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Environmental Report

Yorkshire Water's Water Resources Management Plan

Strategic Environmental Assessment

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Customer:

Yorkshire Water

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Environmental Assessment of the WRMP

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Front Cover Image: Ogden Water Reservoir, Halifax

Non-technical summary

Introduction

Every five years, water companies in England and Wales are required to produce an updated Water Resources Management Plan (WRMP). The WRMP sets out how water companies aim to balance supply and demand for water over the next 25 years, ensuring the efficient use of water and sustainable water supplies are available to meet customers' needs.

In preparing its WRMP, Yorkshire Water has considered the environmental and social impact assessment of each alternative options and has carried out a Strategic Environmental Assessment (SEA), as set out in this Environmental Report. The SEA and the WRMP have also been informed by Habitats Regulations Assessment (HRA) and a Water Framework Directive (WFD) compliance assessment. These assessments are recorded separately. Together, these assessments have formed an integral part of the decision-making process to determine the preferred WRMP.

Strategic environmental assessment screening

Water companies, as responsible authorities under the Environmental Assessment of Plan and Programmes Regulations 2004 (subsequently referred to as the SEA Regulations), must themselves determine if their WRMP falls within the scope of the SEA Regulations.

Government SEA guidance provides directions for determining whether an SEA is required for a WRMP. Application of this guidance indicated that the WRMP falls within the scope of the SEA Regulation, principally due to the risk that the plan may include schemes which will require environmental impact assessment, for example water pipelines, desalination plants or raising of reservoir dams.

Strategic environmental assessment and water resources management planning

In the context of water resource management planning, the SEA process can assist in the identification of potential environmental effects (adverse or beneficial) associated with alternative options being considered by a water company to balance supply and demand over the 25-year planning horizon. Knowledge of these effects helped to evaluate and identify a preferred plan of schemes for balancing supply and demand over this planning horizon, in particular contributing to the option and plan appraisal processes. The preferred plan forms the basis of this WRMP.

The WRMP process already requires a substantial element of environmental assessment and consideration. Certain environmental and social impacts are monetised and incorporated into the planning process by adding them to the capital and operating costs of schemes. SEA can add value to the appraisal process by promoting the consideration of a wider range of impacts that cannot be monetised. The SEA process also identified cumulative effects within Yorkshire Water's WRMP and with other policies, plans, programmes and projects.

There are five key stages of the SEA process:

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

In using the SEA to support decision-making, care must be taken to ensure that environmental and social impacts are not 'double-counted' in both the monetisation process and the SEA, as this may potentially skew the options and plan appraisal process.

The SEA provides information on the relative environmental performance of alternatives and is intended to make the planning and decision-making process more transparent. The SEA can, therefore, be used to support the timing and implementation of water resource management planning options.

An SEA Scoping Report was issued in April 2020 to statutory consultees (the Environment Agency, Natural England and Historic England) giving them an opportunity to provide their views on the proposed scope and level of detail of this SEA Environmental Report. Issues raised by consultees at the scoping stage were considered throughout the SEA process.

Assessment methodology

The assessment has been 'objectives-led'. The SEA objectives have been derived from environmental objectives established in law, policy or other plans and programmes, and from a review of the baseline information. The SEA objectives have been categorised under the following topic areas: biodiversity flora & fauna, population & human health, material assets & resource use, water, soil geology & land use, air & climate, archaeology & cultural heritage and landscape & visual amenity. These are set out in **Table NTS 1**. The overall findings of the SEA describe the extent to which objectives for each topic are met by each of the water resources management plan options.

The outputs of the assessment are a completed, detailed appraisal framework table for each of the selected water resource management options, and a colour coded summary visualisation matrix (ranging from major beneficial impacts to major adverse impacts). This provides a comparative assessment of the residual environmental effects of implementing each water resources management plan option.

The appraisal tables provide an evaluation of impact scale, certainty, duration and permanence in compliance with criteria for determining the likely significance of effects specified in the SEA Regulations Part 2, Regulation 9(2a) and Schedule 1. The assessment assumes implementation of standard best practice in implementing the option, and any proposed mitigation measures incorporated into the option conceptual design and costs. This enables assessment of the significance of residual effects after mitigation, in-line with the Office of the Deputy Prime Minister (ODPM) Practical Guide and UKWIR SEA national guidance. The residual adverse and beneficial effects are identified separately to avoid mixing adverse and beneficial effects, in line with SEA best practice. This enables adverse and beneficial impacts to be independently assessed, maintaining transparency throughout the WRMP decision-making process.

A cumulative, or in-combination, assessment has also been undertaken which has been involved examining the potential impacts of the options included in the preferred plan in combination with each other, as well as in combination with other relevant plans and programmes.

Environmental Baseline

An essential part of the SEA process is to identify the current baseline conditions and their likely evolution in the absence of WRMP24. It is only with knowledge of baseline conditions that potential impacts of the WRMP24 and its schemes can be identified, monitored, and if necessary mitigated. However, it is important to note that the future baseline is not a 'do nothing' option with respect to water resources planning. There will be elements of Yorkshire Water's current WRMP (WRMP19) that will continue in absence of the new WRMP24 plan (e.g. increased water metering, continuing leakage reduction and water efficiency measures to implement Yorkshire Water policy), which will act to alter the future baseline.

This Environmental Report covers the full duration of the current WRMP, i.e. 2024/5 to 2049/50. The statutory process requires WRMPs to be produced every five years, as such, the schemes and programmes for balancing supply and demand for water will be reviewed again and subject to SEA in

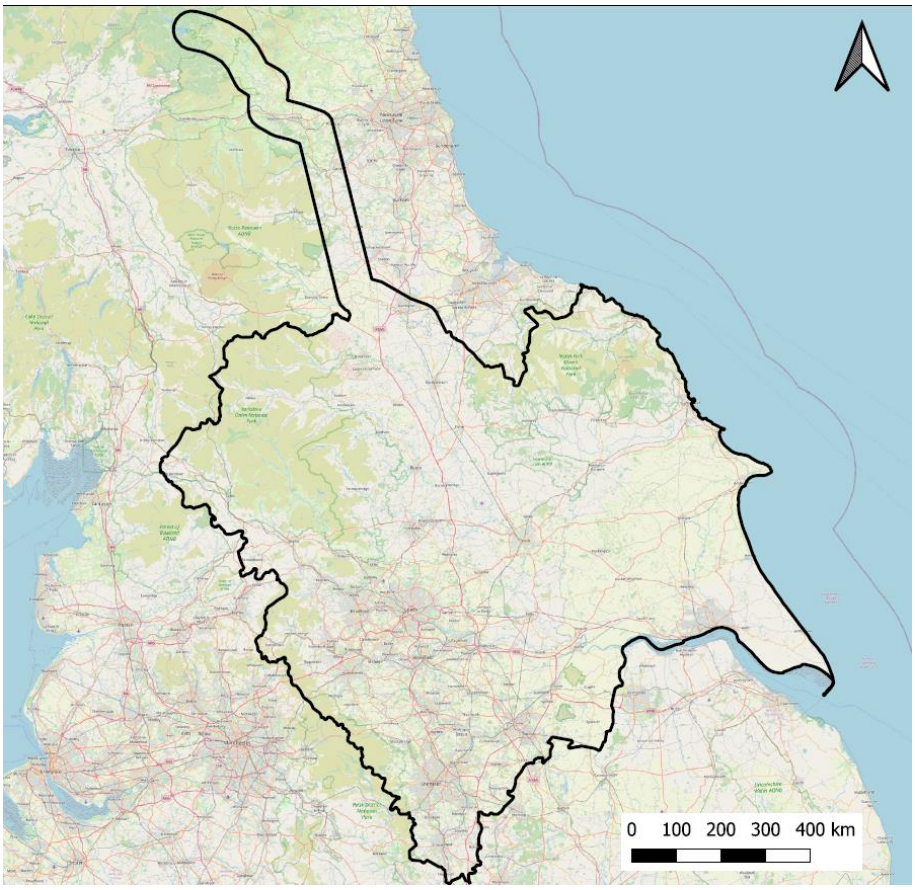
2028/29. Future WRMP cycles will revisit options beyond the current plan's period and the SEA will be updated at that time.

