects on air quality/dust) on proximate non-designated habitats and species (it is noted the majority of the pipeline would cross through agricultural fields/countryside. There are also a number of designated sites within 10km of the proposed works at Court Farm (many of which are also within 10km of the other works, as described above) including: 1 SPA (Severn Estuary approximately 9.7km from the works); 2 SACs (River Usk (approximately 2.3km from the works) and the Severn Estuary (approximately 9.6km from the works)); 1 Ramsar (the Severn Estuary, approximately 9.6km from the works); 18 SSSIs (the closest of which is the River Usk approximately 2.7km from the works); 2 NNRs (the closest of which is Penhow Woodlands approximately 8.6km from the works); and, 6 LNRs (the closest of which is St. Julian's Park, approximately 3.8km from the works). Due to the distance between these sites and the proposed works, it is not anticipated that any effects from construction will arise. There are also four areas of Ancient Woodland within 10km of the works at court farm, with the closest being approximately 0.3km from the works, however, it is not anticipated that works would cause any damage to this area, although may cause minor disturbance (e.g. noise, vibration, dust) on wildlife within this habitat.
Objective 2: Moderate negative effect - The BNG assessment concludes that there would be a moderate negative effect on biodiversity net loss due to the permanent loss of habitats during the construction period, associated with the construction of the new gravity main pipeline, as well as a minor effect associated with the temporary loss/disturbance of habitats associated with the construction of both the gravity main pipeline and (to a lesser extent) the pipeline extension at court farm
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.

Objective 4: Minor negative effect - The construction of the 2.5km raw water pipeline would take place on ALC grade 3b and 4, and potentially some small areas of grade 3a agricultural land as well as non-agricultural land, however, any soil displaced during the excavation of the pipeline would be reinstated following the completion of works. The new valve complex at the LG main connection point would be constructed on grade 3b land. The works at Court Farm would take place on land within ALC grade 2, however, soil displaced during the construction of the pipeline would again be reinstated following completion of works and it is assumed that the majority of the works would be within the existing operational site of the reservoir.
Objective 5: Neutral effect - It is not expected that construction would affect water resources.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures) such as Pant-Y-Reos Brook (which the pipeline would cross and partially run parallel to) and Torf Aen brook (which would also be crossed). It is however, noted that directional drilling would be utilised where the pipeline crosses the watercourses, which should minimise effects.
Objective 7: Minor negative effect - A small section of the proposed raw water main route and the new valve complex at the LG main connection point is in Flood Zones 2 and 3 and therefore may be liable to flooding during the construction period (depending on the timing of installation). A minor negative effect is therefore identified in relation to flood risk. The Court Farm reservoir site is not located within or within close proximity to an area of high flood risk. The option would be unlikely to increase flood risk elsewhere.
Objective 8: Minor negative effect - The construction of the option could result in traffic congestion during the construction period (particularly on the local road network within the vicinity of the scheme) which, together with emissions associated with the use of plant and machinery, may have a negative effect on local air quality.
Objective 9: Minor negative effect - Construction of the option would require the use of raw materials with a minor amount of embodied carbon (958.6tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, a small section of the proposed raw water main route and the new valve complex at the LG main connection point would be located within an area of high flood risk. In consequence, construction could be vulnerable to the effects of climate change (flooding).
Objective 11: Minor positive effect - Construction would involve a modest capital expenditure (initial £3.74m), resulting in a positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy. Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated vehicle movements, which could affect the local road network within the vicinity of the scheme.
Objective 12: Neutral effect - Construction of the option is not expected to have a significant effect on opportunities for recreation or tourism. Construction works may have an effect (e.g. noise and air quality) on recreational users of the areas surrounding works, however, any effects in this regard are anticipated to be negligible.

Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the pipeline excavation which could affect the scattered residential dwellings and farmsteads within the vicinity of the scheme and to a lesser extent (due to relative distance between receptors and the locations of works) the town of Risca and village of Ponthir.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The construction of the option would require raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Minor negative effect - Within 1km of the proposed pipeline route there are 2 Scheduled Monuments and 5 Listed Buildings, with the closest being the Grade II listed Scheduled Monument, St. Peter's Churchyard Cross (remains of) (approximately 200m from the pipeline works). Adjacent to this Monument is the Church of Saint Peter itself which is Grade II* listed. The next closest feature is the Grade II listed Cwrt Henllys (approximately 0.5km from the works); whilst the remaining Scheduled Monument and two Listed Buildings are all situated 950m or more from the proposed works. Due to the proximity of the St. Peters Church/Churchyard Cross, a minor temporary negative effect on the setting of these features is expected. There may also be a very minor negative effect on the setting of the Cwrt Henllys. however, the other features listed above are not expected to be affected by construction works, due to the distance between the features and the proposed works. Within 1km of the works at Court Farm there is: 1 Scheduled Monument (Candwr Camp approximately 0.7km from the Court Farm works); and, 2 Listed Buildings (the closest of which is the Barn at Pen-twyn Farm, approximately 0.8km from the works). Due to the distance between these features and the works, no significant effects are expected.
Objective 17: Neutral effect - None of the scheme elements are within or in proximity to any landscape designations, with the closest designation being the Brecon Beacons National Park, located approximately 8.2km from the works at court farm. Construction works may adversely impact the amenity of the surrounding rural greenfield setting; however, any effects would be temporary, with any soil displaced as a result of pipeline works being reinstated following completion.
Operation
Objective 1: Minor negative uncertain effect - The WFD assessment concludes that additional abstraction from the reservoir may cause deterioration by lowering water levels (particularly during dry weather conditions) and increasing the concentration of any water quality determinands. Any such effects would have the potential to impact on plants, fish and invertebrates. The lowering of water levels may also impact on shoreline conditions with an effect on associated ecology. Maintenance of the water main could also require works in areas of ancient woodland that has the potential for disturbance to biodiversity. Pant-yr-Eos sits at the head of a small stream that ultimately feeds into the Usk estuary via the Bettws Brook and Malpas Brook, although the contribution of this stream to flows in the Usk is negligible. The HRA concludes that assessment of effects on the River Usk / Afon Wysg SAC is likely to be

required but effects are unlikely to be significant, particularly as operation is within the terms of the existing licence. Overall the potential for a minor negative effect on biodiversity has been identified, with some uncertainty remaining.
Objective 2: Moderate positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Minor negative effect - The option would involve the transfer of raw water from Pant-yr-Eos reservoir to Court Farm WTW, with treatment at the WTW at Court Farm, prior to discharge into Court Farm reservoir. Therefore, as water would be transferred between two WFD surface water catchments, however, with treatment prior to discharge into Court Farm reservoir, the INNS risk has been assessed as minor.
Objective 4: Neutral effect - It is not anticipated that the operation of this option would have any effect on soils, geodiversity of land use.
Objective 5: Moderate negative effect - The ALS indicates that water is not available for licensing in the area at Q95 and Q70, with restricted water available at Q50 and Q30. The WFD assessment concludes that the additional abstraction of 13.7Ml/d from the reservoir may cause deterioration by lowering water levels (particularly during dry weather conditions) and any such effects would have the potential to impact on plants, fish and invertebrates. The lowering of water levels may also impact on shoreline conditions with an effect on associated ecology. However, the WFD highlights that it is assumed that there would be no changes to compensation releases from the reservoir to Pantyreos Brook so low flows should be unaffected. With less water in the reservoir due to increased abstraction, the reservoir will take longer to refill, and spill into the brook may be delayed/reduced. However, the WFD assessment concludes that this is likely to have only a minor impact on downstream flows in terms of the proportion of time that the reservoir spills for.
Objective 6: Moderate negative effect - The WFD assessment concludes that the additional abstraction of 13.7Ml/d from the reservoir may cause deterioration by lowering water levels (particularly during dry weather conditions) and increasing the concentration of any water quality determinands. Any such effects would have the potential to impact on plants, fish and invertebrates. The WFD assessment also concludes that increased abstraction from the reservoir could result in changes to physico-chemical quality elements (e.g. TP, BOD, DO, pH, temperature), particularly during low level conditions, potentially causing a deterioration in status. However, the WFD highlights that the changes downstream (in Pantyreos Brook) are not expected to have an impact on biological or WQ elements and the option would not introduce new priority or priority hazardous chemicals in the brook or the reservoir.
Objective 7: Neutral effect - It is not anticipated that the operation of this option would have any effect on flood risk.
Objective 8: Neutral effect - It is not anticipated that the operation of the option would have any effects on air quality.
Objective 9: Neutral effect - The operation of this option is not expected to generate any carbon emissions, and has therefore been assessed as having a neutral effect on this objective.

Objective 10: Moderate positive effect - The additional capacity (13.7Ml/d) provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Moderate positive effect - The additional 13.7Ml/d capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a moderate positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect - The operation of this option is not expected to significantly effect opportunities for recreation or tourism, although may have a very minor effect on recreational users (e.g. walking) of the area surrounding the reservoir if the operation of the option results in a lowering of reservoir levels during the year (i.e. times of low rainfall), thereby having a minor negative effect on visual amenity. However, any effects on recreational users in this respect are anticipated to be negligible.
Objective 13: Moderate positive effect - The increased capacity of 13.7Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Moderate positive effect - The option is not a water efficiency option, so would have no effect on water efficiency, however, it would increase the resilience of water resources within the DCWW supply area, though the provision of an extra 13.7Ml/d of deployable output.
Objective 15: Neutral effect - The operation of the option would not have any effect on waste and resource use.
Objective 16: Neutral effect - There would be no operational effects on designated cultural heritage assets.
Objective 17: Minor negative effect - The operation of the option may lead to a minor negative effect on the character of the local landscape, if the provision of 13.7Ml/d from the reservoir leads to the lowering of reservoir levels during the year (i.e. times of low rainfall).

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW036b
Option Name	Utilisation of the Ynys y Fro
Water company	DCWW
Option Description	9 Ml/d is supplied to Court Farm WTW from Ynys-y-Fro through a pumped main from Ynys-y-Fro connecting to the existing LG Main which transfers to Court Farm. The main will become dual purpose, retaining its function as an emergency washwater discharge. This option does not include for any increased treatment costs at Court Farm (assumed to have capacity). The main elements of this scheme are: construction of a new 104.2l/s Ynys-y-Fro Pumping Station with 70m head; construction of a new 1.6km of 450mm OD HDPE Rising Main to LG Main connection (at Mescoed Road/Bettws Brook); installation of a valve complex at LG Main connection to allow for bi-directional flow; installation of a valve complex and 500m of 700mm DI pipe extension at Court Farm to allow for the LG main to discharge into Court Farm reservoir; and, draw off floating arm and valve works replacement at Ynys y Fro.
Yield	9Ml/d
WRZ	SEWCUS

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
SEW036b	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	-

	Operation (positive)	**0**	**+**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**++**	**++**	**0**	**++**	**++**	**0**	**0**	**0**

Construction
Objective 1: Minor negative effect - Within 10km of the proposed pipeline/PS construction works, there are: 2 SACs, the closest of which is the River Usk/Afon Wysg, approximately 3km from the works (also designated as a SSSI), with the other being the Severn Estuary (approximately 5.8km from the works), which also designated as a Ramsar, SPA and SSSI (the only Ramsar/SPA within 10km of the pipeline works); 15 SSSIs, the closest of which is Henllys Bog, approximately 2.6km from the works, whilst all other SSSIs would all be over 3km from the works); 1 NNR, Newport Wetlands (approximately 6.7km from the works); and, 9 LNRs, the closest of which is Allt-Yr-Yn (approximately 1.1km from the works). Given the distance between these sites and the proposed works, no significant effects would be expected. There are four areas of ancient woodland which would be crossed by the pipeline and therefore, pipeline works may result in a loss/damage of some sections of woodland in these areas, most notably approximately a 400m section of the pipeline passes through two adjoining areas of ancient woodland. A number of other areas would be located within 1km of the pipeline works, however, it is not anticipated that works would cause any harm to these areas, although may cause minor disturbance (e.g. noise, vibration, dust) on wildlife within these habitats. The new pumping station would be constructed downstream of the reservoir, therefore no associated effects on reservoir biodiversity are anticipated. Ynys-y-Fro sits at the head of a small stream that ultimately feeds into the Usk Estuary, although the HRA concludes that construction effects on the Usk and more generally on international sites in general can be avoided with normal best practice. More generally, construction works may have a minor negative effect (e.g. from noise disturbance or effects on air quality/dust) on proximate non-designated habitats and species (it is noted the majority of the pipeline would cross through agricultural fields/countryside. There are also a number of designated sites within 10km of the proposed works at Court Farm (many of which are also within 10km of the other works, as described above) including: 1 SPA (Severn Estuary approximately 9.7km from the works); 2 SACs (River Usk (approximately 2.3km from the works) and the Severn Estuary (approximately 9.6km from the works)); 1 Ramsar (the Severn Estuary, approximately 9.6km from the works); 18 SSSIs (the closest of which is the River Usk approximately 2.7km from the works); 2 NNRs (the closest of which is Penhow Woodlands approximately 8.6km from the works); and, 6 LNRs (the closest of which is St. Julian's Park, approximately 3.8km from the works). Due to the distance between these sites and the proposed works, it is not anticipated that any effects from construction will arise. There are also four areas of Ancient Woodland within 10km of the works at court farm, with the closest being approximately 0.3km from the works, however, it is not anticipated that works would cause any damage to this area, although may cause minor disturbance (e.g. noise, vibration, dust) on wildlife within this habitat.
Objective 2: Minor negative effect - The BNG assessment concludes that there would be a minor negative effect on biodiversity net loss due to the permanent loss of habitats during the construction period, associated with the construction of the new pumped main pipeline, as well as the temporary loss/disturbance of habitats associated with the construction of both the pumped main pipeline and (to a lesser extent) the pipeline extension at court farm
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.

Objective 4: Minor negative effect - The construction of the 1.6km rising main and the new pumping station would take place on a combination of ALC grade 3b and non-agricultural land. The construction of the new PS at Ynys-y-Fro would result in the loss of DCWW owned greenfield land, however, in terms of the pipeline works, any soil displaced during the excavation of the pipeline would be reinstated following the completion of works. The new valve complex at the LG main connection point would be constructed on grade 3b land. The works at Court Farm would take place on land within ALC grade 2, however, soil displaced during the construction of the pipeline would again be reinstated following completion of works and it is assumed that the majority of the works would be within the existing operational site of the reservoir.
Objective 5: Neutral effect - It is not expected that construction would affect water resources.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures), to avoid effects on watercourses such as Bettws Brook (which the pipeline would cross) and at Ynys-Y-Fro reservoir. It is however, noted that directional drilling would be utilised where the pipeline crosses the watercourses, which should minimise effects.
Objective 7: Minor negative effect - A section of the proposed rising main route and the new valve complex at the LG main connection point is in Flood Zones 2 and 3 (associated with the Bettws Brook) and therefore may be liable to flooding during the construction period (depending on the timing of installation). A minor negative effect is therefore identified in relation to flood risk. The Court Farm reservoir site is not located within or within close proximity to an area of high flood risk. The option would be unlikely to increase flood risk elsewhere.
Objective 8: Minor negative effect - The construction of the option could result in traffic congestion during the construction period (particularly on the local road network within the vicinity of the scheme) which, together with emissions associated with the use of plant and machinery, may have a negative effect on local air quality. The option is not, however, located within an AQMA.
Objective 9: Minor negative effect - Construction of the option would require the use of raw materials with a minor amount of embodied carbon (695.9tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, a section of the proposed rising main route and the new valve complex at the LG main connection point would be located within an area of high flood risk. In consequence, construction could be vulnerable to the effects of climate change (flooding).
Objective 11: Minor positive effect - Construction would involve a modest capital expenditure (initial £3.05m), resulting in a positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy. Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated vehicle movements, which could affect the local road network within the vicinity of the scheme.
Objective 12: Minor negative effect - The Newport Reservoirs Fly Fishing Association provides opportunities for fly fishing for members and guests on the Ynys-Y-Fro reservoirs, which may experience some disturbance (e.g. noise, vibration, dust) associated with the construction of the new PS as the reservoir, as well as the draw off floating arm and valve works replacement at the reservoir. Additionally, the Tredegar Park Golf Club golf course is

adjacent to the reservoir and in close proximity to a section of the pipeline and may also experience some effects from construction works. Parc-Y-Brain park would also be in close proximity to the pipeline works and users of the park may therefore also experience some effects (e.g. noise/dust) associated with the excavation of the pipeline route. More generally recreational user (e.g. walking/cycling) of the surrounding area may also experience similar effects.
Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the pipeline excavation and construction of the new PS which could affect residential receptors in Bettws as well as a very limited number of scattered residential dwellings and farmsteads within the vicinity of the scheme and to a lesser extent (due to relative distance between receptors and the locations of works) east Rogerstone/High Cross.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The construction of the option would require raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Neutral effect - Within 1km of the pipeline works/new PS, there is one Scheduled Monument (Fourteen Locks, Monmouthshire Canal, approximately 0.6km south of the new PS) and 10 Listed buildings (the closest of which is approximately 0.6km south of the new PS - the Grade II Limekiln near Pensarn Farm). There are also two Conservation Areas within 1km of the option (Mon & Brecon Canal (Crumlin), approximately 0.7km from the works; and, Mon & Brecon Canal, approximately 0.9km from the works). However, due to the distance between these features and the proposed works, no significant effects are expected. Within 1km of the works at Court Farm there is: 1 Scheduled Monument (Candwr Camp approximately 0.7km from the Court Farm works); and, 2 Listed Buildings (the closest of which is the Barn at Pen-twyn Farm, approximately 0.8km from the works). Due to the distance between these features and the works, no significant effects are expected.
Objective 17: Neutral effect - The site is not within or in proximity to any landscape designations with the Wye Valley AONB and Brecon Beacons National Park approximately 8.3km and 8.2km distant respectively. Construction works may adversely impact the amenity of the surrounding rural greenfield setting, however, effects would be temporary, and furthermore any soil displaced as a result of pipeline works being reinstated following completion.
Operation
Objective 1: Minor negative uncertain effect - The WFD assessment concludes that additional abstraction from the reservoir may cause deterioration by lowering water levels (particularly during dry weather conditions) and increasing the concentration of any water quality determinands. Any such effects would have the potential to impact on plants, fish and invertebrates, and could exacerbate phytoplankton blooms. The lowering of water levels may also impact on shoreline conditions with an effect on associated ecology. In addition, Ynys-y-Fro sits at the head of a minor unnamed stream that ultimately feeds into the Usk Estuary, although the HRA concludes that the contribution of this stream to flows in the Usk is self evidently negligible and that effects on the River Usk / Afon Wysg SAC are very unlikely to be significant, particularly as operation is within the terms of the existing licence. Overall the potential for a minor negative effect on biodiversity has been identified, with some uncertainty remaining.

Objective 2: Minor positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Minor negative effect - The option would involve the transfer of raw water from Ynys-y-Fro reservoir to Court Farm WTW, with treatment at the WTW at Court Farm, prior to discharge into Court Farm reservoir. Therefore, as water would be transferred between two WFD surface water catchments, however, with treatment prior to discharge into Court Farm reservoir, the INNS risk has been assessed as minor.
Objective 4: Neutral effect - It is not anticipated that the operation of this option would have any effect on soils, geodiversity of land use.
Objective 5: Moderate negative effect - The ALS indicates that water is not available for licensing in the area at Q95 and Q70, with restricted water available at Q50 and Q30. The WFD assessment concludes that the additional abstraction of 9Ml/d from the reservoir may cause deterioration by lowering water levels (particularly during dry weather conditions) and any such effects would have the potential to impact on plants, fish and invertebrates. The lowering of water levels may also impact on shoreline conditions with an effect on associated ecology. However, the WFD highlights that it is assumed that there would be no changes to compensation releases from the reservoir to Pantyreos Brook so low flows should be unaffected. With less water in the reservoir due to increased abstraction, the reservoir will take longer to refill, and spill into the brook may be delayed/reduced. However, the WFD assessment concludes that this is likely to have only a minor impact on downstream flows in terms of the proportion of time that the reservoir spills for.
Objective 6: Moderate negative effect - The WFD assessment concludes that the additional abstraction of 9Ml/d from the reservoir may cause deterioration by lowering water levels (particularly during dry weather conditions) and increasing the concentration of any water quality determinands. Any such effects would have the potential to impact on plants, fish and invertebrates and could exacerbate phytoplankton blooms. The WFD assessment also concludes that increased abstraction from the reservoir could result in changes to physico-chemical quality elements (e.g. TP, BOD, DO, pH, temperature), particularly during low level conditions, potentially causing a deterioration in status. However, the WFD highlights that the changes downstream (in Pantyreos Brook) are not expected to have an impact on biological or WQ elements and the option would not introduce new priority or priority hazardous chemicals in the brook or the reservoir.
Objective 7: Neutral effect - It is not anticipated that the operation of this option would have any effect on flood risk.
Objective 8: Neutral effect - It is not anticipated that the operation of the option would have any effects on air quality.
Objective 9: Minor negative effect - The operation of this option is expected to generate 220.3tCO2e/a, largely associated with the energy required to operate the new pumping station. This has been assessed as having a minor negative effect on carbon emissions.
Objective 10: Moderate positive effect - The additional capacity (9Ml/d) provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.

Objective 11: Moderate positive effect - The additional 9Ml/d capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a moderate positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Minor negative effect - The supply of 9Ml/d from Ynys-Y-Fro reservoir may increase the rate of drawdown of the reservoir, which could lead to the lowering of reservoir levels during the year (i.e. times of low rainfall). This in turn could affect the water dependent activities such as angling on the reservoir. Operation of the pumping station may also lead to minor noise which could affect users of the reservoir and nearby golf course. There may also be a very minor effect on recreational users (e.g. walking) of the area surrounding the reservoir if the operation of the option results in a lowering of reservoir levels, thereby having a minor negative effect on visual amenity.
Objective 13: Moderate positive effect - The increased capacity of 9Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Moderate positive effect - The option is not a water efficiency option, so would have no effect on water efficiency, however, it would increase the resilience of water resources within the DCWW supply area, though the provision of an extra 9Ml/d of deployable output.
Objective 15: Minor negative effect - The operation of the option would require energy for the pumping of water from Ynys-Y-Fro reservoir, to the LG main connection (likely involving the use of fossil fuels to generate the energy required).
Objective 16: Neutral effect - There would be no operational effects on designated cultural heritage assets.
Objective 17: Minor negative effect - The operation of the option may lead to a minor negative effect on the character of the local landscape, if the provision of 9Ml/d from the reservoir leads to the lowering of reservoir levels during the year (i.e. times of low rainfall). The option would also result in permanent above ground infrastructure (the new PS), which may have an effect on the local landscape, however, this would be situated at the existing reservoir site, alongside similar existing infrastructure, so would be in keeping with the existing character of the site.

wood.

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW036c
Option Name	Ynys-y-Fro and Pant-yr-Eos to Court Farm via LG main (bi-directional raw water main)
Water company	DCWW
Option Description	Up to 22.7 Ml/d is supplied to Court Farm WTW from Ynys-y-Fro and Pant-yr-Eos reservoirs. 13.7 Ml/d gravitating from Pant-yr-Eos and 9Ml/d pumped from Ynys-y-Fro, by connecting to the existing LG Main which transfers to Court Farm. The LG main will become dual purpose, retaining its function as an emergency washwater discharge. This option does not include for any increased treatment costs at Court Farm (assumed to have capacity). The main elements of this scheme would be: the construction of a new 104.2l/s Ynys-y-Fro Pumping Station with 70m head; construction of a new 1.6km of 450mm OD HDPE Rising Main to LG Main connection; construction of a new 2.5km of new 560mm OD HDPE gravity raw water main; installation of a new valve complex at LG Main connection to allow for bi-directional flow; installation of a new valve complex and 500m of 700mm DI pipe extension at Court Farm to allow for the LG main to discharge into Court Farm reservoir; and draw off floating arm and valve works replacement at Ynys y Fro.
Yield	Up to 22.7Ml/d
WRZ	SEWCUS

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
SEW036c	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**

Construction
Objective 1: Minor negative effect - Within 10km of the site of the new Ynys-y-Fro pumping station, the route of the new 1.6km rising main from Ynys-y-Fro to the LG Main connection, the route of the new 2.5km gravity main between Pant-Yr-Eos and the LG main connection, and the new valve complex at the LG main connection there are: 2 SACs, the closest of which is the River Usk/Afon Wysg, approximately 3.6km from the works (at the closest point), with the other being the Severn Estuary (approximately 5.8km from the works), which also designated as a Ramsar, SPA and SSSI (the only Ramsar/SPA within 10km of the aforementioned works. There are also 17 SSSIs, the closest of which is Henllys Bog (approximately 1.1km from the works), 1 NNR (Newport Wetlands, approximately 6.7km from the works) and 13 LNRs, the closest of which is Allt-Yr-Yn (approximately 1.1km from the works). Due to the relative distance between these features and the works, no significant effects from construction are anticipated. The HRA concludes that construction effects on international sites can be avoided with normal best practice. Construction of the two new water main pipelines would also cross through a combined 6 areas of Ancient Woodland, with a number of other areas of Ancient Woodland being within 100m of the works. Construction of the pipeline may therefore result in the loss/disturbance to these areas. More generally, construction works may have a minor negative effect (e.g. from noise disturbance or effects on air quality/dust) on proximate non-designated habitats and species. There are also a number of designated sites within 10km of the proposed works at Court Farm (many of which are also within 10km of the other works, as described above) including: 1 SPA (Severn Estuary approximately 9.7km from the works); 2 SACs (River Usk (approximately 2.3km from the works) and the Severn Estuary (approximately 9.6km from the works)); 1 Ramsar (the Severn Estuary, approximately 9.6km from the works); 18 SSSIs (the closest of which is the River Usk approximately 2.7km from the works); 2 NNRs (the closest of which is Penhow Woodlands approximately 8.6km from the works); and, 6 LNRs (the closest of which is St. Julian's Park, approximately 3.8km from the works). Due to the distance between these sites and the proposed works, it is not anticipated that any effects from construction will arise. There are also four areas of Ancient Woodland within 10km of the works at court farm, with the closest being approximately 0.3km from the works, however, it is not anticipated that works would cause any damage to this area, although may cause minor disturbance (e.g. noise, vibration, dust) on wildlife within this habitat.
Objective 2: Moderate negative effect - The BNG assessment concludes that there would be a moderate negative effect on biodiversity net loss due to the permanent loss of habitats during the construction period, associated with the construction of both the new gravity main pipeline (from Pant-yr-Eos to the LG main) and the pumped main pipeline (from Ynys-y-Fro to the LG main) as well as a minor effect associated with the temporary loss/disturbance of habitats associated with the construction of the gravity main pipeline, pumped main pipeline and (to a lesser extent) the pipeline extension at court farm
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Moderate negative effect - The construction of the 2.5km raw water pipeline would take place on ALC grade 3b and 4, and potentially some small areas of grade 3a agricultural land as well as non-agricultural land, whilst the construction of the 1.6km rising main and the new pumping station would take place on a combination of ALC grade 3b and non-agricultural land. The construction of the new PS at Ynys-y-Fro would result in the loss of

DCWW owned greenfield land, however, in terms of the pipeline works, any soil displaced during the excavation of the pipelines would be reinstated following the completion of works. The new valve complex at the LG main connection point would be constructed on grade 3b land. The works at Court Farm would take place on land within ALC grade 2, however, soil displaced during the construction of the pipeline would again be reinstated following completion of works and it is assumed that the majority of the works would be within the existing operational site of the reservoir.
Objective 5: Neutral effect - It is not expected that construction would affect water resources.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures), to avoid effects on watercourses such as Bettws Brook, Pant-Y-Reos Brook and Torf Aen Brook (which the pipelines would cross/run parallel to) and at Ynys-Y-Fro reservoir. It is however, noted that directional drilling would be utilised where the pipelines cross watercourses, which should minimise effects.
Objective 7: Minor negative effect - A section of the proposed rising main and a section of the proposed raw water main as well as the new valve complex at the LG main connection point are located within areas of Flood Zones 2 and 3 and therefore may be liable to flooding during the construction period (depending on the timing of installation). A minor negative effect is therefore identified in relation to flood risk. The Court Farm reservoir site is not located within or within close proximity to an area of high flood risk. The option would be unlikely to increase flood risk elsewhere.
Objective 8: Minor negative effect - The construction of the option could result in traffic congestion during the construction period (particularly on the local road network within the vicinity of the scheme) which, together with emissions associated with the use of plant and machinery, may have a negative effect on local air quality. The option is not, however, located within an AQMA.
Objective 9: Moderate negative effect - Construction of the option would require the use of raw materials with a moderate amount of embodied carbon (1,454tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, a section of the proposed rising main route and the new raw water main route as well as the new valve complex at the LG main connection point would be located within an area of high flood risk. In consequence, construction could be vulnerable to the effects of climate change (flooding).
Objective 11: Minor positive effect - Construction would involve a modest capital expenditure (£6.05m), resulting in a positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy. Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated vehicle movements, which could affect the local road network within the vicinity of the scheme.
Objective 12: Minor negative effect - The Newport Reservoirs Fly Fishing Association provides opportunities for fly fishing for members and guests on the Ynys-Y-Fro reservoirs, which may experience some disturbance (e.g. noise, vibration, dust) associated with the construction of the new PS as the reservoir, as well as the draw off floating arm and valve works replacement at the reservoir. Additionally, the Tredegar Park Golf Club golf course is adjacent to the reservoir and in close proximity to a section of the pipeline and may also experience some effects from construction works. Parc-Y-Brain park would also be in close proximity to the pipeline works and users of the park may therefore also experience some effects (e.g. noise/dust) associated

with the excavation of the pipeline route. More generally recreational user (e.g. walking/cycling) of the surrounding area may also experience similar effects.
Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the pipeline excavation and construction of the new PS which could affect residential receptors in Bettws as well as a very limited number of scattered residential dwellings and farmsteads within the vicinity of the scheme and to a lesser extent (due to relative distance between receptors and the locations of works) east Rogerstone/High Cross, Risca and Ponthir.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The construction of the option would require raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Minor negative effect - Within 1km of the site of the new Ynys-y-Fro pumping station, the route of the new 1.6km rising main from Ynys-y-Fro to the LG Main connection, the route of the new 2.5km gravity main between Pant-Yr-Eos and the LG main connection, and the new valve complex at the LG main connection there are: 3 Scheduled Monuments and 13 Listed Buildings, with the closest being the Grade II listed Scheduled Monument, St. Peter's Churchyard Cross (remains of) (approximately 200m from the pipeline works). Adjacent to this Monument is the Church of Saint Peter itself which is Grade II* listed. The next closest feature is the Fourteen Locks, Monmouthshire Canal Scheduled Monument (approximately 0.6km from the works); whilst the remaining Scheduled Monument and Listed Buildings are all situated 0.6km or more from the proposed works. Due to the proximity of the St. Peters Church/Churchyard Cross, a minor temporary negative effect on the setting of these features is expected. There may also be a very minor negative effect on the setting of the Fourteen Locks Scheduled Monument. However, the other features listed above are not expected to be affected by construction works, due to the distance between the features and the proposed works. Within 1km of the works at Court Farm there is: 1 Scheduled Monument (Candwr Camp approximately 0.7km from the Court Farm works); and, 2 Listed Buildings (the closest of which is the Barn at Pen-twyn Farm, approximately 0.8km from the works). Due to the distance between these features and the works, no significant effects are expected.
Objective 17: Minor negative effect - Construction works would not take place within or in close proximity to any landscape designations with the closest designated area being the Brecon Beacons National Park, approximately 8.2km from the pipeline works at Court Farm. Due to the distance between these areas and the construction works, no negative effects are expected. Pipeline works may, however, adversely impact the amenity of the surrounding rural greenfield setting that much of the pipeline would be routed through.
Operation
Objective 1: Minor negative uncertain effect - The WFD assessment concludes that the additional abstraction from the reservoirs may cause deterioration by lowering water levels (particularly during dry weather conditions) and increasing the concentration of any water quality determinands. Any such

effects would have the potential to impact on plants, fish and invertebrates, and in the case of Ynys-Y-Fro reservoir, could exacerbate phytoplankton blooms. The lowering of water levels may also impact on shoreline conditions with an effect on associated ecology. Maintenance of the water main could also require works in areas of ancient woodland that has the potential for disturbance to biodiversity. In addition, Ynys-y-Fro and Pant-yr-Eos each sit at the head of a small stream, both of which ultimately feed into the Usk Estuary, although the HRA concludes that the contribution of these streams to flows in the Usk is self evidently negligible and that effects on the River Usk / Afon Wysg SAC are very unlikely to be significant, particularly as operation is within the terms of the existing licence. Overall the potential for a minor negative effect on biodiversity has been identified, with some uncertainty remaining.
Objective 2: Moderate positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Minor negative effect - The option would involve the transfer of raw water from Pant-yr-Eos and Ynys-y-Fro reservoirs to Court Farm WTW, with treatment at the WTW at Court Farm, prior to discharge into Court Farm reservoir. Therefore, as water would be transferred between two WFD surface water catchments, however, with treatment prior to discharge into Court Farm reservoir, the INNS risk has been assessed as minor.
Objective 4: Neutral effect - It is not anticipated that the operation of this option would have any effect on soils, geodiversity of land use.
Objective 5: Moderate negative effect - The ALS indicates that water is not available for licensing in the area that the reservoirs are situated within at Q95 and Q70, with restricted water available at Q50 and Q30. The WFD assessment concludes that the additional abstraction of 9Ml/d from Ynys-Y-Fro reservoir and 13.7Ml/d from Pant-Yr-Eos reservoir may cause deterioration by lowering water levels (particularly during dry weather conditions) and any such effects would have the potential to impact on plants, fish and invertebrates. The lowering of water levels may also impact on shoreline conditions with an effect on associated ecology. However, the WFD highlights that it is assumed that there would be no changes to compensation releases from the reservoirs to Pant-Yr-Eos Brook so low flows should be unaffected. With less water in the reservoirs due to increased abstraction, the reservoirs will take longer to refill, and spill into the brook may be delayed/reduced. However, the WFD assessment concludes that this is likely to have only a minor impact on downstream flows in terms of the proportion of time that the reservoirs spill for.
Objective 6: Moderate negative effect - The WFD assessment concludes that the additional abstraction of 9Ml/d from Ynys-Y-Fro reservoir and 13.7Ml/d from Pant-Yr-Eos reservoir may cause deterioration of the reservoirs by lowering water levels (particularly during dry weather conditions) and increasing the concentration of any water quality determinands. Any such effects would have the potential to impact on plants, fish and invertebrates and in the case of Ynys-Y-Fro reservoir, could exacerbate phytoplankton blooms. The WFD assessment also concludes that increased abstraction from the reservoirs could result in changes to physico-chemical quality elements (e.g. TP, BOD, DO, pH, temperature) in the reservoirs, particularly during low level conditions, potentially causing a deterioration in their status. However, the WFD highlights that the changes downstream (in Pant-Yr-Eos Brook) are not expected to have an impact on biological or WQ elements and the option would not introduce new priority or priority hazardous chemicals in the brook or the reservoirs.
Objective 7: Neutral effect - It is not anticipated that the operation of this option would have any effect on flood risk.

Objective 8: Neutral effect - It is not anticipated that the operation of the option would have any effects on air quality.
Objective 9: Minor negative effect - The operation of this option is expected to generate 220.3tCO2e/a, largely associated with the energy required to operate the new pumping station. This has been assessed as having a minor negative effect on carbon emissions.
Objective 10: Moderate positive effect - The additional capacity (22.7Ml/d) provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Moderate positive effect - The additional 22.7Ml/d capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a moderate positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Minor negative effect - The supply of 9Ml/d from Ynys-Y-Fro reservoir may increase the rate of drawdown of the reservoir, which could lead to the lowering of reservoir levels during the year (i.e. times of low rainfall). This in turn could affect the water dependent activities such as angling on the reservoir. Operation of the pumping station may also lead to minor noise which could affect users of the reservoir and nearby golf course. More generally, the operation of the option may have a very minor effect on recreational users (e.g. walking) of the areas surrounding the reservoirs if the operation of the option results in a lowering of reservoir levels during the year (i.e. times of low rainfall), thereby having a minor negative effect on visual amenity. However, any effects on recreational users in this respect are anticipated to be negligible.
Objective 13: Moderate positive effect - The increased capacity of 22.7Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Moderate positive effect - The option is not a water efficiency option, so would have no effect on water efficiency, however, it would increase the resilience of water resources within the DCWW supply area, though the provision of an extra 22.7Ml/d of deployable output.
Objective 15: Minor negative effect - The operation of the option would require energy for the pumping of water from Ynys-Y-Fro reservoir, to the LG main connection (likely involving the use of fossil fuels to generate the energy required).
Objective 16: Neutral effect - There would be no operational effects on designated cultural heritage assets.
Objective 17: Minor negative effect - The operation of the option may lead to a minor negative effect on the character of the local landscape, if the provision of 9Ml/d from Ynys-Y-Fro reservoir and 13.7Ml/d from Pant-Yr-Eos leads to the lowering of the respective reservoir levels during the year (i.e. times of low rainfall). The option would also result in permanent above ground infrastructure (the new PS), which may have an effect on the local landscape, however, this would be situated at the existing reservoir site, alongside similar existing infrastructure, so would be in keeping with the existing character of the site.

wood.

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW044
Option Name	Schwyll Boreholes
Water company	DCWW
Option Description	Recommission the Schwyll groundwater spring system and transfer flow north to connect up to the new Tywi CUS to SEWCUS transfer main within the operational land of Cefn Hirgoed SRv. The option includes full treatment costs to allow transfer at all times. The option entails taking 25 Ml/d intermittently from Schwyll. Existing source pumps (total capacity 30 Ml/d) will require replacement. The main elements of this scheme would be: new water 25 MLD treatment works comprised of coagulation, DAF, sand filtration, microfiltration and reverse osmosis; 25 Ml/d Pumpstation with 13 bar pressure; 12.8km of new 710mm dia HDPE SDR11 trunk main; and, replacement source pumps (total capacity 30 Ml/d).
Yield	25Ml/d
WRZ	SEWCUS

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
SEW044	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

	Operation (positive)	**0**	**++**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**+++**	**+++**	**0**	**+++**	**+++**	**0**	**0**	**0**

Construction
Objective 1: Minor negative effect - With 10km of the option there are: 4 SACs, the closest of which is Kenfig/Cynffig (Merthyr Mawr SSSI/Merthyr Mawr Warren NNR), which is located approximately 1.2km from the Schwyll site, with all other SACs being located 2.5km or more from the works; 29 SSSIs, of which 3 are located within 1km of the works (Ewenny and Pant Quarries, Coed Y Mwstwr Woodlands, and Old Castle Down, approximately 0.3km, 0.5km and 0.7km from the from the pipeline works respectively) and all other SSSIs being located 1.2km from the works or more; 2 LNRs, the closest of which is the aforementioned Merthyr Mawr Warren NNR, with the remaining NNR being located approximately 9.2km from the works; and, 5 LNRs, the closest of which are Tremains Wood and Craig-y-Parciau Woodland, both of which are located approximately 1.7km from the works (all remaining LNRs are 6.6km or more from the works. The HRA concludes that the construction associated with this option will not affect any international sites. Due to the proximity of the three closest SSSIs to the works, there may be some minor effects (e.g. noise, dust and air quality) on these sites, however, due to the distance between the other designated sites and the works, no significant effects are expected. There are three areas of ancient woodland would be crossed by the pipeline and therefore, pipeline works may result in a loss/damage of some sections of woodland in these areas. A further three areas of ancient woodland would be located within 100m of the pipeline works (with the closest being approximately 60m from the works) however, it is not anticipated that works would cause any harm to these areas, although may cause minor disturbance (e.g. noise, vibration, dust) on wildlife within these habitats. More generally, construction works may have a minor negative effect (e.g. from noise disturbance or effects on air quality/dust) on proximate non-designated habitats and species.
Objective 2: Moderate negative effect - The BNG assessment concludes that there would be a moderate negative effect on biodiversity net loss due to the permanent loss and temporary disturbance of habitats during the construction period, associated with the construction of the new pipeline, as well as a more minor permanent loss of habitats associated with the construction of the new WTW.
Objective 3: Neutral effect - There would not be any impact on the INNS risk during construction period.
Objective 4: Moderate positive effect - The option would involve the use of the refurbishment of the existing Schwyll Boreholes, with replacement pumps fitted at the existing boreholes. There is also the opportunity to recommission the existing WPS at Schwyll instead of building a new WPS. The new WTW would also be constructed within the existing operational footprint of the Schwyll site, however, there is uncertainty as to whether the site is large enough to accommodate the new WTW and therefore additional land take may be required (assessed below). Objective 4: Minor negative uncertain effect - The new WTW at the Schwyll site may require additional land take (Grade 2 ALC), if the existing operational site is not large enough to accommodate the WTW. The pipeline would mainly be routed through land in ALC grades 3a, 3b and 5 as well as non-agricultural and urban land with some smaller pockets of grade 2 land. However, much of the pipeline would follow the route of roads, so it is not expected that pipeline works would result in significant loss of agricultural land and any soil displaced during pipeline works would be reinstated following completion.