The best available projections for environmental and social characteristics have been considered and summarised, but there is significant uncertainty due to the substantial differences in the availability and temporal resolution of robust projections across the various SEA topic areas, which increases with time. A scenario approach has been adopted to test the sensitivity of the WRMP against the assessment of environmental and social effects based on known or likely changes. In this way, the resilience of options, programmes and the overall plan can be assessed and used to inform decision-making as well as future recommendations for monitoring of the effects of the plan to provide data for subsequent WRMPs and associated SEAs.

Baseline data have been drawn from a variety of sources, including the review of relevant plans, policies and programmes. The likely future trends in the environmental and social issues considered have been presented where information is available to do so. However, reliance on these data sets has in some cases meant that this information has become outdated. Whilst this is sufficient for the SEA process, local and/or site-specific data would be collected during the later EIA process where requested.

The SEA study area comprises the entirety of Yorkshire Water's supply area which is also considered to the natural catchment of the water company's operations (**Figure NTS 1**). The study area also includes an additional 10km wide 'corridor' of the Tyne and Tees to cover the potential development of river transfer and/or pipeline schemes to transfer water to the Yorkshire Water region. This corridor is within the Kielder SWZ which is included in the environmental baseline review. Therefore, the baseline information presented in this report may not identify specific, localised issues that are not reflective of the general trends of the region.

Figure NTS 1 SEA Study Area



The Yorkshire Water region has a varied landscape with the Pennines stretching to the west, the North York Moors in the north, and the low lying southern and eastern parts of the region. Annual average rainfall across the region varies. The highest rainfall is near the Pennines, whilst low lying areas average less than half the volume of rainfall each year, with little seasonal variation.

Urban areas in the west and the south of Yorkshire are principally supplies from reservoirs in the Pennines. Reservoirs located in the Pennines and the valleys of the River Don, Aire, Wharfe, Calder, Nidd and Colne provide the largest upland sources of water in the region. Yorkshire Water operates over 100 impounding reservoirs of which two are major pumped storage reservoirs. The total storage capacity of all the supply reservoirs amounts to some 160,000Ml.

In the eastern and northern parts of the region, river and groundwater abstractions, chiefly from the rivers of the North York Moors and the Yorkshire Wolds respectively, are the major water sources.

Key issues arising from the review of baseline conditions for each of the SEA topics are summarised in **Table NTS 1**. These key issues have been used to support the development of the SEA objectives.

Table NTS 1 Summary of key sustainability issues from the review of the baseline conditions

SEA Topic	Key issues
Biodiversity, Fauna and Flora	The need to protect or enhance the region's biodiversity, particularly protected sites designated for nature conservation. The need to avoid activities likely to cause irreversible damage to natural heritage. The need to take opportunities to improve and not reduce connectivity between fragmented habitats. The need to control the spread of Invasive Non-Native Species (INNS). The need to engage more people in biodiversity issues so that they personally value biodiversity and know what they can do to help, including through recognising the value of the ecosystem services.
Population and Human Health	The need to ensure water supplies remain affordable especially for deprived and vulnerable communities. The need to ensure continued improvements in levels of health across the region, particularly in urban areas and deprived areas. The need to ensure public awareness of drought conditions and importance of maintaining resilient, reliable public water supplies without the need for emergency drought measures. The need to ensure water quantity and quality is maintained for other users including tourists, recreational users and other users such as farmers. The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities for local residents and tourists, including opportunities for access to recreation resources and the natural and historic environment. The need to accommodate an increasing population. The need to contribute towards maintaining sustainable growth in the region. Sites of Nature Conservation Importance, heritage assets, water resources, important landscapes and public rights of way contribute to recreation and tourism opportunities and subsequently health and well-being and the economy.
Material Assets and Resource Use	The need to minimise the consumption of resources, including water and energy. The need to reduce the total amount of waste produced in the region, from all sources, and to reduce the proportion of this waste sent to landfill. The need to continue to reduce leakage from the water supply system. Daily consumption of water is higher that the national average in the area and consequently there is a continued need to encourage more efficient water use. The need to support regional and national commitments to decarbonisation.
Water	The need to further improve the quality of the region's river, estuarine and coastal waters taking into account WFD status targets. The need to maintain the quantity and quality of groundwater resources taking into account WFD status targets.

SEA Topic	Key issues
	The need to improve the resilience, flexibility and sustainability of water resources in the region, particularly in light of potential climate change impacts on surface waters and groundwaters. The need to ensure sustainable abstraction to protected the water environment. The need to ensure that people understand the value of water. The need to reduce and manage flood risk.
Soil, Geology and Land-use	The need to protect geological features of importance and maintain and enhance soil function and health. The need to manage the land more holistically at the catchment level, benefitting landowners, other stakeholders, the environment and sustainability of natural resources (including water resources). The need to make use of previously developed land (brownfield land) and to reduce the prevalence of derelict land in the region.
Air and Climate	The need to reduce air pollutant and greenhouse gas emissions and limit air emissions to comply with air quality standards. The need to mitigate against climate change through the reduction in greenhouse gas emissions in order to contribute to risk reduction over the long term. The need to adapt to the impacts of climate change for example through, sustainable water resource management, water use efficiencies, specific aspects of natural ecosystems (e.g. connectivity) as well as accommodating potential opportunities of climate change.
Archaeology and Cultural Heritage	The need to conserve or enhance sites of archaeological importance and cultural heritage interest, particularly those which are sensitive to the water environment.
Landscape and Visual Amenity	The need to protect and improve the natural beauty of the region's National Parks, AONBs, and other areas of natural beauty. It is envisaged that landscape and designated sites will be maintained and enhanced for the enjoyment of the public.

Table NTS 2 summarises the future environmental baseline in the absence of WRMP24 based on available information.

Table NTS 2 Summary of future environmental baseline in the absence of WRMP24

SEA topic	Future Environmental Baseline
Biodiversity, Flora and Fauna	The Defra 25 Year Environment Plan[1] includes a commitment to restore restoring 75% terrestrial and freshwater protected sites to favourable condition and to create or restore 500,000 hectares of wildlife-rich habitat outside the protected site network, focusing on priority habitats as part of a wider set of land management changes providing extensive benefits. The 25 Year Plan also proposed an adoption of 'Biodiversity Net Gain' approach to development, an approach introduced into national planning policy in 2019 and which will be mandated by the upcoming Environment Bill. The 25 year Plan also includes a commitment to support land management at landscape and catchment level and to support the adoption of long-term sustainable land management practices to significantly expand wildlife habitat and provide opportunities for species and ecosystem recovery. Climate change is anticipated to have an impact on wildlife in the future by exacerbating existing pressures such as changes to the timing of seasonal activity, and water scarcity. It is acknowledged that there is a need to allow wildlife to adapt to the impacts of climate change. Climate may limit species' distributions indirectly though the impact of invasive species on native species along climatic gradients[2]. It will affect the abundance and diversity of natural enemies, competitors and species that constitute resources, as well as a species' ability to compete for resources or resist natural enemies. The Government's Environmental Improvement Plan 2023[3] provides an update on the progress against the interim and long-term targets underpinning the 25-year Environment Plan.
Population and Human Health	Population is expected to grow at a rate between 8.2% and 16.5% across the region, with an increasing proportion of people at or above state pension age. Household projections show potential increases of between 19% and 31% across the region, with an increasing proportion of one person households[4]. In response to recent studies access to the recreational resources, green spaces and the historic environment will have greater importance in future planning[5]. The NPPF suggests a range of areas that should be taken into account, including the provision of appropriate facilities for recreation that preserve the openness of the green belt. The National Ecosystem Assessment and the Marmot Review, Fair Society, Healthy Lives, demonstrate the positive impact that nature has on mental and physical health and as a result the Government intends to establish a Green Infrastructure[6] Partnership with civil society to support the development of green infrastructure in England.