Objective 5: Neutral effect - It is not expected that construction would affect water resources.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). Directional drilling would be utilised where the pipeline crosses the Ewenny River and the Cwm Alon, avoiding the need for in-channel works.
Objective 7: Minor negative effect - Sections of the pipeline (namely where it runs parallel to the Ewenny River and the Nant Ganna, and where it crosses the Brocastle Brook) would be situated within areas of Flood Zone 3 (and 2) and therefore construction could be vulnerable to flooding depending on the timing of works. The boreholes/WPS/WTW site would be directly adjacent to an area of Flood Zone 3 associated with the Ewenny River, however, as it is located just outside of this area it is not anticipated that construction works would be vulnerable to flooding.
Objective 8: Moderate negative effect - Works could result in increased congestion on the road network over the two year construction period, due to associated vehicle movements, particularly on the B4524 (which would be used to access the Schwyll site and which approximately 4.8km of the pipeline would be routed parallel to/along), the B4265, A48, A473 and M4 which the route of the pipeline would cross and may also be used to access works (and in the case of the A473, which a section of pipeline would also be routed along/parallel to) as well as a number of other local roads that may be used to access works, or which the pipeline would cross or be routed along. It is noted however, that where the pipeline crosses the M4 and A473, directional drilling would be utilised, avoiding the need for road closure and thereby avoiding additional congestion. Congestion caused by the construction of the scheme, together with emissions associated with the use of plant and machinery, may have a negative effect on local air quality, particularly on residential areas surrounding the scheme, including those along the B4265 (such as Ewenny and Corntown); Treoes; Coychurch; west Pencoed; and, the scattered residential dwellings in proximity to the scheme. It is noted however, that the scheme is not situated within any AQMAs.
Objective 9: Significant negative effect - The construction of this option would require significant quantities of raw materials such as concrete, steel and plastic, with 11,365tCO2e embodied carbon. Furthermore, the construction of the option would result in additional vehicle movements (over the 2 year construction period) and would require the operation of machinery and plant, which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, sections of the new pipeline would be located within an area of high flood risk. In consequence, construction could be vulnerable to the effects of climate change (flooding).
Objective 11: Significant positive effect - Construction would involve a significant capital expenditure (£45.31m), resulting in a significant positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy. Objective 11: Moderate negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated vehicle movements, particularly on the B4524 (which would be used to access the Schwyll site and which approximately 4.8km of the pipeline would be routed parallel to/along), the B4265, A48, A473 and M4 which the route of the pipeline would cross and may also be used to access works (and in the case of the A473, which a section of pipeline would also be routed along/parallel to) as well as a number of other local roads that may be used to access works, or which the pipeline would cross or be routed along. It is noted however, that where the pipeline crosses the M4 and A473, directional drilling would be utilised, avoiding the need for road closure.

Objective 12: Minor negative effect - The construction of the option may cause disturbance (e.g. noise/vibration and dust/air quality) to users/visitors of recreational/tourist facilities surrounding the works, such as Ogmoor Castle and Southerndown Golf Club, which are both in close proximity to the Schwyll site, in addition to the following, which would be located in close proximity to/adjacent to works along the pipeline route: Bridgend Golf golf club; Vale Cricket Club; Treoes Fishing Lake and Coed-y-Mwstwr golf club. There may also be a negative effect on users of National Cycle Route 88 in Ewenny. More generally, works may have a negative effect on recreational users (e.g. cycling and walking) of areas surrounding the works.
Objective 13: Moderate negative effect - There may be noise/vibration disturbance and air quality impacts associated with the construction of the new WTW, WPS and refurbishment of the boreholes, as well the pipeline excavation which could affect residential receptors along the B4265 (such as Ewenny and Corntown); Treoes; Coychurch; west Pencoed; Brocastle Manor Care home; and, the scattered residential dwellings and farmsteads in proximity to the scheme (particularly those immediately adjacent to the Schwyll site.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Significant negative effect - The construction of the option would require significant quantities of raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Minor negative effect - The Schwyll site does not include any historic designations, however, there are several features within 1km of the scheme, including: 14 Scheduled Monuments, the closest of which are Coychurch Churchyard Cross and Coychurch Celtic Cross-Shaft in Church (approximately 130m and 150m from the works respectively), with a further 3 of the of Scheduled monuments being situated within 500m of the works); 79 listed buildings, of which 10 would be situated within 100m of the works, including Corntown Court, Top Lodge and Former Bethlehem Baptist Church aka Ty Chapel (all <5m from the pipeline works) (the other listed buildings within 100m of the works would be situated 25m or more from the works); whilst a further 11 Listed Buildings would be within 500m of the works. Due to the proximity of a number of these features to the proposed works, it is anticipated that there would be some effects on their setting during construction, however, it is not anticipated that construction works would lead to any damage to assets, assuming construction best practise is adopted. Furthermore, the pipeline route would pass through the edge of the Ewenny Priory Park and Garden of Special Historic Interest, however, it is anticipated that detailed routing should avoid the need to pass through the grounds of the park and garden, but it is likely there would be some minor temporary effects on its setting. A further Park and Garden would be situated within 1km of the works (Merthyr Mawr House, approximately 400m from the works) which may also experience some more minor effects on setting, during construction.
Objective 17: Minor negative effect - The option is not located within, or within close proximity to any statutory designated landscapes , however, the works at the Schwyll site (borehole refurbishments and construction of the new WPS and WTW) and a small section of the pipeline leading away from the site, would be situated within the Merthyr Mawr, Kenfig & Margam Burrows Historic Landscape (non-statutory designation). Works at the Schwyll site may have a minor negative effect on the character of this landscape, however, as works would take place within the existing operational site which benefits from pre-existing natural screening, any effects in this regard are likely to be minor. Excavation of the small section of pipeline leading away from the site may also have a minor negative effect on the character of the landscape, however, any effects in this regard would be temporary, with soil

displaced during pipeline works being reinstated following completion. More generally, much of the pipeline works would be located on greenfield land in a semi-rural area, so may therefore have negative effects on the setting/visual amenity of the landscape that it is situated within, however, any effects would be temporary with soil displaced during construction being reinstated following completion.
Operation
Objective 1: Moderate negative uncertain effect - Once operational, there is the potential for effects on ecology due to abstraction of water from the boreholes. The HRA notes that with regard to operation, Merthyr Mawr Warren, a component of Kenfig SAC, is less than 1km from one of the Schwyll boreholes spring site and supports features that are thought to be supported by groundwater from the Friars Point Carboniferous limestone aquifer. Furthermore, a river (Afon Ogmore) runs adjacent to the SAC and one of the boreholes. The HRA concludes that the nature of any connectivity between the boreholes, the aquifer and the features of the SAC is not certain, and the functioning of the groundwater body is understood to be complex. The reinstatement of the boreholes will be within the terms of the existing licence (and so no operational effects would be expected, assuming that the RoC outcomes are still considered reliable) although this aspect may require more investigation and characterisation to provide confidence, hence HRA concludes that the HRA risk is uncertain. Maintenance of the pipeline may also require works in areas of ancient woodland that may result in temporary disturbance to biodiversity.
Objective 2: Moderate positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - The option involves the use of a groundwater source from the Schwyll Boreholes, with water being treated prior to connecting into the Tywi CUS to SEWCUS transfer main, therefore no pathway for INNS transfer (and treatment).
Objective 4: Neutral effect - It is not anticipated that the operation of this option would have any effect on soils, geodiversity of land use, beyond the potential initial land take associated with the new WTW. assessed under the construction phase.
Objective 5: Moderate negative uncertain effect – The WFD highlights that the increased groundwater abstraction has the potential to reduce flows in overlying surface water features, and whilst the ALS indicates there is water available in the overlying surface water bodies across the flow regime, it is indicated that there is a high potential for connections to surface water, so an impact on surface water bodies (i.e. the River Ogmore, River Ewenny, and River Alun) cannot be ruled out. Flows in these waterbodies could be reduced due to reductions in baseflow or increased losses to ground resulting from increased groundwater abstraction. The WFD highlights that changes to hydrological regime, river continuity and morphological conditions in these rivers could impact fish invertebrates and macrophyte/phytobenthos populations. In terms of the aquifer itself (Swansea Southern Carboniferous Limestone) the WFD notes that the ALS indicates that there is water availability in the aquifer, therefore a moderate abstraction of 25 MLD should not lead to deterioration in quantitative water balance of the aquifer. The WFD also notes that impacts on flows in the Ogmore estuary would be negligible due to the significant influence the sea has on the waterbody and that any flow reductions passed down from the upstream water body would be minor and unlikely to have an impact on ecological populations.
Objective 6: Moderate negative uncertain effect – It is noted that the scope book highlights that the abstraction is subject to saline intrusion. Although the abstraction has operated historically, it is not known how long ago the abstraction ceased, and whether it historically had a wider impact on saline

intrusion to the aquifer. Therefore, the WFD assessment concludes that without further evidence, the potential for deterioration should be considered. The WFD assessment also notes that further information is required, to determine which GWDTEs are failing for chemical status and hence whether there is any potential for the abstraction to impact on those habitats. The WFD also highlights that potential reductions in flows in the overlying surface water bodies (i.e. the River Ogmore, River Ewenny, and River Alun) due to reductions in baseflow or increased losses to ground resulting from increased groundwater abstraction (particularly during times of low flow) could result in changes to physico-chemical quality elements (e.g. P, BOD, DO, pH, temperature). Furthermore, a reduction in flows in these water bodies could result in a minor reduction in dilution of chemicals already present in the watercourses (with the exception of the Ewenny, due to the current High status). The WFD notes however, that reductions in flows in the Ogmore Estuary would be negligible and hence effects on water quality and chemicals would be negligible in this waterbody.
Objective 7: Neutral effect - It is not anticipated that the operation of the option would not be liable for flooding or cause or exacerbate flooding elsewhere.
Objective 8: Neutral effect - There would be no operational effects on air quality given the very low volume of expected traffic associated with the operation of the new WTW.
Objective 9: Significant negative effect - The operation of the option would generate 4,376tonnes CO2e/a associated with the pumping and treatment of water. This has been assessed as having a significant negative effect on this objective.
Objective 10: Significant positive effect - The additional 25Ml/d provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Significant positive effect - The additional 25Ml/d capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a significant positive effect on the local economy.
Objective 12: Neutral - The operation of the option is not anticipated to have any effects on opportunities for recreation or tourism.
Objective 13: Significant positive effect - The increased capacity of 25Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Significant positive effect - The option is not a water efficiency option, so would have no effect on water efficiency, however, it would increase the resilience of water resources within the DCWW supply area, though the provision of an extra 25Ml/d of deployable output.
Objective 15: Moderate negative effect - The operation of the option would require the use of the chemicals (dosing) and ongoing energy use which would likely require the use of fossil fuels for energy.
Objective 16: Neutral effect - It is not anticipated that there will be any significant effects on cultural heritage during the operation of the option.

Objective 17: Neutral effect - Whilst the option would introduce above ground infrastructure at the Schwyll site, this would be within the boundary of the existing operational site and in keeping with the character of the existing site. Furthermore the site benefits from pre-existing natural screening and therefore no significant effects on landscape are expected during the operation of the option.

wood.

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW052
Option Name	
Water company	DCWW
Option Description	Revocation of six upstream licences which provides water at low flow. Proposed abstraction of up to 10Ml/d from the Afon Lwyd by means of a new intake structure, and pumping the raw water to Court Farm through 400m of 450mm HDPE pipe connecting to the LG Main
Yield	up to 10Ml/d
WRZ	SEWCUS

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
SEW052	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	0	0

	Operation (positive)	**0**	**+**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**++**	**++**	**0**	**++**	**++**	**0**	**0**	**0**

Construction
Objective 1: Minor negative effect - The abstraction is approximately 6km upstream of the confluence between the Lwyd and the River Usk SSSI and SAC and approximately 20km from the River Usk SAC, Severn Estuary SAC, SPA and Ramsar. As such the HRA concludes that whilst construction effects are possible (pathways present), significant or significant adverse effects clearly avoidable with established scheme-level avoidance or mitigation measures. There are a number of areas of ancient woodland within 10km of the option, with the closest (4.5ha) being located approximately 0.3km from the existing WwTW. Construction of the abstraction point, pumping station and 0.4km pipeline would require greenfield land. Construction activities would occur within the confined rural setting of the WTW site which may cause minor short-term disturbance to the proximate woodland and grassland habitats.
Objective 2: Minor negative effect - The BNG assessment concludes that there would be a minor negative effect on biodiversity net loss due to the temporary loss of habitats associated with the construction of the pipeline and permanent loss of habitats associated with the construction of the PS.
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Minor positive effect - Works on the WwTW would be contained within an existing operational site such that new ancillary infrastructure should not significantly impact land/soil quality. Objective 4: Minor negative effect - The construction of the abstraction, PS and the pipeline would lead to the development of greenfield land, albeit that effects from the pipeline excavation would be limited and temporary.
Objective 5: Neutral effect - It is not expected that construction would affect water resources. The WFD assessment notes that whilst construction of new infrastructure will require appropriate consenting and permitting, WFD compliance is unlikely to be a barrier to implementation of the option.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). The WFD assessment notes that whilst construction of new infrastructure will require appropriate consenting and permitting, WFD compliance is unlikely to be a barrier to implementation of the option.
Objective 7: Negative effect - WTW is located in an area of high risk of flooding (>3.3% chance per annum). Construction of the scheme components could therefore be liable to flooding depending on the timing of works; however, such risks could be minimised. Construction is not expected, however, to cause or exacerbate flooding in the area or elsewhere.
Objective 8: Minor negative uncertain effect - The construction of the option could result in traffic congestion during the construction period (particularly on the local road network within the vicinity of the scheme) which, together with emissions associated with the use of plant and machinery, may have a negative effect on local air quality..

Objective 9: Minor negative effect - The construction of the option would require concrete, steel and plastic, with 275.8tCO2e embodied carbon. Furthermore, the construction of the option would result in additional vehicle movements (over the 1 year construction stage) and would require the operation of machinery and plant, which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, the site is located within an area of high flood risk. In consequence, construction could be vulnerable to the effects of climate change (flooding).
Objective 11: Minor positive effect - Construction would involve a minor sized capital expenditure (£1.28m), resulting in a minor positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy. The spend would be within one year. Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the local road network within the vicinity of the scheme. However, effects in this regard will be temporary.
Objective 12: Neutral effect - Construction is not considered to have any effects on tourism and construction.
Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the construction of the new PS and pipeline excavation which could affect residential receptors within Ponthir and the scattered residential dwellings and farmsteads within the vicinity of the scheme.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The construction of the option would require limited quantities of materials and fabricated products and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Minor negative effect - The WTW site does not have any historic designations, however, there are several Grade ll Listed Buildings and one scheduled monument within 1km of the scheme. Castle Mound (E of Graig Wood) is approximately 0.3km from the site. Due to the relative distance between these sites and the scale of the proposed works, it is not expected that construction would result in any adverse effects beyond a minor temporary loss of visual amenity regarding their settings during construction.
Objective 17: Neutral effect - The site is not within or in proximity to any landscape designations with the Wye Valley AONB approximately 16km distant. Construction works may adversely impact the amenity of the surrounding rural greenfield setting; however, construction would be confined within the existing site footprint such that any adverse impact on the landscape would be limited.
Operation
Objective 1: Moderate negative uncertain effect - The CAMS suggests that there is water available for use on the Lwyd at some flows (water available for licensing at Q85=10.9Ml/d, and at Q95=6.3Ml/d). The Afon Lwyd is a tributary of the River Usk, however, the confluence of the Lwyd with the Usk is below the Usk tidal limit (so the Usk CAMS is not relevant), and this would suggest effects on the Usk are likely to be limited, although mobile species (i.e.

diadromous fish associated with Severn Estuary SAC / River Usk SAC, and the Severn Estuary Ramsar) may be exposed to environmental changes either in the Usk or the Lwyd. The HRA concludes that these environmental changes are likely to be small (esp. relative to tidal influence / main flow of the Usk) but the extent to which the Lwyd might be considered 'functional habitat' for these species is unknown and may require discussion with NRW (although the Lwyd is not noted in the Usk Management Plan). The HRA also notes that a DCWW drought option relating to the Lwyd was not pursued due to uncertainties over the effects on salmon, which is likely to require additional investigation and hence the HRA risk is 'uncertain'. The HRA also notes that effects on the Severn Estuary sites are unlikely due to the distance downstream.
Objective 2: Minor positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - The option involves effluent reuse, therefore no pathway for INNS (and treatment).
Objective 4: Neutral effect - There would be no operational effects on soils/geodiversity/land use.
Objective 5: Moderate negative effect - The WFD assessment notes that with regard to the Afon Lwyd the ALS indicates restricted water for abstraction at Q95 but available across the rest of the flow regime. The WFD assessment highlights that reductions in flows could result in reduced whole catchment dilution, noting that this, combined with limited water availability means deterioration in status can't be ruled out. Changes to the hydrological regime, river continuity and morphological conditions could impact fish, invertebrate and macrophyte/phytobenthos populations. However, any impacts would be relatively localised as the Afon Lwyd confluences with the Usk approximately 3.5 km downstream, at which point the system is tidal. Furthermore, the WFD assessment concludes that lower flows could result in a reduction in dilution of chemicals already present in the waterbody, and potentially a further deterioration in status.
Objective 6: Moderate negative effect – The WFD assessment notes that the ALS indicates restricted water for abstraction at Q95 but available across the rest of the flow regime. Reductions in flows could result in reduced whole catchment dilution. This combined with limited water availability means deterioration in status can't be ruled out. Changes to the hydrological regime, river continuity and morphological conditions could impact fish, invertebrate and macrophyte/phytobenthos populations. However, any impacts would be relatively localised as the Afon Lwyd confluences with the Usk approximately 3.5 km downstream, at which point the system is tidal. The WFD also notes that reduction in flow, particularly during times of low flow could result in changes to physico-chemical quality elements (e.g. BOD, DO, pH, temperature), potentially causing a deterioration in status and whilst the option would not introduce new priority or priority hazardous chemicals, lower flows could result in a reduction in dilution of chemicals already present in the Afon Lwyd waterbody, and potentially a further deterioration in status.
Objective 7: Neutral effect - It is not anticipated that the operation of the option would not be liable for flooding or cause or exacerbate flooding elsewhere.
Objective 8: Neutral effect - There would be no operational effects on air quality given the very low volume of expected traffic associated with the reverse osmosis plant operation.

Objective 9: Minor negative effect - Operational energy demand would generate 254.2tCO2e/a. This has been assessed as having a minor negative effect on this objective.
Objective 10: Moderate positive effect - The increased capacity (10Ml/d) provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Moderate positive effect - The additional 10Ml/d capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a significant positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect -The operation of the option is not expected to impact upon opportunities for recreation or tourism, including at Kielder Water as the option would result in only minor changes to lake water levels.
Objective 13: Moderate positive effect- The scheme would not adversely affect human health due to increased noise, nuisance or disruption . The increased capacity of up to 10Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Moderate positive effect - The option would involve the reuse of effluent (10 Ml/d) and would increase the resilience of water resources within the DCWW supply area, though the provision of an extra 10Ml/d of deployable output.
Objective 15: Neutral effect - The operation of the option would not have any effect on waste and resource use.
Objective 16: Neutral effect - There would be no operational effects on designated cultural heritage assets.
Objective 17: Neutral effect - The operational sites are not within or in proximity to any landscape designations. There would be no operational effects on local setting of features, given the presence of WwTW and WTW.

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW053
Option Name	New Abstraction from the Afon Lwyd to Llandegfedd through Court Farm
Water company	DCWW
Option Description	Abstraction of 10Ml/d from the Afon Lwyd by means of a new intake structure, and pumping the raw water to Court Farm reservoir through 400m of 450mm HDPE pipe connecting to the LG Main. The flows are then taken to Llandegfedd through a new PS at Court Farm and pumped through the existing 42" CO main
Yield	10 Ml/d
WRZ	SEWCUS

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
SEW053	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	-

	Operation (positive)	**0**	**++**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**++**	**++**	**0**	**++**	**++**	**0**	**0**	**0**

Construction
Objective 1: Minor negative effect - The Severn Estuary (Wales) (8603m) Ramsar, SPA and SAC and the River Usk / Afon Wsg SAC (2160m) are within 10km of the option. The HRA concludes construction effects of the River Usk / Afon Wsyg SAC are possible but avoidable at the scheme level with normal measures. There are 20 SSSI's within 10km of the option, with the closes being the River Usk (Lower Usk)/Afon Wysg (Wysg Isaf), 2160m from the option. All others are at least 2700m from the option. 2 NNR's are within 10km of the option, the Penhow Woodlands (8581m) and the Newport Wetlands (8871m). 7 LNR's sit within 10km of the option, with the closest being Llwyn Celyn (2922m). The remaining 6 are at least 3465m from the option. There are 26 ancient woodlands within 1km of the option, 2 of which lie within 100m. There is a restored ancient woodland site at 30m distance and an ancient semi natural woodland and 67m from the Afon Lwyd site. The remaining ancient woodlands are at least 199m from the option.
Objective 2: Moderate negative effect - The BNG assessment has identified a permanent loss of approx. 0.45ha and temporary loss of approx. 2.4ha of habitats during construction of this option. This has been assessed as a moderate negative effect.
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Minor positive effect - The new pumpstation at Court Farm will be constructed within the footprint of an existing site and therefore is not expected to significantly impact land/soil quality. Objective 4: Minor negative effect - Construction of the raw water intake structure and pumpstation at Afon Lwyd will take place on good agricultural land. Excavation of the pipeline route would also traverse areas of good agricultural land, although this would be reinstated following the construction phase.
Objective 5: Neutral effect - It is not expected that construction would affect water resources.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures).
Objective 7: Major negative effect - The proposed works and pipeline route at Afon Lwyd (>40% of the option) lie entirely within Flood Zone 3. Construction of these scheme components could therefore be liable to flooding depending on the timing of works; however, such risks could be minimised and the works at Court Farm and associated pipeline route would be located in areas of low flood risk. Construction is not expected, however, to cause or exacerbate flooding in the area or elsewhere.
Objective 8: Minor negative uncertain effect - The construction of the option could result in traffic congestion during the 1.5 year construction period (particularly on the A4042) and more generally, the local road network within the vicinity of the scheme and where pipelines will follow/cross road) which, together with emissions associated with the use of plant and machinery, may have a negative effect on local air quality. The option is not located within any AQMAs.

Objective 9: Minor negative effect - Construction of the option would require the use of raw materials with a moderate amount of embodied carbon (**approximately 776 tCO2e**) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Moderate negative effect - As noted above, the works and pipeline at Afon Lwyd (>40% of the option area) are located within an area of high flood risk. In consequence, construction could be vulnerable to the effects of climate change (flooding), depending on the timing of construction.
Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated increased traffic, for example on the A4042 and local minor roads. Objective 11: Minor positive effect - The construction of the option would involve a minor capital expenditure (**£1.68m**), resulting in a minor positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy.
Objective 12: Minor negative effect - The National Cycle Network lies approximately 1.7km south west and 2.2km west of the option. Construction of the option is not expected to significantly affect access to this, or other opportunities for recreation and tourism, although works could result in temporary disruption (noise/air quality) to users of local open space/footpaths including along the Afon Lwyd and around Court Farm Reservoir.
Objective 13: Neutral effect - There may be noise/vibration disturbance and air quality impacts associated with the construction of the option, however, due to the rural location of the scheme and lack of nearby residential receptors, any effects in this regard are anticipated to be negligible.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The construction of the new pipelines, raw water intake structure and pumpstations, would require raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Minor negative effect - There are 4 scheduled monuments within 1km of the option, the nearest being the Castle Mound E of Graig Wood (213m). The remaining 3 are at least 369m from the option. Due to the relative distance between these features and the construction works, no significant effects on their setting or integrity are expected as a result of construction works, however, the aforementioned listed buildings are located along roads leading to the reservoir site that may therefore be used by construction traffic, thereby leading to a minor temporary negative effect on their setting. The option also crosses the Llantarnam Abbey registered park/garden at the Afon Lwyd, however any effects are expected to be temporary.
Objective 17: Minor negative effect - The option does not lies within or near any designated landscapes. The Brecon Beacons National Park lies 8.2km to the north. The Gwent Levels Historic Landscape lies approximately 7.7km to the south. All of these designated landscapes are at a sufficient distance for construction of the option to have no effect. Construction may have short term, temporary negative effects on local landscape features and other receptors in the vicinity of the reservoir (including walkers and visitors to the river and reservoir).
Operation

Objective 1: Moderate negative uncertain effect - The HRA states that with regard to operation, CAMS suggests that there is water available for use on the Lwyd at some flows (WAFU@Q85=10.9Ml/d, WAFU@Q95=6.3Ml/d). The confluence of Lwyd with Usk is below Usk tidal limit (so Usk CAMS not relevant), and this would suggest effects on the Usk are likely to be limited, although mobile species (i.e. diadromous fish associated with Severn Estuary SAC / River Usk SAC, and the Severn Estuary Ramsar) may be exposed to environmental changes either in the Usk or the Lwyd. These environmental changes are likely to be small (esp. relative to tidal influence / main flow of the Usk) but the extent to which the Lwyd might be considered 'functional habitat' for these species is unknown and may require discussion with NRW (although the Lwyd is not noted in the Usk Management Plan). It should be noted that a DCWW drought option relating to the Lwyd was not pursued due to uncertainties over the effects on salmon, which is likely to require additional exploration. Overall the HRA risk is 'uncertain'. Effects on the Severn Estuary sites are unlikely due to the distance downstream. In terms of effects on Llandegfedd Reservoir, is anticipated that the volume of water transferred to the reservoir would be balanced by water abstracted for supply, so changes to the overall quantity of water in the reservoir and the hydrological regime would be minimal.
Objective 2: Moderate positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Significant negative effect - The current proposal includes the abstraction of raw water from the Afon Lwyd and transfer, through a combination of new pumped pipelines and the LG main, into Court Farm Reservoir (in the same WFD surface water catchment) and from Court Farm Reservoir water would be transferred to Llandegfedd Reservoir via the existing CO main (with a new pump to be installed) (in a different WFD surface water catchment). As such, as currently proposed there is a significant risk of transfer of INNS (as water would be transferred between WFD surface water catchments, without treatment prior to discharge. However, it is noted that the presence of INNS in the source water is currently unknown.
Objective 4: Neutral effect - There would be no operational effects on soils/geodiversity/land use following reinstatement of the land post construction.
Objective 5: Moderate negative effect - The WFD assessment highlights that mean daily flows in the Afon Lwyd could be reduced by 3.7% based on the flow record from the gauge located directly downstream of the abstraction point. The WFD also highlights that the ALS indicates restricted water for abstraction at Q95 but available across the rest of the flow regime. Reductions in flows could result in reduced whole catchment dilution. The WFD highlights that this combined with limited water availability means deterioration in status can't be ruled out and that changes to the hydrological regime, river continuity and morphological conditions could impact fish, invertebrate and macrophyte/phytobenthos populations. However, any impacts would be relatively localised as the Afon Lwyd confluences with the Usk approximately 3.5 km downstream, at which point the system is tidal. Overall the WFD assessment concludes that the option would be WFD non-complaint with a low confidence due to the small proportional reduction in flow in the Afon Lwyd. The WFD also highlights that with regard to the Llandegfedd Reservoir, is anticipated that the volume of water transferred to the reservoir would be balanced by water abstracted for supply, so changes to the overall quantity of water in the reservoir and the hydrological regime would be minimal.
Objective 6: Moderate negative effect - The WFD assessment highlights that a reduction in flow in the Afon Lwyd, particularly during times of low flow could result in changes to physico-chemical quality elements (e.g. BOD, DO, pH, temperature), potentially causing a deterioration in status. Additionally, the WFD assessment highlights that whilst the option would not introduce new priority or priority hazardous chemicals into the Afon Lwyd, lower flows could result in a reduction in dilution of chemicals already present in the waterbody, and potentially a further deterioration in status. With regard to the effects on the Llandegfedd Reservoir, the WFD assessment notes that water transfer from Afon Lwyd could potentially be of a different physio-chemical

composition (e.g. TP, BOD, DO, pH, temperature), potentially causing a deterioration in status and an introduction of impediments and additionally, the option has the potential to introduce new priority or priority hazardous chemicals to the reservoir from the source of raw water. Afon Lwyd WFD assessment states that PAHs are causing Moderate element status. Overall the WFD assessment concludes that the option would be WFD non-complaint with a low confidence
Objective 7: Moderate negative effect - The pumpstation and raw water intake structure at Afon Lwyd that would be utilised as part of this option is located within an area of Flood Zone 3 and therefore would be at risk of flooding during operation. Pipelines would not be vulnerable to the effects of flooding following reinstatement of the land after construction has ended. A negative effect has therefore been identified in respect of flood risk.
Objective 8: Neutral effect - No operational effects on air quality are anticipated.
Objective 9: Minor negative effect - Operation of the option would generate 312 **tCO2e** per annum**.** This has been assessed as having a moderate negative effect on this objective.
Objective 10: Moderate negative effect - As noted above, the proposed new pumpstation and raw water intake structure at Afon Lwyd are located within an area of high flood risk (Flood Zone 3) and therefore would be at risk to the effects of climate change (flooding) during operation. Objective 10: Moderate positive effect - The additional **10Ml/d** provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Moderate positive effect - The additional **10Ml/d** provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a moderate positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect -The operation of the option is not expected to impact upon opportunities for recreation or tourism.
Objective 13: Moderate positive effect- The scheme would not adversely affect human health or impact existing recreational facilities or recreation, due to increased noise, nuisance or disruption. The increased provision of an additional **10Ml/d** would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Moderate positive effect - The option would result in a moderate improvement in water efficiency and resilience through movement of water across the network, providing an additional 10Ml/d.
Objective 15: Neutral effect - The operation of the option would not have any effect on waste and resource use.
Objective 16: Neutral effect - The operation of the option would not have any effect on cultural heritage.
Objective 17: Neutral effect - The operational sites are not within or in proximity to any landscape designations. There would be no operational effects on local setting of features. Permanent visual effects from the new pumping station at the Afon Lwyd may lead to minor negative effects on landscape.

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW063
Option Name	Nantybwch Wastewater
Water company	DCWW
Option Description	Currently Nantybwch produces approximately 2 - 2.5 MLD per day in washwater that is sent to sewer. Recovering this washwater would reduce the amount of raw water the needs to be extracted for treatment. Proposed works is a washwater recovery plant and sludge thickening and return pumps back to the head of the works. The main elements of this scheme would be: 200 m3 DWW tank; supernatant pipework to returns sump; lamella feed pumps, D/S 30 m3/h lamella settlers; 0.125 kg/h polymer dosing; 66 m3 thickened sludge holding tank; filter press feed pumps; filter press for 1000 kg/d DS, 20 m3 returns sump; 2 MLD returns pumping station; cake storage; and, a filter press building 30m x 20m.
Yield	2 - 2.5 Ml/d
WRZ	SEWCUS

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
SEW063	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

	Operation (positive)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**+**	**+**	**0**	**+**	**+**	**0**	**0**	**0**

Construction
Objective 1: Neutral effect - Within 10km of the option there are: 3 SACs (Usk Bat Sites / Safleodd Ystlumod Wysg, approximately 4.3km from the option; Cwm Clydach Woodlands / Coedydd Cwm Clydach, approximately 7.5km from the option; and, River Usk / Afon Wysg, approximately 8.6km from the option) and 16 SSSIs (with the closest being Mynydd Llangynidr, approximately 2km from the option). The HRA concludes that HRA risk during construction is low as construction requirements are expected to be small-scale only, within the existing operational site. There are also 13 LNRs and 2 NNRs within 10km of the option, however, all LNRs are over 1km away from the option, with the closest being Parc Bryn Bach (1.1km from the option) and both NNRs are over 7km away from the option. As such no effects are anticipated as a result of the construction of the option, due to the relative distance between these sites and the construction works. There are also number of Ancient Woodlands within 10km of the option, however, these are all over 1.4km away from the option and as such no effects would be anticipated. More generally, construction works may have a very minor negative effect (e.g. from noise disturbance or effects on air quality/dust) on proximate non-designated habitats and species, however, this will be short term and is anticipated to be negligible.
Objective 2: Neutral effect. The BNG assessment concludes that construction of the option would have a neutral effect, as the option would involve washwater recovery, with all associated works taking place within the existing WTW site (hence no loss of habitats)
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Minor negative effect - This option would require the purchase of greenfield land to the south of the existing site, as the current operational site is constrained in terms of available space, however, land in this area falls within ALC Grade 4/5 (poor and very poor) and non-agricultural land, so no significant negative effects are anticipated as the result of this land take.
Objective 5: Neutral effect - It is not expected that construction would affect water resources.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures) to avoid effects on the nearby Sirhowy River.
Objective 7: Moderate negative effect - Both the existing site and the land to the south where the additional infrastructure associated with this option would be constructed are located within an area of Flood Zone 3 and 2 associated with the Sirhowy River and could therefore be liable to flooding depending on the timing of works. Construction is not expected, however, to cause or exacerbate flooding in the area or elsewhere.
Objective 8: Moderate negative effect - The construction of the option could result in traffic congestion during the 1-year construction period (particularly on the A465 and the local road network in close proximity/leading to the scheme, particularly in the village of Nantybwch (as construction traffic would likely need to pass through the village) which, together with emissions associated with the use of plant and machinery, may have a negative effect on local air quality. However, none of the construction works would take place within an AQMA.

Objective 9: Minor negative effect - The construction of this option would require raw materials such as concrete, steel and plastic, with 622.9tCO2e embodied carbon. Furthermore, the construction of the option would result in additional vehicle movements (over the 2 year construction period) and would require the operation of machinery and plant, which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, the new water recovery/treatment infrastructure at Nantybwch would be located within an area of high flood risk. In consequence, construction could be vulnerable to the effects of climate change (flooding).
Objective 11: Minor positive effect - Construction would involve a medium sized capital expenditure (£4.32m), resulting in a moderate positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy. Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated vehicle movements (particularly on the A465 and the local road network in close proximity/leading to the scheme, particularly in the village of Nantybwch. This may also have negative effects on access to the nearby industrial parks and quarry.
Objective 12: Neutral effect - Construction of the option is not expected to have a significant effect on opportunities for recreation or tourism. Construction works may have a negative effect on recreational users (e.g. walking/cycling) of the area surrounding the works, but any effects in this regard are anticipated to be negligible due to the localised and rural nature of the works and lack of any established walking/cycling routes in the area.
Objective 13: Moderate negative effect - Construction would take place in close proximity to the northern section of the village of Nantybwch and furthermore, it is likely that roads passing through the village would be used to access the site. Construction of the scheme and transportation of materials to the site could therefore negatively affect residential receptors in the village, particularly those in close proximity to the work as the scattered residential dwellings and farmsteads surrounding the site, for example, through noise/vibration and air quality/dust impacts, however, these effects would be temporary.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The construction of the option would require raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Neutral effect - Within 1km of the option there is 1 Scheduled Monument (Trefil Tramroad, approximately 711m from the option) and 3 listed buildings (Milgatw (approximately 265m from the option), Agricultural Range at Milgatw (approximately 275m from the option) and Blaen Y Cwm Viaduct (approximately 593m from the option)), however, it is not anticipated that there would be any significant effects on the setting of these sites during construction, as they are set back/at a distance from the works. The Blaenavon Industrial Landscape World Heritage Site is located approximately 9.7km from the option, however, again no effects would be anticipated on this site, due to the distance between the WHS and the works.

Objective 17: Minor negative effect - The option is not located within or in close proximity to any designated landscapes. The Brecon Beacons National Park is approximately 2.4km from the option, however, it is not anticipated that there would be any significant effects on the setting/views from the National Park as a result of the construction of the option. More generally, the option would be located on greenfield land in a rural area, so may therefore have negative effects on the rural setting that it is situated within, however, construction works would take place adjacent to the existing WTW site and the new development would be in keeping with the character of the existing onsite infrastructure/buildings.
Operation
Objective 1: Minor negative effect - Nantybwch is located in the headwaters of the Afon Sirhywi, which ultimately discharges via the Ebbw River to the Usk estuary at its confluence with the Severn Estuary (over 40km downstream via the Afon Sirhywi). It is assumed that the washwater discharge from Nantybwch ultimately enters the Afon Sirhywi and hence the Severn estuary, and that this would no longer occur; however the volumes are inconsequential and effects would be attenuated within a short distance of Nantybwch and as such the HRA concludes that significant effects would not be expected (although consideration of the value of the headwaters to the diadromous fish of the estuary may need to be made, hence minor negative effect/ low HRA risk).
Objective 2: Neutral effect - It is assumed that there would be a biodiversity net gain in operation greater than the net loss in construction; however, without quantification, its magnitude is uncertain and an equivalent score to construction is provided.
Objective 3: Neutral effect - There would not be any INNS risk during operation, the option would involve the recovery of washwater from the Nantybwch treatment works (and hence no new pathways for INNS transfer).
Objective 4: Neutral effect - It is not anticipated that the operation of this option would have any effect on soils, geodiversity of land use, beyond the initial land take assessed under the construction phase.
Objective 5: Neutral effect - It is not anticipated that the operation of this option would have any effect on water quantity, as it would make use of washwater that would usually be sent to sewer and would not involve any additional abstraction from ground/surface water resources. The WFD assessment concludes that leaving 2-2.5 MLD in Shon Sheffreys Reservoir is unlikely to have any impact on the hydrological functioning of the reservoir, given the relatively small volume of water compared with the entire reservoir. Any changes to the reservoir spill regime to downstream watercourse will be negligible.
Objective 6: Neutral effect - It is not anticipated that the operation of this option would have any effect on water quality, as it would make use of washwater that would usually be sent to sewer. The WFD assessment concludes that leaving 2-2.5 MLD in Shon Sheffreys Reservoir is unlikely to have any impact on the hydrological functioning of the reservoir, given the relatively small volume of water compared with the entire reservoir. Any changes to the reservoir spill regime to downstream watercourse will be negligible, hence no significant effects on water quality are anticipated.
Objective 7: Minor negative effect - The new above-ground treatment infrastructure associated with this option would be located within an area of Flood Zone 3 and 2 and could therefore be at risk to flooding during operation.
Objective 8: Neutral effect - It is not anticipated that the operation of the option would have any effects on air quality.

Objective 9: Minor negative effect - The operation of the option (e.g. electricity required for treatment and pumping and use of chemicals) would generate 188.7tCO2e/a. This has been assessed as having a minor negative effect on this objective.
Objective 10: Minor negative effect - The new infrastructure associated with this option would be located within an area of high flood risk (Flood Zone 3/2) and therefore would be at risk to the effects of climate change (flooding) during operation. Objective 10: Minor positive effect - The increased capacity (2-2.5Ml/d) provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Minor positive effect - The additional 2-2.5Ml/d capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral - The operation of the option is not anticipated to have any effects on opportunities for recreation or tourism.
Objective 13: Minor positive effect - The scheme may lead to some minor effects due to noise from the new treatment/recover infrastructure, on the limited number of dwellings and farmsteads within close proximity to the works, however, this would be in keeping with the existing WTW site so is not expected to cause any significant effects. The increased capacity of up to 2-2.25Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - The option would involve the recovery and use of washwater from the existing Nantybwch site (2-2.5Ml/d) and would increase the resilience of water resources within the DCWW supply area, though the provision of an extra 2-2.5Ml/d of deployable output.
Objective 15: Moderate negative effect - The operation of the option would require the use of the chemicals and materials and ongoing energy use (which would likely require the use of fossil fuels for energy) to treat recovered washwater.
Objective 16: Neutral effect - It is not anticipated that there will be any significant effects on cultural heritage during the operation of the option.
Objective 17: Neutral effect - Whilst the option would introduce new above ground infrastructure to a rural location, however, this would be in keeping with the character of the existing WTW site and surrounding agricultural sheds.

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW064
Option Name	Wentwood to Court Farm
Water company	DCWW
Option Description	Wentwood reservoir will be brought back into service to provide a DO of up to 7Ml/d. A new pumping station will be built at Wentwood to pump the raw water 10.9km to Llantrisant pumping station where it will be delivered to Court Farm via the existing raw water main. An additional stage of coagulation dosing and DAF will be required before the raw water enters the reservoir, to deal with any potential algae in the Wentwood raw water. The works will be sized for 7 MLD as this is the limit of the abstraction licence. A average yield of 4.3 Ml/d is expected from the source. An additional coagulation and DAF stage will be required, before the water reaches the raw water reservoir in order to deal with the anticipated algae in the Wentwood water. It is recommended that catchment management measures are implemented in the Wentwood catchment in order to reduce the risk of algal blooms. The main elements of this scheme would be: new pumping station at Wentwood and pumps duty=81l/s, total head=135m; 10.9km of new 450mm dia DI rising main; modifications to existing Llantrisant pumping station; and, 7Ml/d DAF and coagulation
Yield	Up to 7Ml/d
WRZ	SEWCUS

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
SEW064	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
	Operation (positive)	0	++	0	0	0	0	0	0	0	++	++	+/?	++	++	0	0	0

Construction

Objective 1: Moderate negative effect - Within 10km of the option there: are 6 SACs (the closest of which being the River Usk/ Afon Wysg SAC/SSSI which is approximately 80m from the existing Llantrisant pumping station, with all other SACs being situated at least 3.7km from the works); 1 SPA and 1 Ramsar (Severn Estuary SPA/SAC/Ramsar/SSSI, approximately 6.9km from the pipeline works/new PS); 41 SSSIs including the aforementioned River Usk SSSI and two others within 1km of the works (Golden Hill Quarry, Devauden approximately 530m from the works, and Coombe Valley Woods, approximately 970m from the works) as well as the aforementioned Severn Estuary SSSI (with all other SSSIs being located at least 1.7km from the works); 1 NNR (Penhow Woodlands, approximately 2.2km from the works); and 1 LNR (St. Julians Park, approximately 8.8km from the works). As mentioned above, the existing Llantrisant pumping station lies adjacent to the River Usk/ Afon Wysg SAC and River Usk (Lower Usk)/Afon Wysg (Wysg Isaf) SSSI. The construction of the new water main from the Wentwood reservoir to the Llantrisant pumping station and in particular its point of entry to the pumping station will occur adjacent to the designated site. The construction works have the potential for localised effects on the designated site arising from disturbance and limited dust and sediment deposition, however, the HRA concludes that whilst construction will take place close to the SAC, effects will be avoidable with established measures. Lesser and greater horseshoe bats associated with Wye Valley and Forest of Dean Bat Sites/ Safleoedd Ystlumod Dyffryn Gwy a Fforest y Ddena SAC (approximately 3.7km from the works) are also potentially vulnerable to construction works, however, the HRA concludes that effects would be avoidable with established measures, concluding that overall the HRA risk during construction is low.
Other designated sites within close proximity to works (e.g. within 1km) may experience some minor effects (e.g. noise, dust deposition). New land would be required for the pumping station at the Wentwood reservoir (within the existing Wentwood reservoir site and adjacent to existing buildings on site), which in addition to disturbance of local wildlife, may have a minor negative effect on biodiversity due to the permanent loss of habitat. The WFD Assessment conducted as part of the development of the WRMP19 indicated that construction activity would have short term minor negative effects on biodiversity through disturbance of the Wentwood reservoir bed and habitat loss. The pipeline would also cross through 4 areas of Ancient Woodland, with a further 14 areas of Ancient Woodland being within 100m of the works (a large section of the pipeline would be routed around Wentwood Forest, which is the largest area of Ancient Woodland in Wales). Construction of the pipeline may therefore result in the loss/disturbance to these areas. Additionally, some sections of the pipeline route pass through open fields which may result in temporary disturbance to ecology and pipeline works in proximity to or crossing watercourses introduces risks to ecology through increased suspended sediment and contamination. However, with appropriate construction safeguards (such as dust suppression, spill containment and emergency response procedures) and timing of works to avoid sensitive times of the year, overall effects should be temporary and limited.