[1] https://www.gov.uk/government/publications/25-year-environment-plan
[2] Pateman & Hodgson (2015) Biodiversity Climate change impacts report card technical paper. Available from: http://www.nerc.ac.uk/research/partnerships/lwec/products/report-cards/biodiversity/papers/source06/
[3] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1168372/environmental-improvement-plan-2023.pdf
[4] ONS (2010) Housing Statistical Release - Household Projections 2008 to 2033, England.
[5] Defra (2011) The Natural Choice: securing the value of nature, The Natural Environment White Paper
[6] Green infrastructure is a term used to refer to the living network of green spaces, water and other environmental features in both urban and rural areas.

SEA topic	Future Environmental Baseline
	Improvements to the quality of the water environment and certain potential climate change impacts will present opportunities for an expanding tourist industry in the region[7].
Material assets and resource use	The Government's National Infrastructure Strategy[8] (2020) outlines a legal commitment to decarbonise the economy by 2050, strategies to rebuild the economy following the COVID-19 pandemic and plans to 'level-up' UK cities and regional powerhouses. Plans for green-growth clusters in formerly industrial areas and investment via the Towns Fund could benefit the Yorkshire region in terms of the economy, industry, resource usage and the built environment. The UK Government plans to accelerate the deployment of green technology through private sector investment in the retrofitting of existing stock, carbon capture and low-carbon hydrogen. Yorkshire Water's current economic level of leakage target is to reduce its regional level of water leakage from to 297.1Ml/d. By 2018/19, the target leakage is reduced by 5Ml/d to 292.1Ml/d, with a further reduction to 287.1Ml/d in 2019/2020. Yorkshire Water's water resources plan for 2024 will include updated projections and targets for per capita water consumption, commercial demand for water and the social and economic level of leakage targets over the next 25 years.
Water	The Water Framework Directive set a target of aiming to achieve at least 'good status' in all waterbodies by 2015. However, provided that certain conditions are satisfied, in some cases the achievement of good status may be delayed up until 2027. The NPPF states that inappropriate development in areas at risk of flooding (in Flood Zone 1[9], Flood Zone 2[10], Flood Zone 3a[11] or Flood Zone 3b - the functional floodplain); should be avoided by directing development away from areas at highest risk. The NPPF requires that where development is necessary, it should be made safe without increasing flood risk elsewhere, as defined in the Technical Guidance to the NPPF[12]. The NPPF requires the application of a sequential, risk-based approach (operated through Strategic Flood Risk Assessment) to the location of development to avoid where possible flood risk to people and property and to manage any residual risk, taking account of the impacts of climate change. Following application of the Sequential Test, if it is not possible, consistent with wider sustainability objectives, for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied if appropriate. This includes development for water- compatible uses (e.g. water transmission infrastructure and pumping stations) and essential infrastructure (e.g. water treatment works that need to remain operational in times of flood). The Government's 25 year Environment Plan looks to strengthen the relevant protections in the NPPF and, in addition, focus on using more natural flood management solutions, increase the uptake of sustainable drainage systems and improve resilience and recovery times of at risk properties. The Environment Agency has produced 77 Catchment Flood Risk Plans (CFMPs) for England and Wales. Through the CFMPs, inland flood risk across all of England and Wales has been assessed for the first time. The CFMP considers all types of inland flooding, from rivers, ground water, surface water

[7] Defra (2012) The UK Climate Change Risk Assessment 2012 Evidence Report.
[8] HM Treasury Infrastructure UK (2020). National Infrastructure Strategy https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938539/NIS_Report_Web_Accessible.pdf
[9] Low probability of river or sea flooding (<0.1%) which has critical drainage problems.
[10] Medium probability of river (1%-0.1%) or sea flooding (0.5%-0.1%)
[11] High probability of river (>1%) or sea flooding (>0.5%)
[12] Ministry of Housing, Communities & Local Government (2014) Flood risk and coastal change. Accessed at https://www.gov.uk/guidance/flood-risk-and-coastal-change

SEA topic	Future Environmental Baseline
	and tidal flooding. The role of CFMPs is to establish flood risk management policies which will deliver sustainable flood risk management for the long term. This is essential if for effective investment decisions for the future and to help prepare ourselves effectively for the impact of drought events as a result of climate change. The CFMPs will help target the areas that are at greatest risk and provide information on the likely future flood risk, which will help establish the future baseline. Yorkshire Water's 2019 Water Resource Management Plan[13] and its 2022 Drought Plan provide details on how water resources will be managed and secured for the future, including in response to the risks presented by climate change. The Water Resources Management Plan identifies that the Yorkshire Water region will remain in a water supply surplus until the mid 2030s. This reflects the current and forecast economic climate and associated impact on new development and water use. The UK Climate Change Risk Assessment (CCRA) 2017 Evidence Report[14] draws together and interprets the evidence gathered by CCRA regarding current and future threats and opportunities for the UK posed by the impacts of climate change up until 2100. Further details can be found in Section 1.4.2 of Appendix D.
Soil, Geology and Land Use	One of the core planning principles of the National Policy Planning Framework (NPPF) is to encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value. The NPPF also places great importance with respect to Green Belt policy, the aim of which is to prevent urban sprawl by keeping land permanently open. Green Belt serves five purposes: to check the unrestricted sprawl of large built-up areas; to prevent neighbouring towns merging into one another; to assist in safeguarding the countryside from encroachment; to preserve the setting and special character of historic towns; and to assist in urban regeneration, by encouraging the recycling of derelict and other urban land. Although the NPPF promotes a presumption in favour of sustainable development, this does not apply where proposed developments may affect European or other designated sites covered by specific policies. The 25 Year Environment Plan (2018) runs alongside the Industrial Strategy (2017) and outlines the government's approach to safeguarding the environment and sustainable management of the economy. It introduces reforms to incentivised land management following Brexit. The plan details the Environmental Land Management scheme (ELMs), evolution of the Common Agricultural Policy (CAP). The ELMs include 3 new schemes designed to support the rural economy and the government's commitment to net zero emissions by 2050[15]. The first of these schemes, the Sustainable Farming Incentive, will pay farmers to manage their land in an environmentally sustainable way. The scheme designates standards based on a feature e.g. hedgerows or grassland, and contains a series of actions required to meet the criteria. The scheme is currently being piloted but is due to launch in 2022. The Local Nature Recovery Scheme is intended to encourage collaboration between farmers and will pay for actions that support nature recovery which meet local environmental priorities. The Local Nature Recovery Scheme is due to launch in 2024. Finally, the Landscape Recovery scheme support long-term projects to recover landscape and ecosystems. Examples of projects include the restoration of peatland and salt marshes, large-scale tree planting and the re-

[13] Yorkshire Water (2019), Water Resources Management Plan 2019-2035
[14] Defra (2016) The UK Climate Change Risk Assessment 2017 Evidence Report
[15] Defra (2021) Environmental Land Management scheme: overview

SEA topic	Future Environmental Baseline
	wilding of landscapes where appropriate. Again, this scheme is due to come online in 2024.
Air and Climate	Government and international targets indicate significant cuts in greenhouse gas emissions will take place by 2027. The UK met the first and second carbon budgets with headrooms of 36 and 384 MtCO2e respectively and is currently projected to meet the third carbon budget with a headroom of around 26 MtCO2e (until 2022)[16]. Objectives are being achieved for many air pollutants (lead, benzene, 1,3-butadiene and carbon monoxide (CO)). However, measurements show that long-term reducing trends for NO_2[17] and PM10[18] are flattening or even reversing at a number of locations, despite current policy measures. For example, emissions of PM10 and PM2.5 have been relatively stable since 2009. The Government's aim is to reduce emissions of PM2.5 against the 2005 baseline by 30% by 2020, and 46% by 2030, emissions of NO_2 against the 2005 baseline by 55% by 2020 and 73% by 2020 and to reduce emissions of sulphur dioxide against the 2005 baseline by 59% by 2020, increasing to 88% by 2030. Projections suggest with a high degree of certainty that objectives for PM10, NO_2 and O3[19] will not be achieved by 2020[20]. The CCRA considered more than 700 risks and selected 100 risks for detailed review. A selection of threats and opportunities identified under the 'medium scenario' are summarised in **Appendix D**. As well as reducing the carbon footprint, Yorkshire Water are investing in flood resilience measures such as building flood protection walls around treatment works and raising control panels for electrical equipment above flood levels. They are working in partnership with the government to make sure that critical national infrastructure is able to cope with future weather events. This includes working with local authorities, emergency services and others to test and improve joint emergency response plans. Together with leading academics and experts, Yorkshire Water is also working on research studies and innovative solutions like Sustainable Urban Drainage Systems (SUDs) and real time models of our river networks. These projects will help the company understand and manage the water cycle better so that it can maintain high levels of customer service in a way that is cost effective and which delivers multiple benefits for people, wildlife and the environment.
Archaeology and Cultural Heritage	Core planning principles in the NPPF include those aiming to protect heritage assets, including "conserve heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of this and future generations"[21]. Recent and ongoing national economic difficulties may have a negative effect on removing heritage assets from the heritage at risk register. Climate change could have variable impacts on heritage assets in the future. Some types of assets and landscapes have already experienced and survived significant climatic changes in the past and may demonstrate considerable resilience in the face of future climate change. However, many more historic assets are potentially at risk from the direct impacts of future climate change[22].

[16] DECC (2020) Updated energy and emissions projections 2019
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/501292/eepReport2015_160205.pdf
[17] Nitrogen dioxide
[18] Particulates with a diameter of 10µm or less
[19] Ozone
[20] Defra (2019), Clean Air Strategy 2019
[21] CLG (2012) National Planning Policy Framework, Communities and Local Government.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf
[22] English Heritage, now known as Historic England, (2010) Climate Change and the Historic Environment

SEA topic	Future Environmental Baseline
Landscape and Visual Amenity	The NPPF highlights the different roles and character of different areas, promoting the vitality of our main urban areas, protecting the Green Belts around them, recognising the intrinsic character and beauty of the countryside and supporting thriving rural communities within it. The NPPF states that great weight should be given to conserving landscape and scenic beauty in National Parks and AONBs, which have the highest status of protection. It identifies that planning permission should be refused for major developments in these designated areas except in exceptional circumstances and where it can be demonstrated they are in the public interest.

Findings of the assessments

The findings of the SEA are summarised below. **Table NTS 3** sets out the SEA topics and objectives which are identified in **Tables NTS 5, NTS 6** and **NTS 7**.

For each SEA objective, a residual effects assessment was determined against a significance matrix (**Table NTS 3**) which took into account the value / sensitivity of the receptor (e.g. air quality, river water quality, landscape value) and the magnitude of the assessed effect. This significance matrix comprised effects from 'major beneficial' to 'major adverse'. This colour coding was used to complete the columns for residual effects in the visual evaluation matrices summarised in **Tables NTS 5, NTS 6** and **NTS 7**.

Table NTS 3 SEA Topics and Objectives

Topic	Objective
Biodiversity, Flora and Fauna	1.1 To protect and enhance biodiversity, ecological functions, capacity, and habitat connectivity within Yorkshire Water's supply and source area
	1.2 To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.
	1.3 To avoid introducing or spreading INNS.
	1.4 To provide opportunities for habitat creation or restoration and a net benefit/gain for biodiversity
Population and Human Health	2.1 To protect and improve health and well-being and promote sustainable socio-economic development through provision of access to a resilient, high quality, sustainable and affordable supply of water over the long term
	2.2 To protect and enhance the water environment for other users, including recreation, tourism and navigation
Material assets and resource use	3.1 To reduce, and make more efficient, the domestic, industrial and commercial consumption of resources, minimise the generation of waste including leakage from the water supply system, encourage its re-use and eliminate waste sent to landfill
Water	4.1 To maintain or improve the quality of rivers, lakes, groundwater, estuarine and coastal waterbodies.
	4.2 To avoid adverse impact on surface and groundwater levels and flows and ensure sustainable management of abstractions.

Topic	Objective
Soil, geology and land use	4.3 To reduce and manage flood risk, taking climate change into account.
	4.4 To increase awareness of water sustainability and efficient use of water.
	5.1 To protect and enhance geomorphology, and the quality and quantity of soils.
Air and climate	6.1 To maintain and improve air quality
	6.2 To minimise greenhouse gas emissions
	6.3 To adapt and improve resilience to the threats of climate change
Archaeology and cultural heritage	7.1 To conserve and enhance the historic environment, heritage assets and their settings and protect archaeologically important sites.
Landscape and visual amenity	8.1 To protect and enhance designated and undesignated landscapes, townscapes and the countryside

Table NTS 4 SEA Significance Matrix

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

Significance levels identified in **Table NTS 4** are defined as follows.

- **Major –** Effects represent key factors in the decision-making process. They are generally associated with sites and features of international, national or regional importance. If adverse, such resources / features are generally those which cannot be replaced or relocated.
- **Moderate –** Effects are likely to be important considerations at a regional or district scale. If adverse, they are likely to be of potential concern.
- **Minor –** Effects are not likely to be decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects of a particular area or on a particular resource.
- **Negligible –** Effects which are not perceptible, being within normal bounds of variation of the margin of forecasting error.

Customer management options

The SEA of customer management options (**Table NTS 5**), including Domestic customer audits and retrofit, metering domestic meter optants, metering on change of occupancy, household flow regulators and Housing Association targeted programmes.

The customer management options are unlikely to have any major or moderate adverse effects on any of the SEA objectives. Minor adverse effects have been identified in relation to the population and human health and air and climate objectives regarding reduction of air pollutant and greenhouse gas emissions. One option (C13c) may experience minor adverse effects on economic wellbeing of the population (SEA Objective 2.1) as 'premium charges' will negatively impact high user households, meanwhile most of the options will have an impact on air emissions through the increased number of vehicle journeys made to fit water meters, take meter readings or carry out audits.