Objective 2: Moderate negative effect - The BNG assessment concludes that there would be a moderate negative effect on biodiversity net loss due to the temporary and permanent loss of habitats during the construction period, associated with the construction of the new pipeline (PS would have negligible impact on habitat loss)

Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Moderate negative effect - The majority of the pipeline would be constructed on good, good to moderate and moderate quality agricultural land (greenfield), as well as some smaller pockets of poor quality and non-agricultural land. However, any soil displaced during the excavation of the pipeline route would be reinstated following completion. Objective 4: Minor positive effect - The new pumping station would be constructed within the existing Wentwood reservoir site, adjacent to existing WTW buildings onsite (offline)
Objective 5: Neutral effect - It is not expected that construction would affect water resources.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures) to avoid effects on nearby watercourses/waterbodies.
Objective 7: Minor negative effect - A small number of sections of the pipeline (including where it enters the Llantrisant pumping station site) are within of the Flood Zone 3 and could therefore be liable to flooding depending on the timing of works. Construction is not expected, however, to cause or exacerbate flooding in the area or elsewhere.
Objective 8: Minor negative effect - The construction of the option could result in traffic congestion during the 1.5-year construction period (particularly on the A449 (which the pipeline would cross) and the local road network in close proximity/leading to the scheme, which, together with emissions associated with the use of plant and machinery, may have a negative effect on local air quality. However, none of the construction works would take place within an AQMA.
Objective 9: Moderate negative effect - The construction of this option would require raw materials such as concrete, steel and plastic, with 3,094tCO2e embodied carbon. Furthermore, the construction of the option would result in additional vehicle movements (over the 1.5 year construction period) and would require the operation of machinery and plant, which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, small sections of the pipeline works would be located within areas of high flood risk. In consequence, pipeline works could be vulnerable to the effects of climate change (flooding).
Objective 11: Moderate positive effect - Construction would involve a medium sized capital expenditure (£13.92m), resulting in a moderate positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy. Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated vehicle movements, particularly on the A449 (which the pipeline would cross) and the local road network in close proximity/leading to, and crossed by the scheme.
Objective 12: Moderate negative effect - Much of the pipeline would be routed in close proximity to and potentially pass through small areas of Wentwood Forest. As noted above, Wentwood Forest is the largest area of Ancient Woodland in Wales and offers opportunities for recreational activities such as walking, cycling and horse riding across a number of paths through the woodland. Construction in close proximity to the woodland may therefore

cause some disturbance to recreational users of the woodland, e.g. noise, vibration, dust. The new raw water main would cross National Cycle Route 32 and Route 42 in two places (both routes are on-road routes). Excavation of the pipeline route may therefore have a negative effect on cycling on these routes, if they require closure due to the construction works, however, any effects in this regard would be very short term/temporary. Wentwood reservoir has an active angling club, which may be affected by construction of the new PS and pipeline route in close proximity to the reservoir (e.g. noise, dust). Furthermore, the Griffiths Millbrook Farm horse riding facility is located directly adjacent to the site of the new PS and a section of the new pipeline (the pipeline potentially crosses some of the field that the horse riding facility occupies). Construction of the new PS and pipeline in this location is likely to cause disturbance to activities during construction, particularly construction noise may limit the ability of the facility to operate, due to the noise sensitive nature of activities on site (i.e. risk to horse riders if horses are disturbed by construction noise). More generally, construction works may have a negative effect on recreational users (e.g. walking/cycling) of the area surrounding the works.
Objective 13: Minor negative effect - Construction of pumping station and pipeline leading away from the pumping station may have a minor effect (e.g. noise and dust) on the village of Llanvaches, however, the village is situated approximately 750m from the works so any effects are likely to be very minor. Pipeline works may also have a minor effect on residential receptors in Llanvair-Discoed (approximately 600m from pipeline works) and more significantly at Llantrisant (approximately 100m from pipeline works) as well as the scattered residential dwellings and farmsteads in close proximity to the scheme.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Moderate negative effect - The construction of the option would require raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Minor negative effect - The site of the new pumping station does not include any historic designations, however, there are several Listed Buildings within 1km of the pipeline works, including the Grade II listed Tile Farm (Ysgubor Kemeys) (approximately 10m from pipeline works) and the Grade II Twmp Farmhouse (approximately 70m from the pipeline works). Due to the proximity of these heritage assets the pipeline works, it is anticipated that there will be temporary effects on their setting. There may also be minor temporary effects on the setting of other listed buildings near to the pipeline works (another 15 listed buildings are within 500m of the works, however, all are at least 100m away from the works). There are also 6 Scheduled Monuments within 1km of the construction works, however, the closest of these is Llanvair Castle, approximately 570m from the works, and as such it is not expected that there will be any significant effects on their setting, due to the relative distance between works and these sites. There are also two registered parks and gardens within 1km of the works (Penhein (approximately 80m from the pipeline works) and Llangybi House (approximately 230m from the works)) which may experience some minor effects on their setting during the construction phase.
Objective 17: Minor negative effect - Construction works would not take place within or in close proximity to any landscape designations with the closest designated areas being the Wye Valley AONB and the Bryniau Clwyd A Dyffryn Dyfrdwy/Clwydian Range and Dee Valley AONB (both approximately 3km from the works). Additionally, the Brecon Beacons National Park is approximately 9.5km from the works. Due to the distance between these areas and the construction works, no negative effects are expected. Pipeline works may, however, adversely impact the amenity of the surrounding rural greenfield

setting that much of the pipeline would be routed through. Construction of the new pumping station would be confined within the existing Wentwood site, adjacent to existing similar buildings, such that any adverse impact on the landscape would be limited.
Operation
Objective 1: Minor negative uncertain effect - The WFD assessment concludes that new abstraction from this reinstated reservoir may lead to a lowering of reservoir water levels (particularly during dry weather conditions), potentially increasing the concentration of any water quality determinands and that any such effects would have the potential to impact on plants, fish and invertebrates. The lowering of water levels may also impact on shoreline conditions with an effect on associated ecology. Wentwood sits above the Nedern Brook although this is a very minor watercourse for much of its length and most of the stream flow is thought to be derived from the catchment rather than through (for example) spills or releases from Wentwood; however, flooding from the Nedern Brook does support the Nedern Brook Wetlands SSSI around Caldicott, which is used by birds associated with the Severn Estuary SPA and Ramsar (although active water level management is a key factor in the maintenance of this site). The HRA concludes that whilst effects are unlikely as a result of the utilisation of Wentwood, the effects of the option on this wetland would need to be quantified. The HRA also highlights that effects on the habitats of the Severn Estuary SAC and Ramsar, and the diadromous fish associated with these sites, will be essentially nil due to the small volumes involved.
Objective 2: Moderate positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Moderate negative effect - The current proposal includes the abstraction of raw water from Wentwood Reservoir and transfer, through a pumped rising main, to Llantrisant pumping station where water would be pumped onwards to Court Farm reservoir, with raw water undergoing an additional coagulation and DAF stage prior to discharge into Court Farm reservoir. In consequence there is a moderate risk of transfer of INNS (as water would be transferred between WFD surface water catchments, with some treatment prior to discharge).
Objective 4: Neutral effect - It is not anticipated that the operation of this option would have any effect on soils, geodiversity of land use during operation.
Objective 5: Moderate negative effect – The WFD assessment notes that the ALS indicates that Wentwood Reservoir is located in the Usk Estuary and Coastal Area and that this area is not assessed using the CAMS resources assessment so it is not possible to determine water availability. The WFD highlights that new abstraction from the reinstated reservoir may cause further deterioration of the reservoir waterbody by lowering water levels (particularly during dry weather conditions) or be a potential impediment to improvement. Any such effects would have the potential to impact on plants, fish and invertebrates. The lowering of water levels may also impact on shoreline conditions with an effect on associated ecology.
Objective 6: Moderate negative effect - The WFD highlights that new abstraction from the reinstated reservoir may cause further deterioration of the reservoir waterbody by lowering water levels (particularly during dry weather conditions) and increasing the concentration of any water quality determinands, or be a potential impediment to improvement. Any such effects would have the potential to impact on plants, fish and invertebrates. The WFD assessment also highlights that new abstraction from the reservoir could result in changes to physico-chemical quality elements (e.g. TP, BOD, DO,

pH, temperature), due to reduced dilution, especially during dry weather conditions, thus potentially causing a deterioration in status. However, the WFD highlights that the option would not introduce new priority or priority hazardous chemicals to the reservoir.
Objective 7: Minor negative effect - The existing Llanstrisant pumping station that would be utilised as part of this option is located within an area of Flood Zone 3 and therefore would be at risk of flooding during operation. A negative effect has therefore been identified in respect of flood risk.
Objective 8: Neutral effect - It is not anticipated that the operation of the option would have any effects on air quality.
Objective 9: Moderate negative effect - The operation of the option (e.g. electricity required for pumping, chemicals dosing) would generate 619tonnes CO2e/a. This has been assessed as having a moderate negative effect on this objective.
Objective 10: Minor negative effect - As noted above, the existing Llanstrisant pumping station that would be utilised as part of this option is located within an area of high flood risk (Flood Zone 3) and therefore would be at risk to the effects of climate change (flooding) during operation. Objective 10: Moderate positive effect - The additional 7Ml/d provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Moderate positive effect - The additional 7Ml/d capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a moderate positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Minor negative uncertain effect - As noted above, Wentwood Reservoir has an active angling club. If the abstraction from the reservoir leads to the lowering of reservoir levels during the year (i.e. times of low rainfall), this may have a negative effect on the water dependent activities, such as angling. However, as noted under Objectives 5 and 6, this could partly be mitigated by appropriate use of the abstraction. Objective 12: Minor positive uncertain effect - Catchment management, if implemented would benefit the raw water quality in Wentwood reservoir, which could have a positive effect for the angling club.
Objective 13: Moderate positive effect - The increased capacity of 7Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Moderate positive effect - The option is not a water efficiency option, so would have no effect on water efficiency, however, it would increase the resilience of water resources within the DCWW supply area, though the provision of an extra 7Ml/d of deployable output.
Objective 15: Minor negative effect - The operation of the option would require the use of the chemicals and materials for treatment/filtration and ongoing energy use (which would likely require the use of fossil fuels for energy) to pump water.
Objective 16: Neutral effect - No effect on the historic environment during operation of this option is anticipated.

Objective 17: Neutral effect - Permanent visual effects from the new pumping station at the Wentwood are considered negligible given the existing water supply infrastructure at the site and the potential to mitigate effects through design.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW067
Option Name	Effluent recirculation for washwater use (reduce potable demand) at Cardiff East and Cog Moors
Water company	
Option Description	Currently washwater at both sites is sourced from the potable network. The washwater is used for washing down screens, diluting polymer for sludge processing, clean sludge thickeners. Proposal is to source washwater from final effluent using new washwater booster sets to connect to existing washwater manifold. A total average saving of 0.8 Ml/d (800 m3/d) is expected. The main scheme elements of this option would be: Cog Moors - 5 m3 FE wetwell, 2 l/s lift PS, Boll filters 2 l/s capacity, washwater booster 10 kw, 100m connecting pipework 50mm diameter. Cardiff Eastmoors - 10 m3 FE wetwell, 5 l/s lift PS, Boll filters 5 l/s capacity, washwater booster 15 kw, 150m connecting pipework 50mm diameter, UV disinfection 300 m3/d capacity 2 kW.
Yield	0.8Ml/d
WRZ	SEWCUS

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
SEW067	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

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	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	0

Construction
Objective 1: Minor negative effect - Within 10km of the Cog Moors site there is: 1 Ramsar site (Severn Estuary, approximately 2.5km from the Cog Moors site); 1 SAC (Severn Estuary, approximately 2.7km from the Cog Moors site); 1 SPA (Severn Estuary, approximately 2.6km from the Cog Moors site); 15 SSSIs (the closest being Cog Moors, approximately 170m from the Cog Moors site – the remaining SSSIs are all 1km or more from the works, including the Severn Estuary, approximately 2.6km away); and, 6 LNRs (the closest of which is Cosmeston Lakes Country Park, approximately 740m from the Cog Moors Site – with the remaining LNRs all being over 4.9km away from the option). There are also a number of areas of ancient woodland within 10km of the option, including 7 within 1km (the closest of which is approximately 110m from the site). Considering the small scale nature of the works at the existing Cog Moors WwTW site, no significant effects on the Severn Estuary Ramsar/SAC/SPA/SSSI are expected. There may be some very minor effects on the Cog Moors SSSI site and more generally, non-designated habitats and species in close proximity to the works (e.g. noise, air quality impacts and dust deposition), however any effects in this regard are anticipated to be minor, as works will take place on the existing WwTW site. It is not anticipated that there will be any significant effects on any of the sites that are situated further away from the proposed works. Within 10km of the Cardiff Eastmoors site there is: 1 Ramsar site (Severn Estuary, approximately 85m from the Cardiff Eastmoors site); 1 SAC (Severn Estuary, approximately 86m from the Cardiff Eastmoors site); 1 SPA (Severn Estuary, approximately 85m from the Cardiff Eastmoors site); 17 SSSIs (the closest being the Severn Estuary, approximately 86m from the Cardiff Eastmoors site – the remaining SSSIs are all 2.3km or more from the works); and, 6 LNRs (the closest of which is Howardian LNR, approximately 2.8km from the Cardiff Eastmoors site – with the remaining LNRs all being over 2.8km away from the option). Considering the proximity of the Cardiff Eastmoors WwTW site to the Severn Estuary Ramsar/SAC/SPA/SSSI, temporary effects on the habitats/species of these sites may occur (e.g. noise and dust) and more generally effects to non-designated habitats and species in close proximity to the works may occur, however, considering that the works will be confined to the existing WwTW site, which located within a large industrial area, and that works will be small scale and temporary in nature, any effects are expected to be minor and the HRA concludes that no significant effects would be anticipated assuming normal measures. It is not anticipated that there will be any significant effects on any of the other sites that are situated further away from the proposed works.
Objective 2: Neutral effect. The BNG assessment concludes that construction of the option would have a neutral effect, as the option would involve washwater recovery, with all associated works taking place within the existing WTW site (hence no loss of habitats)
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Minor positive effect - All works would be contained within the existing operational sites of the Cardiff Eastmoors WwTW and Cog Moors WwTW such that new ancillary infrastructure should not significantly impact land/soil quality.
Objective 5: Neutral effect - It is not expected that construction would affect water resources.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures).

Objective 7: Minor negative effect - The Cog Moors WwTW site is located within an area of Flood Zone 3, therefore, construction works could be liable to flooding depending on the timing of works, however, it is anticipated that the existing site already incorporates flood mitigation/defences. The Cardiff East Moors site is surrounded by an area within Flood Zone 3, however, the site itself is not at risk of flooding. Construction is not expected, to cause or exacerbate flooding in the area or elsewhere.
Objective 8: Minor negative effect - The construction of the option could result in traffic congestion during the 0.75-year construction period on the local road network leading to both of the WwTW sites, which, together with emissions associated with the use of plant and machinery, may have a negative effect on local air quality. This may lead to more of an impact at the Cardiff Eastmoors site, due to its location within an industrial area in the City of Cardiff, where existing traffic levels will likely be high (the Cog Moors site is located in a rural location), however, neither of the sites are located within an AQMA.
Objective 9: Minor negative effect - The construction of the option would require raw materials such as concrete, steel and plastic, with a total of 455tCO2e embodied carbon. Furthermore, the construction of the option would result in additional vehicle movements (over the 1 year construction stage) and would require the operation of machinery and plant, which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, the Cog Moors site is located within an area of high flood risk. In consequence, construction at this site could be vulnerable to the effects of climate change (flooding), however, it is anticipated that the existing site already incorporates flood mitigation/defences.
Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the local road network within the vicinity of the two WwTWs. However, effects in this regard will be temporary. Objective 11: Minor positive effect - Construction would involve a minor sized capital expenditure (initial £2.05m), resulting in a minor positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy. The spend would be within one year.
Objective 12: Neutral effect - Construction of the option is not expected to have a significant effect on opportunities for recreation or tourism. Works at the Cardiff Eastmoors site would be located with the existing WwTW site, which is located within an industrial area, whilst works at the Cog Moors site would also take place within the existing WwTW site, however, within a more rural area, although there does not appear to be any recreational or tourist facilities within the vicinity of the site that would be affected.
Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the construction of the option, however, the Cardiff Eastmoors site is not located within close proximity to any residential receptors as it is situated within an industrial area and the Cog Moors site is located in a largely open area, with only a small number of scattered residential dwellings and farmsteads within the vicinity of the scheme (all of which are 200m or over away from the site), hence any effects are anticipated to be minor.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The construction of the option would require raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant.

Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Neutral effect - There are no heritage assets within 1km of the Cardiff Eastmoors site. The closest Listed Building and Scheduled monument are approximately 1.3km and 3km away from the site respectively. There are 6 listed buildings and 1 Scheduled Monument within 1km of the Cog Moors site, however, the listed buildings are all 0.5km or more away from the site and the Scheduled Monument is just over 0.9km from the site. Due to the distance between the works and the closest heritage assets, and as works would take place within the existing operational sites of the WwTWs, no effects are anticipated.
Objective 17: Neutral effect - Construction at both of the sites would not take place within, or within close proximity to any designated landscapes. Furthermore, construction works would be small-scale and would take place within the existing operational boundaries of the WwTW sites, such that no significant effects on the local landscape would be expected.
Operation
Objective 1: Minor negative effect - The HRA concludes that the as the Cogmoors WwTW discharges to Sully Brook and hence to the Bristol Channel near Barry, outside the Severn Estuary sites, there will be no effects from this component of the option. Eastmoors WwTW discharges to the Severn Estuary SAC/SPA/Ramsar, but the effects of the scheme on discharge volumes and quality will be negligible and significant effects would not be anticipated (hence HRA risk is low). It is not anticipated that the operation of this option would have any direct effect on any other designated or non-designated habitats or species, however, it would reduce the amount of water taken from the potable network, as final effluent would be utilised instead of potable water, for use as washwater at both of the WwTW sites. This may subsequently have a positive effect on habitats elsewhere as it may reduce the need for abstraction of groundwater/surface water which would usually subsequently be placed into the potable network and normally taken for use as washwater at the two sites, which, if the water was normally sourced from any raw water sources which were functionally linked to biodiversity sites, could reduce any existing negative effects on those sites. However, the significance of this and certainty that this would take place is currently unknown, and as the saving would be only 0.8Ml/d any effect is anticipated to be negligible.
Objective 2: Neutral effect - It is assumed that there would be a biodiversity net gain in operation greater than the net loss in construction; however, without quantification, its magnitude is uncertain and an equivalent score to construction is provided.
Objective 3: Neutral effect - There would not be any INNS risk during operation, the option would involve the use of final effluent at each of the sites as a source of washwater (and hence no new pathways for INNS transfer).
Objective 4: Neutral effect - It is not anticipated that the operation of this option would have any effect on soils, geodiversity of land use.
Objective 5: Neutral effect - It is not anticipated that the operation of this option would have any direct effect on water quantity (e.g. groundwater levels or river flows) and the WFD assessment concludes that sourcing washwater from final effluent across 2 WwTW's equates to ~0.4 MLD of final effluent not being discharged to surface waters, which would have a negligible impact on flows and overall would be WFD compliant. However, the option would reduce the amount of water taken from the potable network, as final effluent would be utilised instead of water from the potable network, for use as washwater at both of the WwTW sites. This may subsequently have a positive effect on water quantity as it may reduce the need for abstraction of

groundwater/surface water which would usually be placed into the potable network and taken for use as washwater at the two sites, however, certainty of any effect in this regard is currently unknown, and as the saving would be only 0.8Ml/d any effect is anticipated to be negligible.
Objective 6: Neutral effect - It is not anticipated that the operation of this option would have any effect on water quality. The WFD assessment concludes that overall the option would be WFD compliant.
Objective 7: Minor negative effect - The new above-ground infrastructure at the Cog Moors site associated with this option would be located within an area of Flood Zone 3 and could therefore be at risk to flooding during operation.
Objective 8: Neutral effect - It is not anticipated that the operation of the option would have any effects on air quality.
Objective 9: Neutral effect - The operation of this option would only generate 44.6tonnes CO2e/a, which has been assessed as having a neutral effect on this objective.
Objective 10: Minor negative effect - The new above-ground infrastructure at the Cog Moors site would be located within an area of high flood risk (Flood Zone 3) and therefore would be at risk to the effects of climate change (flooding) during operation. Objective 10: Minor positive effect - The water savings (0.8Ml/d) provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Neutral effect - The 0.8Ml/d saving provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a positive effect on the local economy, however, due to the very small scale of the yield the effect against this objective has been assessed as neutral. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral - The operation of the option is not anticipated to have any effects on opportunities for recreation or tourism.
Objective 13: Neutral effect - The 0.8Ml/d saving provided by this option will help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing. However, due to the very small scale of the yield achieved by this option, the effect against this objective has been assessed as neutral.
Objective 14: Minor positive effect - The option would involve the use of final effluent as a source of washwater at the two WwTW site (0.8Ml/d) and would increase the resilience of water resources within the DCWW supply area.
Objective 15: Minor negative effect - The operation of the option would require the use of ongoing energy use (which would likely require the use of fossil fuels).
Objective 16: Neutral effect - It is not anticipated that there will be any significant effects on cultural heritage during the operation of the option.

Objective 17: Neutral effect - Whilst the option would introduce new above ground infrastructure to a rural location, however, this would be in keeping with the character of the existing WTW site and surrounding agricultural sheds.

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Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW166
Option Name	Memorial PS
Water company	DCWW
Option Description	This option would involve providing 47 Ml/d peak flows to the Pontsticill Low Level network in order to release the flows from the Pontsticill WTW to enable other WRMP options and the trading option. In order to be able to supply the combined 47 Ml/d, Cilfynydd WPS (21Ml/d) will be reinstated to support the Memorial WPS (26 Ml/d). The Pumps at Memorial WPS will be replaced with Low suction, high lift pumps to be able to pump to Ty Gwyn SRv. Cefn Mably WPS will be reinstated to provide additional pressure to the supply side of Memorial WPS and Tongwynlais SRv. Installation of a pressure and flow control valve arrangement at the inlet to Tongwynlais SRv to ensure that the service reservoir does not overtop. The main elements of this scheme would be: replacement of the existing Memorial pumps with 4 high lift, low suction pumps to pump at total of 26 Ml/d; slab and externally mounted surge vessel Memorial WPS; reinstatement of Cilfynydd WPS to supply 21Ml/d; slab and externally mounted surge vessel for Cilfynydd WPS; reinstate Cefn Mably WPS, assume 1600l/s at 12.5m lift based on current modelling; and, replace the existing 48" butterfly valve with a new pressure and flow control valve arrangement at Tongywnlais SRv Inlet, as well as a level sensor in the SRv.
Yield	47Ml/d
WRZ	SEWCUS

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
SEW166	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

	Operation (positive)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**+++**	**+++**	**0**	**+++**	**+++**	**0**	**0**	**0**

Construction
Objective 1: Minor negative effect - Within 10km of the Cilfynydd and Memorial WPS sites (the sites are situated approximately 0.8km from each other and hence the same features/sites are within 10km of both) there is: 1 SAC (Aberbargoed Grasslands, approximately 9.1km/9.3km from the Cilfynydd and Memorial WPS sites respectively); 11 SSSIs (the closest of which is Nelson Bog approximately 3.8km/4.2km from the Cilfynydd and Memorial WPS sites respectively); and 3 LNRs (the closest of which is Craig-Yr-Hesg, approximately 2.2km/1.6km from the Cilfynydd and Memorial WPS sites respectively). Additionally Aberbargoed Grasslands/Glaswelltiroedd Aberbargoednnr NNR is approximately 9.1km/9.3km from the Cilfynydd and Memorial WPS sites respectively (the only NNR within 10km of these sites). Due to the distance between the WPS sites and these features, no effects would be anticipated. There are also a number of areas of Ancient Woodland within 1km of the two sites, the closest being approximately 0.2km from the Memorial site. Whilst works at the sites would not directly affect any areas of ancient woodland, there may be some disturbance (e.g. noise) to species within these areas, due their proximity to the works. The Cefyn Mably is approximately 16km/16.8km from the Memorial and Cilfynydd sites respectively, hence is situated within 10km of a different set of designated sites (with the exception of two SSSIs which would be situated within 10km of all three sites), including: 3 SACs, 1 SPA and 1 Ramsar, with the closest being the Severn Estuary SAC/SPA/Ramsar (each of the designations covering the Severn Estuary cover slightly different areas at differing distances from the WPS site (between 5.3km and 5.6km from the site) , the closest of which is the SPA at 5.3km). There are also 22 SSSIs and 9 LNRs within 10km of the option (the closest of which are the Argloddiau Cronfeyedd Dwr Llanisien A Llys-Faen / Llanishen And Lisvane Reservoir Embankments SSSI (approximately 2.8km from the WPS site) and the Nant Fawr Corridor LNR (immediately adjacent to the SSSI)). Additionally Newport Wetlands NNR is approximately 10km from the site (the only NNR within 10km). Due to the distance between the WPS site and these features, no effects would be anticipated. There are also a number of areas of Ancient Woodland within 1km of the site, including 6 within 0.5km of the works, with the closest being approximately 0.2km from the option. Whilst works at the site would not directly affect any areas of ancient woodland, there may be some disturbance (e.g. noise) to species within these areas, due their proximity to the works. More generally construction works at the three sites may lead to some disturbance (e.g., noise, vibration, dust) to proximate non-designated habitats and species, however, any effects in this regard are anticipated to be very minor as works would take place within the existing WPS sites.
Objective 2: Neutral effect. The BNG assessment concludes that construction of the option would have a neutral effect, as the option is a network option, with all works assumed to take place within the three existing WPS sites (hence no loss of habitats)
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Moderate positive effect - Works at the Cilfynydd WPS, the Memorial WPS and Cefn Mably WPS and at Tongywnlais SRv would be contained within the existing DCWW operational sites such that new ancillary infrastructure/refurbishments should not significantly impact land/soil quality. The

option would also utilise existing infrastructure and involve the reinstatement of infrastructure (Cilfynydd WPS and Cefn Mably WPS) such that a positive effect on this objective has been assessed.
Objective 5: Neutral effect - It is not expected that construction would affect water resources.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures).
Objective 7: Neutral effect - None of the sites of the proposed works (Cilfynydd WPS, the Memorial WPS, Cefn Mably WPS and Tongywnlais SRv) are located within areas at a high risk of flooding. It is not anticipated, that construction would result in, or exacerbate, flooding elsewhere during the construction period.
Objective 8: Minor negative effect - The construction of the option could result in traffic congestion during the construction period, particularly on the M4, A470 and A4054 and the local road network in close proximity/leading to the various sites which, together with emissions associated with the use of plant and machinery, may have a negative effect on local air quality. Whilst none of the construction works would take place within an AQMA, the A4054, which may be used to access the Memorial and Cilfynydd sites, does include a section which is located within an AQMA, so there is a possibility that construction traffic (if using this road to access these sites) may increase air pollution within this AQMA.
Objective 9: Minor negative effect - Construction of the option would require the use of raw materials with a minor amount of embodied carbon (439tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Neutral effect - The construction of this option is not expected to have any effect on climate resilience.
Objective 11: Minor positive effect - Construction would involve a modest capital expenditure (£4.33m) which could have a minor positive effect on the local economy. The construction period would be one year long, which may provide the potential for a number of local businesses and SMEs to have involvement and opportunities. Individual spend by contractors and workers could also provide some local benefit to business. Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated vehicle movements (particularly on the M4, A470 and A4054 and the local road network in close proximity/leading to the various sites)
Objective 12: Neutral effect - Works across the three WPS sites are not expected to have any effect on opportunities for, or facilities relating to recreation or tourism. Works at the three WPSs will take place at the existing sites, which are situated adjacent to major roads and away from any recreational/tourist facilities.
Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the construction at the various sites, which could affect for example, residential receptors within Cilfynydd, Abercynon and Tongwynlais and small number of scattered residential dwellings within the vicinity of the scheme. However, as works will take place at existing sites, which are predominantly all located adjacent to major roads and works will be temporary, any effects are anticipated to be minor.

Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The construction of the option would require minor quantities of raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Minor negative effect - There are 5 listed buildings within 1km of both the Cilfynydd and Memorial WPS sites, with the closest being the Cilfynydd War Memorial, approximately 90m from the Memorial WPS site (approximately 880m from the Cilfynydd WPS site), whilst the closest feature to the Cilfynydd site is situated approximately 80m from the site. All other listed buildings within 1km of the Memorial site are situated 700m or more from the site. Within 1km of the Cefn Mably site there are 4 listed buildings, the closest of which is St. Julians Manor, approximately 650m from the site. Due to the proximity of the Cilfynydd War Memorial to the Memorial WPS site, there may be some effects on its setting during construction, however, as works would be situated within the existing WPS site, it is anticipated that any effects would be minor. The Cefn Mably WPS site is situated within the Cefn Mably registered historic park and garden. Works at this site may therefore have a negative effect on the setting and character of this feature, however, as the works would take place at the existing WPS, any effects in this regard are considered to be minor and temporary.
Objective 17: Neutral effect - The three WPS sites would not be situated within, or in close proximity to any landscape designations. Works would take place within the existing WPS sites and hence no effects on landscape are anticipated.
Operation
Objective 1: Neutral effect - It is not anticipated that the operation of the option would have any effect on biodiversity as it is a network solution involving reinstating/refurbishing water pumping stations, furthermore the HRA concludes that there are no effect pathways and hence HRA risk is negligible.
Objective 2: Neutral effect - It is assumed that there would be a biodiversity net gain in operation greater than the net loss in construction; however, without quantification, its magnitude is uncertain and an equivalent score to construction is provided.
Objective 3: Neutral effect - The option would involve the reinstatement/upgrading of existing infrastructure, with no new pathways for INNS transfer, therefore the effect against this objective has been assessed as neutral.
Objective 4: Neutral effect - There would be no operational effects on land use/soils.
Objective 5: Neutral effect - As the option is a network option (involving the reinstatement/refurbishment of three water pumping stations) and does not involve the abstraction of any additional water, there would be no effect on water quantity.
Objective 6: Neutral effect - As the option is a network option (involving the reinstatement/refurbishment of three water pumping stations) and does not involve the abstraction of any additional water, there would be no effect on water quality.

Objective 7: Neutral effect - It is not anticipated that the operation of the option would not be liable for flooding or cause or exacerbate flooding elsewhere.
Objective 8: Neutral effect - no operational effects on air quality are anticipated.
Objective 9: Significant negative effect - The operation of the option (largely associated with its operational energy demand) would generate 2,908tonnes CO2e/a. This has been assessed as having a significant negative effect on this objective.
Objective 10: Significant positive effect - The increased capacity (47Ml/d) provided by this option would enable the use of other WRMP options and the trading option, thereby helping ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Significant positive effect - The additional 47Ml/d capacity provided by this option will enable the use of other WRMP options and the trading option, thereby helping ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a significant positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect - It is not expected that there will be any effects on recreation or tourism as a result of the operation of this option.
Objective 13: Significant positive effect- The scheme would not adversely affect human health due to increased noise, nuisance or disruption . The additional 47Ml/d capacity provided by this option will enable the use of other WRMP options and the trading option, thereby helping ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Significant positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the supply area, by enabling the use of other WRMP options and the trading option, though the provision of an extra 47Ml/d deployable output.
Objective 15: Significant negative effect - The operation of this option would require ongoing energy usage in order to power the WPSs. This would likely require the use of fossil fuels to generate energy.
Objective 16: Neutral effect - There would be no operational effects on designated cultural heritage assets.
Objective 17: Neutral effect - No effects on landscape are anticipated during operation. Reinstated/refurbished WPSs would be situated within the existing WPS sites.

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW167
Option Name	Trading Option - New Transfer from the wye to Severn Trent
Water company	DCWW
Option Description	This option would involve abstracting 105Ml/d water from the River Wye at the existing Monmouth Intake then pumped using the existing pumpstation (upgraded to provided the necessary head) through a new pressure main and gravity main which discharge into the River Severn at a location close to Deerhurst, Provisional route initially follows the A40 and A417 and crosses the River Wye in 2 locations
Yield	105Ml/d - Option facilitates trade from the SEWCUS system to either Severn Trent Water or WRSE. Discharge to River Severn near Deerhurst.
WRZ	SEWCUS

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
SEW167	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**

Construction
Objective 1: Major negative effect – There is one SPA within 10km of the option, Walmore Common (9271m). The option crosses 3 SAC's; The Wye Valley Woodlands / Coetiroedd Dyffryn Gwy (Wales), the River Wye / Afon Gwy (Wales) and the River Wye / Afon Gwy (England). There are another 3 SAC's within 10km of the option; Wye Valley Woodlands / Coetiroedd Dyffryn Gwy (England) (169m), Wye Valley and Forest of Dean Bat Sites / Safleoedd Ystlumod Dyffryn Gwy a Fforest y Ddena (Wales) (520m) and Wye Valley and Forest of Dean Bat Sites / Safleoedd Ystlumod Dyffryn Gwy a Fforest y Ddena (England) (1701m). The option crosses 5 SSSI's, Fiddler's Elbow, River Wye (Lower Wye) / Afon Gwy (Gwy Isaf), Aston Ingham Meadows, River Wye and Ashleworth Ham and is within 10km of 74 others. 5 of these are within 1km, Newton Court Stable Block (520m), Coughton Wood and Marsh (60m), Upper Wye Gorge (112m), Great Doward (637m) and Coombe Hill Canal (834m) and all others are at least 1140m from the option. The option crosses the Fiddler's Elbow NNR and is within 10km of 3 others; Lady Park Wood (1542m), Highbury Wood (4470m) and The Hudnalls (9573m). There are 7 LNR's within 10km of the option, the nearest being Coppett Hill (226m) and all others being at least 5561m from the option. There are 2 Ancient Woodlands adjacent to the proposed option, approximately 5m and 9m distance respectively. There are a further 65 ancient woodlands within 1km of the option, with 2 others sitting within 100m at 56m and 70m. Given that the option involves significant works crossing a number of sites and in close proximity to others, there is potential for loss/damage to habitats and disturbance (e.g. noise, vibration, dust) and as such a significant negative effect has been identified. More generally, construction works may result in loss/disturbance (e.g. noise, dust, vibration) to non-designated habitats and species.
Objective 2: Moderate negative effect - The BNG assessment has identified a temporary loss of approx. 183.9ha during construction of this option. This has been assessed as a moderate negative effect.
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Neutral effect - The pipeline will be laid within grades 1, 2, 3, 4 and non-agricultural (mainly grade 3) land within England and mainly good to moderate quality agricultural land in Wales. The option is not expected to require any land take as any soil displaced during excavation of pipelines would be reinstated following completion of the construction and upgrading of the Monmouth Intake PS will take place on existing infrastructure. In consequence, effects on geology and soils have been identified as neutral.
Objective 5: Neutral effect - No effects on water quantity are anticipated during the construction phase of the option.
Objective 6: Neutral effect - Construction of the pipeline could have a negative impact on water quality, particularly where it is planned to cross the River Wye. However, construction is expected to have no discernible effect on river flows, surface water quality or groundwater quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures).
Objective 7: Moderate negative effect - The reservoir lies on the flood plains of the River Wye and the River Severn within Flood Zone 3 (<40%), therefore construction works at the reservoir could be liable to flooding, depending on the timing of works.

Objective 8: Minor negative uncertain effect - The construction of the option could result in traffic congestion during the 2 year construction period (particularly on the A4136, A40, A4137, B4229, B4234, B4222, B4221 and the B4215) and more generally, the local road network within the vicinity of the scheme and where pipelines will follow/cross road) which, together with emissions associated with the use of machinery, may have a negative effect on local air quality. The option is not located within any AQMAs.
Objective 9: Major negative effect - Construction of the option would require the use of raw materials with a significant amount of embodied carbon (**approximately 45,580 tCO2e**) as well as the use of machinery which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, a number of sections of the new pipeline would be located within an area of high flood risk. In consequence, construction could be vulnerable to the effects of climate change (flooding).
Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated increased traffic, for example on the A4136, A40, A4137, B4229, B4234, B4222, B4221 and the B4215, as well as local minor roads. Objective 11: Major positive effect - The construction of the option would involve a significant capital expenditure (**£94.8m**), resulting in a significant positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy.
Objective 12: Minor/Moderate/Major negative uncertain effect - The pipeline runs along/parallel to 1.9km of the National Cycle Network from its western end, and 4.6km at its eastern end. The western end of the pipeline also lies only 0.3km from Offa's Dyke (National Trail). The option also passes by various hotels, sports facilities and open spaces, as well as the Tom Roberts Adventure Centre. More generally, works could result in temporary disruption (noise/air quality) to users of local open space/footpaths. As any disruption will be temporary, due to reinstatement of land following construction, this has been assessed as having a minor negative effect.
Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the construction of the new pipeline which could affect residential receptors within close proximity to the works, such as at Monmouth, Crocker's Ash, Whitchurch, Old Forge, Goodrich, Walford, Coughton, Pontshill, Ryeford, Lea, Aston Crews, Aston Ingham, Picklenash, Hartpury and Ashleworth as well as the scattered residential dwellings and farmsteads within the vicinity of the scheme, however, these effects would be temporary.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Major negative effect - The construction of the new pipelines, upgrading of the pumping station at Monmouth and work on the pressure tanks and outfall headwall would require raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.

Objective 16: Moderate negative effect - There are 16 scheduled monuments within 1km of the option, the closest being Kerne Bridge (19m). 2 others sit within 100m of the option; Dry Arch Bridge 300yds (270m) NE of St Giles' Church (25m) and Ganarew Cross (27m). The remaining 13 are all at least 134m from the option. 4 registered parks and gardens sit within 1km of the option; Monmouth, Chapel House (750m), Monmouth, Chippenham (872m), Monmouth, St John's (928m) and Monmouth: Nelson Garden (983m). There are 622 listed buildings within 1km of the option. 46 of these sit within 100m, with 8 sitting <10m from the option. A further 48 sit within 100m of the option.
Objective 17: Moderate negative effect - The option crosses the Wye valley AONB and is 7244m from the Malvern Hills AONB. It also crosses 4 landscape character areas; Dyffryn Gwy a Choed Gwent/Wye Valley and Wentwood, South Herefordshire and Over Severn, Forest of Dean and Lower Wye, and Severn and Avon Vales as well as the Lower Wye Valley historic landscape. Construction may have short term, temporary negative effects these designated areas as well as local landscape features and other receptors in the vicinity of the reservoir (including walkers and visitors to the river and reservoir).
Operation
Objective 1: Minor negative uncertain effect - It is assumed that increased abstraction from the Wye would be offset by equivalent reduction in abstraction for DCWW supply, therefore no net impact on flows in the Wye (or on any downstream sites) and it is assumed that discharge into the Severn would be adequately managed by Severn Trent Water, such that there would be no effects in the Severn, or downstream sites, however, there remains some uncertainty.
Objective 2: Moderate positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Significant negative effect - The current proposal includes the abstraction of raw water from the River Wye and transfer, through a combination of new pumped pressure main and gravity main pipelines to the River Severn (in another WFD surface water catchment). As such, as currently proposed there is a significant risk of transfer of INNS (as water would be transferred between WFD surface water catchments, without treatment prior to discharge). However, it is noted that the presence of INNS in the source water is currently unknown.
Objective 4: Neutral effect - There would be no operational effects on soils/geodiversity/land use following reinstatement of the land post construction.
Objective 5:Neutral effect -The WFD assessment highlights that increased abstraction to Severn Trent would be offset by equivalent reduction in abstraction for DCWW supply, therefore no net impact and overall the option would be WFD compliant.
Objective 5:Neutral effect -The WFD assessment highlights that increased abstraction to Severn Trent would be offset by equivalent reduction in abstraction for DCWW supply, therefore no net impact and overall the option would be WFD compliant.
Objective 7: Neutral effect - Although several sections of the pipeline are located within Flood Zone 3, these will be situated underground once the land is reinstated and will not be liable to flooding during operation.
Objective 8: Neutral effect - No operational effects on air quality are anticipated.