Minor beneficial effects have been identified for the majority of the customer management options, in relation to supporting human health and economic wellbeing, sustainable and efficient use of water resources and increased resilience to climate change impacts. There are a number of options that, in isolation, will result in negligible beneficial impacts for every SEA objective. C30b is likely to result in reductions in water savings of a magnitude considered to be of a major beneficial effect, whereas C2, C4, C5 and C30a of moderate beneficial effect.

Leakage options

The SEA of leakage options are outlined in **Table NTS 6**. The leakage options are unlikely to have any major or moderate adverse effects on any of the SEA objectives. Three options are anticipated to have minor adverse effects on health and wellbeing of local populations, reduction in consumption of resources, improvement in air quality. These minor adverse effects are predominantly resulting from disturbances created from the physical maintenance activities of these options, which would result in temporary increases in noise and air pollution, disturbance to communities and changes in local views and settings.

Options D1a-e, D3a-e and D9a-j are anticipated to have moderate benefits on population and human health, material assets and resource use, efficient use of water and climate resilience due to the savings created by these leakage control options. Elsewhere, minor beneficial effects have been identified across several of the SEA objectives.

Resource management options

A wide variety of options have been assessed, shown in **Table NTS 7**, leading to a range of environmental effects being identified. These reflect the scale of abstraction and/or the location of the option in relation to sensitive environments (aquatic and terrestrial). As may be expected, the smaller scale options generally have the lower environmental effects, but differences do occur between such options due to their environmental setting. Many of the options have no greater than minor adverse effects. However, some options may have moderate or major adverse effects for some of the SEA objectives, as discussed below:

- Three schemes are anticipated to have major adverse effects against a total of six SEA objectives: DV8(iv)A(i), DV8(iv)A(ii) and DV8B. A further two schemes are anticipated to have major adverse effects against a total of five SEA objectives: DV6(vi) and DV8(iv). All the Derwent Valley (DV) resource options, with the exception of DV3, DV8(v) and DV8(v)A, are anticipated to lead to major adverse impacts on biodiversity. Major adverse impacts for these options are also anticipated in relation to material assets and resource use, protection and enhancement of geology/soil quality, and minimisation of greenhouse gas emissions. However, these options are also anticipated to be associated with major to moderate beneficial effects on population and human health and climate change resilience due to the increase in available public water supply.
- The Ouse Raw Water Transfer (R2) option is anticipated to have two moderate adverse effects on biodiversity, and archaeology and cultural heritage due to the construction of the abstraction and new pipeline. However, two major beneficial effects were identified, related to population and human health and climate change resilience due to a yield of 60Ml/d, therefore maintaining

the supply-demand balance. The River Ouse water treatment works extension (R1a) option may also lead to moderate adverse effects on biodiversity.

- The Grid network enhancement: New River Ouse WTW to York (R1c) option and associated pipelines option to North Yorkshire (R1d and R1f) have been identified as having a major adverse effect on biodiversity. The Grid network enhancement: New River Ouse WTW to North Yorkshire 3 Option (R1f) is also anticipated to result in moderate adverse effects for material assets and resource use, air and climate and archaeology and cultural heritage. R1g Grid network enhancement: New River Ouse WTW to York is not anticipated to result in any moderate or major adverse effects, but has the potential for moderate benefits to biodiversity given the opportunities for habitat enhancement and to climate reliance in relation to deployable output increases.
- R6 South Yorkshire Groundwater Option 1 has been identified as having a moderate adverse effect on water due to a potential impact on ground water balance and surface water flows.
- TheSherwood Sandstone and Magnesian Limestone Boreholes Option 3 (R8c) is anticipated to lead to three moderate adverse effects; for population and human health, due to construction work being required in residential areas, and for cultural heritage, due to construction impacting upon the quality and settings of Scheduled Monuments and several Grade II Listed Buildings. R8f Sherwood Sandstone and Magnesian Limestone Boreholes Option 6 has been identified as having potential for a major adverse effect on biodiversity due to its proximity to designated sites as well as a moderate effect on archaeology and cultural heritage. Moderate benefits are however anticipated for population and human health due to the increase in supply of up to 20Ml/d. R8g Sherwood Sandstone Boreholes support to North Yorkshire is also expected to have moderate benefits for population and human health with an increased deployable output of up to 15Ml/d.
- The R13 East Yorkshire Groundwater Option 2 is associated with moderate adverse effects on biodiversity due to the potential for adverse temporary effects on nearby ancient woodland. Moderate adverse effects on groundwater are also associated with the option pending further investigation.
- The R29 Reservoir desilting option is assessed as having a major adverse effect on biodiversity and the quality of habitat in a number of nationally and internationally designated sites. If desilting requires extensive drawdown of the reservoirs, there will also likely be temporary moderate adverse effects on landscape and visual amenity given the setting of these reservoirs. Desilting works have the potential have a temporarily adverse effect on water quality both within the reservoir and in the downstream watercourses due to elevated turbidity in the compensation flow release water. Desilting would only occur following careful planning and further investigations, and that the list of reservoirs included in the option may decrease if unacceptable environmental impacts are identified. An increase of 11Ml/d in deployable output will likely lead to moderate beneficial effects on population and human health and adapting to climate change.
- Option R34 (Abstraction Option 1) has the potential for moderate adverse effects on population and human health, and archaeology and cultural heritage. A large proportion of the pipeline route will pass through heavily built areas, leading to temporary adverse effects from noise, dust and vibration and temporary adverse impacts on a range of recreational facilities and historical assets.
- The is also one possible moderate adverse effect for the River Aire Abstraction option 1 (R35), relating to archaeology and cultural heritage due to the proximity of the pipeline route potentially passing to a World Heritage Site (WHS). It will however provide a 10Ml/d yield on most days, contributing to moderate beneficial impacts.
- Option R49 (Supply Dales from the Tees - raw) is expected to result in moderate adverse effects on biodiversity, material assets and resource use and cultural heritage given the proximity of construction to sensitive assets, including areas of ancient woodland and scheduled monuments) as well as the materials required to construct the scheme which will be consistent with the scale. However, the scheme will provide up to 15Ml/d which can support the health and economic wellbeing of the public and enhance climate resilience resulting in moderate beneficial effects.

- The construction phase of the R51 Supply Dales from the Tees – treated option is anticipated to result in adverse effects on material assets and resource use, and archaeology and cultural heritage given the scale and location of construction. However, given the provision of an additional 15Ml/d essential public water supplies will be maintained bringing moderate beneficial effects to population and human health, air and climate through increased resilience to climate change, and biodiversity through habitat enhancement.
- The East Yorkshire coast desalination (R61) and Tidal Abstraction Reservoir (R78) options have the potential for major adverse effects on biodiversity as it may impact on the Humber Estuary SAC/SPA/Ramsar. In addition, major adverse effects are associated with the significant amount of resource use and energy required to operate R61. However moderate benefits are anticipated for both options in relation to population and human health and climate resilience, associated with the maintenance of essential public water supply
- The Aire and Calder new WTW (R86) option may result in moderate adverse impacts on biodiversity and material assets and resource use during the construction phase, however given the increase of up to 70Ml/d benefit to public water supply, moderate benefits have been identified for population and human health and climate resilience.
- Increased abstraction related to the Rebuild Northallerton WTW (R87) option has the potential to have a major adverse effect on surface water flows and moderate adverse effects on water quality during implementation.
- Assessment of Convert Wensleydale springs to boreholes (R89) has identified the potential for groundwater drawdown during operation to result in major adverse effects on flows in the associated surface water body, and for major adverse effects on groundwater quality.

Drought options

Following comments received from regulators on the draft WRMP24, The WRMP24 now includes the use of drought orders and permits. For the purposes of water resources planning, these have been grouped by option type (e.g. Rivers, Reservoirs and Demand Reductions). These options were previously assessed in Yorkshire Water's Drought Plan 2022 and the findings are reported in the Drought Plan SEA Environmental Report[23]. As these have already been subject to assessment in the Drought Plan SEA (and HRA) and to avoid unnecessary duplication, these options have only been considered 'in-combination' with the preferred plan supply options.

[23] Ricardo (2022) SEA Environmental Report. Yorkshire Water's Drought Plan 2022. (https://www.yorkshirewater.com/media/c2qgvnsf/yorkshire-water-drought-plan-2022-sea-environmental-report.pdf)

Table NTS 5 Visual evaluation matrix summary for customer management options

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C1d Household customer audits and water efficiency retrofits	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C2 Metering domestic meter optants (growth)	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C4 Metering on change of occupancy	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C5 Metering on asset end of life	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C6a Non-household water use audit and retrofit	Adverse				None								None				None	None
	Beneficial				None								None				None	None
C6a(ii) Non-household domestic	Adverse				None								None				None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
water use audit and retrofit																		
	Beneficial				None								None				None	None
C11c Retrofits of rainwater harvesting for households	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C12a3 Rainwater harvesting for commercial customers	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C13c Household tariffs	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C15d Installation of internal household flow regulators	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C18c Leaky loo fixes	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C21c Community Incentives	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C23b1 Rainwater harvesting for agriculture	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C27d School visits	Adverse		None	None	None		None						None				None	None
	Beneficial			None	None		None						None				None	None
C28e Household media campaign	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C29c Household incentives	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C30a Water labelling- baseline	Adverse			None	None								None				None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
	Beneficial			None	None								None				None	None
C30b Water labelling- low demand common reference scenario	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None
C32c Rainwater harvesting for households- new developments	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C34a Non-household media campaign	Adverse	None			None		None						None	None	None		None	None
	Beneficial				None		None						None	None	None		None	None
C35c Water retailer incentives	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None
C36 Metering domestic meter optants (enhanced programme)	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C37 Metering new developments (growth)	Adverse		None		None		None		None	None	None		None				None	None
	Beneficial		None		None		None		None	None	None		None				None	None

Table NTS 6 Visual evaluation matrix summary for leakage options

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
D1a-e Active Leakage Control	Adverse				None													
	Beneficial				None													
D2a-c Pressure management	Adverse				None													
	Beneficial				None													
D3a-e Mains renewal/ replacement	Adverse				None													
	Beneficial				None													

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
D6a Above ground pressure management	Adverse				None													
	Beneficial				None													
D7a-e Permanent acoustic logging	Adverse				None													
	Beneficial				None													
D9a-j High tech active leakage control	Adverse			None	None	None	None						None	None	None		None	None
	Beneficial			None	None		None						None	None	None		None	None
D15a-e Intensive active leakage control	Adverse				None													
	Beneficial				None													
D16a-e Trunk main active leakage control	Adverse				None													
	Beneficial				None													
D17a Transient Pressure Management	Adverse				None													

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
	Beneficial				None													
LSM Leakage reduction and smart metering glidepath (50%)	Adverse				**None**													
	Beneficial				**None**													

Table NTS 7 Visual evaluation matrix summary for resource management options

Option	Impact	SEA Objectives																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
DV3 South Yorkshire GW	Adverse				None							None						
	Beneficial											None						
DV6(iv) Import Tees to South Yorkshire Pipeline	Adverse				None							None						
	Beneficial											None						
DV6(v) Import Tees to South Yorkshire Pipeline	Adverse				None							None						
	Beneficial											None						

Option	Impact	SEA Objectives															
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
DV6(vi) Tees to South Yorkshire Pipeline	Adverse				None							None						
	Beneficial											None						
DV7a(iv) Tees to Ouse Pipeline Option 1	Adverse				None							None						
	Beneficial											None						
DV7a(v) Import Tees to Ouse Pipeline Option 2	Adverse				None							None						
	Beneficial											None						
DV7a vi) Tees to York Pipeline Option 3	Adverse				None							None						
	Beneficial											None						
DV8(iv) York to South Yorkshire Pipeline	Adverse				None					None		None						
	Beneficial									None		None						
DV8(iv)A(i) York to South Yorkshire Pipeline	Adverse									None		None						

Option	Impact	SEA Objectives																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
	Beneficial									None		None						
DV8(iv)A(ii) York to South Yorkshire Pipeline	Adverse									None		None						
	Beneficial									None		None						
DV8(v) York WTW Capacity increase	Adverse				None							None						
	Beneficial											None						
DV8(v)A New York water treatment works	Adverse											None						
	Beneficial											None						
DV8B New York water treatment works & dual main interconnector	Adverse											None						
	Beneficial										None							
E2 Yorkshire grid network to STW	Adverse											None						
	Beneficial											None						

Option	Impact	SEA Objectives															
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
R1a River Ouse water treatment works extension	Adverse				None							None						
	Beneficial											None						
R1c Grid network enhancement: New River Ouse WTW to York 30Ml/d	Adverse				None							None						
	Beneficial											None						
R1c(i) Grid network enhancement: New River Ouse WTW to York 60Ml/d	Adverse				None							None						
	Beneficial											None						
R1d Grid network enhancement: New River Ouse WTW to North Yorkshire 1	Adverse				None					None		None						
	Beneficial									None		None						
R1e Grid network enhancement: New River Ouse WTW to North Yorkshire 2	Adverse				None					None		None						
	Beneficial									None		None						
R1f Grid network enhancement: New	Adverse				None					None		None						

Option	Impact	SEA Objectives																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
River Ouse WTW to North Yorkshire 3																		
	Beneficial									None		None						
R1g Grid network enhancement: New River Ouse WTW to York	Adverse				None					None		None						
	Beneficial									None		None						
R2 Ouse Raw Water Transfer	Adverse				None							None						
	Beneficial											None						
R3 Increased River Ouse pump storage capacity	Adverse				None							None						
	Beneficial											None						
R3a River Ouse licence transfer	Adverse				None		None											None
	Beneficial				None		None											None
R5 Aquifer Storage and Recovery Scheme 1	Adverse				None													
	Beneficial																	

Option	Impact	SEA Objectives																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
R6 South Yorkshire Groundwater Option 1	Adverse				None							None						
	Beneficial											None						
R8b Sherwood Sandstone and Magnesian Limestone Boreholes Option 2	Adverse				None							None						
	Beneficial											None						
R8c Sherwood Sandstone and Magnesian Limestone Boreholes Option 3	Adverse				None							None						
	Beneficial											None						
R8f Sherwood Sandstone and Magnesian Limestone Boreholes Option 6	Adverse				None							None						
	Beneficial											None						
R8g Sherwood Sandstone Boreholes support to North Yorkshire	Adverse				None							None						
	Beneficial											None						
R8h New groundwater (Sherwood	Advers				None		None					None						

Option	Impact	SEA Objectives															
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
Sandstone) supply to existing North Yorkshire WTW																		
	Beneficial						None					None						
R12 Yorkshire Groundwater Option 1	Adverse				None													
	Beneficial																	
R13 East Yorkshire Groundwater Option 2	Adverse				None							None						
	Beneficial											None						
R17 Reuse abandoned third party Groundwater source Option 2	Adverse				None													
	Beneficial																	
R18 Reuse abandoned third party Groundwater source Option 3	Adverse				None													
	Beneficial																	
R19 Reuse abandoned third party Groundwater source Option 4	Adverse				None													
	Beneficial																	