Objective 9: Significant negative effect - Operation of the option would generate **4,468 tCO2e** per annum**.** This has been assessed as having a significant negative effect on this objective.
Objective 10: Significant positive effect - The option would facilitate trade from the SEWCUS system to either Severn Trent Water or WRSE, by transferring 105Ml/d of water from the River Wye to the River Severn. This would ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Significant positive effect -The option would facilitate trade from the SEWCUS system to either Severn Trent Water or WRSE, by transferring 105Ml/d of water from the River Wye to the River Severn. This would ensure a continual supply of clean drinking water and increase resilience of supply supporting economic/population growth which could result in a moderate positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect -The operation of the option is not expected to impact upon opportunities for recreation or tourism.
Objective 13: Significant positive effect- The option would facilitate trade from the SEWCUS system to either Severn Trent Water or WRSE, by transferring 105Ml/d of water from the River Wye to the River Severn. This would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Significant positive effect - The option would facilitate trade from the SEWCUS system to either Severn Trent Water or WRSE, by transferring 105Ml/d of water from the River Wye to the River Severn, thereby increase the resilience of water resources in either the Severn Trent or WRSE regions.
Objective 15: Neutral effect - The operation of this option would not involve additional infrastructure or resources and would likely require only minor energy usage, therefore the effect on this objective has been assessed as neutral.
Objective 16: Neutral effect - The operation of the option would not have any effect on cultural heritage.
Objective 17: Neutral effect - The operation of the option would not have any effect on the local landscape. New above ground infrastructure will be built within the footprint of existing works.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW168
Option Name	Llwynon Gravity Main Upgrades
Water company	DCWW
Option Description	Scheme to enable DCWW to stop supplying c7 Ml/d minimum sweetening flow year round into the Llwynon gravity main in order to avoid WQ issues. The scheme comprises installation of new pressure reducing valves (PRVs), meters, burst protection valves and flow control valves. This option would involve the following works: Near Memorial PS: • Install new inline PRV complex and meter • Complex to be installed on existing 27" Steel trunk main • 2 x under-pressure drillings (1 x upstream & 1 x downstream) or conventional shutdown (600mm) • Complex can be built off-line; close existing in-line valve to commission • 2 x chambers (1 x PRV; 1 x meter) • Install new burst protection valve complex and meter • Complex to be installed on existing 27" Steel trunk main upon removal / cut out of existing (old) burst protection valve/ Lana-Johnson valve (conventional shutdown) • 1 x new in-line valve (700mm) and associated tee's • 2 x chambers (1 x burst protection valve) (1 x meter) At Memorial PS: • Install new flow control valve complex and meter • Complex to be installed on existing 29" and 30" Steel trunk main(s) • 4 x new large washouts • 1 x new flow control valve & 1 x new meter; size of pipework to be confirmed; ~600mm inlet & outlet of complex • 2 x 800 mm valves and 2 x 600mm valves to replace existing 450mm valves to WPS • Waste/flushing pipework to be installed from washouts
Yield	Upgrades and enhancements will enable DCWW to stop losing 7 M/d annually as sweetening flow
WRZ	SEWCUS

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
SEW168	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	0	0	0
	Operation (positive)	0	0	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0

Construction

Objective 1: Minor negative effect - Within 10km of the Memorial WPS site there is: 1 SAC (Aberbargoed Grasslands, approximately 9.3km from the Memorial WPS site; 11 SSSIs (the closest of which is Nelson Bog approximately 4.2km from the Memorial WPS sites; and 3 LNRs (the closest of which is Craig-Yr-Hesg, approximately 1.6km from the Memorial WPS site. Additionally Aberbargoed Grasslands/Glaswelltiroedd Aberbargoednnr NNR is approximately 9.3km from the Memorial WPS site (the only NNR within 10km of the site). Due to the distance between the WPS site and these features, no effects would be anticipated. The HRA concludes that no sites are considered to be exposed to the environmental changes associated with the option due to the small-scale of the required works, the distance to the European sites and the characteristics of the interest features; the option will have 'no effect' on any European sites. There are also a number of areas of Ancient Woodland within 1km of the site, the closest being approximately 0.2km from the Memorial site. Whilst works at the sites would not directly affect any areas of ancient woodland, there may be some disturbance (e.g. noise) to species within these areas, due their proximity to the works.
More generally construction works at the site may lead to some disturbance (e.g., noise, vibration, dust) to proximate non-designated habitats and species, however, any effects in this regard are anticipated to be very minor as works would take place within the existing WPS site.

Objective 2: Neutral effect - The BNG assessment concludes that construction of the option would have a neutral effect, as the option is a network option, with all works assumed to take place within an existing WPS site (hence no loss of habitats)

Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.

Objective 4: Minor positive effect - The new infrastructure associated with the option will be constructed within the existing operational site at Llwynon WTW such that new pumping infrastructure should not significantly impact land/soil quality
Objective 5: Neutral effect - No effects on water quantity are anticipated during the construction phase of the option.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures).
Objective 7: Neutral effect - None of the sites of the proposed works at/near the Memorial WPS are located within areas at a high risk of flooding. It is not anticipated, that construction would result in, or exacerbate, flooding elsewhere during the construction period.
Objective 8: Minor negative uncertain effect - The construction of the option could result in traffic congestion during the 1 year construction period (particularly on the A470) and more generally, the local road network within the vicinity of the scheme and where pipelines will follow/cross road) which, together with emissions associated with the use of machinery, may have a negative effect on local air quality. The option is not located within any AQMAs.
Objective 9: Moderate negative effect - Construction of the option would require the use of raw materials with a significant amount of embodied carbon (**approximately 1,014 tCO2e**) as well as the use of machinery which would also contribute to carbon emissions.
Objective 10: Neutral effect - The construction of this option is not expected to have any effect on climate resilience.
Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated increased traffic, for example on the A470, as well as local minor roads. Objective 11: Minor positive effect - The construction of the option would involve a minor capital expenditure (**£2m**), resulting in a minor positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy.
Objective 12: Minor negative effect - Access to Grawen Caravan & Camping Park and local bed & breakfasts' would likely not be restricted or prevented during construction. However, noise and dust associated with construction and resultant traffic may affect a limited number of visitors to the area and recreational activity. More generally, construction of the option may impact upon recreational activities such as walking and cycling near and around the reservoir (e.g. Effects of construction noise and dust and construction traffic).
Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the construction of the new pipeline which, although there are no significant residential receptors nearby, could affect scattered residential dwellings and farmsteads within close proximity to the works, however these effects would be temporary.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.

Objective 15: Moderate negative effect - The installation of new pressure reducing valves, meters, burst protection valves and flow control valves would require raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery associated with construction. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Neutral effect - There are 8 listed buildings within 1km of the option. The closest 2 being those associated with the Llwynon reservoir dam, approximately 200m from the option. The remaining 6 are all over 300m from the option. Due to the nature of the works and their location within an existing treatment works it is not expected that there will be any effect on designated cultural sites.
Objective 17: Moderate negative effect - Construction of the option will take place within the Brecon Beacons National Park. Construction may have short term, temporary negative effects on local landscape features and other receptors in the vicinity of the reservoir (including walkers and visitors to the reservoir) however, adverse effects would be over a short timescale.
Operation
Objective 1: Neutral effect - It is not anticipated that the operation of the option would have any effect on biodiversity as it is a network solution involving works on an existing pumping station, furthermore the HRA concludes that there are no effect pathways (the option does not require 'new water') and so will not have any operational effects and hence HRA risk is negligible.
Objective 2: Neutral effect - It is assumed that there would be a biodiversity net gain in operation greater than the net loss in construction; however, without quantification, its magnitude is uncertain and an equivalent score to construction is provided.
Objective 3: Neutral effect - The option would involve the reinstatement/upgrading of existing infrastructure, with no new pathways for INNS transfer, therefore the effect against this objective has been assessed as neutral.
Objective 4: Neutral effect - There would be no operational effects on soils/geodiversity/land as all construction will take place in the footprint of the existing treatment works.
Objective 5: Minor negative effect – The WFD assessment states that a new intermittent discharge to the River Taff (via the Nant Cae-dudwg watercourse - approx. 900m upstream of the confluence) has the potential to have effects on water quality and hence potentially on water chemistry. Discharges are expected to take place once-twice per year during dry weather. The WFD assessment highlights that as the water body is of Good to High status for all elements apart from Fish (Moderate due to Fish), it is likely that new permit limits will be imposed to prevent deterioration. Considering the expected infrequent use of the discharge, it would be unlikely to have a notable effect on the Nant Cae-dudwg, or on the Taff downstream. Overall the WFD assessment concludes that the option would be WFD complaint with a low confidence.
Objective 6: Minor negative effect – The WFD assessment highlights that a new intermittent discharge to the River Taff (via the Nant Cae-dudwg watercourse - approx. 900m upstream of the confluence) has the potential to have effects on water quality and hence potentially on water chemistry. Discharges are expected to take place once-twice per year during dry weather. The WFD assessment highlights that, as the water body is of Good to High status for all elements apart from Fish (Moderate due to Fish), it is likely that new permit limits will be imposed to prevent deterioration. Considering the

expected infrequent use of the discharge, it would be unlikely to have a notable effect on the Nant Cae-dudwg, or on the Taff downstream. The WFD also highlights that washwater discharges, particularly during times of low flow, could result in changes to physico-chemical quality elements (e.g. BOD, DO, pH, temperature) and additionally, could result in changes to river chemistry, potentially causing a deterioration in status. Overall the WFD assessment concludes that the option would be WFD compliant, with a low confidence due to discharge to tributary a distance upstream and volume/constitution of washwater.
Objective 7: Neutral effect - The option is not located within areas at a high risk of flooding. It is not anticipated, that operation of the option would result in, or exacerbate, flooding in the area or elsewhere.
Objective 8: Neutral effect - No operational effects on air quality are anticipated.
Objective 9: Neutral effect - The operation of this option is not anticipated to generate any discernible carbon emissions and hence a neutral effect has been identified.
Objective 10: Moderate positive effect - The additional 10Ml/d provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Moderate positive effect - The additional 7Ml/d provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a moderate positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect -The operation of the option is not expected to impact upon opportunities for recreation or tourism.
Objective 13: Moderate positive effect- The scheme would not adversely affect human health or impact existing recreational facilities or recreation, due to increased noise, nuisance or disruption. The increased provision of an additional 7Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Moderate positive effect - This option would improve water efficiency by enabling DCWW to stop supplying c7 Ml/d minimum sweetening flow year round into the Llwynon gravity main, and would increase the resilience of water resources within the DCWW supply area, though the provision of an extra 7Ml/d of deployable output.
Objective 15: Neutral effect - The operation of this option would not involve additional infrastructure or resources and would likely require only minor energy usage, therefore the effect on this objective has been assessed as neutral.
Objective 16: Neutral effect - The operation of the option would not have any effect on cultural heritage.

Objective 17: Neutral effect - The operation of the option would not have any effect on the local landscape. New above ground infrastructure will be built within the footprint of existing works.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	WEF-MET-8121
Option Name	WEF-MET-8121
Water company	DCWW
Option Description	This option would involve the installation of meters in 1,338,715 households and 80,769 meters in non-households across the SEWCUS zone between 2025-2050.
Yield	41.53Ml/d
WRZ	SEWCUS

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
WEF-MET-8121	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

Construction
Objective 1: Neutral effect - The construction of this option is not anticipated to impact on biodiversity.

Objective 2: Neutral effect - The construction of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The construction of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The construction of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Neutral effect - The construction of this option is not anticipated to impact on water quantity.
Objective 6: Neutral effect - The construction of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The construction of this option is not anticipated to impact on flood risk.
Objective 8: Significant negative uncertain effect - The construction of the option could result in traffic congestion during the construction period (this would be on the road network across the SEWCUS zone) which, together with embodied carbon associated with meters and emissions from powering installation equipment, may have a negative effect on local air quality. Construction activity may take place within an AQMA.
Objective 9: Significant negative effect - The construction of the option would include embodied carbon from material production of meters (1,338,715 household meters and 80,769 non-household meters total), in addition to vehicle movements for the distribution and installation of the meters over the 25 year implementation stage, with the total carbon arising from the implementation phase being 19,466.94tCO2e (above BAU emissions over the plan period).
Objective 10: Neutral effect - The construction of this option is not anticipated to impact on climate resilience.
Objective 11: Significant positive effect - This option would result in a significant capital spend of approx. £108.25m, with capital spend being spread across 25 years (2025 - 2050). This could result in a positive effect on the local economy associated with potential employment opportunities, supply chain benefits and spend by workers and contractors in the local economy.
Objective 12: Neutral effect - The construction of this option is not anticipated to impact on tourism and recreation.
Objective 13: Neutral effect - The construction of this option is not anticipated to impact on human health and well-being.
Objective 14: Neutral effect - The construction of this option is not anticipated to impact on water resource use.

Objective 15: Moderate negative effect - This option requires the installation of 1,338,715 household meters and 80,769 non-household meters total. These could be sourced from manufactures utilising more sustainable materials, however, assume limited opportunities for the acquisition of meters utilising fully sustainable or recycled/recyclable materials. Production and installation of meters/devices may result in small quantities of waste associated with manufacturing waste, device packaging, materials required for installation and disposal of any faulty/damaged devices.
Objective16: Neutral effect - The construction of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The construction of this option is not anticipated to impact on landscape
Operation
Objective 1: Neutral effect - The operation of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - The operation of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The operation of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The operation of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Significant positive effect - The operation of this option would result in major reductions in the demand for water (41.53Ml/d WAFU benefit), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering..
Objective 6: Neutral effect - The operation of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The operation of this option is not anticipated to impact on flood risk.
Objective 8: Neutral effect - The operation of this option is not anticipated to impact on air quality.
Objective 9: Significant positive effect - The operation of the option would involve carbon emissions associated with meter reading activities, however, the option would reduce greenhouse gas emissions associated with reduced electricity production for the production/treatment of water and water use in the home (e.g. heating, etc.) and overall, the operation of the option is anticipated to reduce carbon emissions by an average of 1413.2tCO2e/year across the plan period.

Objective 10: Significant positive effect - The increased capacity of 41.53Ml/d would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience and adaptability to the effects of climate change.
Objective 11: Significant positive effect - This option would provide an additional capacity of 41.53Ml/d, which would help ensure a continual supply of clean drinking water and increase resilience of supply to DCWW customers, supporting economic growth which could result in a positive effect on the local economy and social wellbeing.
Objective 12: Neutral effect - The operation of this option is not anticipated to impact on tourism and recreation.
Objective 13: Significant positive effect - The operation of this option would result in a positive effect on human health. Overall, the increase in capacity of 41.53Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Significant positive effect - This option would involve a major reduction in demand from the supply network (41.53Ml/d), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering. The option would result in a major improvement in water efficiency and resilience.
Objective 15: Neutral effect - The operation of this option is not anticipated to impact on waste and resource use.
Objective16: Neutral effect - The operation of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The operation of this option is not anticipated to impact on landscape

FINAL

Tywi Gower Resource Zone

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	TWG03
Option Name	Bryn Gwyn Supernatant Recovery
Water company	DCWW
Option Description	Bryn Gwyn WTW produces approximately 2-2.5Ml/d of supernatant. This supernatant is collected with site drainage (including chemical delivery run-off) before being discharged into the river. Separating and recovering this supernatant from surface run-off would reduce the amount of raw water needing to be abstracted for treatment. Main scheme elements: Pipeline, manhole chambers, diversion of drainage via new drainage pipe, replacement of existing supernatant return pumps, total length of proposed pipework = 286m. (Location of option used in spatial assessment assumed based on grid reference provided in proforma).
Yield	2.3Ml/d
WRZ	Tywi Gower

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
TWG03	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0

Construction
Objective 1: Minor negative effect - There are 2 SACs (River Tywi located 3.5km away and Cernydd Carmel 8.5km away) and 25 SSSIs within 10km, with the closest being Cae Cilmaenllwyd located approximately 1.6km from the works. There are 2 NNRs (Dinefwr Estate 4.9km away and Carmel 8.7km away) and 1 LNR (Carreg Cennen Woodlands 2.7km away) within 10km and 4 ancient woodland areas within 1km, with the closest being a restored ancient woodland site 900m away. The option construction is limited to works within the existing DCWW site. Due to the small scale of the activities required, the construction phase impacts are unlikely to extend outside of the DCWW site. However, due to proximity to watercourses within the Afon Tywi SAC catchment, best practice construction measures and mitigation are required to avoid pollution incidents and sediment runoff that could impact the SAC. However, the HRA concludes that whilst potential effect pathways present, current baseline available data suggests compliance risk is small and effects avoidable using standard mitigation. Construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - The BNG assessment concludes that as capital works are within the boundary of the existing Water Treatment Works, there are no construction activities that will cause an impact from a BNG standpoint.
Objective 3: Neutral effect - The construction activities could result in the disruption of terrestrial and aquatic INNS. Effects are considered to be neutral as best practice construction methods will reduce the risk of distribution.
Objective 4: Neutral effect - The option is located within ALC Grade 4 and 5 agricultural land, and is therefore of poor quality. The pipeline will require temporary land take during the construction phase and will not result in the loss of best and most versatile agricultural land. There are 4 historic landfill sites within 5km of the option location. Cilmaenllwyd Quarry is the closest landfill site located 2.1km from the option location. Pollution from landfill sites during construction is considered unlikely.
Objective 5: Neutral effect - The Breinant river is 650m from the option location. The overall groundwater status at the option location is poor. No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology. The WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.

Objective 6: Neutral effect - It is not expected that construction of this option would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). As such, the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.
Objective 7: Moderate negative effect - A small proportion (<40%) of the WTW site is located in an area of high risk to flooding from surface water/small watercourses (Flood Zone 3) and hence could be at risk of flooding during construction. However, the construction of option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Neutral effect - Carmarthenshire Llandeilo AQMA is located 4.4km from the option location. There will be an increase in vehicle movement associated with construction activities which could cause short-term deterioration in local air quality, however, given the very modest capital expenditure and scale of works, any effect in this regard is anticipated to negligible.
Objective 9: Neutral effect - Construction would involve the use of materials with embodied carbon as well as carbon emissions related to construction traffic, however, construction carbon is only anticipated to total 21.7tCO2e, which is not expected to have any discernible effect on this objective.
Objective 10: Minor negative effect - As noted above, a small proportion (<40%) of the WTW site is located in an area of high risk to flooding from surface water/small watercourses (Flood Zone 3). In consequence, the sites of the construction of this infrastructure would be vulnerable to the effects of climate change (flooding), depending on the timing of works.
Objective 11: Neutral effect - The option would only require a very modest CAPEX (£0.65m) which is not expected to have any discernible effect on the economy during construction.
Objective 12: Neutral effect - Construction works are not expected to have a significant impact on opportunities/facilities for recreation or tourism. There are no cycle routes, national trails, country parks or greenspace areas within 1km of the option location.
Objective 13: Minor negative effect - Construction of the option is not expected to have a significant impact on health during the construction period, due to the largely rural location. Construction works may have a minor negative effect (e.g. noise disturbance, vibration, dust deposition and air quality impacts) on nearby residential receptors as there are a number of scattered residential dwellings and farmsteads in proximity to the option.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - New pipework and manhole chambers along with replacing existing return pumps will require new materials. Given the modest CAPEX, the option is expected to have a minor negative effect on waste and resources. It is possible that the option could use limited quantities of waste materials and any new infrastructure would incorporate limited sustainable design measures and materials and there is also the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled, however, given the modest scale of construction works and CAPEX, any effect in this regard is anticipated to be negligible.

Objective 16: Neutral effect - There are no World Heritage Sites within 10km and no Registered Parks and Gardens within 1km of the option. There is 1 Scheduled Monument (Bryngwyn Standing stone located 560m from the options approximate location) and no Listed Buildings within 1km of the option. It is not anticipated construction would have any significant effect on theses heritage assets, due to the distance between these sites and proposed works.
Objective 17: Moderate negative effect - The option is located within the Brecon Beacons National Park. There are no AONBs within 10km of the option. The option requires the construction of a number of new elements including a pipeline so construction works are likely to be visually intrusive to the rural (national park) landscape in the short term.
Operation
Objective 1: Neutral effect - The option does not require any additional abstractions, with the portion of supernatant replacing the volume of abstraction. As such, the hydrological regime should remain unchanged and there should be no downstream impacts on the Afon Tywi SAC and as such the HRA assessment concludes that the HRA risk during operation is negligible ('no effects' or clearly no LSE alone (e.g. no impact pathways; features not sensitive; etc.)). There is no pathway for the operational activities of this component to result in effects on non-designated aquatic habitats or species. Any operational impacts will not alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided. The BNG assessment concludes that any operational effects on habitat loss are also likely to be of neutral effect.
Objective 3: Neutral effect - The option will not result in the introduction of a new pathway. The supernatant will is a product of the treatment process and any supernatant that is recovered will be subject to further treatment. It is assumed that best practice measures will be implemented during the operation and maintenance at the WTW.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Neutral effect - There is no pathway for this option to impact river or groundwater flows. There would be no change in sediment dynamics. As such, the WFD assessment concludes that there is a negligible risk to WFD compliance.
Objective 6: Neutral effect - There are no pathways for water quality impacts associated with the operation of this option. As such, the WFD assessment concludes that there is a negligible risk to WFD compliance.
Objective 7: Moderate negative effect - As noted above a small proportion (<40%) of the WTW site is located in an area of high risk to flooding from surface water/small watercourses (Flood Zone 3) and, therefore, may be liable to flooding during operation. However, the operation of the option would be unlikely to increase flood risk in the area or elsewhere.

Objective 8: Neutral effect - Operation of the option is not expected to impact local air quality.
Objective 9: Minor negative uncertain effect - The operation of the option would require energy for the recovery and treatment (e.g. PAC dosing, coagulation, flocculation, clarification, filtration (RGF), contact tanks, UV dosing) of supernatant, which would generate carbon emissions, however, the exact carbon emissions associated with the operation of the option is currently unknown.
Objective 10: Minor positive effect - Operation of the option will provide 2.3Ml/d of water resource, which would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Minor positive effect - Operation of this option will provide up to 2.3Ml/d deployable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers, supporting economic/population growth.
Objective 12: Neutral effect - Operation of the option is not expected to have a negative impact on tourism and recreation.
Objective 13: Minor positive effect - The scheme would not adversely affect human health due to increased noise, nuisance or disruption. Operation of this option will provide up to 2.3Ml/d deployable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - The option would increase water efficiency by reducing the amount of raw water needing to be abstracted and treated by 2-2.5 Ml/d, the option would also increase the resilience of water resources within the DCWW supply area, though the provision of an extra 2.3Ml/d of deployable output.
Objective 15: Minor negative uncertain effect - The operation of the option would require energy for the recovery and treatment of supernatant, as well as the use of chemicals/materials associated with treatment e.g. PAC dosing, coagulation, flocculation, clarification, filtration (RGF), contact tanks, UV dosing.
Objective 16: Neutral effect - Operation of this option is not expected to have any impact on cultural heritage sites.
Objective 17: Neutral effect - The option will not permanently alter the existing landscape, having a neutral effect during operation.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	TWG09
Option Name	Upsize Llangyfelach WPS
Water company	DCWW
Option Description	To reduce demand on the Bryn Gwyn system, the Llangyfelach water pumping station pumping water to Cockett service reservoir will be upsized to supply an additional 4Ml/d on top of the existing 14.59Ml/d (at 75.4m lift and 165kW). (Location of option used in spatial assessment assumed based on grid reference provided in proforma).
Yield	4Ml/d
WRZ	Tywi Gower

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
TWG09	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
	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**

Construction
Objective 1: Minor negative effect - There are two Ramsar sites (Burry Inlet 6.4km away and Crynlyn Bog 6.5km away), 3 SACs (Carmarthen Bay and Estuaries 6.3km away, Crymlyn Bog 6.5km away and Gower Commons 7.85km away) and 1 SPA (Burry Inlet 6.4km away) within 10km of the option. There is 1 SSSI (Pinplas Grasslands 750m away) within 1km and a further 11 within 10km. There is 1 NNR (Crymlyn Bog and Pant y Sais 6.3km away) and 6 LNR within 10km, with the closest LNR being Cadle Heath located 2.35km from the works. There are a number of ancient woodland areas within 1km of the option site (Ancient Semi-natural Woodland is 180m away). Option construction is limited to a single pumping station site. Small scale activities associated with upgrade/alteration are within existing assets. The HRA concludes that the HRA risk is negligible during the construction period and that construction phase impacts are highly unlikely outside of the DCWW site but pollution during the construction can not be screened out in the absence of mitigation for Bristol Channel Approaches SAC, Carmarthen Bay and Estuaries SAC, Burry Inlet SPA and Ramsar due to the presence of connecting waterbodies. Construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - The BNG assessment concludes that the construction activities will have a very small impact to land cover and this is expected to have a neutral impact overall from a BNG standpoint.
Objective 3: Neutral effect - Upsizing of the pumping station could potentially result in increased disruption to terrestrial and aquatic INNS. Effects are considered neutral due to the minor nature of the works and in consideration of best practice construction methods.
Objective 4: Neutral effect - The option is located within non-agricultural and low grade (4 and 5) agricultural land. The option is not likely to require permanent land take and will not result in the loss of best and most versatile agricultural land. There are 2 historic landfill sites within 1km of the option location, Cilfwnwr Farm is located 670m away and Penplas Farm is 990m away. Pollution from landfill sites during construction is considered unlikely.
Objective 5: Neutral effect - Afon Llan is within 1km of the scheme (300m away). The overall groundwater status at the option location is poor. No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology. The WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.
Objective 6: Neutral effect - It is not expected that construction of this option would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). As such, the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.

Objective 7: Significant negative effect - The WTW site is located in an area of high risk to flooding from surface water/small watercourses (Flood Zone 3) and hence could be at risk of flooding during construction. However, the construction of the option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Minor negative effect - Swansea AQMA is 3.1km from the option location. There will be an increase in vehicle movement associated with construction activities and will likely cause short-term deterioration in local air quality, which given the scale of CAPEX and works required, is anticipated to be minor.
Objective 9: Neutral effect - Construction would involve the use of materials with embodied carbon as well as carbon emissions related to construction traffic, however, construction carbon is only anticipated to total 45.1tCO2e, which is not expected to have any discernible effect on this objective.
Objective 10: Moderate negative effect - As noted above, the WTW site is located in an area of high risk to flooding from surface water/small watercourses (Flood Zone 3). In consequence, the sites of the construction of this infrastructure would be vulnerable to the effects of climate change (flooding), depending on the timing of works.
Objective 11: Minor positive effect - The scheme would result in a minor increase in construction jobs associated with the £1.85m capital spend during the 1.5-year construction period. Individual spend by contractors and workers could also provide some local benefit to business. Works are unlikely to affect the local transport network, given the location and nature of the scheme.
Objective 12: Neutral effect - Construction works are not expected to have a significant impact on opportunities/facilities for recreation or tourism. There are no cycle routes, national trails or country parks within 1km of the option. There are 2 greenspace areas within 1km of the option location, both being religious grounds 700m and 880m from the option location.
Objective 13: Minor negative effect - Construction of the option is not expected to have a significant impact on health during the construction period, due to the largely rural location. Construction works may have a minor negative effect (e.g. noise disturbance, vibration, dust deposition and air quality impacts) on residential receptors in the nearby village of LLangyfelach and a number of scattered residential dwellings in proximity to the option.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The option will make use of existing infrastructure at Llangyfelach water pumping station and the existing water pipeline network, however new materials such as concrete steel and plastic, will be required to upsize the Llangyfelach water pumping station and would generate waste. Energy would also be required for the operation of machinery and plant. It is possible that the option could use limited quantities of waste materials and any new infrastructure would incorporate limited sustainable design measures and materials and there is also the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled, however, given the modest scale of construction works and CAPEX, any effect in this regard is anticipated to be negligible.
Objective 16: Minor negative effect - There are no World Heritage Sites within 10 km of the option. Penllergare Registered Park and Garden is 970m from the approximate option location. There are 4 Listed Buildings and no Scheduled Monuments within 1km of the option, with the closest Listed Building being the Church of St David and St Cyfelach 700m from the option. It is not anticipated construction would have any significant effect on theses heritage assets, due to the distance between these sites and proposed works.

Objective 17: Minor negative effect - There are no National Parks within 10km of the option. Gower AONB is within 10km of the option (approximately 6.7km away). As the option requires Llangyfelach water pumping station to be upsized, construction works are likely to be visually intrusive to the protected landscape in the short term.
Operation
Objective 1: Neutral effect - The option does no require any additional abstractions or discharges. The HRA concludes that no potential impact pathways to the designated sites within 20km have been identified and as such, the HRA risk during operation is negligible. There is no pathway for the operational activities of this component to result in effects on non-designated aquatic habitats or species. Any operational impacts will not alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided. The BNG assessment concludes that any operational effects on habitat loss are likely to be of moderate effect.
Objective 3: Neutral effect - Effects are considered neutral as this is an existing scheme with an increase in the volume of water. Water will be treated at the WTW and the risk is neutral considering best practice measures during operation and maintenance of the WTW and associated infrastructure.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Neutral effect - There is no pathway for this option to impact river or groundwater flows. There would be no change in sediment dynamics. As such the WFD assessment concludes that there would be negligible risk to WFD compliance.
Objective 6: Neutral effect - There are no pathways for water quality impacts associated with the operation of this option. As such the WFD assessment concludes that there would be negligible risk to WFD compliance.
Objective 7: Significant negative effect - As noted above, the WTW site is located in an area of high risk to flooding from surface water/small watercourses (Flood Zone 3) and hence could be at risk of flooding during operation. However, the operation of the option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Neutral effect - Operation of the option is not expected to impact local air quality.
Objective 9: Neutral effect - Operational energy demand associated with pumping infrastructure would result in 86.1tCO2e/a which in line with the definitions of significance is considered to be a neutral effect on this objective.
Objective 10: Minor positive effect - Operation of the option will provide 4Ml/d of water resource, which would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.

Objective 11: Minor positive effect - Operation of this option will provide up to 4Ml/d employable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers, supporting economic/population growth.
Objective 12: Neutral effect - Operation of the option is not expected to have a negative impact on tourism and recreation.
Objective 13: Minor positive effect - The scheme would not adversely affect human health due to increased noise, nuisance or disruption. Operation of this option will provide up to 4Ml/d deployable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the DCWW supply area by providing an additional 4Ml/d deployable output which is deemed to be a minor positive effect for this objective.
Objective 15: Minor negative uncertain effect - The operation of the option is likely to require additional energy and may require the use of chemicals, however, the effects in this regard are currently uncertain.
Objective 16: Neutral effect - Operation of this option is not expected to have any impact on cultural heritage sites.
Objective 17: Neutral effect - The option will not permanently alter the existing landscape, having a neutral effect during operation.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	TWG11
Option Name	Bryn Gwyn Distribution Options - Felindre WTW Supply to Llanon
Water company	DCWW
Option Description	In order to reduce stress on the Bryn Gwyn WTW resource, 4Ml/d will be supplied to the Llannon SRv demand area from Felindre through the Hendy connection to the Llannon network. The flow in the network will reverse back to the demand area and Llannon SRv through the existing DN 250mm/10 inch DI distribution main. A new pumping station (Bryngwili) will be connected to the existing distribution to pump 4Ml/d. (Location of option used in spatial assessment assumed based on grid reference provided in proforma).
Yield	4Ml/d
WRZ	Tywi Gower

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
TWG11	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	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**

Construction
Objective 1: Minor negative effect - There is a SSSI within 1km and a further 11 within 10km and 4 LNR within 10km. There are 6 areas of Ancient Woodland within 1km of the option location. The construction works for the option are limited to the installation of a single pumping station at Bryngwili. Small scale construction activities are therefore likely to associated with the works. The HRA concludes that construction phase impacts are highly unlikely outside of the DCWW site (based on standard distance threshold e.g. air quality), with the exception of pollution and sediment laden runoff from the site which could impact the downstream Carmarthen Bay and Estuaries / Bae Caerfyrddin SAC Aberoedd SAC (Burry Inlet), Burry Inlet SPA and Ramsar, due to the presence of connecting waterbodies (River Loughor). The mobile qualifying features of the Afon Tywi/River Tywi SAC could also be impacted if their use of offsite functionally linked habitat extends to Burry Inlet and the River Loughor. Therefore mitigation (best practice site management, pollution control measures) will be required. Overall, the HRA concludes that the HRA risk associated with construction would be low (potential effect pathways present but current baseline available data suggests compliance risk is small and effects avoidable using standard mitigation). Construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - The BNG assessment concludes that construction activities will have a very small impact to land cover, which is expected to cause a neutral effect on this objective.
Objective 3: Neutral effect - The new pumping station and changes to the existing water transfer system could potentially result in increased disruption to terrestrial and aquatic INNS. Effects are considered neutral as construction activities will be minor and best practice construction measures will prevent the distribution of INNS.
Objective 4: Minor negative effect - The new pumping station is located on ALC grade 2 land. The land surrounding the new pumping station is non-agricultural, built up land. The option would potentially require permanent land take of ALC grade 2 land, resulting in the loss of best and most versatile agricultural land. There is a historic landfill site located 800m from the option location, it is unlikely that this waste site will result in any pollution during construction of the option.
Objective 5: Neutral effect - Afon Gwili and Afon Llwchwr are within 1km of the scheme. The overall groundwater status at the option location is poor. No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology. As such the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.

Objective 6: Neutral effect - It is not expected that construction of this option would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). As such, the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.
Objective 7: Minor negative uncertain effect - The site of the new PS appears to be situated in a small area of land between an area at risk of flooding from rivers (Flood Zone 2) and an area at high risk of flooding from surface water/small watercourses (Flood Zone 3), however, it is not clear whether the exact site of the PS will be located within or partially within either of these areas, given the limited space between them. As such, construction works associated with the option may be at risk of flooding. Construction of the option is not expected to increase the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Minor negative effect - There are 2 AQMAs within 10km of the option (Swansea and Llanelli). There will be an increase in vehicle movement associated with construction activities and will likely cause short-term deterioration in local air quality, which, given the minor scale of CAPEX and construction activity, is anticipated to result in a minor negative effect on this objective.
Objective 9: Minor negative effect - Construction of the option would require the use of raw materials with a minor amount of embodied carbon (149.8.9tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Minor negative uncertain effect - As noted above the site of the new PS appears to be situated in a small area of land between an area at risk of flooding from rivers (Flood Zone 2) and an area at high risk of flooding from surface water/small watercourses (Flood Zone 3), however, it is not clear whether the exact site of the PS will be located within or partially within either of these areas, given the limited space between them. As such, construction of the new PS may be at risk to the effects of climate change (flooding).
Objective 11: Minor positive effect - The scheme would result in a minor increase in construction jobs associated with the £2.36m capital spend. Individual spend by contractors and workers could also provide some local benefit to business. Works are unlikely to affect the local transport network, given the location and nature of the scheme.
Objective 12: Neutral effect - There are no cycle routes, national trails or country parks within 1km of the option. There are 8 greenspace areas within 1km of the option, including Capel Newydd (religious grounds) 200m from the option location, Hendy Park, and Libanus Chapel. Construction works are not expected to have a significant impact upon opportunities/facilities for recreation or tourism.
Objective 13: Minor negative effect - Construction of the option is not expected to have a significant impact on human health during construction as construction activity is only expected to be small scale. Construction works may have a minor negative effect (e.g. noise disturbance, vibration, dust deposition and air quality) on residential receptors in Hendy, which is adjacent to the new pumping station location.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The option will be an addition to the existing Llannon water network, however new materials such as concrete, steel and plastic will be required to construct the new Bryngwili Pumping Station and would generate waste. Energy would also be required for the operation of plant and machinery. It is possible that the option could use limited quantities of waste materials and any new infrastructure would incorporate limited

sustainable design measures and materials and there is also the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled, however, given the limited scale of works and CAPEX, any effects in this regard are anticipated to be negligible.
Objective 16: Minor negative effect - There are no World Heritage Sites within 10km or registered parks and gardens within 5km of the option. There are 3 Scheduled Monuments and 4 Grade II Listed Buildings within 1km of the option. Hendy Castle Mound is the closest Scheduled Monument approximately 480m from the option site. The closest listed building (Tynewedd Chapel) is 670m from the new pumping station location. It is not anticipated construction would have any significant effect on these heritage assets, due to the distance between these sites and proposed works but there may be a minor negative effect on the Scheduled Monument during construction.
Objective 17: Minor negative effect - There are no National Parks within 10km of the option. Gower AONB is within 10km of the option (approximately 9km away). The option requires the construction of a new pumping station, construction works are expected to be small scale but has the potential to be visually intrusive to adjacent residential properties in Hendy. South East of the site it is predominantly rural but unlikely to be significantly impacted by the construction of the pumping station.
Operation
Objective 1: Neutral effect - There are currently no changes required to the existing infrastructure to allow the reverse of water. No additional abstractions or discharges are required and as such, the HRA has not identified potential operational impact pathways to the designated sites within 20km of the option. Overall the HRA concludes that the HRA risk is negligible ('no effects' or clearly no LSE alone (e.g. no impact pathways; features not sensitive; etc.)). There is no pathway for the operational activities of this component to result in effects on non-designated aquatic habitats or species. Any operational impacts will not alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided. The construction effect for this scheme is expected to be neutral, therefore a neutral operational impact is anticipated. The BNG assessment concludes that any operational effects on habitat loss are likely to be of minor effect. Furthermore, this component leads to a small change to habitats.
Objective 3: Neutral effect - The option will not results in the creation in of a new pathway for INNS distribution and water will be transferred in a closed system. The water will be transferred between WTWs and the treatment process further prevents any new INNS pathways.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Neutral effect - There is no pathway for this option to impact river or groundwater flows. There would be no change in sediment dynamics. As such the WFD assessment concludes that there is a negligible risk to WFD compliance.
Objective 6: Neutral effect - There are no pathways for water quality impacts associated with the operation of this option. As such the WFD assessment concludes that there is a negligible risk to WFD compliance.
Objective 7: Minor negative uncertain effect - As noted above, the site of the new PS appears to be situated in a small area of land between an area at risk of flooding from rivers (Flood Zone 2) and an area at high risk of flooding from surface water/small watercourses (Flood Zone 3), however, it is not clear

whether the exact site of the PS will be located within or partially within either of these areas, given the limited space between them. As such, the PS may be at risk of flooding during operation. Operation of the option is not expected to increase the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Neutral effect - Operation of the option is not expected to impact local air quality.
Objective 9: Moderate negative effect - Operational energy demand associated with pumping would generate 621.1tonnes CO2e/a. This has been assessed as having a moderate negative effect on this objective.
Objective 10: Minor positive effect - Operation of the option will provide 4Ml/d of water resource, which would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Minor positive effect - Operation of this option will provide up to 4Ml/d deployable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers, supporting economic/population growth.
Objective 12: Neutral effect - Operation of the option is not expected to have a negative impact on tourism and recreation.
Objective 13: Minor positive effect - The scheme would not adversely affect human health due to increased noise, nuisance or disruption. Operation of this option will provide up to 4Ml/d deployable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. The option would however, increase the resilience of water resources within the DCWW supply area by providing an additional 4Ml/d yield which is deemed to be a minor positive effect for this objective.
Objective 15: Minor negative uncertain effect - The operation of the option is likely to require additional energy and may require the use of chemicals, however, the effects in this regard are currently uncertain.
Objective 16: Neutral effect - Operation of this option is not expected to have any impact on cultural heritage sites.
Objective 17: Neutral effect - The option will not permanently alter the existing landscape, having a neutral effect during operation.

wood.

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	TGW12
Option Name	Crai Distribution Option - Upsize Christopher Road WPS
Water company	DCWW
Option Description	In order to reduce demand on Crai resources, GCG SRv (2.4 Ml/d average demand) and Bros SRv(1.7Ml/d average demand) will be rezoned to the Felindre WTW by upsizing Christopher Road PS to reverse flows in the 17" main from Crai and putting two booster PS's to pump to GCG SRv and Bros SRv. (Location of option used in spatial assessment assumed based on grid reference provided in proforma).
Yield	4.1Ml/d
WRZ	Tywi Gower

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
TWG12	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

	Operation (positive)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**+**	**+**	**0**	**+**	**+**	**0**	**0**	**0**

Construction
Objective 1: Moderate negative effect - The new Brynawel PS and Rhos PS would be situated within areas of urban Ancient Woodland, and therefore construction at these two sites would result in minor loss of Ancient Woodland areas. The existing Christopher Road PS which would be upgraded meanwhile, is situated immediately adjacent to another area of urban Ancient Woodland and may result in disturbance/ more minor effects (e.g. noise, dust) on this site. There are 19 SSSIs within 10km of the option location, 1 NNR within 10km, a LNR within 1km of the option and a further 3 within 10km. There are 13 European sites within 20km of the proposed pumping station (Christopher Road) and two booster pumping stations (Brynawel and Rhos). The closest sites are Crymlyn Bog / Cors Crymlyn SAC and Ramsar located 4.2km from the closest element of the proposed works (Christopher Road PS). The HRA concludes that due to the small scale of the proposed works and absence of potential impacts pathways (no hydrological connectivity, disturbance and air quality impacts highly unlikely given standard threshold distances) no Likely Significant Effects are anticipated at any of the European sites during the construction phase (negligible HRA risk). Construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - The BNG assessment concludes that construction activities will have a very small impact to land cover, which is expected to cause a neutral effect on this objective.
Objective 3: Neutral effect - Upsizing of the pumping station would require minor construction activities which could result in the distribution of terrestrial INNS. Effects are considered neutral based on the implementation to best practice construction methods.
Objective 4: Minor negative effect - Land surrounding the option location is of poor quality (grade 3b or lower). The approximate site locations are within non-agricultural or urban areas. The option would potentially require permanent land take but not result in loss of best and most versatile agricultural land. There are 11 historic landfill sites within 5km of the option location, and the Danygrag House historic landfill site is 1.05km from the option location. Pollution from landfill sites during construction is considered unlikely.
Objective 5: Neutral effect - The Breinant river is within 1km of the scheme. The overall groundwater status at the option location is poor. No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology. As such the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.
Objective 6: Neutral effect - It is not expected that construction of this option would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). As such the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.