Option	Impact	SEA Objectives																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
R29 Reservoir De-silting	Adverse				None													
	Beneficial				None													
R31a Additional bankside storage on the River Ouse	Adverse				None							None						
	Beneficial											None						
R34 River Calder Abstraction Option 1	Adverse				None							None						
	Beneficial											None						
R35 River Aire Abstraction Option 1	Adverse				None							None						
	Beneficial											None						
R37b(ii) River Aire abstraction Option 4	Adverse											None						
	Beneficial											None						
R49 Supply Dales from the Tees - raw	Adverse				None													

Option	Impact	SEA Objectives																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
	Beneficial																	
R51 Dales from the Tees - treated	Adverse				None													
	Beneficial																	
R58 Transfer from UU Option 3	Adverse		None		None													
	Beneficial		None		None													
R59 Transfer from UU Option 4	Adverse				None													
	Beneficial																	
R61 East Yorkshire coast desalination	Adverse				None							None						
	Beneficial											None						
R78 Tidal Abstraction Reservoir	Adverse				None													
	Beneficial																	

Option	Impact	SEA Objectives																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
R85 Recommission Kirklees WTW	Adverse				None						None	None	None					
	Beneficial				None						None	None	None					
R86 Aire and Calder new water treatment works	Adverse											None						
	Beneficial											None						
R87 Rebuild Northallerton WTW	Adverse										None	None	None					
	Beneficial				None						None	None	None					
R88 Increase storage at an existing WTW in North Yorkshire	Adverse				None							None						
	Beneficial											None						
R89 Convert Wensleydale springs to boreholes	Adverse				None						None	None	None					
	Beneficial				None						None	None	None					
	Adverse				None		None					None	None	None				None

Option	Impact	SEA Objectives																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
R90 North Yorkshire annual license increase																		
	Beneficial				None		None					None	None	None				None
R91 New internal transfer to North Yorkshire WTW	Adverse											None						
	Beneficial											None						

Key:

- Major adverse
- Moderate adverse
- Minor adverse
- Negligible adverse
- None — Not applicable
- Major beneficial
- Moderate beneficial
- Minor beneficial
- Negligible beneficial

Formulation of the preferred plan

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

Yorkshire Water reviewed its initial least-cost plan against the SEA findings, including ensuring that the environmental and social impacts were not 'double-counted' in both the monetisation process and the SEA, as this could potentially skew the options and programme appraisal process.

The preferred plan has been selected in accordance with Yorkshire Water's goal to use demand management and leakage reduction measures to meet the predicted supply-demand deficit as far as possible. This is also in line with guidance from Ofwat and Defra, and preferences expressed by Yorkshire Water customers. Whilst the WRMP optimisation model delivers a least cost solution, this does not consider regulatory and customer preferences or any wider resilience benefits from alternative solutions. The WRMP24 has been developed in parallel to the Water Resources North (WReN) Regional Plan and the objectives of both plans are aligned.

Preferred plan

The WRMP24 preferred plan is set out in **Table NTS 8**. The plan includes 14 demand management options, including LSM Leakage reduction and smart metering glidepath. The plan aligns with the previous WRMP19 plan to implement significant leakage reduction over the long term and includes a target to achieve 50% reduction of compared with 2017/18 leakage by 2050. The demand measures within the preferred plan also include customer demand management measures to further reduce water consumption per person/per property within Yorkshire Water's supply area.

The demand management measures result in predominantly negligible beneficial and adverse effects on SEA objectives. Minor adverse effects have been identified in relation to the air and climate SEA objectives regarding use of material resources, air pollutant and greenhouse gas emissions associated with vehicle usage to visits properties and undertake audits and retrofits. A mixture of moderate and minor beneficial effects are anticipated on SEA objectives for population and human health, efficient use of water resources and climate resilience. The LSM Leakage and smart metering glidepath option will result in major beneficial effects across the same objectives due to the significant savings of over 100Ml/d projected. The same option also has moderate adverse effects assessed for material resource use in relation to the amount of materials that will be required to undertake leakage reduction activities and roll out smart metering.

However given the scale of the supply-demand balance deficit it has been necessary to also include a range of supply side measures within the WRMP24. A total of nine supply options are included in the preferred plan, including option DV8B was mandated into the plan by Yorkshire Water as it this is the only option available to backfill against the loss of the STW import, which is due to cease in 2035. Major adverse impacts for options DV7a(vi) Tees to York Pipeline Option 3 and DV8B New York water treatment works and North to South Yorkshire Pipeline within the preferred plan are anticipated in relation to biodiversity, material assets and resource use, protection and enhancement of geology/soil quality, and minimisation of greenhouse gas emissions. However these options are also anticipated to be associated with major to moderate beneficial effects on population and human health and climate change resilience due to the increase in available public water supply.

The construction phases of an additional three resource options (R13, R31a and R37b(ii)) within the preferred plan are anticipated to result in moderate adverse effects on biodiversity in relation to scheme construction. R13 also experiences moderate adverse effects on water quantity as although abstraction would be within existing limits, the increase in abstraction could have moderate effects on quantitative status of the groundwater body. Option R3 has assessed a moderate adverse effect for cultural heritage due to the proximity of heritage assets to the proposed pipeline. The remaining three supply side options in the preferred plan are assessed resulting in negligible to minor adverse effects only across

all SEA objectives. The majority of resource options provide opportunities to result in biodiversity enhancement (habitat creation/restoration), provide beneficial effects on population and human health and in relation to climate change resilience.

Following Regulator requests, the WRMP24 Preferred Plan has included the use of drought orders and permits. The options were previously assessed in the Drought Plan (April 2022) and the SEA, HRA and WFD assessments that supported the plan. The options have been grouped into three categories; rivers, reservoirs and demand reduction measures and the assessments taken from the Drought Plan 2022 have been combined into these groups. The SEA assessed major adverse effects across all drought option categories. DO16 River Drought Permits have major adverse effects on water quality and DO17 Demand Reduction may result in major adverse effects on population and human health, due to the potential disruption, as well as adaptation to climate change. Meanwhile, the reservoir options have the potential to cause major adverse effects on water quality and water quantity. The river drought options may also result in major beneficial effects on population and human health due to provision of large deployable output and continued water supply. The HRA concluded that apart from the North Area Reservoir 1 and the North Yorkshire Groundwater increased abstraction drought option, all of the other options within the plan were not considered to have likely significant effects on the qualifying features of European sites. No further assessment has been completed within this WRMP, however the potential for in-combination effects between the plans is considered in Section 7.4.1.

The HRA of the WRMP preferred plan has concluded that following inclusion of appropriate mitigation measures during the construction phase of relevant schemes that no adverse effects on the integrity of any European site are anticipated. Further details are provided within the HRA report which accompanies this Environmental Report[24].

The WFD compliance assessment has informed SEA findings against the water topic objectives, and has identified potential non-compliance in relation to three options associated with one WFD water body; R3a, R3 and DV8B. The potential WFD compliance issue has been identified following an AMP7 WINEP investigation undertaken by Yorkshire Water. The risk of deterioration as a result of flow reductions, and potential for exacerbated dissolved oxygen sags, is considered to be significantly reduced if Yorkshire Water continue their commitment to making improvements to storm overflow discharges through the WINEP to meet obligations of the Environment Act. However, it is important to note that Yorkshire Water are still in consultation with the Environment Agency over the closure of the investigation. The WFD compliance assessment also concluded further uncertain impacts associated with multiple WFD water bodies in relation to three schemes within the preferred plan: R8g Sherwood Sandstone Boreholes support to North Yorkshire, R13 East Yorkshire Groundwater Option 2 and R91 New internal transfer to North Yorkshire WTW. Further investigations will need to be carried out to confirm these impacts before the schemes could be implemented. R13 East Yorkshire Groundwater Option 2 will be within any constraints imposed following Water Industry National Environment Programme (WINEP) investigations. Further details are provided within the WFD compliance assessment report which accompanies this Environmental Report[25].