Objective 7: Minor negative uncertain effect - The site of the new Rhos PS appears to be situated in a small area of land between an area at risk of flooding from rivers (Flood Zone 2) and an area at high risk of flooding from rivers (Flood Zone 3), however, it is not clear whether the exact site of the PS will be located within or partially within either of these areas, given the limited space between them. As such, construction works associated with the option may be at risk of flooding. Construction of the option is not expected to increase the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Moderate negative effect - There are no AQMAs within 10km of the option. There will be an increase in vehicle movement associated with construction activities which could cause short-term deterioration in local air quality, which, given the scale of works and CAPEX, is anticipated to result in a moderate negative effect on this objective.
Objective 9: Minor negative effect - Construction of the option would require the use of raw materials with a minor amount of embodied carbon (507.3tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Minor negative uncertain effect - As noted above the site of the new Rhos PS appears to be situated in a small area of land between an area at risk of flooding from rivers (Flood Zone 2) and an area at high risk of flooding from rivers (Flood Zone 3), however, it is not clear whether the exact site of the PS will be located within or partially within either of these areas, given the limited space between them. As such, construction of the new PS may be at risk to the effects of climate change (flooding).
Objective 11: Moderate positive effect - The scheme would result in a minor increase in construction jobs associated with the £8.32m capital spend over the 1.5 year construction period. Individual spend by contractors and workers could also provide some local benefit to business. Works are unlikely to affect the local transport network, given the location and nature of the scheme.
Objective 12: Minor negative effect - Due to the potential disruption to recreational facilities including Cycle route 43 within 1km of the option (with it's closest point only 160m away) and 12 greenspace areas within 1km of the option including playing fields, sports facilities and golf course. The closest greenspace is playing fields less than 20 metres from the approximate option location, which could lead to disturbances to users of the playing fields (e.g. noise, vibrations, dust). There are no country parks or national trails within 1km of the option.
Objective 13: Minor negative effect - Construction of the option is not expected to have a significant impact on human health during construction as construction activity is only expected to be small scale. Construction works may have a minor negative effect (e.g. noise disturbance, vibration, dust deposition and air quality) on residential receptors in Pontardawe as the option is predominantly located within the town.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Moderate negative effect - The option will make use of existing infrastructure at Christopher Road pumping station and the existing water pipeline network, however new materials such as concrete, steel and plastic will be required to upgrade the Christopher Road pumping station, along with the two new pumping stations as Brynawel and Rhos and, as such, would generate waste. Energy would also be required for the operation of plant and machinery. Objective 15: Minor positive uncertain effect - It is possible that the option could use limited quantities of waste materials and any new infrastructure

would incorporate limited sustainable design measures and materials. There is also the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Neutral effect - There are no World Heritage Sites within 10km and no registered parks and gardens within 5km of the option. There is 1 Scheduled Monument (Waun y Coed Colliery Branch canal and Tramroad Incline - 900m away) and 10 Listed Buildings (Grade II and II*) within 1km of the option, the closest listed building is Grade II listed Ynysmeudwy Isaf Overbridge on Swansea Canal located 35m from the approximate option location. It is not anticipated construction would have any significant effect on these heritage assets, due to the distance between these sites and proposed works.
Objective 17: Neutral effect - The Brecon Beacons National Park is within 10km of the option (approximately 8.8km away). There are no AONBs within 10km. The option requires the construction of two new booster pumping stations and the upsizing of an existing pumping station, construction works are unlikely to be visually intrusive to the landscape as the option is within an urban area.
Operation
Objective 1: Neutral effect - The operational changes are limited to a change in distribution within the existing network. Therefore with no additional abstractions or discharges, there are no operational impacts at the sites identified within 20km and the HRA concludes that the HRA risk during operation would be negligible. There is no pathway for the operational activities of this component to result in effects on non-designated aquatic habitats or species. Any operational impacts will not alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided. The construction effect for this scheme is expected to be neutral, therefore a neutral operational impact is anticipated. The BNG assessment concludes that any operational effects on habitat loss are likely to be of minor effect. Furthermore, this component leads to a small change to habitats.
Objective 3: Minor negative effect- Effects are considered minor negative as water will be transferred between catchments. However, water will be transferred in a closed system and will be treated further reducing the risk of any new pathways.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Neutral effect - There is no pathway for this option to impact river or groundwater flows. There would be no change in sediment dynamics. As such the WFD assessment concludes that there is a negligible risk to WFD compliance.
Objective 6: Neutral effect - There are no pathways for water quality impacts associated with the operation of this option. As such the WFD assessment concludes that there is a negligible risk to WFD compliance.

Objective 7: Minor negative uncertain effect - As noted above the site of the new Rhos PS appears to be situated in a small area of land between an area at risk of flooding from rivers (Flood Zone 2) and an area at high risk of flooding from rivers (Flood Zone 3), however, it is not clear whether the exact site of the PS will be located within or partially within either of these areas, given the limited space between them. As such, operation of this element of the scheme may be at risk of flooding. Operation of the option is not expected to increase the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Neutral effect - Operation of the option is not expected to impact local air quality.
Objective 9: Moderate negative effect - Operational energy demand associated with pumping would generate 737.7tonnes CO2e/a. This has been assessed as having a moderate negative effect on this objective.
Objective 10: Minor positive effect - Operation of the option will provide 4.1Ml/d of water resource, which would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Minor positive effect - Operation of this option will provide 4.1Ml/d deployable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers, supporting economic/population growth.
Objective 12: Neutral effect - Operation of the option is not expected to have any impact on tourism and recreation.
Objective 13: Minor positive effect - The scheme would not adversely affect human health due to increased noise, nuisance or disruption. Operation of this option will provide an additional 4.1Ml/d deployable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the DCWW supply area by providing an additional 4.1Ml/d yield.
Objective 15: Minor negative uncertain effect - The operation of the option is likely to require additional energy and may require the use of chemicals, however, the effects in this regard are currently uncertain.
Objective 16: Neutral effect - Operation of this option is not expected to have any impact on cultural heritage sites.
Objective 17: Neutral effect - The option will not permanently alter the existing landscape, and therefore is anticipated to have a neutral effect during operation.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	TWG13
Option Name	Crai Distribution - Rezoning and Valve Isolation
Water company	DCWW
Option Description	The option is aimed at providing a permanent solution to the water quality issues, experienced in the DMA. An investigation following a 2018 major water quality incident found that the poor water quality was primarily due to the deteriorated cement lining in the trunk mains. The deterioration is not localised but sporadic. This option resolves the water quality issues by removing the deteriorated lining and relining the whole trunk main. This assessment assumes that the pipe will require excavation.
Yield	N/A
WRZ	Tywi Gower

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
TWG13	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	0	0	0	0

	Operation (positive)	**0**	**++**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Construction
Objective 1: Significant negative effect - As the pipeline crosses an SSSI, with a further 5 SSSIs within 1km of the route. The route also crosses through a number of Ancient Woodland sites. There are also 2 NNRs and 1 LNR within 1km and 1 NNR and 2 LNRs within 10km. There are 14 European sites within 20km of the option components. The closest site is Coedydd Nedd a Mellte SAC which is 5.8km to the east. The HRA highlights that the relining of the whole trunk main will not require any land-take within a European site, and the distance between the site and pipeline corridor is sufficient to avoid air quality impacts, and the works are in a different hydrological catchment to the SAC, therefore pollution incidents will not result in Likely Significant Effects. The HRA also highlights that the Coedydd Nedd a Mellte SAC does not support mobile qualifying features, therefore functionally linked habitats will not be impacted and those European sites at greater distances will not be impacted. The HRA concludes that the HRA risk during construction would be negligible ('no effects' or clearly no LSE alone (e.g. no impact pathways; features not sensitive; etc.)). Construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Moderate negative effect - The BNG assessment concludes that construction activities regarding the pipeline will temporarily cause habitat change, which is expected to cause a moderate negative effect on this objective.
Objective 3: Neutral effect - The major construction activities could result in the distribution of terrestrial and aquatic INNS. The construction will also be required within a SSSI. Construction impacts are considered to be neutral, assuming best practice construction methods will be implemented to reduce the risk of INNS distribution.
Objective 4: Moderate negative effect - ALC along the pipeline route is relatively poor with the highest grade of 3b. The pipeline intersects a historic landfill site with potential for contamination (Tip off A4067 at Godre r-graig). There are a further 12 historic landfill sites within 1km of the option.
Objective 5: Neutral effect - The pipeline crosses 7 rivers and the Swansea Canal. No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology. As such the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.
Objective 6: Neutral effect - It is not expected that construction of this option would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). As such the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.

Objective 7: Moderate negative effect - A small proportion of the pipeline (<40%) crosses through areas at high risk to flooding from rivers (Flood Zone 3), and therefore may be at risk of flooding during construction. Construction of the option is not expected to increase the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Moderate negative effect - There are no AQMAs within 10km of the option. There will be an increase in vehicle movement associated with construction activities and will likely cause short-term deterioration in local air quality, which, given the scale of works and CAPEX associated with this option is anticipated to have a moderate negative effect on this objective.
Objective 9: Moderate negative effect - Construction of the option would require the use of raw materials with a moderate amount of embodied carbon (2,894.4tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, a small proportion of the pipeline (<40%) crosses through areas at high risk to flooding from rivers (Flood Zone 3), and therefore may be at risk to the effects of climate change (flooding) during construction.
Objective 11: Moderate negative effect - Construction of the scheme would involve works to pipelines within the A4067 and crossing the A4221, the B4599 and potentially other local roads in the area, as well as within the urban areas of Gurnos, Ystalyfera and Ystradglynais and potentially other smaller built up areas, which, combined with construction traffic may have a moderate effect on local congestion/traffic during the construction period. Objective 11: Moderate positive effect - The scheme would result in a minor increase in construction jobs associated with the £8.2m capital spend over the 1.5 year construction period. Individual spend by contractors and workers could also provide some local benefit to business. Works are unlikely to affect the local transport network, given the location and nature of the scheme.
Objective 12: Minor negative effect - Cycle route 43 is within 1km of the option runs adjacent to the pipeline route for a distance with its closest point only 25m away. There are no national trails within 1km. The pipeline crosses through Craig-y-Nos country park. There are 46 areas of greenspace within 1km of the option pipeline including playing fields, religious grounds and play space. The closest greenspace area is approximately 10 metres from the pipeline and is playing fields, construction works in close proximity to this greenspace area could lead to disturbances to users (e.g. noise, vibrations, dust). There are no country parks or national trails within 1km of the option.
Objective 13: Minor negative effect - Construction of the option is not expected to have a significant impact on human health during construction due to the scale of construction activities required for the option. Construction works will likely have a minor negative effect (e.g. noise disturbance, vibration, dust deposition and air quality) on residential receptors of the towns the pipeline passes through including Ystradgynlais, Penrhos and Godr'er-graig.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Moderate negative effect - The option will be replacing the lining of the existing pipeline with new material and will generate waste. Energy would also be required for the operation of plant and machinery. Objective 15: Minor positive uncertain effect - The option will use the existing 20km pipeline, replacing the lining rather than replacing the whole structure. Furthermore, it is possible that the option could use limited quantities of waste materials and any new infrastructure would incorporate

limited sustainable design measures and materials. There is also the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Significant negative effect - The pipeline crosses through Craig-y-Nos Castle and Country Park. There are no World Heritage Sites within 10km of the option. There are 12 Scheduled Monuments and 32 Listed Buildings within 1km of the option. Three of the Scheduled Monuments are directly adjacent to the pipeline line (Crimea Colliery & Canal Quay, Remains of Lock and Dry Dock at Pantyffynnon and Tramroad at Ystradgynlais). The closest Listed Building to the proposed option is Craig-y-Nos Castle approximately 20 metres away. Due to the proximity of the works there is a major possibility that construction of the option could impact heritage assets.
Objective 17: Moderate negative effect - Approximately 30% of the option pipeline is located within the Brecon Beacons National Park. There are no AONBs within 10km of the option. The option requires the existing pipeline lining needs removing and replaced, and therefore it is anticipated that this would be visually intrusive and adversely impact the landscape.
Operation
Objective 1: Neutral effect - During operation, there will be no additional abstractions or discharges and no change in baseline operation following renovation of the existing trunk main. Therefore no operational impacts have been identified from a HRA standpoint and the HRA concludes that the HRA risk would be negligible. There is no pathway for the operational activities of this component to result in effects on non-designated aquatic habitats or species. Any operational impacts will not alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Moderate positive effect - It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided. The BNG assessment concludes that any operational effects on habitat loss are likely to be of neutral effect. Furthermore, this component leads to a small temporary change to habitats.
Objective 3: Neutral effect - The option will include works to existing infrastructure and pathways. No new pathways will be created and the risk will be neutral once water is treated at the relevant WTW.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Neutral effect - There is no pathway for this option to impact river or groundwater flows. There would be no change in sediment dynamics. As such the WFD assessment concludes that there is a negligible risk to WFD compliance.
Objective 6: Neutral effect - There are no pathways for water quality impacts associated with the operation of this option. As such the WFD assessment concludes that there is a negligible risk to WFD compliance.

Objective 7: Neutral effect - Some of the option will be located within an area at low risk to flooding. However, none of the elements of this scheme are situated within an area at high risk thus, the operation of this option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Neutral effect - Operation of the option is not expected to impact local air quality.
Objective 9: Neutral effect - The operation of this option is not expected to require any additional energy than what is already required for the existing pipeline and as such operational carbon emissions associated with the option would be 0TCO2e/year. As such, this option has been assessed as having a neutral effect on this objective during operation.
Objective 10: Neutral effect - Operation of the option will not provide any additional water resources and instead seeks to improve water quality issues, which is not anticipated to have any discernible effect on climate resilience.
Objective 11: Neutral effect - Operation of the option will not provide any additional water resources and instead seeks to improve water quality issues, which is not anticipated to have any discernible effect on the economy.
Objective 12: Neutral effect - Operation of the option is not expected to have a negative impact on tourism and recreation.
Objective 13: Neutral effect - Operation of the option will not provide any additional water resources and instead seeks to improve water quality issues, which is not anticipated to have any discernible effect on human health and wellbeing.
Objective 14: Neutral effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. Furthermore, the operation of the option will not provide any additional water resources and instead seeks to improve water quality, hence is not anticipated to have any discernible effect on water resource use.
Objective 15: Neutral effect - The operation of the option is not expected to require additional energy or use of chemicals.
Objective 16: Neutral effect - Operation of this option is not expected to have any impact on cultural heritage sites.
Objective 17: Neutral effect - The option will not permanently alter the existing landscape, having a neutral effect during operation.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	TWG14
Option Name	Ystradfellte - Reverse flow through Tonna control valve
Water company	DCWW
Option Description	In order to reduce the stress on the resource from Cefn Drysgoed, flows through the Tonna Flow control valve will be reversed so that 2.5Ml/d from the Felindre system can meet some of the demand on the Cefn Drysgoed network. Elements: New Park Field Pumping Station (PS) to pump to the Cefn Drysgoed network (2.5Ml/d - from the model)
Yield	2.5Ml/d
WRZ	Tywi Gower

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
TWG14	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
	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**

Construction
Objective 1: Minor negative effect - Crymlyn Bog Ramsar, SAC, SSSI and NNR is located 7.66km from the option. There are a further 11 SSSIs within 10km of the option, the closest site is Fforest Goch Bog 4.49km away. There are 5 LNRs within 10km of the option, the closest site is Eaglesbush Valley 3.73km away. There are 10 European sites within 20km of the option components. The HRA highlights that the PS is located with an urban area, and not hydrologically connected to downstream receptors. The HRA also notes that the site also doesn't support any habitats that could be used as functionally linked habitat by mobile qualifying features that travel over larger distances. The European sites will therefore not be impacted due to the distance being sufficient to avoid air quality, noise, visual impacts etc, and the absence of hydrological connection. Therefore pollution incidents will not result in Likely Significant Effects and the HRA concludes that the HRA risk during construction would be negligible ('no effects' or clearly no LSE alone (e.g. no impact pathways; features not sensitive; etc.)). Construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - Construction impacts associated with this scheme are expected to be neutral due to only a small amount of land being required and this land being urban.
Objective 3: Neutral effect - The new Park Field PS elements could potentially result in increased disruption to terrestrial and aquatic INNS. Effects are neutral due to the minor nature of the construction activities and in consideration of best practice construction methods.
Objective 4: Neutral effect - The option is located within an area allocated as urban land, and effects on agricultural soils are therefore considered unlikely. There are 5 historic landfill sites within 5km of the option, with the closest site 1.04km away (Cadoxton). Contamination is not anticipated due to the scale of the option and it's distance from the historic landfill site.
Objective 5: Neutral effect - There are 3 water courses within 500m of the option (Dulais, Afon Nedd and Neath Canal). No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology. As such the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.
Objective 6: Neutral effect - It is not expected that construction of this option would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). As such the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.

Objective 7: Neutral effect - The pumping station itself is not located within an area at risk to flooding, however, within 500m of the option there are areas at high risk to flooding from the sea. Construction of the option is not expected to increase the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Minor negative effect - Neath Port Talbort AQMA is located 9.09km from the option. Impacts on these AQMAs resulting from construction are considered unlikely. There will be an increase in vehicle movement associated with construction activities and will likely cause short-term deterioration in local air quality, which, given the scale of the works and CAPEX, is anticipated to have a minor negative effect on this objective.
Objective 9: Minor negative effect - Construction of the option would require the use of raw materials with a minor amount of embodied carbon (125.5tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Neutral effect - It is not anticipated that the construction of this option would have any effect on climate resilience.
Objective 11: Minor positive effect - The scheme would result in a minor increase in construction jobs associated with the £1.23m capital spend. Individual spend by contractors and workers could also provide some local benefit to business. Works are unlikely to affect the local transport network, given the location and nature of the scheme.
Objective 12: Minor negative effect - Construction works are not expected to have a significant impact on opportunities/facilities for recreation or tourism. Any effects are expected to be minor such as disturbances to users (e.g. noise, vibrations, dust) in the short term. There are 12 greenspace areas within 1km of the option, the closest site is St Anne's Church 210m away and it is unlikely there will be any recreational impacts on greenspace areas as the option only requires small scale works. National cycle route 46/47 is located approximately 70m from the option location and Afan Argoed Country Park is located 5.4km away.
Objective 13: Moderate negative effect - Due to the location of the works in close proximity to a residential area, construction works will likely have a moderate negative effect (e.g. noise disturbance, vibration, dust deposition and air quality) on residential receptors in surrounding Tonna.
Objective 14: Neutral effect - The construction phase of this option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The option involves constructing a new pumping station thus requiring new materials, such as concrete, steel and plastic and, as such, would generate waste. Energy would also be required for the operation of plant and machinery. It is possible that the option could use limited quantities of waste materials and any new infrastructure would incorporate limited sustainable design measures and materials and there is also the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled, however, given the scale of the works and CAPEX required, any effect in this regard is anticipated to be negligible.
Objective 16: Moderate negative effect - There are 19 Listed Buildings within 500m of the option, 3 of which are less than 10m from the proposed working width boundary. There are 3 Scheduled Monuments within 500m of the option, with the closest being Aberdulais Aqueduct, 175m away. There are a further 18 Scheduled Monuments within 5km of the option. There are 4 registered parks and gardens within 10km of the option, with the closest

being The Gnoll 865m away. There are no World Heritage Sites within 10km of the option. There is a moderate possibility that construction of the option could impact the structures and settings of the Listed Buildings in close proximity to the construction site.
Objective 17: Minor negative effect - There are no AONBs or National Park within 10km of the option. The option is located within a largely urban area, therefore construction of the pumping station is unlikely to have a significant effect on the surrounding landscape.
Operation
Objective 1: Neutral effect - The HRA highlights that during operation, there will be no additional abstractions or discharges and as such no operational impacts have been identified. As such the HRA concludes that the HRA risk would be negligible ('no effects' or clearly no LSE alone (e.g. no impact pathways; features not sensitive; etc.)). There is no pathway for the operational activities of this component to result in effects on non-designated aquatic habitats or species. Any operational impacts will not alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - It is assumed that operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - There is no pathway for this option to increase the risk of INNS transfer.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Neutral effect - There is no pathway for this option to impact river or groundwater flows. There would be no change in sediment dynamics. As such the WFD assessment concludes that there is a negligible risk to WFD compliance.
Objective 6: Neutral effect - There are no pathways for water quality impacts associated with the operation of this option. As such the WFD assessment concludes that there is a negligible risk to WFD compliance.
Objective 7: Neutral effect - None of the option elements are within an area at risk to flooding. Operation of this option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Neutral effect - Operation of the option is not expected to impact local air quality.
Objective 9: Minor negative effect - Operational energy demand associated with pumping would generate 125.7tonnes CO2e/a. This has been assessed as having a moderate negative effect on this objective.
Objective 10: Minor positive effect - Operation of the option will provide 2.5Ml/d of water resource, which would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.

Objective 11: Minor positive effect - Operation of this option will provide up to 2.5Ml/d deployable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers, supporting economic/population growth.
Objective 12: Neutral effect - Operation of the option is not expected to have any impact on tourism and recreation.
Objective 13: Minor positive effect - Operation of this option will provide up to 2.5Ml/d deployable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the DCWW supply area by providing an additional 2.5Ml/d yield.
Objective 15: Minor negative uncertain effect - The operation of the option is likely to require additional energy to operate the new pumping station, however, the effects in this regard are currently uncertain.
Objective 16: Minor negative uncertain effect - There are 3 Listed buildings in close proximity to the site. Therefore, it is considered that there is potential for the setting and structure of the Listed Buildings to be affected by the pumping station, new site roads and hardstanding. However, this is uncertain until further details are available.
Objective 17: Neutral effect - The option is located within a largely urban area, therefore it is not anticipated that there will be any effect on the landscape during operation.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	TWG15
Option Name	Llyn y Fan Fach Regulation
Water company	DCWW
Option Description	The scheme will support the Usk main by supplying up to 10.4Ml/d from Llyn y Fan Fach reservoir directly to Bryn Gwyn water treatment works through a new gravity raw water pipeline. A new hydro turbine will provide power at the works.
Yield	10.4Ml/d
WRZ	Tywi Gower

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
TWG15	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	0

	Operation (positive)	**0**	**++**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**++**	**++**	**0**	**++**	**++**	**0**	**0**	**0**

Construction
Objective 1: Significant negative uncertain effect - The option pipeline crosses through a number of ancient woodland sites. The eastern end of the pipeline crosses into the Mynydd Du (Black Mountain) SSSI, with a further 2 sites within 1km of the route and 16 within 10km. Carreg Cennen Woodlands LNR is located 2.3km from the works. There are 4 NNRs (Dinefwr Estate (4.8km from the option), Dan-yr-Ogof (7km from the option), Ogof Ffynnon Ddu (8.3km from the option) and Carmel (8.9km from the option). There are 3 SACs within 10km of the option with the Afon Tywi SAC being the closest to the works at approximately, 2.6km and hydrologically connected to the works via the Afon Sawdde. The Afon Sawdde is noted within the Core Management Plan for the Afon Tywi as a significant tributary. Its potential to support the mobile qualifying features, particularly sea lamprey and otter which are key species in the upper Afon Tywi is uncertain. The construction methodology (open cut, trenchless) for each watercourse crossing is unknown at this stage. The same mobile species are qualifying features of the downstream Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC. As such the HRA concludes that the Afon Tywi SAC and Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC cannot be screened out, as mitigation will be required for water quality effects from pollution or sediment runoff. The HRA also states that further investigation will be required to understand the use of the Afon Sawdde by the mobile species to understand potential sensitivities when the pipeline is constructed at the pipeline crossings and the potential for disturbance and habitat degradation. As such the HRA concludes that the HRA risk is uncertain. There is no potential for construction effects on any other European site due to a lack of impact pathways. Construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Moderate negative effect - The BNG assessment concludes that construction activities will have an impact to land cover. This is expected to cause a moderate negative impact as the pipeline is constructed.
Objective 3: Neutral effect - Construction of the new pipeline could potentially result in increased disruption to terrestrial and aquatic INNS. However, effects are considered to be neutral as best practice construction methods will reduce the risk of distribution.
Objective 4: Neutral effect - The vast majority of the pipeline route is within grade 4 agricultural land, and is therefore of poor quality. The pipeline will require temporary land take during the construction phase and will not result in the loss of best and most versatile agricultural land. There are 6 historic landfill sites within 5km of the scheme. Twynllanan historic landfill site is the closest site located 1.7km from the option. Pollution from landfill sites during construction is considered unlikely.
Objective 5: Neutral effect - The pipeline crosses 10 rivers including Afon Sawdde and Garwnant. The overall groundwater status at the option location is poor. No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to

result in a change in channel morphology. The WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.
Objective 6: Neutral effect - It is not expected that construction of this option would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). As such, the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.
Objective 7: Moderate negative effect - A small proportion (<40%) of the pipeline crosses through areas at high risk to flooding from rivers (Flood Zone 3) and additionally, the WTW site is situated partially within an area at high risk to flooding (Flood Zone 3) associated with surface water/small watercourses. As such the construction of the option may be at risk to flooding, depending on the timing of works. The construction of the option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Moderate negative effect - Carmarthenshire Llandeilo AQMA is located 4.4km from the option location, thus impacts on this AQMA resulting from construction are considered unlikely. There will be an increase in vehicle movements associated with construction activities and will likely cause short-term deterioration in local air quality, which given the scale of construction and CAPEX, is anticipated to result in a moderate negative effect on local air quality.
Objective 9: Moderate negative effect - Construction of the option would require the use of raw materials with a moderate amount of embodied carbon (4,262tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, a small proportion of the pipeline crosses through areas at high risk to flooding from rivers (Flood Zone 3) and additionally, the WTW site is situated partially within an area at high risk to flooding (Flood Zone 3) associated with surface water/small watercourses. As such the construction of the option may be at risk to the effects of climate change (flooding).
Objective 11: Moderate positive effect - Construction would involve a moderate capital expenditure (£24.83m) which could have a moderate positive effect on the local economy. The construction period would be 1.5 years long, which may provide the potential for a number of local businesses and SMEs to have sustained involvement and opportunities. Individual spend by contractors and workers could also provide some local benefit to business.
Objective 12: Minor negative effect - Construction works are not expected to have a significant impact on opportunities/facilities for recreation or tourism. There are no cycle routes, national trails or country parks within 1km of the option. There are 4 greenspace areas within 1km including Capelymaen religious grounds (55m from pipeline), Cemetery (200m from pipeline), All Saints' Church (380m from pipeline) and St Simon and St Jude's Church and Cemetery (900m from pipeline) which could lead to disturbances to users (e.g. noise, vibrations, dust) in the short term.
Objective 13: Minor negative effect - Construction of the option is not expected to have a significant impact on health during the construction period, due to the largely rural location. Construction works may have a minor negative effect (e.g. noise disturbance, vibration, dust deposition and air quality impacts) on nearby residential receptors as there are a number of scattered residential dwellings and farmsteads in proximity to the option.
Objective 14: Neutral effect - The construction phase of this option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.

Objective 15: Moderate negative effect - The option involves constructing an entirely new pipeline thus, requiring all new materials, such as concrete, steel and plastic and as such, would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - It is possible that the option could use limited quantities of waste materials and any new infrastructure would incorporate limited sustainable design measures and materials. There is also the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Significant negative effect - There are no World Heritage Sites within 10km and no Registered Parks and Gardens within 5km of the option. There are however 3 Scheduled Monuments (Twyn yr Esgair Settlement is 45m from the option, Standing Stones and Round Cairns South of Tyle-Pengan is 90m from the option and Picws Du Cairn is 850m from the option) and 19 Listed Buildings within 1km of the option with the closest being the Valve House on former filter beds on Afon Sawdde located approximately 10m from the option pipeline. Due to the proximity of the works there is a major possibility that construction of the option could impact heritage assets.
Objective 17: Moderate negative effect - The option is located within the Brecon Beacons National Park. There are no AONBs within 10km of the option. The option requires the construction of a new pipeline and Hydro turbine, construction works would be visually intrusive to the surrounding rural and national park landscape, however effects from the pipeline will only be temporary.
Operation
Objective 1: Significant negative uncertain effect - The HRA highlights that there will be additional abstractions from the Llyn y Fan Fach reservoir which could effect the hydrologically connected Afon Tywi SAC and any functionally linked habitat within the Afon Sawdde. The HRA also highlights that the Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC is hydrologically connected downstream, and therefore the same mobile qualifying features could be affected through their use of the upper Afon Tywi catchment. Overall the HRA concludes that the HRA risk is therefore uncertain. Operational activities of this option may result in minor effects on non-designated aquatic habitats or species due to a change in reservoir level regime and potential changes to downstream flows.
Objective 2: Moderate positive effect - It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided. The BNG assessment concludes that any operational effects on habitat loss are likely to be of neutral effect.
Objective 3: Neutral effect - While raw water will be transferred, the transfer will be via a closed system into a treatment works. It is assumed that best practice measures will be implemented during the operation and maintenance of the WTW.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.

Objective 5: Neutral effect - The operation of the option could lead to changes in the level/spill regime of Llyn y Fan Reservoir, however, the WFD assessment highlights that the Llyn y Fan Reservoir is not a WFD water body and the impact on the downstream surface water flows is expected to be negligible and as such, there is a negligible risk to WFD compliance.
Objective 6: Neutral effect - No operational activities of this component would have a discernible effect on surface water or groundwater quality. The WFD assessment concludes that there is a negligible risk to WFD compliance.
Objective 7: Moderate negative effect - As noted above the WTW site is situated partially within an area at high risk to flooding (Flood Zone 3) associated with surface water/small watercourses. As such the operation of this site may be at risk to flooding. The operation of this option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Minor negative uncertain effect - It is not anticipated that there would be any significant impact on traffic congestion during the operational period such that the option is expected to have a neutral effect on local air quality, however, as the number of vehicle movements required during the operation of the option is currently unknown, the effect against this objective has been scored as a minor negative uncertain effect.
Objective 9: Neutral effect - Operational carbon emissions associated with the option are anticipated to be approximately 1.8tCO2e/year, which is not anticipated to have any discernible effect on this objective.
Objective 10: Moderate positive effect - Operation of the option will provide 10.4Ml/d of water resource, which would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Moderate positive effect - Operation of this option will provide up to 10.4Ml/d deployable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers, supporting economic/population growth.
Objective 12: Neutral effect - Operation of the option is not expected to have a negative impact on tourism and recreation.
Objective 13: Moderate positive effect - The scheme would not adversely affect human health due to increased noise, nuisance or disruption. Operation of this option will provide up to 10.4Ml/d deployable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Moderate positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the DCWW supply area by providing an additional 10.4Ml/d deployable output.
Objective 15: Minor negative uncertain effect - The operation of the option is likely to require additional energy and may require the use of chemicals, however, the effects in this regard are currently uncertain. It is noted that the new hydro turbine will also provide energy, reducing energy requirements.
Objective 16: Neutral effect - Operation of this option is not expected to have any impact on cultural heritage sites.

Objective 17: Neutral effect - The option will not permanently alter the existing landscape as the new pipeline will be underground, having a neutral effect during operation.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	TWG026
Option Name	Bryn Gwyn Distribution Options - Carn Powell SRV to Llannon SRV
Water company	DCWW
Option Description	To support the Bryn Gwyn network an additional 0.9Ml/d will be pumped from Carn Powell service reservoir to Llannon service reservoir via a new pumping station at Carn Powell (11Ml/d with 50m lift). (Location of option used in spatial assessment assumed based on grid reference provided in proforma).
Yield	0.9Ml/d
WRZ	Tywi Gower

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
TWG026	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

	Operation (positive)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Construction
Objective 1: Minor negative effect - There are 2 SACs and 25 SSSIs within 10km of the option. There are 2 NNRs and 1 LNR within 10km. There is one 4 acre ancient woodland area within 1km of the option location. The option construction is limited to a single pumping station site. The HRA highlights that due to the small scale of the activities required, the construction phase impacts are unlikely to extend outside of the DCWW site, however pollution incidents and sediment runoff impacts to the Afon Tywi SAC during the construction can not be screened out due to the presence of connecting waterbodies. Best practice construction measures and mitigation will be required. As such the HRA concludes that the HRA risk is low (effect pathways present but current baseline suggests compliance risk is small or effects avoidable (e.g. with best practice construction mitigation)). Construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - The BNG assessment concludes that the construction activities will have a very small impact to land cover. This is expected to have a neutral impact overall from a BNG standpoint.
Objective 3: Neutral effect - The new pumping station could potentially result in increased disruption to terrestrial and aquatic INNS. Effects are neutral due to the minor nature of the construction activities and in consideration of best practice construction methods.
Objective 4: Neutral effect - The option is located within non-agricultural and low grade (4 and 5) agricultural land. The new pumping station will require temporary land take during the construction phase and will not result in the loss of best and most versatile agricultural land. There are 5 historic landfill sites within 5km of the option location. Cilmaenllwyd Quarry is the closest landfill site located 2.3km from the option. Pollution from landfill sites during construction is considered unlikely.
Objective 5: Neutral effect - The Afon Camannt river is within 1km of the scheme (810m away). The overall groundwater status at the option location is poor. No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology. As such the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.
Objective 6: Neutral effect - It is not expected that construction of this option would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). As such, the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.
Objective 7: Neutral effect - None of the elements of this scheme are situated within an area at high risk of flooding and construction is not expected to increase the risk of flooding in the vicinity of the scheme or elsewhere.

Objective 8: Minor negative effect - Carmarthenshire Llandeilo AQMA is 4.85km away from the option. There will be an increase in vehicle movement associated with construction activities and will likely cause short-term deterioration in local air quality, which given the scale of construction and CAPEX, is anticipated to result in a minor negative effect on local air quality.
Objective 9: Minor negative effect - Construction of the option would require the use of raw materials with a minor amount of embodied carbon (120.9tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Neutral effect - It is not anticipated that the construction of this option would have any effect on climate resilience.
Objective 11: Minor positive effect - The scheme would result in a minor increase in construction jobs associated with the £2.35m capital spend. Individual spend by contractors and workers could also provide some local benefit to business. Works are unlikely to affect the local transport network, given the location and nature of the scheme.
Objective 12: Neutral effect - Construction works are not expected to have a significant impact on opportunities/facilities for recreation or tourism. There are no cycle routes, national trains, country parks or greenspace areas within 1km of the option location.
Objective 13: Minor negative effect - Construction of the option is not expected to have a significant impact on health during the construction period, due to the largely rural location. Construction works may have a minor negative effect (e.g. noise disturbance, vibration, dust deposition and air quality impacts) on nearby residential receptors as there are a number of scattered residential dwellings and farmsteads in proximity to the option.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The option will require the construction of a new water pumping station at Carn Powell thus, requiring new materials, such as concrete, steel and plastic and as such, would generate waste. Energy would also be required for the operation of machinery and plant. It is possible that the option could use limited quantities of waste materials and any new infrastructure would incorporate limited sustainable design measures and materials and there is also the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled, however, given the modest scale of CAPEX and construction works, any effects in this regard are anticipated to be negligible.
Objective 16: Neutral effect - There are no World Heritage Sites within 10km and no Registered Parks and Gardens within 5km of the option. There are no Scheduled Monuments or Listed Buildings within 1km of the option. It is not anticipated construction would have any significant effect on heritage assets, due to the distance between these sites and proposed works.
Objective 17: Moderate negative effect - The option is located within the Brecon Beacons National Park. There are no AONBs within 10km of the option. The option requires the construction of a new pumping station, construction works are likely to be visually intrusive to the rural (national park) landscape.
Operation

Objective 1: Neutral effect - The option does no require any additional abstractions or discharges, rather is a change in operation through redistribution of existing available water resource within the network. As such, no potential impact pathways to the European sites have been identified during operation and the HRA concludes that the HRA risk is negligible. There is no pathway for the operational activities of this component to result in effects on non-designated aquatic habitats or species. Any operational impacts will not alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - It is assumed that the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided. The BNG assessment concludes that any operational effects on habitat loss are likely to be of a moderate impact.
Objective 3: Neutral effect - Effects are considered neutral as the option includes the transfer of water in a closed system between service reservoirs.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Neutral effect - There is no pathway for this option to impact river or groundwater flows. There would be no change in sediment dynamics. As such the WFD assessment concludes that there is a negligible risk to WFD compliance.
Objective 6: Neutral effect - There are no pathways for water quality impacts associated with the operation of this option. As such the WFD assessment concludes that there is a negligible risk to WFD compliance.
Objective 7: Neutral effect - None of the elements of this scheme are situated within an area at high risk of flooding and the operation of this option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Neutral effect - Operation of the option is not expected to impact local air quality.
Objective 9: Minor negative effect - Operational energy demand would generate 247.9tonnes CO2e/a. This has been assessed as having a minor negative effect on this objective.
Objective 10: Neutral effect - Operation of the option will provide 0.9Ml/d of water resource, which is not anticipated to have any discernible effect on climate resilience.
Objective 11: Neutral effect - Operation of this option will provide up to 0.9Ml/d, which is not anticipated to have any discernible effect on the economy.
Objective 12: Neutral effect - Operation of the option is not expected to have a negative impact on tourism and recreation.

Objective 13: Neutral effect - Operation of this option will provide up to 0.9Ml/d, which is not anticipated to have any discernible effect on human health and wellbeing.
Objective 14: Neutral effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the DCWW supply area by providing an additional 0.9Ml/d deployable output which is deemed to be a neutral effect for this objective.
Objective 15: Minor negative uncertain effect - The operation of the option is likely to require additional energy and may require the use of chemicals, however, the effects in this regard are currently uncertain.
Objective 16: Neutral effect - Operation of this option is not expected to have any impact on cultural heritage sites.
Objective 17: Neutral effect - The option will not permanently alter the existing landscape, having a neutral effect during operation.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	WEF-MET-8201
Option Name	WEF-MET-8201
Water company	DCWW
Option Description	This option would involve the installation of meters in 749,595 households and 53,350 meters in non-households across the TWG zone between 2025-2050.
Yield	23.75Ml/d
WRZ	TWG

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
WEF-MET-8201	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**

Construction
Objective 1: Neutral effect - The construction of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - The construction of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The construction of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The construction of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Neutral effect - The construction of this option is not anticipated to impact on water quantity.
Objective 6: Neutral effect - The construction of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The construction of this option is not anticipated to impact on flood risk.
Objective 8: Significant negative uncertain effect - The construction of the option could result in traffic congestion during the construction period (this would be on the road network across the TWG zone) which, together with embodied carbon associated with meters and emissions from powering installation equipment, may have a negative effect on local air quality. Construction activity may take place within an AQMA.
Objective 9: Significant negative effect - The construction of the option would include embodied carbon from material production of meters (749,595 household meters and 53,350 non-household meters total), in addition to vehicle movements for the distribution and installation of the meters over the 25 year implementation stage, with the total carbon arising from the implementation phase being 10,999.6tCO2e (above BAU emissions over the plan period).
Objective 10: Neutral effect - The construction of this option is not anticipated to impact on climate resilience.
Objective 11: Significant positive effect - This option would result in a significant capital spend of approx. £62.12m, with capital spend being spread across 25 years (2025 - 2050). This could result in a positive effect on the local economy associated with potential employment opportunities, supply chain benefits and spend by workers and contractors in the local economy.

Objective 12: Neutral effect - The construction of this option is not anticipated to impact on tourism and recreation.
Objective 13: Neutral effect - The construction of this option is not anticipated to impact on human health and well-being.
Objective 14: Neutral effect - The construction of this option is not anticipated to impact on water resource use.
Objective 15: Moderate negative effect - This option requires the installation of 749,595 household meters and 53,350 non-household meters. These could be sourced from manufactures utilising more sustainable materials, however, assume limited opportunities for the acquisition of meters utilising fully sustainable or recycled/recyclable materials. Production and installation of meters/devices may result in small quantities of waste associated with manufacturing waste, device packaging, materials required for installation and disposal of any faulty/damaged devices.
Objective16: Neutral effect - The construction of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The construction of this option is not anticipated to impact on landscape
Operation
Objective 1: Neutral effect - The operation of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - The operation of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The operation of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The operation of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Significant positive effect - The operation of this option would result in major reductions in the demand for water (23.75Ml/d WAFU benefit), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering..
Objective 6: Neutral effect - The operation of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The operation of this option is not anticipated to impact on flood risk.

Objective 8: Neutral effect - The operation of this option is not anticipated to impact on air quality.
Objective 9: Moderate positive effect - The operation of the option would involve carbon emissions associated with meter reading activities, however, the option would reduce greenhouse gas emissions associated with reduced electricity production for the production/treatment of water and water use in the home (e.g. heating, etc.) and overall, the operation of the option is anticipated to reduce carbon emissions by an average of 811.4tCO2e/year across the plan period.
Objective 10: Moderate positive effect - The increased capacity of 23.75Ml/d would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience and adaptability to the effects of climate change.
Objective 11: Moderate positive effect - This option would provide an additional capacity of 23.75Ml/d, which would help ensure a continual supply of clean drinking water and increase resilience of supply to DCWW customers, supporting economic growth which could result in a positive effect on the local economy and social wellbeing.
Objective 12: Neutral effect - The operation of this option is not anticipated to impact on tourism and recreation.
Objective 13: Moderate positive effect - The operation of this option would result in a positive effect on human health. Overall, the increase in capacity of 23.75Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Significant positive effect - This option would involve a major reduction in demand from the supply network (23.75Ml/d), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering. The option would result in a major improvement in water efficiency and resilience.
Objective 15: Neutral effect - The operation of this option is not anticipated to impact on waste and resource use.
Objective16: Neutral effect - The operation of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The operation of this option is not anticipated to impact on landscape

wood.

FINAL

Mid-South Ceredigion Resource Zone

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	MSC01
Option Name	Claerwen Transfer
Water company	DCWW
Option Description	The objective of the scheme is to reduce demand on the Teifi Pools reservoirs by about 70%. This will be achieved by means of abstraction of up to 7 Ml/d of raw water from Claerwen Reservoir, to be pumped to Strata Florida WTW through 12km of 450mm DI pipework. The existing process at Strata Florida is considered adequate for Claerwen raw water. No additional modifications necessary.
Yield	7Ml/d
WRZ	M&S Ceredigion

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
MSC01	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

Construction
Objective 1: Significant negative effect - The majority of the option pipeline route lies within the Elenydd - Mallaen SPA. There are 6 SAC's within 10km of the option. The option crosses the Elenydd SAC and SSSI, and the remaining 5 SAC's are the Afon Teifi (118m), Coetiroedd Cwm Elan / Elan Valley Woodlands (2644m), Cors Caron (4106m), Grogwynion (6959m) and the River Wye / Afon Gwy (Wales) (7839m). Cors Caron is also a Ramsar site and NNR. Another 32 SSSI's lie within 10km of the option, the nearest of which is the Afon Teifi (118m). Another 2 SSSI's sit within 1km of the option; Rhos Gargoed (735m) and Coed Mynachlog-Fawr (992m). The remaining SSSI's are at least 2650m distance from the option. There are 2 NNR's, other than Cors Caron, within 10km of the option; Claerwen (3102m) and Nant Irfon (7925m). The option crosses 1 ancient woodland 4 and there are a further 3 within 1km; at 626m, 831m and 904m distance respectively. Given the significant length of pipeline excavation works that would be situated within the Elenydd - Mallaen SPA and Elenydd SAC and SSSI, the construction would likely result in loss to/damage to habitats (such as blanket bogs and Calaminarian grasslands of the Violetalia calaminariae that are the primary reason for selection of the SAC), the option has been assessed as having a significant negative effect on this objective. Other sites in close proximity to the works may experience disturbance (e.g. noise, dust). Other waterbodies are directly downstream of the Teifi Pools, which form part of the River Teifi / Afon Teifi SAC, and will be vulnerable to construction effects (e.g. runoff, spillages and suspended sediment-related effects such as smothering or reduction in light on fish, macrophytes/phytobenthos and invertebrates both in the reservoir and downstream). However, effects can be minimised with appropriate avoidance and mitigation measures during construction.
Objective 2: Minor negative effect - The BNG assessment has identified a permanent loss of approx. 0.182ha of habitats during construction of this option. This has been assessed as a minor negative effect.
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Neutral effect - This option is not expected to require any land take as works would be undertaken on an existing reservoir, with any soil displaced during excavation of new pipelines being reinstated following completion of the construction. The majority of the option sits within very poor agricultural land, with the rest within poor agricultural land. In consequence, effects on geology and soils have been identified as neutral.
Objective 5: Neutral effect - Given the nature of the option, no effects are anticipated in relation to water quantity during the construction phase.
Objective 6: Neutral effect - It is not expected that construction would affect water resources. The WFD assessment notes that whilst construction of new infrastructure will require appropriate consenting and permitting, WFD compliance is unlikely to be a barrier to implementation of the option.
Objective 7: Moderate negative effect - The reservoir lies within Flood Zone 3 (<40%), therefore construction works at the reservoir could be liable to flooding, depending on the timing of works.

Objective 8: Minor negative effect - The construction of the option could result in traffic congestion during the construction period (particularly on the local road network within the vicinity of the scheme) which, together with emissions associated with the use of plant and machinery, may have a minor negative effect on local air quality, given the rural location of the scheme and the short term, temporary (1.5 years) nature of construction works. The option is not located within an AQMA.
Objective 9: Moderate negative effect - Construction of the option would require the use of raw materials with a moderate amount of embodied carbon **(2,973.5tCO2e)** as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, the reservoir lies within Flood Zone 3 (<40% of the overall route). In consequence, construction could be vulnerable to the effects of climate change (flooding).
Objective 11:Neutral effect - Works are unlikely to increase congestion and disruption/driver delay on the road network due to the rural nature of the option and lack of nearby roads. Objective 11: Moderate positive effect - The construction of the option would involve a moderate capital expenditure (**£17.5m**), resulting in a moderate positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy.
Objective 12: Minor negative effect - The option is not expected to significantly affect opportunities for recreation and tourism during the construction period, although works could result in temporary disruption (noise/air quality) to users of local open space/footpaths. The National Cycle Network lies 4.32km to the east, and 4.52km to the west of the option. It is not anticipated that there will be any effect on this due to the distance from the option.
Objective 13: Neutral effect - The nearest built up area is Pontrhydfendigaid, 1.86km to the west of the option. There may be noise/vibration disturbance and air quality impacts associated with the construction of the option, however, due to the rural location of the scheme and lack of nearby residential receptors, any effects in this regard are anticipated to be negligible.
Objective 14: Neutral effect - the construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Moderate negative effect - The construction of the new pipeline, as well as the raw water intake structure and pumping station, would require raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Minor negative effect -There are 4 scheduled monuments within 1km of the option, however the closest of these is 466m from the pipeline works (Hafod Eidos rural Settlement) and it is not anticipated that it would maintain views of the works, therefore no effects on the setting of this site would be expected. All other Scheduled monuments are set back further from the works and no effects are anticipated. There are 14 listed buildings within 1km of the option, including 2 within 100m, the closest of which is the Gauge House at Claerwen Reservoir, which is only 27m from the route of the pipeline, it is anticipated that construction works may have a temporary effect on the setting of the gauge house, as well as the setting of other listed buildings within very close proximity to the works: Road bridge below Claerwen dam (70m), and the Claerwen Dam itself along with attached footbridges

(116m & 1606m where partly in Rhayader community). The remaining 10 listed buildings within 1km of the scheme are all over 800m away from the works so are unlikely to see any negative effects.
Objective 17: Minor negative effect - The reservoir lies crosses both the Upland Ceredigion and Elan Valley Historic Landscapes. Construction may have short term, temporary negative effects on local landscape features and other receptors in the vicinity of the reservoir (including walkers and visitors to the reservoir).
Operation
Objective 1: Minor negative uncertain effect - Whilst the shores of the reservoir are bordered by the Elenydd - Mallaen SPA and Elenydd SAC and SSSI, it is not anticipated that the abstraction of 7Ml/d from the reservoir would have any significant effects on these sites; the interest features of the SPA (Merlin and Red Kite) are not water dependent, whilst the blanket bogs/grasslands of the SAC are not anticipated to be affected by reduced levels in the reservoir. A new abstraction of7 Ml/d could change the hydrological regime and morphological conditions within the reservoir, and water edge conditions with resulting impacts on ecological populations, particularly shoreline habitats. However, due to the relatively small abstraction rate in relation to the size/volume of the waterbody, the risk is considered to be low. However, as a result of a new abstraction from Claerwen Reservoir, reduced/affected outflows could impact the downstream river waterbody (Afon Claerwen). Whilst it is assumed that there would be no change to compensation flows released from the reservoir, longer term there would be a change to the pattern of overtopping which would reflect the reduced reservoir volume, but it is difficult to anticipate what this would be. The change in overtopping regime may impact high flows in the Afon Claerwen, which in turn could impact fish, invertebrate and macrophyte/phytobenthos populations.
Objective 2: Minor positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Moderate negative effect - The option consists of an abstraction and transfer between catchments with treatment, however raw water is to be treated at Strata florida. Therefore, this has been assessed as a moderate negative effect,.
Objective 4: Neutral effect - There would be no operational effects on soils/geodiversity/land use.
Objective 5: Moderate negative effect – The WFD assessment highlights that with regard to the Claerwen Reservoir, a new abstraction of up to 7 Ml/d could change the hydrological regime and morphological conditions within the reservoir, and water edge conditions with resulting impacts on ecological populations, particularly shoreline habitats. However, due to the relatively small abstraction rate in relation to the size/volume of the waterbody, the risk of deterioration in status is deemed low. However, with regard to the Afon Claerwen, the WFD assessment highlights that as a result of a new abstraction from Claerwen Reservoir, reduced/affected outflows could impact the downstream river waterbody. It is assumed that there would be no change to compensation flows released from the reservoir, however, longer term there would be a change to the pattern of overtopping which would reflect the reduced reservoir volume, but it is difficult to anticipate what this would be. The WFD assessment highlights that the change in overtopping regime may impact high flows in the Afon Claerwen, which in turn could impact fish, invertebrate and macrophyte/phytobenthos populations. The WFD assessment

also notes that the ALS for the north west Wye catchment area indicates that water is restricted for licensing at Q95 but available across the remaining flow regime. Overall the WFD assessment concludes that the option would be non-complaint (low confidence).
Objective 6: Moderate negative effect – The WFD assessment highlights that with regard to the Claerwen Reservoir, decreasing the volume, depth and residency time of water in the reservoir could result in changes to physico-chemical quality elements (e.g. BOD, DO, pH, temperature), potentially causing a deterioration in status. With regard to the Afon Claerwen, the WFD assessment highlights that decreasing the volume, depth and residency time of water in the reservoir could result in changes to physico-chemical quality elements (e.g. BOD, DO, pH, temperature) of the water released downstream, potentially causing a deterioration in status. Additionally, the WFD assessment highlights that the option would not introduce new priority or priority hazardous chemicals into the Afon Claerwen, but lower flows could result in a minor reduction in dilution of chemicals already present in the beck, however, this risk is deemed very low. Overall, the WFD assessment concludes that the option would be WFD non-complaint (low confidence).
Objective 7: Neutral effect - It is not anticipated that the operation of the option would not be at risk of flooding or cause or exacerbate flooding elsewhere.
Objective 8: Neutral effect - No operational effects on air quality are anticipated.
Objective 9: Minor negative effect - Operational energy demand associated with this option would generate 447 tonnes CO2e/a. This has been assessed as having a minor negative effect on this objective.
Objective 10: Moderate positive effect - The additional capacity (7Ml/d) provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Moderate positive effect - The additional 7Ml/d capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a moderate positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect -The operation of the option is not expected to impact upon opportunities for recreation or tourism.
Objective 13: Moderate positive effect - The increased capacity of 7Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Moderate positive effect - The option would result in a moderate improvement in water efficiency and resilience through movement of water across the network, providing an additional 7Ml/d.
Objective 15: Neutral effect - The operation of this option would not involve additional infrastructure or resources and would likely require only minor energy usage, therefore the effect on this objective has been assessed as neutral.
Objective 16: Neutral effect - The operation of the option would not have any effect on cultural heritage.
Objective 17: Neutral effect - The operation of the option would not have any effect on the local landscape. New above ground infrastructure will be built within the footprint of existing works.

wood.

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	MSC02
Option Name	New zonal connection to North Ceredigion
Water company	DCWW
Option Description	The objective of the scheme is to support a WRZ that is expected to be in deficit with water from a zone in surplus, through a new connection between Cefnllan SRv and Penuwch SRv. The main elements of this scheme are: New booster PS at 87l/s at 270m lift [at Cefnllan WTW X: 259822; Y: 281438] and 20km of 450mm pressure DI rising main from Cefnllan SRv to Penuwch SRv
Yield	2.3Ml/d
WRZ	M&S Ceredigion

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
MSC02	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	0

	Operation (positive)	**0**	**++**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**+**	**+**	**0**	**+**	**+**	**0**	**0**	**0**

Construction
Objective 1: Moderate negative effect - Within 10km of the proposed there are 2 Ramsar sites (Cors Caron at approx. 7.8km; and Cors Fochno and Dyfi at approx. 8.5km), 7 SACs (West Wales Marine / Gorllewin Cymru Forol at approx. 1.4km; Pen Llyn a'r Sarnau / Lleyn Peninsula and the Sarnau at approx. 2.8km; Rhos Talglas at approx. 2.8km; Afon Teifi / River Teifi at approx. 7.7km; Cors Caron at approx. 7.8km; Cors Fochno at approx. 8.3km; and, Grogwynion at approx. 9.4km) and one SPA (Northern Cardigan Bay / Gogledd Bae Ceredigion at approx. 1.4km). Given the distance to these sites, no significant effects are expected. Within 10km of the option there are also 46 SSSIs, including 10 within 1km (Coed Nant Llolwyn, which is crossed by the option; Cors Llyn Farch A Llyn Fanod at approx. 0.1km; Rheidol Shingles and Backwaters at approx. 0.3km; Rhos Bwlch-Y-Rhandir at approx. 0.5km; Llyn Eiddwen at approx. 0.6km; Rhos-Rydd at approx. 0.6km; Gweunydd Pendinas at approx. 0.8km; Gro Ty'n Yr Helyg at approx. 1km; and, Rhos Blaen Carrog at approx. 1km), whilst the remaining SSSIs are situated at least 1.3km from the works; 3 National Nature Reserves (Llyn Eiddwen at approx. 0.8km, Cors Caron at approx. 7.8km, and Dyfi at approx. 8.6km) and 3 Local Nature Reserves (Pendinas at approx. 0.4km; Penglais at approx. 0.8km; and, Coed Y Cwm at approx. 1.2km). There are also 4 areas of Ancient Woodland within 10km of the option, including one which the route would cross and another immediately adjacent to the route (the remaining areas of Ancient Woodland are situated approximately 0.4km and 2.4km from the option). Given that the option crosses the Coed Nant Llolwyn SSSI and an area of Ancient Woodland, there is potential for significant negative effects on these sites, including loss of/damage to habitats and species. Other designated sites within close proximity to works (e.g. within 1km) may experience some minor effects (e.g. noise, dust deposition). More generally, construction works may have a minor negative effect (e.g. from noise disturbance or effects on air quality/dust) on proximate non-designated habitats and species (it is noted the majority of the pipeline would cross through agricultural fields/countryside.
Objective 2: Moderate negative effect - The BNG assessment has identified a permanent loss of approx. 3.7ha and a temporary loss of approx. 62.9ha of habitats during construction of this option. The option also crosses an area of Ancient Woodland. This has been assessed as a moderate negative effect.
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Minor positive effect - The construction of the pipeline would take place almost entirely within the existing road network, with only a small section (approx. 0.4km) of the route being on greenfield land classified as very poor quality agricultural land and non-agricultural land. It is assumed that the new pumping station would be constructed at the existing WTW site with a minor positive effect on this objective.
Objective 5: Neutral effect - No effects on water quantity are anticipated during the construction phase of the option.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures).

Objective 7: Moderate negative effect - The route of the proposed pipeline would cross various areas of Flood Zone 3 (<40% of the overall route) and Flood Zone 2. Consequently, construction of these sections of the pipeline would be liable to flooding during construction. However, it is unlikely that construction of the overall scheme would cause or exacerbate flood risk elsewhere.
Objective 8: Significant negative uncertain effect - The option is not situated within an AQMA, however, construction would require the transportation of materials/equipment to site and given the significant scale of the option, could have a significant negative effect on air quality. However, as the exact scale (CAPEX) and number of vehicle movements required is currently not clear, there is uncertainty.
Objective 9: Moderate negative effect - The construction of the option would require materials such as concrete, steel and plastic, with 3,301.4tCO2e embodied carbon. Furthermore, the construction of the option would result in additional vehicle movements (over the 1.5 year implementation stage) and would require the operation of machinery and plant, which would also contribute to carbon emissions.
Objective 10: Minor negative effect - As noted above, the route of the proposed pipeline would cross various areas of Flood Zone 3 (<40% of the overall route) and Flood Zone 2. In consequence, construction could be vulnerable to the effects of climate change (flooding).
Objective 11: Moderate positive effect - Construction would involve a moderate capital expenditure (£16.5m) which could have a moderate positive effect on the local economy. The construction period would be 2 years long, which may provide the potential for a number of local businesses and SMEs to have sustained involvement and opportunities. Individual spend by contractors and workers could also provide some local benefit to business. Objective 11: Moderate negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated vehicle movements, particularly on the A44, A4120, A487, B4576, Lon Rhydygwin, and Heol-Y-Bont (as the majority of the pipeline would be routed along these roads) as well as a number of other local roads that may be used to access works, or which the pipeline would cross.
Objective 12: Minor negative effect - The construction of the option is not expected to have any significant effect on recreation as the majority of the route would be constructed along roads in the rural countryside. It is however noted that the route of the pipeline crosses National Cycle Route 81, however given the scale of the works at this section (crossing of a road) effects are anticipated to be minor. more generally there may be minor effects (e.g. noise disturbance) on cyclists/walkers in close proximity to the works.
Objective 13: Moderate negative effect - There may be noise/vibration disturbance and air quality impacts associated with the pipeline excavation and construction of the pumping station which could affect residential receptors in eastern and southern Aberystwyth, Southgate, Llanfarian, Langwyryfon and the scattered residential dwellings and farmsteads within the vicinity of the scheme along the pipeline route.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Moderate negative effect - The construction of the option would require raw materials, such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Moderate negative effect - Within 1km of the option there are 3 Scheduled Monuments (Castle Tan-y-Castell (678m); Pen Dinas Camp (754m); and Awelon, Standing Stone 130m S of (840m)), 54 Listed Buildings, including 16 within 0.1km (Milestone near Aberllolwyn drive (6m), Y Garreg

Fawr (6m), Wall and gate piers at Crugiau Lodge (8m); The War Memorial (9m); Milestone near Crugyn Dimai (9m); Crugiau Lodge (13m); Rhos-goch (13m); Greenways (13m); Ardwyn (13m); Capel Saron including vestry, forecourt railings and gates (17m); Gilfachgoed (21m); Lychgate to SE of Church of St Padarn (39m); Padarn House including front railings (41m) Ty Mawr and railings (54m) Glyn Padarn (80m); and, Aberllolwyn (99m)) and one Registered Park and Garden (University of Wales, Aberystwyth: Plas Penglais, P (immediately adjacent to the works). Due to the proximity of some of these features, a moderate temporary negative effect on the setting of these features is expected.
Objective 17: Minor negative effect - Construction works would not take place within or in close proximity to any landscape designations. Pipeline works may, however, adversely impact the amenity of the surrounding rural greenfield setting that much of the pipeline would be routed through, however, as the pipeline route largely follows the routes of existing roads, any effects in this regard are anticipated to be minor. The new pumping station is expected to be constructed within the existing operational boundary of the WTW site and as such any effects on local townscape are anticipated to also be minor.
Operation
Objective 1: Neutral effect - It is not anticipated that the operation of the option would have any effect on biodiversity as it is a network solution to allow the transfer of water from one water resource zone in surplus to another in deficit (from a WTW to a service reservoir) and hence it is assumed the option would not result in any additional abstraction.
Objective 2: Moderate positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - It is not anticipated that there would not be any INNS risk during operation, as the option would involve the transfer of potable water from a WTW to a service reservoir (hence no new pathways for INNS transfer).
Objective 4: Neutral effect - There would be no operational effects on land use/soils.
Objective 5: Neutral effect - As the option is a network option (involving the transfer of water from one water resource zone in surplus to another in deficit (from a WTW to a service reservoir)) and does not involve the abstraction of any additional water, there would be no effect on water quantity. The WFD assessment concludes that the option would be WFD compliant.
Objective 6: Neutral effect - As the option is a network option (involving the transfer of water from one water resource zone in surplus to another in deficit (from a WTW to a service reservoir)) and does not involve the abstraction of any additional water, there would be no effect on water quality. The WFD assessment concludes that the option would be WFD compliant.
Objective 7: Neutral effect - It is not anticipated that the operation of the option would not be at risk of flooding or cause or exacerbate flooding elsewhere.
Objective 8: Neutral effect - No operational effects on air quality are anticipated.
Objective 9: Moderate negative effect - Operational energy demand associated with the pumping of water along the 20km pipeline would result in 615.5tCO2e/year, which has been assessed as having a moderate negative effect on this objective.

Objective 10: Minor positive effect - The increased capacity (2.3Ml/d) provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Minor positive effect - The operation of the option would help to ensure a continual supply of clean drinking water across the DCWW operational area, by providing 2.3Ml/d of water from a resource zone in surplus to another in deficit, thereby helping to ensure a continual supply of clean drinking water and increasing resilience of supply, supporting economic/population growth which could result in a positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect - It is not expected that there will be any effects on recreation or tourism as a result of the operation of this option.
Objective 13: Minor positive effect- The scheme would not adversely affect human health due to increased noise, nuisance or disruption. The operation of the option would help to ensure a continual supply of clean drinking water across the DCWW operational area, by providing 2.3Ml/d of water from a resource zone in surplus to another in deficit, thereby helping to ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - The option is not a leakage reduction or water efficiency option, however, the option would help to ensure a continual supply of clean drinking water across the DCWW operational area, by transferring 2.3Ml/d of water from a resource zone in surplus to another in deficit, thereby ensuring increase the resilience of water resources within the DCWW supply area.
Objective 15: Moderate negative uncertain effect - The operation of the option would require moderate ongoing energy use (which would likely require the use of fossil fuels for energy) to pump water. However, in the absence of data on energy requirements, there remains some uncertainty.
Objective 16: Neutral effect - It is not anticipated that there will be any significant effects on cultural heritage during the operation of the option.
Objective 17: Neutral effect - Whilst the option would introduce new above ground infrastructure (a new pumping station), this would be in keeping with the character of the existing WTW site, which is situated within an urban location and it is not expected to have any significant effect on this objective.

wood.

FINAL

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	MSC06a
Option Name	Llyn Egnant Dam Raising - 0.5m
Water company	DCWW
Option Description	This scheme would raise Llyn Egnant Dam by 0.5m to increase storage capacity. This option would provide approximately 90 Ml of additional storage, but would require significant adianta work to the dam
Yield	TBC - increase in reservoir capacity of 90Ml
WRZ	M&S Ceredigion

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
MSC06a	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**

Construction
Objective 1: Significant negative effect - The option lies within the Elenydd - Mallaen SPA. There are 5 SAC's within 10km of the option. The Afon Teifi SAC covers Llyn Egnant and the Elenydd SAC lies adjacent to the north, east and south, both of these are also SSSI's. Construction of the option would involve works to existing DCWW assets (the reservoir dam) which may cause disturbance (e.g. noise, vibration, dust) to the sites highlighted above, however, it is expected that any effects in this regard could be minimised with standard construction best practice. The raising of the reservoir level would result in the permanent loss of habitats of the Elenydd - Mallaen SPA and Elenydd SAC (which could include blanket bog, grassland and heathland) which would become inundated as a result of increased water levels in the reservoir and as such, has been assessed as a significant negative effect. The remaining 3 SAC's are Cors Caron (7617m), Grogwynion (8152m) and Coedydd a Cheunant Rheidol (9904m), however, given the distance to these sites no significant effects would be anticipated. Another 12 SSSI's lie within 10km of the option; Rhos Gargoed (3156m), Coed Mynachlog-Fawr (4596m), Gro Ystwyth (6155m), Cae'r Meirch (6852m), Mwyngloddfa Cwmystwyth (6908m), Cors Caron (7617m), Cors Bwlch-Y-Baedd (8201m), Cwm Doethie - Mynydd Mallaen (9145m), Cors Y Sychnant (9231m), Caeau Hirnant (9604m), Mwyngloddfa Frongoch (9553m) and Coedydd a Cheunant Rheidol (9904m) as well as two NNRs: Claerwen (2377m) and Cors Caron (7860m). Cors Caron is also a Ramsar site. Additionally, 4 Ancient woodlands lie within 10km, with the nearest being 2164m and the remaining 3 being at least 3755m from the option. Given the distance between the works and these sites, no significant effects would be anticipated. Other waterbodies are directly downstream of Llyn Egnant, which forms part of the River Teifi / Afon Teifi SAC and will be vulnerable to construction effects (e.g. runoff, spillages and suspended sediment-related effects such as smothering or reduction in light on fish, macrophytes/phytobenthos and invertebrates both in the reservoir and downstream). However, effects can be minimised with appropriate avoidance and mitigation measures during construction.
Objective 2: Moderate negative effect - The BNG assessment has identified a permanent loss of approx. 1.03Ha of habitats during construction of this option. This has been assessed as a moderate negative effect.
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Neutral effect - Whilst works could have temporary impacts on land use and soils, given the nature of the option (i.e. Removing and replacing existing infrastructure), no significant negative effects are anticipated in relation to geology and soils during the construction phase. Objective 4: Minor positive effect - The option would be constructed on the existing reservoir site, which is considered to have a positive effect on objective 4.
Objective 5: Neutral effect - Given the nature of the option, no effects are anticipated in relation to water quantity during the construction phase.
Objective 6: Neutral effect - There is the potential for the disturbance of contaminated sediments during construction of the new weir, in addition to direct effects on water quality as result of accidental spillage or leakage of PAHs. Appropriate precautions would need be taken during the construction

to protect the quality of the water environment and it is anticipated that standard best practice construction measures would manage these effects such that there would be no overall change in waterbody status with any effects likely to be temporary and localised.
Objective 7: Neutral effect - The option would involve the construction of above-ground infrastructure, but is located outside of floodplain areas. It is anticipated that the option would neither cause nor exacerbate flooding in the catchment.
Objective 8: Neutral effect - Works are unlikely to significantly affect the local transport network, given the location and nature of the scheme and the short term, temporary (1 years) nature of construction works. Effects on air quality are therefore expected to be negligible. The option is not located within an AQMA.
Objective 9: Minor negative effect - Construction of the option would require the use of raw materials with a moderate amount of embodied carbon (**660tCO2e**) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Neutral effect - The construction of this option is not expected to have any effect on climate resilience.
Objective 11: Minor positive effect - The construction of the option would involve a minor capital expenditure (**£3m**), resulting in a moderate positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy.
Objective 12: Minor negative effect - The nearest section of the National Cycle Network is approximately 8km to the west of the option. Construction is unlikely to have any impact on access to this. There are no other recreational or sports facilities in the area. Generally however, construction of the option may impact upon recreational activities such as walking and cycling near and around the Teifi pools (e.g. effects of construction noise and dust and construction traffic).
Objective 13: Neutral effect - There may be noise/vibration disturbance and air quality impacts associated with the construction of the option, however, due to the rural location of the scheme and lack of nearby residential receptors, any effects in this regard are anticipated to be negligible.
Objective 14: Neutral effect - the construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The construction of the option would require concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is also the opportunity for the reuse of masonry materials as part of construction, or re-use/recycling of materials such as steel and plastic, however, the significance of this effect is currently uncertain.
Objective 16: Neutral effect - There is 1 scheduled monument within 1km of the option, the Hafod Frith Deserted Rural Settlement (812m). There are no listed buildings or registered parks and gardens within 1km of the option. Due to the relative distance between the scheduled monument and the construction works, no significant effects on its setting or integrity are expected as a result of construction work.

Objective 17: Minor negative effect - The reservoir lies within the Upland Ceredigion Historic Landscape. Construction may have short term, temporary negative effects on local landscape features and other receptors in the vicinity of the reservoir (including walkers and visitors to the reservoir).
Operation
Objective 1: Minor negative uncertain effect - Raising the reservoir level and capacity could change the hydrological regime and morphological conditions within the reservoir, and water edge conditions with resulting impacts on ecological populations, particularly shoreline habitats. The reservoir would have a larger surface area, with new flooded areas around the perimeter of the current reservoir, raised levels of the reservoir could lead to impacts on benthic communities and could potentially lead to a deterioration in plant communities. No further effects on the designated sites cited in the construction section are anticipated, beyond the initial loss of habitats that would become inundated as a result of the raising of the water level assessed during the construction phase.
Objective 2: Moderate positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - The option is for an increase in the storage capacity of Llyn Egnant with a change to existing infrastructure, but with no change to pathways for INNS release.
Objective 4: Minor negative effect - Once operational, the option would result in a loss of land around the entire pool which has been identified as a minor negative effect with respect to geology and soils. However, it is noted that this land would be very poor grade agricultural land.
Objective 5: Moderate negative effect – The WFD assessment highlights that raising the Llyn Egnant reservoir level and capacity could change the hydrological regime and morphological conditions within the reservoir, and water edge conditions with resulting impacts on ecological populations, particularly shoreline habitats. The reservoir would have a larger surface area, with new flooded areas around the perimeter of the current reservoir, raised levels of the reservoir could lead to impacts on benthic communities and could potentially lead to a deterioration in plant communities. Overall the WFD assessment concludes that the option would be WFD non-complaint (low confidence).
Objective 6: Moderate negative effect – The WFD assessment highlights that increasing the volume, depth and residency time of water in the Llyn Egnant reservoir could result in changes to physico-chemical quality elements (e.g. TP, BOD, DO, pH, temperature), potentially causing a deterioration in status. Overall the WFD assessment concludes that the option would be WFD non-complaint (low confidence).
Objective 7: Moderate positive effect - The scheme does not lie within Flood Zones 2 or 3 however it is reservoir raising scheme that could help to further alleviate flooding in the catchment through provision of extra capacity. The alleviation of flooding may increase resilience to the effects of climate change, including more frequent and severe rainfall events and increases in flash flooding.
Objective 8: Neutral effect - No operational effects on air quality are anticipated.
Objective 9: Neutral effect - The operation of this option would have no discernible effect on carbon emissions.

Objective 10: Moderate positive uncertain effect - As noted above, the scheme is a reservoir raising that could help alleviate flooding in the catchment by providing extra capacity within the reservoir. The alleviation of flooding may increase resilience to the effects of climate change, including more frequent and severe rainfall events and increases in flash flooding. The scheme would also help to ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change, however, it is currently unclear what the daily yield volume associated with this option would be, hence there remains some uncertainty.
Objective 11: Minor positive uncertain effect - The additional capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a positive effect on the local economy. However, it is currently unclear what the daily yield volume associated with this option would be, hence there remains some uncertainty. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect -The operation of the option is not expected to impact upon opportunities for recreation or tourism
Objective 13: Minor positive uncertain effect- The scheme would not adversely affect human health due to increased noise, nuisance or disruption . The increased capacity would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing. However, it is currently unclear what the daily yield volume associated with this option would be, hence there remains some uncertainty.
Objective 14: Minor positive uncertain effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the DCWW supply area, though the provision of extra deployable output. However, it is currently unclear what the daily yield volume associated with this option would be, hence there remains some uncertainty.
Objective 15: Neutral effect - The operation of the option would not have any effect on waste and resource use.
Objective 16: Neutral effect - Given the location of the scheme in relation to heritage features, no effects are anticipated during the operational phase of the option in relation to cultural heritage.
Objective 17: Minor negative effect - Earthworks, concreting and masonry walling to raise the reservoir has been identified as having a negative effect with respect to landscape, as it will introduce additional above ground infrastructure, however this would be in keeping with the character of the existing reservoir infrastructure, hence the effect has been assessed a minor negative.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	MSC06b
Option Name	Llyn Egnant Dam Raising - 1m
Water company	
Option Description	This scheme would raise Llyn Egnant Dam by 1m to increase storage capacity. The crest height is raised by 0.9m to maintain the previous freeboard level. This option would provide approximately 180 Ml of additional storage, but would require significant additional work to the dam.
Yield	
WRZ	M&S Ceredigion

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
MSC06b	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

Construction
Objective 1: Significant negative effect - The option lies within the Elenydd - Mallaen SPA. There are 5 SAC's within 10km of the option. The Afon Teifi SAC covers Llyn Egnant and the Elenydd SAC lies adjacent to the north, east and south, both of these are also SSSI's. Construction of the option would involve works to existing DCWW assets (the reservoir dam) which may cause disturbance (e.g. noise, vibration, dust) to the sites highlighted above, however, it is expected that any effects in this regard could be minimised with standard construction best practice. The raising of the reservoir level would result in the permanent loss of habitats of the Elenydd - Mallaen SPA and Elenydd SAC (which could include blanket bog, grassland and heathland) which would become inundated as a result of increased water levels in the reservoir and as such, has been assessed as a significant negative effect. The remaining 3 SAC's are Cors Caron (7611m), Grogwynion (8147m) and Coedydd a Cheunant Rheidol (9897m), however, given the distance to these sites no significant effects would be anticipated. Another 12 SSSI's lie within 10km of the option; Rhos Gargoed (3149m), Coed Mynachlog-Fawr (4593m), Gro Ystwyth (6148m), Cae'r Meirch (6845m), Mwyngloddfa Cwmystwyth (6900m), Cors Caron (7611m), Cors Bwlch-Y-Baedd (8197m), Cwm Doethie - Mynydd Mallaen (9144m), Cors Y Sychnant (9230m), Caeau Hirnant (9595m, in addition to two NNRs: Claerwen (2371m) and Cors Caron (7854m). Cors Caron is also a Ramsar site. Additionally, 4 Ancient woodlands lie within 10km, with the nearest being 2162m and the remaining 3 being at least 3753m from the option. Given the distance between the works and these sites, no significant effects would be anticipated. Other waterbodies are directly downstream of Llyn Egnant, which forms part of the River Teifi / Afon Teifi SAC and will be vulnerable to construction effects (e.g. runoff, spillages and suspended sediment-related effects such as smothering or reduction in light on fish, macrophytes/phytobenthos and invertebrates both in the reservoir and downstream). However, effects can be minimised with appropriate avoidance and mitigation measures during construction.
Objective 2: Moderate negative effect - The BNG assessment has identified a permanent loss of approx. 2.19Ha of habitats during construction of this option. This has been assessed as a moderate negative effect.
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Neutral effect - Whilst works could have temporary impacts on land use and soils, given the nature of the option (i.e. Removing and replacing existing infrastructure), no significant negative effects are anticipated in relation to geology and soils during the construction phase. Objective 4: Minor positive effect - The option would be constructed on the existing reservoir site, which is considered to have a positive effect on objective 4.
Objective 5: Neutral effect - Given the nature of the option, no effects are anticipated in relation to water quantity during the construction phase.
Objective 6: Neutral effect - There is the potential for the disturbance of contaminated sediments during construction of the new weir spillway and crest, in addition to direct effects on water quality as result of accidental spillage or leakage of PAHs. Appropriate precautions would need be taken during the

construction to protect the quality of the water environment and it is anticipated that standard best practice construction measures would manage these effects such that there would be no overall change in waterbody status with any effects likely to be temporary and localised.
Objective 7: Neutral effect - The option would involve the construction of above-ground infrastructure, but is located outside of floodplain areas. It is anticipated that the option would neither cause nor exacerbate flooding in the catchment.
Objective 8: Neutral effect - Works are unlikely to significantly affect the local transport network, given the location and nature of the scheme and the short term, temporary (1 year) nature of construction works. Effects on air quality are therefore expected to be negligible. The option is not located within an AQMA.
Objective 9: Minor negative effect - Construction of the option would require the use of raw materials with a moderate amount of embodied carbon **(814tCO2e)** as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Neutral effect - The construction of this option is not expected to have any effect on climate resilience.
Objective 11: Minor positive effect - The construction of the option would involve a minor capital expenditure (**£3.4m**), resulting in a moderate positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy.
Objective 12: Minor negative effect - The nearest section of the National Cycle Network is approximately 8km to the west of the option. Construction is unlikely to have any impact on access to this. There are no other recreational or sports facilities in the area. Generally however, construction of the option may impact upon recreational activities such as walking and cycling near and around the Teifi pools (e.g. effects of construction noise and dust and construction traffic).
Objective 13: Neutral effect - There may be noise/vibration disturbance and air quality impacts associated with the construction of the option, however, due to the rural location of the scheme and lack of nearby residential receptors, any effects in this regard are anticipated to be negligible.
Objective 14: Neutral effect - the construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The construction of the option would require concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is also the opportunity for the reuse of masonry materials as part of construction, or re-use/recycling of materials such as steel and plastic, however, the significance of this effect is currently uncertain.
Objective 16: Neutral effect - There is 1 scheduled monument within 1km of the option, the Hafod Frith Deserted Rural Settlement (809m). There are no listed buildings or registered parks and gardens within 1km of the option. Due to the relative distance between the scheduled monument and the construction works, no significant effects on its setting or integrity are expected as a result of construction work.

Objective 17: Minor negative effect - The reservoir lies within the Upland Ceredigion Historic Landscape. Construction may have short term, temporary negative effects on local landscape features and other receptors in the vicinity of the reservoir (including walkers and visitors to the reservoir).
Operation
Objective 1: Minor negative uncertain effect - Raising the reservoir level and capacity could change the hydrological regime and morphological conditions within the reservoir, and water edge conditions with resulting impacts on ecological populations, particularly shoreline habitats. The reservoir would have a larger surface area, with new flooded areas around the perimeter of the current reservoir, raised levels of the reservoir could lead to impacts on benthic communities and could potentially lead to a deterioration in plant communities. No further effects on the designated sites cited in the construction section are anticipated, beyond the initial loss of habitats that would become inundated as a result of the raising of the water level assessed during the construction phase.
Objective 2: Moderate positive effect - It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - The option is for an increase in the storage capacity of Llyn Egnant with a change to existing infrastructure, but with no change to pathways for INNS release.
Objective 4: Minor negative effect - Once operational, the option would result in a loss of land around the entire pool which has been identified as a minor negative effect with respect to geology and soils. However, it is noted that this land would be very poor grade agricultural land.
Objective 5: Moderate negative effect – The WFD assessment highlights that raising the Llyn Egnant reservoir level and capacity could change the hydrological regime and morphological conditions within the reservoir, and water edge conditions with resulting impacts on ecological populations, particularly shoreline habitats. The reservoir would have a larger surface area, with new flooded areas around the perimeter of the current reservoir, raised levels of the reservoir could lead to impacts on benthic communities and could potentially lead to a deterioration in plant communities. Overall the WFD assessment concludes that the option would be WFD non-complaint (low confidence).
Objective 6: Moderate negative effect – The WFD assessment highlights that increasing the volume, depth and residency time of water in the Llyn Egnant reservoir could result in changes to physico-chemical quality elements (e.g. TP, BOD, DO, pH, temperature), potentially causing a deterioration in status. Overall the WFD assessment concludes that the option would be WFD non-complaint (low confidence).
Objective 7: Significant positive effect - The scheme does not lie within Flood Zones 2 or 3 however it is a reservoir raising scheme that could help to further alleviate flooding in the catchment through provision of extra capacity. The alleviation of flooding may increase resilience to the effects of climate change, including more frequent and severe rainfall events and increases in flash flooding.
Objective 8: Neutral effect - No operational effects on air quality are anticipated.
Objective 9: Neutral effect - The operation of this option would have no discernible effect on carbon emissions.

Objective 10: Significant positive uncertain effect - As noted above, the scheme is a reservoir raising scheme that could help alleviate flooding in the catchment by providing extra capacity within the reservoir. The alleviation of flooding may increase resilience to the effects of climate change, including more frequent and severe rainfall events and increases in flash flooding. The scheme would also help to ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change. However, it is currently unclear what the daily yield volume associated with this option would be, hence there remains some uncertainty.
Objective 11: Moderate positive uncertain effect - The additional capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a positive effect on the local economy. However, it is currently unclear what the daily yield volume associated with this option would be, hence there remains some uncertainty. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect -The operation of the option is not expected to impact upon opportunities for recreation or tourism
Objective 13: Moderate positive uncertain effect- The scheme would not adversely affect human health due to increased noise, nuisance or disruption . The increased capacity would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing. However, it is currently unclear what the daily yield volume associated with this option would be, hence there remains some uncertainty.
Objective 14: Moderate positive uncertain effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the DCWW supply area, though the provision of extra deployable output. However, it is currently unclear what the daily yield volume associated with this option would be, hence there remains some uncertainty.
Objective 15: Neutral effect - The operation of the option would not have any effect on waste and resource use.
Objective 16: Neutral effect - Given the location of the scheme in relation to heritage features, no effects are anticipated during the operational phase of the option in relation to cultural heritage.
Objective 17: Minor negative effect - Earthworks, concreting and masonry walling to raise the reservoir has been identified as having a negative effect with respect to landscape, as it will introduce additional above ground infrastructure, however this would be in keeping with the character of the existing reservoir infrastructure, hence the effect has been assessed a minor negative.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	MSC07
Option Name	Llechryd WTW Distribution Options - Upgrades to automate Deri Goch WPS
Water company	DCWW
Option Description	As part of the Llechryd WTW Distribution Options - upgrades are required to automate Deri Goch WPS. This will maximise supply from Llechryd WTW, and hold back flow from Strata Florida WTW to preserve minimum storage in the Llyn Teifi and Llyn Egnant reservoirs. The option would involve the installation of a Rotork unit on existing 250NB Gate valve to enable it to be automatically opened and closed without the need to visit site.
Yield	0Ml/d (benefit is automatic operation to hold back water in reservoirs and operate more efficiently)
WRZ	M&S Ceredigion

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
MSC07	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**

Construction
Objective 1: Minor negative effect - The Afon Teifi/ River Teifi SAC (also a SSSI) is the only European site within 10km of the option (approx. 1.7km from the site), however, due to the scale and nature of the works, it is not expected to be affected by the works. There are also 19 SSSIs within 10km of the option, the closest of which is approx. 1.6km from the works (Somin Silian), next closest is the aforementioned Afon Teifi, which is situated approx. 1.7km from the works. The remaining SSSIs are all situated at least 4.2km from the works. Due to the distance between the works and all of the SSSIs and the small scale and nature of the works, no effects from construction are expected at any of the SSSIs. There are also a number of areas of Ancient Woodland within 10km of the option, including 16 within 1km of the works. One of these areas is situated within 0.1km of the works (at approx. 0.06km) Due to the proximity of this area to the works (and to a lesser extent some of the other areas within 1km) construction may lead to very minor negative impacts (e.g. noise), given the scale of construction works. More generally, construction would take place in a rural setting and may lead to very minor negative effects (e.g. noise) on non-designated habitats and species proximate to construction works.
Objective 2: Neutral effect - The BNG assessment concludes that construction of the option would have a neutral effect, as the option is a network option, with all works assumed to take place within the existing WPS site (hence no loss of habitats)
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Neutral effect - This option is not expected to require any land take as works would be undertaken within the existing WPS site, hence a neutral effect has been identified against this objective.
Objective 5: Neutral effect - No effects on water quantity are anticipated during the construction phase of the option.
Objective 5: Neutral effect - No effects on water quality are anticipated during the construction phase of the option, assuming standard construction best practise and mitigation.
Objective 7: Neutral effect - The Deri Goch WPS site is not situated within an area at high risk of flooding. It is not anticipated that construction would result in, or exacerbate, flooding elsewhere during the construction period.
Objective 8: Neutral effect -The WPS site is not situated within an AQMA. The construction of the option would require the transportation of materials/equipment to site, however, given the very small scale and nature of the works, it is expected that the number of vehicle movements would be negligible and hence a neutral effect has been identified.
Objective 9: Neutral effect - Construction of the option would require the use of raw materials with embodied carbon, however, due to the small scale of the option, the quantities of materials are anticipated to be negligible and associated embodied carbon would be below the threshold for a minor

negative effect (<100tCO2e), hence a neutral effect has been identified. Construction of the option may also require the use plant and machinery which would also contribute to carbon emissions.
Objective 10: Neutral effect - The construction of this option is not expected to have any effect on climate resilience.
Objective 11: Neutral effect - Construction of the option would involve a very modest capital expenditure, which would be less than the threshold for a minor positive effect (<£1m), hence, it is not anticipated that the construction of the option would have any discernible effect on the local economy. Given the scale of construction, no notable effects on local transport infrastructure (i.e. from the transport of materials to site) are anticipated.
Objective 12: Neutral effect - Due to the small scale and nature of the works and the rural location of works at the existing WPS site, away from any tourist/recreational receptors and facilities, no effects on recreation or tourism are anticipated.
Objective 13: Neutral effect - There may be noise/vibration disturbance associated with the construction, which could affect the very limited number of scattered residential dwellings and farmsteads within the vicinity of the scheme. However, due to the small scale and nature of the works at the existing WPS site and limited number of receptors, any effects are anticipated to be negligible.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Neutral effect - The construction of the option would require materials such as concrete, steel and plastic and would potentially generate waste. However, due to the scale and nature of the option, material quantities expected to negligible. Energy would also be required for the operation of machinery and plant. There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, given the very modest scale of the option, any effect in this regard is anticipated to be negligible.
Objective 16: Neutral effect - Within 1km of the option there are 5 Listed Buildings, the closest of which is the Grade II North Lodge, which situated approximately 0.24km from the works, however, is separated from the works by woodland and given the scale and nature of the works, no effects on the asset or its setting are expected. The remaining Listed Buildings are all situated at least 0.7km from the works and not expected to be affected. There are no other heritage assets within 1km of the works, hence a neutral effect has been identified against this objective.
Objective 17: Neutral effect - The option is not located in close proximity to any statutory designated landscapes. Whilst the works would take place within a rural location, given the small scale and nature of the works (installation of a Rotork unit to a valve at the existing WPS), no effects on landscape or visual amenity are anticipated.
Operation
Objective 1: Neutral effect - It is not anticipated that the operation of the option would have any effect on biodiversity as it is a network solution to allow the automated control of a valve at the existing WPS.
Objective 2: Neutral effect - It is assumed that there would be a biodiversity net gain in operation greater than the net loss in construction; however, without quantification, its magnitude is uncertain and an equivalent score to construction is provided.

Objective 3: Neutral effect - The option would involve the automatic control of a valve at the existing WPS, with no new pathways for INNS transfer, therefore the effect against this objective has been assessed as neutral.
Objective 4: Neutral effect - There would be no operational effects on land use/soils.
Objective 5: Neutral effect - As the option is a network option (involving the automatic control of a valve at the existing WPS) and does not involve the abstraction of any additional water, there would be no effect on water quantity. The WFD assessment concludes that the option would be WFD compliant.
Objective 6: Neutral effect - As the option is a network option (involving the automatic control of a valve at the existing WPS) and does not involve the abstraction of any additional water, there would be no effect on water quality. The WFD assessment concludes that the option would be WFD compliant.
Objective 7: Neutral effect - It is not anticipated that the operation of the option would not be liable for flooding or cause or exacerbate flooding elsewhere.
Objective 8: Neutral effect - No operational effects on air quality are anticipated.
Objective 9: Neutral effect - Operational energy demand associated with the operation of the Rotork unit to automate the opening and closing of the valve at the WPS is anticipated to be negligible, with negligible (0tCO2e) associated carbon emissions.
Objective 10: Neutral effect - Whilst the option would not directly increase deployable output/capacity, it would help to maximise supply from Llechryd WTW, and hold back flow from Strata Florida WTW to preserve minimum storage in the Llyn Teifi and Llyn Egnant reservoirs, thereby helping ensure a continual supply of clean drinking water and increased resilience of supply and adaptability to the effects of climate change. However, as the option would not result in any additional deployable output, it has been assessed as having a neutral effect against this objective.
Objective 11: Neutral effect - Whilst the option would not directly increase deployable output/capacity, it would help to maximise supply from Llechryd WTW, and hold back flow from Strata Florida WTW to preserve minimum storage in the Llyn Teifi and Llyn Egnant reservoirs, thereby helping to ensure a continual supply of clean drinking water and increasing resilience of supply, supporting economic/population growth which could result in a positive effect on the local economy. However, as the option would not result in any additional deployable output, it has been assessed as having a neutral effect against this objective. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect - It is not expected that there will be any effects on recreation or tourism as a result of the operation of this option.
Objective 13: Neutral effect- The scheme would not adversely affect human health due to increased noise, nuisance or disruption. Whilst the option would not directly increase deployable output/capacity, it would help to maximise supply from Llechryd WTW, and hold back flow from Strata Florida WTW to preserve minimum storage in the Llyn Teifi and Llyn Egnant reservoirs, thereby ensuring a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-

wellbeing. However, as the option would not result in any additional deployable output, it has been assessed as having a neutral effect against this objective.
Objective 14: Neutral effect - The option is not a leakage reduction or water efficiency option, however, the option would help to maximise supply from Llechryd WTW, and hold back flow from Strata Florida WTW to preserve minimum storage in the Llyn Teifi and Llyn Egnant reservoirs, thereby ensuring increase the resilience of water resources within the DCWW supply area. However, as the option would not result in any additional deployable output, it has been assessed as having a neutral effect against this objective.
Objective 15: Neutral effect - The operation of this option would not involve additional infrastructure or resources and is likely to require negligible energy usage, therefore the effect on this objective has been assessed as neutral.
Objective 16: Neutral effect - The operation of the option would not have any effect on cultural heritage.
Objective 17: Neutral effect - No significant effects on landscape are expected during the operational phase of this option.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	MSC08
Option Name	Upsize Llechryd WTW
Water company	DCWW
Option Description	Llechryd WTW currently has a maximum capacity of 19 MLD. The maximum abstraction rate is 800 m3/h. It is expected that the abstraction licence could be increased to 880 m3/h freeing up an extra 2 MLD. The option would involve the installation of: new low level pumps 3 No. 880 m3/h capacity; a new polymer dosing plant; an additional RGF filter; and, connecting pipework for new filter 20m 100mm.
Yield	2Ml/d
WRZ	M&S Ceredigion

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
MSC08	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	-

	Operation (positive)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**+**	**+**	**0**	**+**	**+**	**0**	**0**	**0**

Construction
Objective 1: Minor negative effect - Within 1km of the WTW site there are 2 SACs; the Afon Teifi/River Teifi SAC (approx. 0.1km from the WTW) and Cardigan Bay/Bae Ceredigion SAC (approx. 8.21km from the WTW). Given the proximity of the Afon Teifi/River Teifi SAC to the works there is the potential for negative effects (e.g. noise, dust deposition), however, given the scale of works and assuming construction best practice, any effects are anticipated to be minor. There are also 9 SSSIs within 10km of the option, including one within 1km; Afon Teifi SSSI (approx. 0.21km). Given the proximity of the Afon Teifi SSSI to the works there is the potential for negative effects (e.g. noise, dust deposition), however, given the scale of works and assuming construction best practice, any effects are anticipated to be minor. All other SSSIs are situated at least 1.6kmfrom the works and are not expected to be affected by construction given the scale and nature of the works at the existing WTW site. There is also one NNR within 10km; Coedmor, which is situated approximately 1.7km from the works and is not expected to be affected by the construction of the option for the same reasons stated above. Additionally there are a number of areas of Ancient Woodland within 10km of the option, including 12 within 1km of the works. One of these areas is situated within 0.1km of the works (at approx. 0.07km). Due to the proximity of this area to the works (and to a lesser extent some of the other areas within 1km) construction may lead to very minor negative impacts (e.g. noise), given the scale and nature of construction works. More generally, construction would take place in a rural setting and may lead to very minor negative effects (e.g. noise) on non-designated habitats and species proximate to construction works.
Objective 2: Neutral effect - The BNG assessment concludes that construction of the option would have a neutral effect, as it is assumed that all works would take place within the existing WTW site (hence no loss of habitats).
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Minor positive effect - This option is not expected to require any land take as it is assumed that works would be undertaken within the existing WTW site. In consequence, a minor positive effect has been identified.
Objective 5: Neutral effect - No effects on water quantity are anticipated during the construction phase of the option. Construction of new infrastructure will require appropriate consenting and permitting, but WFD compliance unlikely to be a barrier to implementation of the option.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures).
Objective 7: Neutral effect - The Llechryd WTW site is not situated within an area at high risk of flooding, although it is located just outside of an area of Flood Zone 2, however, it is not expected that construction would be at risk of flooding. It is not anticipated that construction would result in, or exacerbate, flooding elsewhere during the construction period.

Objective 8: Minor negative uncertain effect - The WTW site is not situated within an AQMA. The construction of the option would require the transportation of materials/equipment to site, which is likely to require a small number of vehicle movements, with a potential minor negative impact on local air quality. However, as the exact number of vehicle movements required is currently unknown, there remains some uncertainty.
Objective 9: Minor negative effect - Construction of the option would require the use of raw materials with a minor amount of embodied carbon (187tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Neutral effect - The construction of this option is not expected to have any effect on climate resilience.
Objective 11: Minor positive effect - The scheme would result in a minor increase in construction jobs associated with the £2.6m capital spend during the 1-year construction period. Given the scale of construction, no notable effects on local transport infrastructure (i.e. from the transport of materials to site) are anticipated.
Objective 12: Neutral effect - Due to the small scale and nature of the works and the rural location of works at the existing WTW site, away from any tourist/recreational receptors and facilities, no effects on recreation or tourism are anticipated.
Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the construction works at the WTW which could affect residential receptors within close proximity to the works, such those along the A484 and in east Llechryd as well as the scattered residential dwellings and farmsteads within the vicinity of the scheme, however, these effects would be temporary.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The construction of the option would require materials such as concrete, steel and plastic and would potentially generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Neutral effect - Within 1km of the WTW site there are two Scheduled Monuments; Onnen-Deg Defended Settlement (at approx. 0.4km), and Llwynduris Castle Mound (at approx. 0.89km) and 14 Listed Buildings, the closest of which is the Grade II Manoreifed (at approx. 0.31km). However, these all benefit from either woodland/tree buffer or distance from the works and given the small scale and nature of the works (i.e. within the existing WTW site) no significant effects are expected.
Objective 17: Minor negative effect - The option is not located in close proximity to any statutory designated landscapes, with the closest being the Pembrokeshire Coast, approximately 8.36km from the works. Whilst the works would take place within a rural location, given the small scale and nature of the works (i.e. within the existing WTW site) no significant effects are anticipated, although there may be a minor negative effect on local landscape/visual amenity.
Operation

Objective 1: Moderate negative uncertain effect - The option has been assessed as having a moderate uncertain effect, due to the potential for effects arising from the additional 2ml/d abstraction from the Afon Teifi, a site designated (SAC) for a range of freshwater fish species e.g. river lamprey, brook lamprey and bull head as well as Atlantic Salmon. Whilst the ALS indicates water is available, it is unclear that this could be abstracted without additional effects on these designated features without further modelling.
Objective 2: Neutral effect - It is assumed that there would be a biodiversity net gain in operation greater than the net loss in construction; however, without quantification, its magnitude is uncertain and an equivalent score to construction is provided.
Objective 3: Neutral effect - The option would involve increasing the abstraction licence to increase abstraction, with changes to the WTW to enable this, however, there would be no new pathways/no changes to pathways for INNS transfer, therefore the effect against this objective has been assessed as neutral.
Objective 4: Neutral effect - There would be no operational effects on land use/soils.
Objective 5: Minor negative effect – The WFD assessment highlights that the 2021 overall WFD waterbody status is moderate, with the driving element identified as macrophytes and phytobenthos combined and highlights that changes to the hydrological regime, river continuity and morphological conditions could impact fish, invertebrate and macrophyte/phytobenthos populations. The WFD assessment also highlights that flows in the River Teifi could be reduced by up to 7.6% (Q95) as a result of the total abstraction rate of 21 Ml/d, calculated using flow data from Glanteifi gauging station ~2.2 km upstream of the abstraction location. However, there is <1% impact on Q95 flows when considering only the increase from the current to proposed abstraction rates (2 Ml/d increase, from 19 Ml/d current). The ALS indicates that water is available for abstraction across the entire flow regime. In this case, with water available in the catchment, the total abstraction being less than 10%, and the proportional increase in abstraction associated with the option being very low, the impact is assessed as negligible and therefore WFD compliant (low confidence).
Objective 6: Minor negative effect – The WFD assessment highlights that a reduction in flows in the Teifi, particularly during times of low flow could result in changes to physico-chemical quality elements (e.g. BOD, DO, pH, temperature), potentially causing a deterioration in status. However, as the proportional increase in abstraction is very low the impact is assessed as negligible. The WFD assessment also highlights that whilst the option would not introduce new priority or priority hazardous chemicals, lower flows could result in a reduction in dilution of chemicals already present in the waterbody, and potentially a further deterioration in status. However, as the proportional increase in abstraction is very low the impact is assessed as negligible. Overall, the WFD assessment concludes that the option would be WFD compliant (low confidence).
Objective 7: Neutral effect - It is not anticipated that the operation of the option would not be liable for flooding or cause or exacerbate flooding elsewhere.
Objective 8: Neutral effect - No operational effects on air quality are anticipated.
Objective 9: Minor negative effect - Operational energy demand associated with the operation of the option would lead to 197.6tCO2e/year carbon emissions; which, in line with the thresholds of significance, has been assessed as having a minor negative effect.

Objective 10: Minor positive effect - The increased capacity (2Ml/d) provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Minor positive effect - The additional 2Ml/d capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a minor positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect -The operation of the option is not expected to impact upon opportunities for recreation or tourism
Objective 13: Minor positive effect- The scheme would not adversely affect human health due to increased noise, nuisance or disruption. The increased capacity of up to 2Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the supply area, though the provision of an extra 2Ml/d deployable output.
Objective 15: Minor negative uncertain effect - The operation of the option would require the ongoing use of chemicals to treat water as well as ongoing energy use to pump and treat water which would likely require the use of fossil fuels for energy. However, as the energy requirements and chemical quantities required for the operation of the option are currently unknown, some uncertainty remains.
Objective 16: Neutral effect - The operation of the option would not have any effect on cultural heritage.
Objective 17: Minor negative effect - Whilst the option is not located in close proximity to any statutory designated landscapes, the option would result in new permanent above ground infrastructure in a rural location (albeit within the existing WTW site) which may have a minor negative effect on local landscape/visual amenity.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	WEF-MET-8202
Option Name	WEF-MET-8202
Water company	DCWW
Option Description	This option would involve the installation of meters in 55,923 households and 12,290 meters in non-households across the MSC zone between 2025-2050.
Yield	1.79Ml/d
WRZ	MSC

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
WEF-MET-8202	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**

Construction
Objective 1: Neutral effect - The construction of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - The construction of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The construction of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The construction of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Neutral effect - The construction of this option is not anticipated to impact on water quantity.
Objective 6: Neutral effect - The construction of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The construction of this option is not anticipated to impact on flood risk.
Objective 8: Moderate negative uncertain effect - The construction of the option could result in traffic congestion during the construction period (this would be on the road network across the MSC zone) which, together with embodied carbon associated with meters and emissions from powering installation equipment, may have a negative effect on local air quality. Construction activity may take place within an AQMA.
Objective 9: Minor negative effect - The construction of the option would include embodied carbon from material production of meters (55,923 household meters and 12,290 non-household meters total), in addition to vehicle movements for the distribution and installation of the meters over the 25 year implementation stage, with the total carbon arising from the implementation phase being 950.3tCO2e (above BAU emissions over the plan period).
Objective 10: Neutral effect - The construction of this option is not anticipated to impact on climate resilience.
Objective 11: Moderate positive effect - This option would result in a significant capital spend of approx. £5.73m, with capital spend being spread across 25 years (2025 - 2050). This could result in a positive effect on the local economy associated with potential employment opportunities, supply chain benefits and spend by workers and contractors in the local economy.

Objective 12: Neutral effect - The construction of this option is not anticipated to impact on tourism and recreation.
Objective 13: Neutral effect - The construction of this option is not anticipated to impact on human health and well-being.
Objective 14: Neutral effect - The construction of this option is not anticipated to impact on water resource use.
Objective 15: Minor negative effect - This option requires the installation of 55,923 household meters and 12,290 non-household meters. These could be sourced from manufactures utilising more sustainable materials, however, assume limited opportunities for the acquisition of meters utilising fully sustainable or recycled/recyclable materials. Production and installation of meters/devices may result in small quantities of waste associated with manufacturing waste, device packaging, materials required for installation and disposal of any faulty/damaged devices.
Objective16: Neutral effect - The construction of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The construction of this option is not anticipated to impact on landscape
Operation
Objective 1: Neutral effect - The operation of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - The operation of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The operation of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The operation of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Minor positive effect - The operation of this option would result in minor reductions in the demand for water (1.79Ml/d WAFU benefit), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering..
Objective 6: Neutral effect - The operation of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The operation of this option is not anticipated to impact on flood risk.

Objective 8: Neutral effect - The operation of this option is not anticipated to impact on air quality.
Objective 9: Minor positive effect - The operation of the option would involve carbon emissions associated with meter reading activities, however, the option would reduce greenhouse gas emissions associated with reduced electricity production for the production/treatment of water and water use in the home (e.g. heating, etc.) and overall, the operation of the option is anticipated to reduce carbon emissions by an average of 60.7tCO2e/year across the plan period.
Objective 10: Minor positive effect - The increased capacity of 1.79Ml/d would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience and adaptability to the effects of climate change.
Objective 11: Minor positive effect - This option would provide an additional capacity of 1.79Ml/d, which would help ensure a continual supply of clean drinking water and increase resilience of supply to DCWW customers, supporting economic growth which could result in a positive effect on the local economy and social wellbeing.
Objective 12: Neutral effect - The operation of this option is not anticipated to impact on tourism and recreation.
Objective 13: Minor positive effect - The operation of this option would result in a positive effect on human health. Overall, the increase in capacity of 1.79Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - This option would involve a major reduction in demand from the supply network (1.79Ml/d), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering. The option would result in a major improvement in water efficiency and resilience.
Objective 15: Neutral effect - The operation of this option is not anticipated to impact on waste and resource use.
Objective16: Neutral effect - The operation of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The operation of this option is not anticipated to impact on landscape

Clwyd Coastal Resource Zone

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	WEF-MET-8012
Option Name	WEF-MET-8012
Water company	DCWW
Option Description	This option would involve the installation of meters in 82,130 households and 6,943 meters in non-households across the CC zone between 2025-2050.
Yield	2.03Ml/d
WRZ	CC

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
SEW005a	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

Construction

Objective 1: Neutral effect - The construction of this option is not anticipated to impact on biodiversity.

Objective 2: Neutral effect - The construction of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The construction of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The construction of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Neutral effect - The construction of this option is not anticipated to impact on water quantity.
Objective 6: Neutral effect - The construction of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The construction of this option is not anticipated to impact on flood risk.
Objective 8: Moderate negative uncertain effect - The construction of the option could result in traffic congestion during the construction period (this would be on the road network across the CC zone) which, together with embodied carbon associated with meters and emissions from powering installation equipment, may have a negative effect on local air quality. Construction activity may take place within an AQMA.
Objective 9: Moderate negative effect - The construction of the option would include embodied carbon from material production of meters (82,130 household meters and 6,943 non-household meters total), in addition to vehicle movements for the distribution and installation of the meters over the 25 year implementation stage, with the total carbon arising from the implementation phase being 1,118.2tCO2e (above BAU emissions over the plan period).
Objective 10: Neutral effect - The construction of this option is not anticipated to impact on climate resilience.
Objective 11: Moderate positive effect - This option would result in a significant capital spend of approx. £5.8m, with capital spend being spread across 25 years (2025 - 2050). This could result in a positive effect on the local economy associated with potential employment opportunities, supply chain benefits and spend by workers and contractors in the local economy.
Objective 12: Neutral effect - The construction of this option is not anticipated to impact on tourism and recreation.
Objective 13: Neutral effect - The construction of this option is not anticipated to impact on human health and well-being.
Objective 14: Neutral effect - The construction of this option is not anticipated to impact on water resource use.

Objective 15: Minor negative effect - This option requires the installation of 82,130 household meters and 6,943 non-household meters. These could be sourced from manufactures utilising more sustainable materials, however, assume limited opportunities for the acquisition of meters utilising fully sustainable or recycled/recyclable materials. Production and installation of meters/devices may result in small quantities of waste associated with manufacturing waste, device packaging, materials required for installation and disposal of any faulty/damaged devices.
Objective16: Neutral effect - The construction of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The construction of this option is not anticipated to impact on landscape
Operation
Objective 1: Neutral effect - The operation of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - The operation of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The operation of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The operation of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Minor positive effect - The operation of this option would result in minor reductions in the demand for water (2.03Ml/d WAFU benefit), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering..
Objective 6: Neutral effect - The operation of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The operation of this option is not anticipated to impact on flood risk.
Objective 8: Neutral effect - The operation of this option is not anticipated to impact on air quality.
Objective 9: Minor positive effect - The operation of the option would involve carbon emissions associated with meter reading activities, however, the option would reduce greenhouse gas emissions associated with reduced electricity production for the production/treatment of water and water use in the home (e.g. heating, etc.) and overall, the operation of the option is anticipated to reduce carbon emissions by an average of 64.8tCO2e/year across the plan period.

Objective 10: Minor positive effect - The increased capacity of 2.03Ml/d would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience and adaptability to the effects of climate change.
Objective 11: Minor positive effect - This option would provide an additional capacity of 2.03Ml/d, which would help ensure a continual supply of clean drinking water and increase resilience of supply to DCWW customers, supporting economic growth which could result in a positive effect on the local economy and social wellbeing.
Objective 12: Neutral effect - The operation of this option is not anticipated to impact on tourism and recreation.
Objective 13: Minor positive effect - The operation of this option would result in a positive effect on human health. Overall, the increase in capacity of 2.03Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - This option would involve a major reduction in demand from the supply network (2.03Ml/d), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering. The option would result in a major improvement in water efficiency and resilience.
Objective 15: Neutral effect - The operation of this option is not anticipated to impact on waste and resource use.
Objective16: Neutral effect - The operation of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The operation of this option is not anticipated to impact on landscape

FINAL

Appendix G
Preferred Options Assessment Matrices

wood.

FINAL

Tywi Gower Resource Zone

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	TGW12
Option Name	Crai Distribution Option - Upsize Christopher Road WPS
Water company	DCWW
Option Description	In order to reduce demand on Crai resources, GCG SRv (2.4 Ml/d average demand) and Bros SRv(1.7Ml/d average demand) will be rezoned to the Felindre WTW by upsizing Christopher Road PS to reverse flows in the 17" main from Crai and putting two booster PS's to pump to GCG SRv and Bros SRv
Yield	4.1Ml/d
WRZ	Tywi Gower

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
TWG12	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0

Construction
Objective 1: Moderate negative effect - The new Brynawel PS and Rhos PS would be situated within areas of urban Ancient Woodland, and therefore construction at these two sites would result in minor loss of Ancient Woodland areas. The existing Christopher Road PS which would be upgraded meanwhile, is situated immediately adjacent to another area of urban Ancient Woodland and may result in disturbance/ more minor effects (e.g. noise, dust) on this site. There are 19 SSSIs within 10km of the option location, 1 NNR within 10km, a LNR within 1km of the option and a further 3 within 10km. There are 13 European sites within 20km of the proposed pumping station (Christopher Road) and two booster pumping stations (Brynawel and Rhos). The closest sites are Crymlyn Bog / Cors Crymlyn SAC and Ramsar located 4.2km from the closest element of the proposed works (Christopher Road PS). The HRA concludes that due to the small scale of the proposed works which would be located within urban areas, and absence of potential impacts pathways (no hydrological connectivity, disturbance and air quality impacts highly unlikely given standard threshold distances; no risk of effects on 'functional habitats' for any interest features) it is considered that there will be 'no effects' on European sites during construction phase (negligible HRA risk). Construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - The BNG assessment concludes that construction activities will have a very small impact to land cover as works would be situated within existing sites, which is expected to cause a neutral effect on this objective.
Objective 3: Neutral effect - Upsizing of the pumping station would require minor construction activities which could result in the distribution of terrestrial INNS. Effects are considered neutral based on the implementation to best practice construction methods.
Objective 4: Minor negative effect - Land surrounding the option location is of poor quality (grade 3b or lower). The approximate site locations are within non-agricultural or urban areas. The option would potentially require permanent land take but not result in loss of best and most versatile agricultural land. There are 11 historic landfill sites within 5km of the option location, and the Danygrag House historic landfill site is 1.05km from the option location. Pollution from landfill sites during construction is considered unlikely.
Objective 5: Neutral effect - The Breinant river is within 1km of the scheme. The overall groundwater status at the option location is poor. No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology. As such the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.
Objective 6: Neutral effect - It is not expected that construction of this option would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). As such the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.
Objective 7: Minor negative uncertain effect - The site of the new Rhos PS appears to be situated in a small area of land between an area at risk of flooding from rivers (Flood Zone 2) and an area at high risk of flooding from rivers (Flood Zone 3), however, it is not clear whether the exact site of the PS

will be located within or partially within either of these areas, given the limited space between them. As such, construction works associated with the option may be at risk of flooding. Construction of the option is not expected to increase the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Moderate negative effect - There are no AQMAs within 10km of the option. There will be an increase in vehicle movement associated with construction activities which could cause short-term deterioration in local air quality, which, given the scale of works and CAPEX, is anticipated to result in a moderate negative effect on this objective.
Objective 9: Minor negative effect - Construction of the option would require the use of raw materials with a minor amount of embodied carbon (507.3tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Minor negative uncertain effect - As noted above the site of the new Rhos PS appears to be situated in a small area of land between an area at risk of flooding from rivers (Flood Zone 2) and an area at high risk of flooding from rivers (Flood Zone 3), however, it is not clear whether the exact site of the PS will be located within or partially within either of these areas, given the limited space between them. As such, construction of the new PS may be at risk to the effects of climate change (flooding).
Objective 11: Moderate positive effect - The scheme would result in a minor increase in construction jobs associated with the £8.32m capital spend over the 1.5 year construction period. Individual spend by contractors and workers could also provide some local benefit to business. Works are unlikely to affect the local transport network, given the location and nature of the scheme.
Objective 12: Minor negative effect - Due to the potential disruption to recreational facilities including Cycle route 43 within 1km of the option (with it's closest point only 160m away) and 12 greenspace areas within 1km of the option including playing fields, sports facilities and golf course. The closest greenspace is playing fields less than 20 metres from the approximate option location, which could lead to disturbances to users of the playing fields (e.g. noise, vibrations, dust). There are no country parks or national trails within 1km of the option.
Objective 13: Minor negative effect - Construction of the option is not expected to have a significant impact on human health during construction as construction activity is only expected to be small scale. Construction works may have a minor negative effect (e.g. noise disturbance, vibration, dust deposition and air quality) on residential receptors in Pontardawe as the option is predominantly located within the town.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Moderate negative effect - The option will make use of existing infrastructure at Christopher Road pumping station and the existing water pipeline network, however new materials such as concrete, steel and plastic will be required to upgrade the Christopher Road pumping station, along with the two new pumping stations as Brynawel and Rhos and, as such, would generate waste. Energy would also be required for the operation of plant and machinery. Objective 15: Minor positive uncertain effect - It is possible that the option could use limited quantities of waste materials and any new infrastructure would incorporate limited sustainable design measures and materials. There is also the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.

Objective 16: Neutral effect - There are no World Heritage Sites within 10km and no registered parks and gardens within 5km of the option. There is 1 Scheduled Monument (Waun y Coed Colliery Branch canal and Tramroad Incline - 900m away) and 10 Listed Buildings (Grade II and II*) within 1km of the option, the closest listed building is Grade II listed Ynysmeudwy Isaf Overbridge on Swansea Canal located 35m from the approximate option location. It is not anticipated construction would have any significant effect on these heritage assets, due to the distance between these sites and proposed works.
Objective 17: Neutral effect - The Brecon Beacons National Park is within 10km of the option (approximately 8.8km away). There are no AONBs within 10km. The option requires the construction of two new booster pumping stations and the upsizing of an existing pumping station, construction works are unlikely to be visually intrusive to the landscape as the option is within an urban area.
Operation
Objective 1: Neutral effect - The operational changes are limited to a change in distribution within the existing network. Therefore with no additional abstractions or discharges, there are no operational impacts at the sites identified within 20km and the HRA concludes that the HRA risk during operation would be negligible. There is no pathway for the operational activities of this component to result in effects on non-designated aquatic habitats or species. Any operational impacts will not alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - The BNG assessment concludes that whilst this option would not have any effect on habitat loss during construction and therefore does not drive a strategic response during operation, opportunities to provide local benefit, in line with SMNR and the Welsh Wellbeing Goals, should still be considered.
Objective 3: Minor negative effect- Effects are considered minor negative as water will be transferred between catchments. However, water will be transferred in a closed system and will be treated further reducing the risk of any new pathways.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Neutral effect - There is no pathway for this option to impact river or groundwater flows. The WFD assessment concludes that as this scheme involves a network transfer with no new abstractions or discharge to WFD water bodies. As a result there is a negligible risk to WFD compliance.
Objective 6: Neutral effect - There are no pathways for water quality impacts associated with the operation of this option. The WFD assessment concludes that as this scheme involves a network transfer with no new abstractions or discharge to WFD water bodies. As a result there is a negligible risk to WFD compliance.
Objective 7: Minor negative uncertain effect - As noted above the site of the new Rhos PS appears to be situated in a small area of land between an area at risk of flooding from rivers (Flood Zone 2) and an area at high risk of flooding from rivers (Flood Zone 3), however, it is not clear whether the exact site of the PS will be located within or partially within either of these areas, given the limited space between them. As such, operation of this element of the scheme may be at risk of flooding. Operation of the option is not expected to increase the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Neutral effect - Operation of the option is not expected to impact local air quality.

Objective 9: Moderate negative effect - Operational energy demand associated with pumping would generate 737.7tonnes CO2e/a. This has been assessed as having a moderate negative effect on this objective.
Objective 10: Minor positive effect - Operation of the option will provide 4.1Ml/d of water resource, which would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Minor positive effect - Operation of this option will provide 4.1Ml/d deployable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers, supporting economic/population growth.
Objective 12: Neutral effect - Operation of the option is not expected to have any impact on tourism and recreation.
Objective 13: Minor positive effect - The scheme would not adversely affect human health due to increased noise, nuisance or disruption. Operation of this option will provide an additional 4.1Ml/d deployable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the DCWW supply area by providing an additional 4.1Ml/d yield.
Objective 15: Minor negative uncertain effect - The operation of the option is likely to require additional energy and may require the use of chemicals, however, the effects in this regard are currently uncertain.
Objective 16: Neutral effect - Operation of this option is not expected to have any impact on cultural heritage sites.
Objective 17: Neutral effect - The option will not permanently alter the existing landscape, and therefore is anticipated to have a neutral effect during operation.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	TWG14
Option Name	Ystradfellte - Reverse flow through Tonna control valve
Water company	DCWW
Option Description	In order to reduce the stress on the resource from Cefn Drysgoed, flows through the Tonna Flow control valve will be reversed so that 2.5Ml/d from the Felindre system can meet some of the demand on the Cefn Drysgoed network. Elements: New Park Field Pumping Station (PS) to pump to the Cefn Drysgoed network (2.5Ml/d - from the model)
Yield	2.5Ml/d
WRZ	Tywi Gower

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
TWG14	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0

Construction
Objective 1: Minor negative effect - Crymlyn Bog Ramsar, SAC, SSSI and NNR is located 7.66km from the option. There are a further 11 SSSIs within 10km of the option, the closest site is Fforest Goch Bog 4.49km away. There are 5 LNRs within 10km of the option, the closest site is Eaglesbush Valley 3.73km away. There are 10 European sites within 20km of the option components. The HRA highlights that the proposed PS is to be set within an urban area, with potential loss of some woodland habitat, but separated from local watercourses by built up residential areas, road networks and an industrial estate. The PS would be located in the Afon Nedd catchment, and so there are no down- or upstream European sites and so no direct hydrological connectivity for pollution or sedimentation issues. Similarly, all the European sites are at sufficient distances such that they will not be impacted by direct habitat loss, or air quality, noise, visual impacts etc. The habitats affected by the option will not be important to the functional integrity of any sites or the populations of mobile species. Therefore, the HRA concludes that with no potential impact pathways, it is considered that there will be 'no effects' on European sites. Construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Minor negative effect - The BNG assessment concludes that wit regard to the new PS next to residential road, it could be situated on amenity grass, or adjacent woodland and hence it is assumed that it is split 50/50 between both. As such the BNG identifies that that the option would result in the permanent loss of 0.02ha of habitats.
Objective 3: Neutral effect - The new Park Field PS elements could potentially result in increased disruption to terrestrial and aquatic INNS. Effects are neutral due to the minor nature of the construction activities and in consideration of best practice construction methods.
Objective 4: Neutral effect - The option is located within an area allocated as urban land, and effects on agricultural soils are therefore considered unlikely. There are 5 historic landfill sites within 5km of the option, with the closest site 1.04km away (Cadoxton). Contamination is not anticipated due to the scale of the option and it's distance from the historic landfill site.
Objective 5: Neutral effect - There are 3 water courses within 500m of the option (Dulais, Afon Nedd and Neath Canal). No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology. As such the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.
Objective 6: Neutral effect - It is not expected that construction of this option would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). As such the WFD assessment concludes that following best practice construction techniques, there will be no risk to WFD compliance associated with construction activities.
Objective 7: Neutral effect - The pumping station itself is not located within an area at risk to flooding, however, within 500m of the option there are areas at high risk to flooding from the sea. Construction of the option is not expected to increase the risk of flooding in the vicinity of the scheme or elsewhere.

Objective 8: Minor negative effect - Neath Port Talbort AQMA is located 9.09km from the option. Impacts on these AQMAs resulting from construction are considered unlikely. There will be an increase in vehicle movement associated with construction activities and will likely cause short-term deterioration in local air quality, which, given the scale of the works and CAPEX, is anticipated to have a minor negative effect on this objective.
Objective 9: Minor negative effect - Construction of the option would require the use of raw materials with a minor amount of embodied carbon (125.5tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Neutral effect - It is not anticipated that the construction of this option would have any effect on climate resilience.
Objective 11: Minor positive effect - The scheme would result in a minor increase in construction jobs associated with the £1.23m capital spend. Individual spend by contractors and workers could also provide some local benefit to business. Works are unlikely to affect the local transport network, given the location and nature of the scheme.
Objective 12: Minor negative effect - Construction works are not expected to have a significant impact on opportunities/facilities for recreation or tourism. Any effects are expected to be minor such as disturbances to users (e.g. noise, vibrations, dust) in the short term. There are 12 greenspace areas within 1km of the option, the closest site is St Anne's Church 210m away and it is unlikely there will be any recreational impacts on greenspace areas as the option only requires small scale works. National cycle route 46/47 is located approximately 70m from the option location and Afan Argoed Country Park is located 5.4km away.
Objective 13: Moderate negative effect - Due to the location of the works in close proximity to a residential area, construction works will likely have a moderate negative effect (e.g. noise disturbance, vibration, dust deposition and air quality) on residential receptors in surrounding Tonna.
Objective 14: Neutral effect - The construction phase of this option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The option involves constructing a new pumping station thus requiring new materials, such as concrete, steel and plastic and, as such, would generate waste. Energy would also be required for the operation of plant and machinery. It is possible that the option could use limited quantities of waste materials and any new infrastructure would incorporate limited sustainable design measures and materials and there is also the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled, however, given the scale of the works and CAPEX required, any effect in this regard is anticipated to be negligible.
Objective 16: Moderate negative effect - There are 19 Listed Buildings within 500m of the option, 3 of which are less than 10m from the proposed working width boundary. There are 3 Scheduled Monuments within 500m of the option, with the closest being Aberdulais Aqueduct, 175m away. There are a further 18 Scheduled Monuments within 5km of the option. There are 4 registered parks and gardens within 10km of the option, with the closest being The Gnoll 865m away. There are no World Heritage Sites within 10km of the option. There is a moderate possibility that construction of the option could impact the structures and settings of the Listed Buildings in close proximity to the construction site.
Objective 17: Minor negative effect - There are no AONBs or National Park within 10km of the option. The option is located within a largely urban area, therefore construction of the pumping station is unlikely to have a significant effect on the surrounding landscape.

Operation
Objective 1: Neutral effect - The HRA highlights that operational changes are limited to a change in distribution within the existing network. Therefore with no additional abstractions or discharges, there are no operational effects on European sites. As such the HRA concludes that the HRA risk would be negligible ('no effects' or clearly no LSE alone (e.g. no impact pathways; features not sensitive; etc.)). There is no pathway for the operational activities of this component to result in effects on non-designated aquatic habitats or species. Any operational impacts will not alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Minor positive effect - The BNG assessment concludes that given the minor extent of habitat loss, a strategic response is not required. However, the BNG assessment highlights that opportunities to provide mitigation and enhancement of biodiversity and ecosystem resilience should be considered during design and implementation. It is assumed that there would be the operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - There is no pathway for this option to increase the risk of INNS transfer.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Neutral effect - There is no pathway for this option to impact river or groundwater flows. The WFD assessment concludes that as this scheme involves a network transfer with no new abstractions or discharge to WFD water bodies. As a result there is a negligible risk to WFD compliance.
Objective 6: Neutral effect - There are no pathways for water quality impacts associated with the operation of this option. The WFD assessment concludes that as this scheme involves a network transfer with no new abstractions or discharge to WFD water bodies. As a result there is a negligible risk to WFD compliance.
Objective 7: Neutral effect - None of the option elements are within an area at risk to flooding. Operation of this option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Neutral effect - Operation of the option is not expected to impact local air quality.
Objective 9: Minor negative effect - Operational energy demand associated with pumping would generate 125.7tonnes CO2e/a. This has been assessed as having a moderate negative effect on this objective.
Objective 10: Minor positive effect - Operation of the option will provide 2.5Ml/d of water resource, which would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Minor positive effect - Operation of this option will provide up to 2.5Ml/d deployable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers, supporting economic/population growth.

Objective 12: Neutral effect - Operation of the option is not expected to have any impact on tourism and recreation.
Objective 13: Minor positive effect - Operation of this option will provide up to 2.5Ml/d deployable output, which would help to ensure a continual supply of clean drinking water and ensure resilience of supply to DCWW customers generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the DCWW supply area by providing an additional 2.5Ml/d yield.
Objective 15: Minor negative uncertain effect - The operation of the option is likely to require additional energy to operate the new pumping station, however, the effects in this regard are currently uncertain.
Objective 16: Minor negative uncertain effect - There are 3 Listed buildings in close proximity to the site. Therefore, it is considered that there is potential for the setting and structure of the Listed Buildings to be affected by the pumping station, new site roads and hardstanding. However, this is uncertain until further details are available.
Objective 17: Neutral effect - The option is located within a largely urban area, therefore it is not anticipated that there will be any effect on the landscape during operation.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	WEF-MET-8201
Option Name	WEF-MET-8201
Water company	DCWW
Option Description	This option would involve the installation of meters in 749,595 households and 53,350 meters in non-households across the TWG zone between 2025-2050.
Yield	23.75Ml/d
WRZ	TWG

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
WEF-MET-8201	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

Construction
Objective 1: Neutral effect - The construction of this option is not anticipated to impact on biodiversity.

Objective 2: Neutral effect - The construction of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The construction of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The construction of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Neutral effect - The construction of this option is not anticipated to impact on water quantity.
Objective 6: Neutral effect - The construction of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The construction of this option is not anticipated to impact on flood risk.
Objective 8: Significant negative uncertain effect - The construction of the option could result in traffic congestion during the construction period (this would be on the road network across the TWG zone) which, together with embodied carbon associated with meters and emissions from powering installation equipment, may have a negative effect on local air quality. Construction activity may take place within an AQMA.
Objective 9: Significant negative effect - The construction of the option would include embodied carbon from material production of meters (749,595 household meters and 53,350 non-household meters total), in addition to vehicle movements for the distribution and installation of the meters over the 25 year implementation stage, with the total carbon arising from the implementation phase being 10,999.6tCO2e (above BAU emissions over the plan period).
Objective 10: Neutral effect - The construction of this option is not anticipated to impact on climate resilience.
Objective 11: Significant positive effect - This option would result in a significant capital spend of approx. £62.12m, with capital spend being spread across 25 years (2025 - 2050). This could result in a positive effect on the local economy associated with potential employment opportunities, supply chain benefits and spend by workers and contractors in the local economy.
Objective 12: Neutral effect - The construction of this option is not anticipated to impact on tourism and recreation.
Objective 13: Neutral effect - The construction of this option is not anticipated to impact on human health and well-being.
Objective 14: Neutral effect - The construction of this option is not anticipated to impact on water resource use.

Objective 15: Moderate negative effect - This option requires the installation of 749,595 household meters and 53,350 non-household meters. These could be sourced from manufactures utilising more sustainable materials, however, assume limited opportunities for the acquisition of meters utilising fully sustainable or recycled/recyclable materials. Production and installation of meters/devices may result in small quantities of waste associated with manufacturing waste, device packaging, materials required for installation and disposal of any faulty/damaged devices.
Objective16: Neutral effect - The construction of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The construction of this option is not anticipated to impact on landscape
Operation
Objective 1: Neutral effect - The operation of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - The operation of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The operation of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The operation of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Significant positive effect - The operation of this option would result in major reductions in the demand for water (23.75Ml/d WAFU benefit), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering..
Objective 6: Neutral effect - The operation of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The operation of this option is not anticipated to impact on flood risk.
Objective 8: Neutral effect - The operation of this option is not anticipated to impact on air quality.
Objective 9: Moderate positive effect - The operation of the option would involve carbon emissions associated with meter reading activities, however, the option would reduce greenhouse gas emissions associated with reduced electricity production for the production/treatment of water and water use in the home (e.g. heating, etc.) and overall, the operation of the option is anticipated to reduce carbon emissions by an average of 811.4tCO2e/year across the plan period.

Objective 10: Moderate positive effect - The increased capacity of 23.75Ml/d would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience and adaptability to the effects of climate change.
Objective 11: Moderate positive effect - This option would provide an additional capacity of 23.75Ml/d, which would help ensure a continual supply of clean drinking water and increase resilience of supply to DCWW customers, supporting economic growth which could result in a positive effect on the local economy and social wellbeing.
Objective 12: Neutral effect - The operation of this option is not anticipated to impact on tourism and recreation.
Objective 13: Moderate positive effect - The operation of this option would result in a positive effect on human health. Overall, the increase in capacity of 23.75Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Significant positive effect - This option would involve a major reduction in demand from the supply network (23.75Ml/d), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering. The option would result in a major improvement in water efficiency and resilience.
Objective 15: Neutral effect - The operation of this option is not anticipated to impact on waste and resource use.
Objective16: Neutral effect - The operation of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The operation of this option is not anticipated to impact on landscape

wood.

FINAL

SEWCUS Resource Zone

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	SEW166
Option Name	Memorial PS
Water company	DCWW
Option Description	This option would involve providing 47 Ml/d peak flows to the Pontsticill Low Level network in order to release the flows from the Pontsticill WTW to enable other WRMP options and the trading option. In order to be able to supply the combined 47 Ml/d, Cilfynydd WPS (21Ml/d) will be reinstated to support the Memorial WPS (26 Ml/d). The Pumps at Memorial WPS will be replaced with Low suction, high lift pumps to be able to pump to Ty Gwyn SRv. Cefn Mably WPS will be reinstated to provide additional pressure to the supply side of Memorial WPS and Tongwynlais SRv. Installation of a pressure and flow control valve arrangement at the inlet to Tongwynlais SRv to ensure that the service reservoir does not overtop. The main elements of this scheme would be: replacement of the existing Memorial pumps with 4 high lift, low suction pumps to pump at total of 26 Ml/d; slab and externally mounted surge vessel Memorial WPS; reinstatement of Cilfynydd WPS to supply 21Ml/d; slab and externally mounted surge vessel for Cilfynydd WPS; reinstate Cefn Mably WPS, assume 1600l/s at 12.5m lift based on current modelling; and, replace the existing 48" butterfly valve with a new pressure and flow control valve arrangement at Tongywnlais SRv Inlet, as well as a level sensor in the SRv.
Yield	47Ml/d
WRZ	SEWCUS

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
SEW166	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
	Operation (positive)	0	0	0	0	0	0	0	0	0	+++	+++	0	+++	+++	0	0	0

Construction

Objective 1: Minor negative effect - Within 10km of the Cilfynydd and Memorial WPS sites (the sites are situated approximately 0.8km from each other and hence the same features/sites are within 10km of both) there is: 1 SAC (Aberbargoed Grasslands, approximately 9.1km/9.3km from the Cilfynydd and Memorial WPS sites respectively); 11 SSSIs (the closest of which is Nelson Bog approximately 3.8km/4.2km from the Cilfynydd and Memorial WPS sites respectively); and 3 LNRs (the closest of which is Craig-Yr-Hesg, approximately 2.2km/1.6km from the Cilfynydd and Memorial WPS sites respectively). Additionally Aberbargoed Grasslands/Glaswelltiroedd Aberbargoednnr NNR is approximately 9.1km/9.3km from the Cilfynydd and Memorial WPS sites respectively (the only NNR within 10km of these sites). Due to the distance between the WPS sites and these features, no effects would be anticipated. There are also a number of areas of Ancient Woodland within 1km of the two sites, the closest being approximately 0.2km from the Memorial site. Whilst works at the sites would not directly affect any areas of ancient woodland, there may be some disturbance (e.g. noise) to species within these areas, due their proximity to the works.

The Cefn Mably site is approximately 16km/16.8km from the Memorial and Cilfynydd sites respectively, hence is situated within 10km of a different set of designated sites (with the exception of two SSSIs which would be situated within 10km of all three sites), including: 3 SACs, 1 SPA and 1 Ramsar, with the closest being the Severn Estuary SAC/SPA/Ramsar (each of the designations covering the Severn Estuary cover slightly different areas at differing distances from the WPS site (between 5.3km and 5.6km from the site) , the closest of which is the SPA at 5.3km). There are also 22 SSSIs and 9 LNRs within 10km of the option (the closest of which are the Argloddiau Cronfeyedd Dwr Llanisien A Llys-Faen / Llanishen And Lisvane Reservoir Embankments SSSI (approximately 2.8km from the WPS site) and the Nant Fawr Corridor LNR (immediately adjacent to the SSSI)). Additionally Newport Wetlands NNR is approximately 10km from the site (the only NNR within 10km). Due to the distance between the WPS site and these features, no effects would be anticipated.

There are also a number of areas of Ancient Woodland within 1km of the site, including 6 within 0.5km of the works, with the closest being approximately 0.2km from the option. Whilst works at the site would not directly affect any areas of ancient woodland, there may be some disturbance (e.g. noise) to species within these areas, due their proximity to the works.

The HRA highlights that the only European sites potentially exposed to effects from construction are the Severn estuary sites (downstream sites, may be exposed to site-derived pollutants, principally from the works at Cefn Mably due to proximity) and the Cardiff Beech Woods SAC (within approximately 500m of Tongwynlais SRv). The HRA concludes that effects on the Severn estuary sites will be avoidable with established avoidance or mitigation measures. With regard to Tongwynlais SRv and the Cardiff Beech Woods SAC, the HRA concludes that this site will not be exposed to any effects as a result of the option due to (a) the very small scale of the works at Tongwynlais (modifications to valves); (b) the location of the SAC (up catchment from the SRv location); and (c) the distance to the SAC (~500m, ensuring no risk of air quality changes etc.).

More generally construction works at the three sites may lead to some disturbance (e.g., noise, vibration, dust) to proximate non-designated habitats and species, however, any effects in this regard are anticipated to be very minor as works would take place within the existing WPS sites.
Objective 2: Neutral effect. The BNG assessment concludes that construction of the option would have a neutral effect, as the option is a network option, with all works assumed to take place within the three existing WPS sites (hence no loss of habitats)
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Moderate positive effect - Works at the Cilfynydd WPS, the Memorial WPS and Cefn Mably WPS and at Tongywnlais SRv would be contained within the existing DCWW operational sites such that new ancillary infrastructure/refurbishments should not significantly impact land/soil quality. The option would also utilise existing infrastructure and involve the reinstatement of infrastructure (Cilfynydd WPS and Cefn Mably WPS) such that a positive effect on this objective has been assessed.
Objective 5: Neutral effect - It is not expected that construction would affect water resources.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures).
Objective 7: Neutral effect - None of the sites of the proposed works (Cilfynydd WPS, the Memorial WPS, Cefn Mably WPS and Tongywnlais SRv) are located within areas at a high risk of flooding. It is not anticipated, that construction would result in, or exacerbate, flooding elsewhere during the construction period.
Objective 8: Minor negative effect - The construction of the option could result in traffic congestion during the construction period, particularly on the M4, A470 and A4054 and the local road network in close proximity/leading to the various sites which, together with emissions associated with the use of plant and machinery, may have a negative effect on local air quality. Whilst none of the construction works would take place within an AQMA, the A4054, which may be used to access the Memorial and Cilfynydd sites, does include a section which is located within an AQMA, so there is a possibility that construction traffic (if using this road to access these sites) may increase air pollution within this AQMA.
Objective 9: Minor negative effect - Construction of the option would require the use of raw materials with a minor amount of embodied carbon (439tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Neutral effect - The construction of this option is not expected to have any effect on climate resilience.
Objective 11: Minor positive effect - Construction would involve a modest capital expenditure (£4.33m) which could have a minor positive effect on the local economy. The construction period would be one year long, which may provide the potential for a number of local businesses and SMEs to have involvement and opportunities. Individual spend by contractors and workers could also provide some local benefit to business.

Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated vehicle movements (particularly on the M4, A470 and A4054 and the local road network in close proximity/leading to the various sites)
Objective 12: Neutral effect - Works across the three WPS sites are not expected to have any effect on opportunities for, or facilities relating to recreation or tourism. Works at the three WPSs will take place at the existing sites, which are situated adjacent to major roads and away from any recreational/tourist facilities.
Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the construction at the various sites, which could affect for example, residential receptors within Cilfynydd, Abercynon and Tongwynlais and small number of scattered residential dwellings within the vicinity of the scheme. However, as works will take place at existing sites, which are predominantly all located adjacent to major roads and works will be temporary, any effects are anticipated to be minor.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The construction of the option would require minor quantities of raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Minor negative effect - There are 5 listed buildings within 1km of both the Cilfynydd and Memorial WPS sites, with the closest being the Cilfynydd War Memorial, approximately 90m from the Memorial WPS site (approximately 880m from the Cilfynydd WPS site), whilst the closest feature to the Cilfynydd site is situated approximately 80m from the site. All other listed buildings within 1km of the Memorial site are situated 700m or more from the site. Within 1km of the Cefn Mably site there are 4 listed buildings, the closest of which is St. Julians Manor, approximately 650m from the site. Due to the proximity of the Cilfynydd War Memorial to the Memorial WPS site, there may be some effects on its setting during construction, however, as works would be situated within the existing WPS site, it is anticipated that any effects would be minor. The Cefn Mably WPS site is situated within the Cefn Mably registered historic park and garden. Works at this site may therefore have a negative effect on the setting and character of this feature, however, as the works would take place at the existing WPS, any effects in this regard are considered to be minor and temporary.
Objective 17: Neutral effect - The three WPS sites would not be situated within, or in close proximity to any landscape designations. Works would take place within the existing WPS sites and hence no effects on landscape are anticipated.
Operation
Objective 1: Neutral effect - It is not anticipated that the operation of the option would have any effect on biodiversity as it is a network solution involving reinstating/refurbishing water pumping stations, furthermore the HRA concludes that as the option is a network resilience solution that will not require 'new water' it will not have any operational effects and hence HRA risk is negligible.

Objective 2: Neutral effect - The BNG assessment concludes that whilst this option would not have any effect on habitat loss during construction and therefore does not drive a strategic response during operation, opportunities to provide local benefit, in line with SMNR and the Welsh Wellbeing Goals, should still be considered.
Objective 3: Neutral effect - The option would involve the reinstatement/upgrading of existing infrastructure, with no new pathways for INNS transfer, therefore the effect against this objective has been assessed as neutral.
Objective 4: Neutral effect - There would be no operational effects on land use/soils.
Objective 5: Neutral effect - As the option is a network option (involving the reinstatement/refurbishment of three water pumping stations) and does not involve the abstraction of any additional water, there would be no effect on water quantity. The WFD assessment concludes the option would be WFD complaint.
Objective 6: Neutral effect - As the option is a network option (involving the reinstatement/refurbishment of three water pumping stations) and does not involve the abstraction of any additional water, there would be no effect on water quality. The WFD assessment concludes the option would be WFD complaint.
Objective 7: Neutral effect - It is not anticipated that the operation of the option would not be liable for flooding or cause or exacerbate flooding elsewhere.
Objective 8: Neutral effect - no operational effects on air quality are anticipated.
Objective 9: Significant negative effect - The operation of the option (largely associated with its operational energy demand) would generate 2,908tonnes CO2e/a. This has been assessed as having a significant negative effect on this objective.
Objective 10: Significant positive effect - The increased capacity (47Ml/d) provided by this option would enable the use of other WRMP options and the trading option, thereby helping ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Significant positive effect - The additional 47Ml/d capacity provided by this option will enable the use of other WRMP options and the trading option, thereby helping ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a significant positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect - It is not expected that there will be any effects on recreation or tourism as a result of the operation of this option.
Objective 13: Significant positive effect- The scheme would not adversely affect human health due to increased noise, nuisance or disruption . The additional 47Ml/d capacity provided by this option will enable the use of other WRMP options and the trading option, thereby helping ensure a continual

supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Significant positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the supply area, by enabling the use of other WRMP options and the trading option, though the provision of an extra 47Ml/d deployable output.
Objective 15: Moderate negative effect - The operation of this option would require ongoing energy usage in order to power the WPSs. This would likely require the use of fossil fuels to generate energy.
Objective 16: Neutral effect - There would be no operational effects on designated cultural heritage assets.
Objective 17: Neutral effect - No effects on landscape are anticipated during operation. Reinstated/refurbished WPSs would be situated within the existing WPS sites.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	**SEW168**
Option Name	**Llwynon Gravity Main Upgrades**
Water company	**DCWW**
Option Description	**Scheme to enable DCWW to stop supplying c7 Ml/d minimum sweetening flow year round into the Llwynon gravity main in order to avoid WQ issues. The scheme comprises installation of new pressure reducing valves (PRVs), meters, burst protection valves and flow control valves. This option would involve the following works:** **Near Memorial PS:** • Install new inline PRV complex and meter • Complex to be installed on existing 27" Steel trunk main • 2 x under-pressure drillings (1 x upstream & 1 x downstream) or conventional shutdown (600mm) • Complex can be built off-line; close existing in-line valve to commission • 2 x chambers (1 x PRV; 1 x meter) • Install new burst protection valve complex and meter • Complex to be installed on existing 27" Steel trunk main upon removal / cut out of existing (old) burst protection valve/ Lana-Johnson valve (conventional shutdown) • 1 x new in-line valve (700mm) and associated tee's • 2 x chambers (1 x burst protection valve) (1 x meter) **At Memorial PS:** • Install new flow control valve complex and meter • Complex to be installed on existing 29" and 30" Steel trunk main(s) • 4 x new large washouts • 1 x new flow control valve & 1 x new meter; size of pipework to be confirmed; ~600mm inlet & outlet of complex • 2 x 800 mm valves and 2 x 600mm valves to replace existing 450mm valves to WPS • Waste/flushing pipework to be installed from washouts
Yield	Upgrades and enhancements will enable DCWW to stop losing 7 M/d annually as sweetening flow
WRZ	SEWCUS

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
SEW168	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	0	0	0
	Operation (positive)	0	0	0	0	0	0	0	0	0	++	++	0	++	++	0	0	0

Construction

Objective 1: Minor negative effect - Within 10km of the Memorial WPS site there is: 1 SAC (Aberbargoed Grasslands, approximately 9.3km from the Memorial WPS site; 11 SSSIs (the closest of which is Nelson Bog approximately 4.2km from the Memorial WPS sites; and 3 LNRs (the closest of which is Craig-Yr-Hesg, approximately 1.6km from the Memorial WPS site. Additionally Aberbargoed Grasslands/Glaswelltiroedd Aberbargoednnr NNR is approximately 9.3km from the Memorial WPS site (the only NNR within 10km of the site). Due to the distance between the WPS site and these features, no effects would be anticipated. The HRA concludes that no sites are considered to be exposed to the environmental changes associated with the option due to the small-scale of the required works, the distance to the European sites and the characteristics of the interest features; the option will have 'no effect' on any European sites. There are also a number of areas of Ancient Woodland within 1km of the site, the closest being approximately 0.2km from the Memorial site. Whilst works at the sites would not directly affect any areas of ancient woodland, there may be some disturbance (e.g. noise) to species within these areas, due their proximity to the works.
More generally construction works at the site may lead to some disturbance (e.g., noise, vibration, dust) to proximate non-designated habitats and species, however, any effects in this regard are anticipated to be very minor as works would take place within the existing WPS site.

Objective 2: Neutral effect - The BNG assessment concludes that construction of the option would have a neutral effect, as the option is a network option, with all works assumed to take place within an existing WPS site (hence no loss of habitats)

Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.

Objective 4: Minor positive effect - The new infrastructure associated with the option will be constructed within the existing operational site at Llwynon WTW such that new pumping infrastructure should not significantly impact land/soil quality
Objective 5: Neutral effect - No effects on water quantity are anticipated during the construction phase of the option.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures).
Objective 7: Neutral effect - None of the sites of the proposed works at/near the Memorial WPS are located within areas at a high risk of flooding. It is not anticipated, that construction would result in, or exacerbate, flooding elsewhere during the construction period.
Objective 8: Minor negative uncertain effect - The construction of the option could result in traffic congestion during the 1 year construction period (particularly on the A470) and more generally, the local road network within the vicinity of the scheme and where pipelines will follow/cross road) which, together with emissions associated with the use of machinery, may have a negative effect on local air quality. The option is not located within any AQMAs.
Objective 9: Moderate negative effect - Construction of the option would require the use of raw materials with a significant amount of embodied carbon (**approximately 1,014 tCO2e**) as well as the use of machinery which would also contribute to carbon emissions.
Objective 10: Neutral effect - The construction of this option is not expected to have any effect on climate resilience.
Objective 11: Minor negative effect - Works could result in increased congestion and disruption/driver delay on the road network due to associated increased traffic, for example on the A470, as well as local minor roads. Objective 11: Minor positive effect - The construction of the option would involve a minor capital expenditure (**£2m**), resulting in a minor positive effect on the local economy associated with potential employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors in the local economy.
Objective 12: Minor negative effect - Access to Grawen Caravan & Camping Park and local bed & breakfasts' would likely not be restricted or prevented during construction. However, noise and dust associated with construction and resultant traffic may affect a limited number of visitors to the area and recreational activity. More generally, construction of the option may impact upon recreational activities such as walking and cycling near and around the reservoir (e.g. effects of construction noise and dust and construction traffic).
Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the construction of the new pipeline which, although there are no significant residential receptors nearby, could affect scattered residential dwellings and farmsteads within close proximity to the works, however these effects would be temporary.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.

Objective 15: Moderate negative effect - The installation of new pressure reducing valves, meters, burst protection valves and flow control valves would require raw materials such as concrete, steel and plastic and would generate waste. Energy would also be required for the operation of machinery associated with construction. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Neutral effect - There are 8 listed buildings within 1km of the option. The closest 2 being those associated with the Llwynon reservoir dam, approximately 200m from the option. The remaining 6 are all over 300m from the option. Due to the nature of the works and their location within an existing treatment works it is not expected that there will be any effect on designated cultural sites.
Objective 17: Moderate negative effect - Construction of the option will take place within the Brecon Beacons National Park. Construction may have short term, temporary negative effects on local landscape features and other receptors in the vicinity of the reservoir (including walkers and visitors to the reservoir) however, adverse effects would be over a short timescale.
Operation
Objective 1: Neutral effect - It is not anticipated that the operation of the option would have any effect on biodiversity as it is a network solution involving works on an existing pumping station, furthermore the HRA concludes that there are no effect pathways (the option does not require 'new water') and so will not have any operational effects and hence HRA risk is negligible.
Objective 2: Neutral effect - The BNG assessment concludes that whilst this option would not have any effect on habitat loss during construction and therefore does not drive a strategic response during operation, opportunities to provide local benefit, in line with SMNR and the Welsh Wellbeing Goals, should still be considered.
Objective 3: Neutral effect - The option would involve the reinstatement/upgrading of existing infrastructure, with no new pathways for INNS transfer, therefore the effect against this objective has been assessed as neutral.
Objective 4: Neutral effect - There would be no operational effects on soils/geodiversity/land as all construction will take place in the footprint of the existing treatment works.
Objective 5: Minor negative effect – The WFD assessment states that a new intermittent discharge to the River Taff (via the Nant Cae-dudwg watercourse - approx. 900m upstream of the confluence) has the potential to have effects on water quality and hence potentially on water chemistry. Discharges are expected to take place once-twice per year during dry weather. The WFD assessment highlights that as the water body is of Good to High status for all elements apart from Fish (Moderate due to Fish), it is likely that new permit limits will be imposed to prevent deterioration. Considering the expected infrequent use of the discharge, it would be unlikely to have a notable effect on the Nant Cae-dudwg, or on the Taff downstream. Overall the WFD assessment concludes that the option would be WFD complaint with a low confidence.
Objective 6: Minor negative effect – The WFD assessment highlights that a new intermittent discharge to the River Taff (via the Nant Cae-dudwg watercourse - approx. 900m upstream of the confluence) has the potential to have effects on water quality and hence potentially on water chemistry. Discharges are expected to take place once-twice per year during dry weather. The WFD assessment highlights that, as the water body is of Good to High

status for all elements apart from Fish (Moderate due to Fish), it is likely that new permit limits will be imposed to prevent deterioration. Considering the expected infrequent use of the discharge, it would be unlikely to have a notable effect on the Nant Cae-dudwg, or on the Taff downstream. The WFD also highlights that washwater discharges, particularly during times of low flow, could result in changes to physico-chemical quality elements (e.g. BOD, DO, pH, temperature) and additionally, could result in changes to river chemistry, potentially causing a deterioration in status. Overall the WFD assessment concludes that the option would be WFD compliant, with a low confidence due to discharge to tributary a distance upstream and volume/constitution of washwater.
Objective 7: Neutral effect - The option is not located within areas at a high risk of flooding. It is not anticipated, that operation of the option would result in, or exacerbate, flooding in the area or elsewhere.
Objective 8: Neutral effect - No operational effects on air quality are anticipated.
Objective 9: Neutral effect - The operation of this option is not anticipated to generate any discernible carbon emissions and hence a neutral effect has been identified.
Objective 10: Moderate positive effect - The additional 10Ml/d provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.
Objective 11: Moderate positive effect - The additional 7Ml/d provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a moderate positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect -The operation of the option is not expected to impact upon opportunities for recreation or tourism.
Objective 13: Moderate positive effect- The scheme would not adversely affect human health or impact existing recreational facilities or recreation, due to increased noise, nuisance or disruption. The increased provision of an additional 7Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Moderate positive effect - This option would improve water efficiency by enabling DCWW to stop supplying c7 Ml/d minimum sweetening flow year round into the Llwynon gravity main, and would increase the resilience of water resources within the DCWW supply area, though the provision of an extra 7Ml/d of deployable output.
Objective 15: Neutral effect - The operation of this option would not involve additional infrastructure or resources and would likely require only minor energy usage, therefore the effect on this objective has been assessed as neutral.
Objective 16: Neutral effect - The operation of the option would not have any effect on cultural heritage.

Objective 17: Neutral effect - The operation of the option would not have any effect on the local landscape. New above ground infrastructure will be built within the footprint of existing works.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	WEF-MET-8121
Option Name	WEF-MET-8121
Water company	DCWW
Option Description	This option would involve the installation of meters in 1,338,715 households and 80,769 meters in non-households across the SEWCUS zone between 2025-2050.
Yield	41.53Ml/d
WRZ	SEWCUS

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
WEF-MET-8121	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**

Construction
Objective 1: Neutral effect - The construction of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - The construction of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The construction of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The construction of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Neutral effect - The construction of this option is not anticipated to impact on water quantity.
Objective 6: Neutral effect - The construction of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The construction of this option is not anticipated to impact on flood risk.
Objective 8: Significant negative uncertain effect - The construction of the option could result in traffic congestion during the construction period (this would be on the road network across the SEWCUS zone) which, together with embodied carbon associated with meters and emissions from powering installation equipment, may have a negative effect on local air quality. Construction activity may take place within an AQMA.
Objective 9: Significant negative effect - The construction of the option would include embodied carbon from material production of meters (1,338,715 household meters and 80,769 non-household meters total), in addition to vehicle movements for the distribution and installation of the meters over the 25 year implementation stage, with the total carbon arising from the implementation phase being 19,466.94tCO2e (above BAU emissions over the plan period).
Objective 10: Neutral effect - The construction of this option is not anticipated to impact on climate resilience.
Objective 11: Significant positive effect - This option would result in a significant capital spend of approx. £108.25m, with capital spend being spread across 25 years (2025 - 2050). This could result in a positive effect on the local economy associated with potential employment opportunities, supply chain benefits and spend by workers and contractors in the local economy.

Objective 12: Neutral effect - The construction of this option is not anticipated to impact on tourism and recreation.
Objective 13: Neutral effect - The construction of this option is not anticipated to impact on human health and well-being.
Objective 14: Neutral effect - The construction of this option is not anticipated to impact on water resource use.
Objective 15: Moderate negative effect - This option requires the installation of 1,338,715 household meters and 80,769 non-household meters total. These could be sourced from manufactures utilising more sustainable materials, however, assume limited opportunities for the acquisition of meters utilising fully sustainable or recycled/recyclable materials. Production and installation of meters/devices may result in small quantities of waste associated with manufacturing waste, device packaging, materials required for installation and disposal of any faulty/damaged devices.
Objective16: Neutral effect - The construction of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The construction of this option is not anticipated to impact on landscape
Operation
Objective 1: Neutral effect - The operation of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - The operation of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The operation of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The operation of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Significant positive effect - The operation of this option would result in major reductions in the demand for water (41.53Ml/d WAFU benefit), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering..
Objective 6: Neutral effect - The operation of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The operation of this option is not anticipated to impact on flood risk.

Objective 8: Neutral effect - The operation of this option is not anticipated to impact on air quality.
Objective 9: Significant positive effect - The operation of the option would involve carbon emissions associated with meter reading activities, however, the option would reduce greenhouse gas emissions associated with reduced electricity production for the production/treatment of water and water use in the home (e.g. heating, etc.) and overall, the operation of the option is anticipated to reduce carbon emissions by an average of 1413.2tCO2e/year across the plan period.
Objective 10: Significant positive effect - The increased capacity of 41.53Ml/d would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience and adaptability to the effects of climate change.
Objective 11: Significant positive effect - This option would provide an additional capacity of 41.53Ml/d, which would help ensure a continual supply of clean drinking water and increase resilience of supply to DCWW customers, supporting economic growth which could result in a positive effect on the local economy and social wellbeing.
Objective 12: Neutral effect - The operation of this option is not anticipated to impact on tourism and recreation.
Objective 13: Significant positive effect - The operation of this option would result in a positive effect on human health. Overall, the increase in capacity of 41.53Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Significant positive effect - This option would involve a major reduction in demand from the supply network (41.53Ml/d), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering. The option would result in a major improvement in water efficiency and resilience.
Objective 15: Neutral effect - The operation of this option is not anticipated to impact on waste and resource use.
Objective16: Neutral effect - The operation of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The operation of this option is not anticipated to impact on landscape

Mid-South Ceredigion Resource Zone

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	MSC08
Option Name	Upsize Llechryd WTW
Water company	DCWW
Option Description	Llechryd WTW currently has a maximum capacity of 19 MLD. The maximum abstraction rate is 800 m3/h. It is expected that the abstraction licence could be increased to 880 m3/h freeing up an extra 2 MLD. The option would involve the installation of: new low level pumps 3 No. 880 m3/h capacity; a new polymer dosing plant; an additional RGF filter; and, connecting pipework for new filter 20m 100mm.
Yield	2Ml/d
WRZ	M&S Ceredigion

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
MSC008	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	-
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	+	0	0	0

Construction
Objective 1: Minor negative effect - Within 1km of the WTW site there are 2 SACs; the Afon Teifi/River Teifi SAC (approx. 0.1km from the WTW) and Cardigan Bay/Bae Ceredigion SAC (approx. 8.21km from the WTW). Given the proximity of the Afon Teifi/River Teifi SAC to the works there is the potential for negative effects (e.g. noise, dust deposition), however, given the scale of works and assuming construction best practice, any effects are anticipated to be minor. There are also 9 SSSIs within 10km of the option, including one within 1km; Afon Teifi SSSI (approx. 0.21km). Given the proximity of the Afon Teifi SSSI to the works there is the potential for negative effects (e.g. noise, dust deposition), however, given the scale of works and assuming construction best practice, any effects are anticipated to be minor. All other SSSIs are situated at least 1.6km from the works and are not expected to be affected by construction given the scale and nature of the works at the existing WTW site. There is also one NNR within 10km; Coedmor, which is situated approximately 1.7km from the works and is not expected to be affected by the construction of the option for the same reasons stated above. Additionally there are a number of areas of Ancient Woodland within 10km of the option, including 12 within 1km of the works. One of these areas is situated within 0.1km of the works (at approx. 0.07km). Due to the proximity of this area to the works (and to a lesser extent some of the other areas within 1km) construction may lead to very minor negative impacts (e.g. noise), given the scale and nature of construction works. More generally, construction would take place in a rural setting and may lead to very minor negative effects (e.g. noise) on non-designated habitats and species proximate to construction works.
Objective 2: Neutral effect - The BNG assessment concludes that construction of the option would have a neutral effect, as it is assumed that all works would take place within the existing WTW site (hence no loss of habitats).
Objective 3: Neutral effect - there would not be any impact on the INNS risk during construction period.
Objective 4: Minor positive effect - This option is not expected to require any land take as it is assumed that works would be undertaken within the existing WTW site. In consequence, a minor positive effect has been identified.
Objective 5: Neutral effect - No effects on water quantity are anticipated during the construction phase of the option. Construction of new infrastructure will require appropriate consenting and permitting, but WFD compliance unlikely to be a barrier to implementation of the option.
Objective 6: Neutral effect - It is not expected that construction would affect water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures).
Objective 7: Neutral effect - The Llechryd WTW site is not situated within an area at high risk of flooding, although it is located just outside of an area of Flood Zone 2, however, it is not expected that construction would be at risk of flooding. It is not anticipated that construction would result in, or exacerbate, flooding elsewhere during the construction period.
Objective 8: Minor negative uncertain effect - The WTW site is not situated within an AQMA. The construction of the option would require the transportation of materials/equipment to site, which is likely to require a small number of vehicle movements, with a potential minor negative impact on local air quality. However, as the exact number of vehicle movements required is currently unknown, there remains some uncertainty.

Objective 9: Minor negative effect - Construction of the option would require the use of raw materials with a minor amount of embodied carbon (187tCO2e) as well as the use of plant and machinery which would also contribute to carbon emissions.
Objective 10: Neutral effect - The construction of this option is not expected to have any effect on climate resilience.
Objective 11: Minor positive effect - The scheme would result in a minor increase in construction jobs associated with the £2.6m capital spend during the 1-year construction period. Given the scale of construction, no notable effects on local transport infrastructure (i.e. from the transport of materials to site) are anticipated.
Objective 12: Neutral effect - Due to the small scale and nature of the works and the rural location of works at the existing WTW site, away from any tourist/recreational receptors and facilities, no effects on recreation or tourism are anticipated.
Objective 13: Minor negative effect - There may be noise/vibration disturbance and air quality impacts associated with the construction works at the WTW which could affect residential receptors within close proximity to the works, such those along the A484 and in east Llechryd as well as the scattered residential dwellings and farmsteads within the vicinity of the scheme, however, these effects would be temporary.
Objective 14: Neutral effect - The construction phase of the option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - The construction of the option would require materials such as concrete, steel and plastic and would potentially generate waste. Energy would also be required for the operation of machinery and plant. Objective 15: Minor positive uncertain effect - There is the possibility that waste building materials such as steel and plastic, could potentially be re-used or recycled. However, the significance of this is currently unknown.
Objective 16: Neutral effect - Within 1km of the WTW site there are two Scheduled Monuments; Onnen-Deg Defended Settlement (at approx. 0.4km), and Llwynduris Castle Mound (at approx. 0.89km) and 14 Listed Buildings, the closest of which is the Grade II Manoreifed (at approx. 0.31km). However, these all benefit from either woodland/tree buffer or distance from the works and given the small scale and nature of the works (i.e. within the existing WTW site) no significant effects are expected.
Objective 17: Minor negative effect - The option is not located in close proximity to any statutory designated landscapes, with the closest being the Pembrokeshire Coast, approximately 8.36km from the works. Whilst the works would take place within a rural location, given the small scale and nature of the works (i.e. within the existing WTW site) no significant effects are anticipated, although there may be a minor negative effect on local landscape/visual amenity.
Operation
Objective 1: Moderate negative uncertain effect - The option has been assessed as having a moderate uncertain effect, due to the potential for effects arising from the additional 2ml/d abstraction from the Afon Teifi, a site designated (SAC) for a range of freshwater fish species e.g. river lamprey, brook lamprey and bull head as well as Atlantic Salmon. Whilst the ALS indicates water is available, it is unclear that this could be abstracted without additional effects on these designated features without further modelling.

Objective 2: Neutral effect - The BNG assessment concludes that whilst this option would not have any effect on habitat loss during construction and therefore does not drive a strategic response during operation, opportunities to provide local benefit, in line with SMNR and the Welsh Wellbeing Goals, should still be considered.
Objective 3: Neutral effect - The option would involve increasing the abstraction licence to increase abstraction, with changes to the WTW to enable this, however, there would be no new pathways/no changes to pathways for INNS transfer, therefore the effect against this objective has been assessed as neutral.
Objective 4: Neutral effect - There would be no operational effects on land use/soils.
Objective 5: Minor negative effect – The WFD assessment highlights that the 2021 overall WFD waterbody status is moderate, with the driving element identified as macrophytes and phytobenthos combined and highlights that changes to the hydrological regime, river continuity and morphological conditions could impact fish, invertebrate and macrophyte/phytobenthos populations. The WFD assessment also highlights that flows in the River Teifi could be reduced by up to 7.6% (Q95) as a result of the total abstraction rate of 21 Ml/d, calculated using flow data from Glanteifi gauging station ~2.2 km upstream of the abstraction location. However, there is <1% impact on Q95 flows when considering only the increase from the current to proposed abstraction rates (2 Ml/d increase, from 19 Ml/d current). The ALS indicates that water is available for abstraction across the entire flow regime. In this case, with water available in the catchment, the total abstraction being less than 10%, and the proportional increase in abstraction associated with the option being very low, the impact is assessed as negligible and therefore WFD compliant (low confidence).
Objective 6: Minor negative effect – The WFD assessment highlights that a reduction in flows in the Teifi, particularly during times of low flow could result in changes to physico-chemical quality elements (e.g. BOD, DO, pH, temperature), potentially causing a deterioration in status. However, as the proportional increase in abstraction is very low the impact is assessed as negligible. The WFD assessment also highlights that whilst the option would not introduce new priority or priority hazardous chemicals, lower flows could result in a reduction in dilution of chemicals already present in the waterbody, and potentially a further deterioration in status. However, as the proportional increase in abstraction is very low the impact is assessed as negligible. Overall, the WFD assessment concludes that the option would be WFD compliant (low confidence).
Objective 7: Neutral effect - It is not anticipated that the operation of the option would not be liable for flooding or cause or exacerbate flooding elsewhere.
Objective 8: Neutral effect - No operational effects on air quality are anticipated.
Objective 9: Minor negative effect - Operational energy demand associated with the operation of the option would lead to 197.6tCO2e/year carbon emissions; which, in line with the thresholds of significance, has been assessed as having a minor negative effect.
Objective 10: Minor positive effect - The increased capacity (2Ml/d) provided by this option would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience of supply and adaptability to the effects of climate change.

Objective 11: Minor positive effect - The additional 2Ml/d capacity provided by this option will help ensure a continual supply of clean drinking water and increase resilience of supply, supporting economic/population growth which could result in a minor positive effect on the local economy. It is unlikely that there will be any direct impact on employment levels during operation.
Objective 12: Neutral effect -The operation of the option is not expected to impact upon opportunities for recreation or tourism
Objective 13: Minor positive effect- The scheme would not adversely affect human health due to increased noise, nuisance or disruption. The increased capacity of up to 2Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the supply area, though the provision of an extra 2Ml/d deployable output.
Objective 15: Minor negative uncertain effect - The operation of the option would require the ongoing use of chemicals to treat water as well as ongoing energy use to pump and treat water which would likely require the use of fossil fuels for energy. However, as the energy requirements and chemical quantities required for the operation of the option are currently unknown, some uncertainty remains.
Objective 16: Neutral effect - The operation of the option would not have any effect on cultural heritage.
Objective 17: Minor negative effect - Whilst the option is not located in close proximity to any statutory designated landscapes, the option would result in new permanent above ground infrastructure in a rural location (albeit within the existing WTW site) which may have a minor negative effect on local landscape/visual amenity.

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	WEF-MET-8202
Option Name	WEF-MET-8202
Water company	DCWW
Option Description	This option would involve the installation of meters in 55,923 households and 12,290 meters in non-households across the MSC zone between 2025-2050.
Yield	1.79Ml/d
WRZ	MSC

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
WEF-MET-8202	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

Construction

Objective 1: Neutral effect - The construction of this option is not anticipated to impact on biodiversity.

Objective 2: Neutral effect - The construction of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The construction of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The construction of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Neutral effect - The construction of this option is not anticipated to impact on water quantity.
Objective 6: Neutral effect - The construction of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The construction of this option is not anticipated to impact on flood risk.
Objective 8: Moderate negative uncertain effect - The construction of the option could result in traffic congestion during the construction period (this would be on the road network across the MSC zone) which, together with embodied carbon associated with meters and emissions from powering installation equipment, may have a negative effect on local air quality. Construction activity may take place within an AQMA.
Objective 9: Minor negative effect - The construction of the option would include embodied carbon from material production of meters (55,923 household meters and 12,290 non-household meters total), in addition to vehicle movements for the distribution and installation of the meters over the 25 year implementation stage, with the total carbon arising from the implementation phase being 950.3tCO2e (above BAU emissions over the plan period).
Objective 10: Neutral effect - The construction of this option is not anticipated to impact on climate resilience.
Objective 11: Moderate positive effect - This option would result in a significant capital spend of approx. £5.73m, with capital spend being spread across 25 years (2025 - 2050). This could result in a positive effect on the local economy associated with potential employment opportunities, supply chain benefits and spend by workers and contractors in the local economy.
Objective 12: Neutral effect - The construction of this option is not anticipated to impact on tourism and recreation.
Objective 13: Neutral effect - The construction of this option is not anticipated to impact on human health and well-being.
Objective 14: Neutral effect - The construction of this option is not anticipated to impact on water resource use.

Objective 15: Minor negative effect - This option requires the installation of 55,923 household meters and 12,290 non-household meters. These could be sourced from manufactures utilising more sustainable materials, however, assume limited opportunities for the acquisition of meters utilising fully sustainable or recycled/recyclable materials. Production and installation of meters/devices may result in small quantities of waste associated with manufacturing waste, device packaging, materials required for installation and disposal of any faulty/damaged devices.
Objective16: Neutral effect - The construction of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The construction of this option is not anticipated to impact on landscape
Operation
Objective 1: Neutral effect - The operation of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - The operation of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The operation of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The operation of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Minor positive effect - The operation of this option would result in minor reductions in the demand for water (1.79Ml/d WAFU benefit), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering..
Objective 6: Neutral effect - The operation of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The operation of this option is not anticipated to impact on flood risk.
Objective 8: Neutral effect - The operation of this option is not anticipated to impact on air quality.
Objective 9: Minor positive effect - The operation of the option would involve carbon emissions associated with meter reading activities, however, the option would reduce greenhouse gas emissions associated with reduced electricity production for the production/treatment of water and water use in the home (e.g. heating, etc.) and overall, the operation of the option is anticipated to reduce carbon emissions by an average of 60.7tCO2e/year across the plan period.

Objective 10: Minor positive effect - The increased capacity of 1.79Ml/d would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience and adaptability to the effects of climate change.
Objective 11: Minor positive effect - This option would provide an additional capacity of 1.79Ml/d, which would help ensure a continual supply of clean drinking water and increase resilience of supply to DCWW customers, supporting economic growth which could result in a positive effect on the local economy and social wellbeing.
Objective 12: Neutral effect - The operation of this option is not anticipated to impact on tourism and recreation.
Objective 13: Minor positive effect - The operation of this option would result in a positive effect on human health. Overall, the increase in capacity of 1.79Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - This option would involve a major reduction in demand from the supply network (1.79Ml/d), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering. The option would result in a major improvement in water efficiency and resilience.
Objective 15: Neutral effect - The operation of this option is not anticipated to impact on waste and resource use.
Objective16: Neutral effect - The operation of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The operation of this option is not anticipated to impact on landscape

FINAL

Clwyd Coastal Resource Zone

Option Assessment Information	
WRW Option ID	[If needed.]
Option ID	WEF-MET-8012
Option Name	WEF-MET-8012
Water company	DCWW
Option Description	This option would involve the installation of meters in 82,130 households and 6,943 meters in non-households across the CC zone between 2025-2050.
Yield	2.03Ml/d
WRZ	CC

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
WEF-MET-8012	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

Construction
Objective 1: Neutral effect - The construction of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - The construction of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The construction of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The construction of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Neutral effect - The construction of this option is not anticipated to impact on water quantity.
Objective 6: Neutral effect - The construction of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The construction of this option is not anticipated to impact on flood risk.
Objective 8: Moderate negative uncertain effect - The construction of the option could result in traffic congestion during the construction period (this would be on the road network across the CC zone) which, together with embodied carbon associated with meters and emissions from powering installation equipment, may have a negative effect on local air quality. Construction activity may take place within an AQMA.
Objective 9: Moderate negative effect - The construction of the option would include embodied carbon from material production of meters (82,130 household meters and 6,943 non-household meters total), in addition to vehicle movements for the distribution and installation of the meters over the 25 year implementation stage, with the total carbon arising from the implementation phase being 1,118.2tCO2e (above BAU emissions over the plan period).
Objective 10: Neutral effect - The construction of this option is not anticipated to impact on climate resilience.
Objective 11: Moderate positive effect - This option would result in a significant capital spend of approx. £5.8m, with capital spend being spread across 25 years (2025 - 2050). This could result in a positive effect on the local economy associated with potential employment opportunities, supply chain benefits and spend by workers and contractors in the local economy.
Objective 12: Neutral effect - The construction of this option is not anticipated to impact on tourism and recreation.

Objective 13: Neutral effect - The construction of this option is not anticipated to impact on human health and well-being.
Objective 14: Neutral effect - The construction of this option is not anticipated to impact on water resource use.
Objective 15: Minor negative effect - This option requires the installation of 82,130 household meters and 6,943 non-household meters. These could be sourced from manufactures utilising more sustainable materials, however, assume limited opportunities for the acquisition of meters utilising fully sustainable or recycled/recyclable materials. Production and installation of meters/devices may result in small quantities of waste associated with manufacturing waste, device packaging, materials required for installation and disposal of any faulty/damaged devices.
Objective16: Neutral effect - The construction of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The construction of this option is not anticipated to impact on landscape
Operation
Objective 1: Neutral effect - The operation of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - The operation of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The operation of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The operation of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Minor positive effect - The operation of this option would result in minor reductions in the demand for water (2.03Ml/d WAFU benefit), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering..
Objective 6: Neutral effect - The operation of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The operation of this option is not anticipated to impact on flood risk.
Objective 8: Neutral effect - The operation of this option is not anticipated to impact on air quality.

Objective 9: Minor positive effect - The operation of the option would involve carbon emissions associated with meter reading activities, however, the option would reduce greenhouse gas emissions associated with reduced electricity production for the production/treatment of water and water use in the home (e.g. heating, etc.) and overall, the operation of the option is anticipated to reduce carbon emissions by an average of 64.8tCO2e/year across the plan period.
Objective 10: Minor positive effect - The increased capacity of 2.03Ml/d would help ensure a continual supply of clean drinking water and increase resilience of supply, thereby increasing resilience and adaptability to the effects of climate change.
Objective 11: Minor positive effect - This option would provide an additional capacity of 2.03Ml/d, which would help ensure a continual supply of clean drinking water and increase resilience of supply to DCWW customers, supporting economic growth which could result in a positive effect on the local economy and social wellbeing.
Objective 12: Neutral effect - The operation of this option is not anticipated to impact on tourism and recreation.
Objective 13: Minor positive effect - The operation of this option would result in a positive effect on human health. Overall, the increase in capacity of 2.03Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.
Objective 14: Minor positive effect - This option would involve a major reduction in demand from the supply network (2.03Ml/d), through a combination of a reduction in demand associated with increased metering and a reduction in leakage associated with metering. The option would result in a major improvement in water efficiency and resilience.
Objective 15: Neutral effect - The operation of this option is not anticipated to impact on waste and resource use.
Objective16: Neutral effect - The operation of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The operation of this option is not anticipated to impact on landscape

wood.