Implementation of the four options above, as well as options R37b(ii) River Aire Abstraction Option 4 and DV3 South Yorkshire GW, will be dependent on meeting Environment Agency licensing requirements.

Implementation of this plan will result in no deficit in the 25-year period of the WRMP.

[24] Ricardo Energy & Environment (2022) Habitats Regulation Assessment of the Draft WRMP24. Report prepared for Yorkshire Water Services, September 2022.
[25] Ricardo Energy & Environment (2022) Water Framework Directive Regulations Compliance Assessment of the Draft WRMP24. Report prepared for Yorkshire Water Services, September 2022.

Table NTS 8 WRMP24 preferred plan

Category	Option Reference	Scheme	Benefit (Ml/d) on full implementation	First Year of Benefit
Customer management	C1d	Household customer audits and water efficiency retrofits	3.3	2025
Customer management	C6a	Non-household water use audit and retrofit	0.2	2025
Customer management	C6a(ii)	Non-household domestic water use audit and retrofit	4.5	2026
Customer management	C12a3	Rainwater harvesting for commercial customers	2.0	2025
Customer management	C13c	Household tariffs	0.4	2025
Customer management	C15d	Installation of internal household flow regulators	0.5	2025
Customer management	C23b1	Rainwater harvesting for agriculture	1.0	2025
Customer management	C27d	School visits	1.0	2025
Customer management	C28e	Household media campaign	1.7	2025
Customer management	C30a	Water labelling- baseline	39.6	2025
Customer management	C32c	Rainwater harvesting for households- new developments	1.4	2025
Customer management	C34a	Non-household media campaign	0.8	2025
Customer management	C35c	Water retailer incentives	0.3	2025
Leakage/ Customer management	LSM	Leakage reduction and smart metering glidepath (50%)	115.9	2025
Resource	DV7a(vi)	Tees to York Pipeline - NWL import 140 Ml/d	140.0	2040
Resource	DV8B	New York WTW and new north to south internal transfer connection	50.0	2035
Resource	R3	Increased River Ouse pumping capacity	10.0	2028

Category	Option Reference	Scheme	Benefit (Ml/d) on full implementation	First Year of Benefit
Resource	R3a	River Ouse licence transfer	<1ML/d annual but up to 15Ml/d peak	2027
Resource	R8g	Sherwood Sandstone Boreholes support to North Yorkshire	15.0	2035
Resource	R13	East Yorkshire Groundwater Option 2	6.0	2028
Resource	R31a	Additional bankside storage at York WTW	10.6	2082
Resource	R37b (ii)	River Aire Abstraction option 4	33.5	2073
Resource	R91	New internal transfer to North Yorkshire WTW	5.0	2028
Drought	DO16	Drought Supply Rivers Drought Permits - Dry Year Annual Average until 2028	4.6	2025
Drought	DO17	Demand Reduction Dry Year Annual Average - 2028 Year Benefits Ends	19.2	2026
Drought	DO18	Drought Supply Reservoir Compensation Drought Permits Dry Year Annual Average 2028 Yr Benefit Ends	17.9	2025

A visual summary of SEA findings for each of the schemes included in the preferred plan is provided in **Table NTS 9**.

Table NTS 9 Visual summary for options in the preferred plan

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C1d Household customer audits and water efficiency retrofits	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C6a Non-household customer audits and water efficiency retrofits (schools, leisure centres and hospitality)	Adverse				None								None				None	None
	Beneficial				None								None				None	None
C6a(ii) Non-household customer audits and water efficiency retrofits (general domestic use only)	Adverse				None								None				None	None
	Beneficial				None								None				None	None
C12a3 Rainwater harvesting for commercial customers	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C13c Household tariffs	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C15d Installation of internal household flow regulators	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C23b1 Rainwater harvesting for agriculture	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C27d School Visits	Adverse		None	None	None		None						None				None	None
	Beneficial			None	None		None						None				None	None
C28e Household water efficiency media campaign	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C30a Water labelling-baseline	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C32c Rainwater harvesting for households- new developments	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C34a Non-household water efficiency media campaign	Adverse	None			None		None						None	None	None		None	None
	Beneficial				None		None						None	None	None		None	None
C35cNon-household water efficiency incentive scheme	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None
LSM Leakage reduction and smart metering glidepath (50%)	Adverse				None													
	Beneficial				None													
DV7a(vi) NWL import - York Pipeline Option 1	Adverse				None							None						
	Beneficial											None						

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
DV8B New York WTW and Dual Main	Adverse											None						
	Beneficial											None						
R3 Increased River Ouse pump storage capacity	Adverse				None							None						
	Beneficial											None						
R3a Increased River Ouse pump storage capacity	Adverse					None											None	
	Beneficial					None											None	
R8g Sherwood Sandstone Abstraction support to North Yorkshire	Adverse				None							None						
	Beneficial											None						
R13 East Yorkshire Groundwater Option 2	Adverse				None							None						
	Beneficial											None						

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
R31a Additional bankside storage on the River Ouse	Adverse				None							None						
	Beneficial											None						
R37b(ii) River Aire Abstraction option 4	Adverse											None						
	Beneficial											None						
R91 New internal transfer to North Yorkshire WTW	Adverse											None						
	Beneficial											None						
DO16 Drought Supply Rivers Drought Permits - Dry Year Annual Average until 2028*	Adverse		None		None	None		None			None	None	None	None		None	None	
	Beneficial	None	None	None	None				None	None		None	None	None	None		None	None
DO17 WRMP Demand Reduction Dry Year Annual Average - 2028 Year Benefits Ends*	Adverse		None	None	None			None		None	None	None						
	Beneficial		None	None	None		None						None	None				

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
DO18 WRMP Drought Supply Reservoir Compensation Drought Permits Dry Year Annual Average 2028 Yr Benefit Ends*	Adverse		None	None	None	None		None			None	None		None	None	None	None	
	Beneficial	None	None	None	None		None		None	None		None	None	None	None		None	None

**Note: The drought permit option assessments originate from the Drought Plan 2022 SEA. The options (and their assessments) have been amalgamated into three categories for water resources planning (River, Reservoir and Demand Reduction)*

Key:

- Major adverse
- Moderate adverse
- Minor adverse
- Negligible adverse
- None — Not applicable
- Major beneficial
- Moderate beneficial
- Minor beneficial
- Negligible beneficial

Cumulative impact assessment

A cumulative assessment of the preferred plan was undertaken to consider whether the preferred plan options, when constructed or operated together, led to additional effects on each of the SEA topics.

There are potential cumulative impacts between the following options which would require construction in the vicinity of York WTW should these schemes have overlapping construction phases:

The first year of benefit for R31a within the preferred plan is identified as 2082 (see **Table 7.1**) and this scheme is estimated to be associated with an approximately 4 year construction phase. Option DV8B is associated with a 10-year time-to-build period (of which a large proportion will be construction) and is identified as operational in 2035, and therefore the construction phases will not coincide with that of R31a. The DV7a(vi) scheme is identified as operational in 2040 within the preferred plan (see **Table NTS 8**) with an approximately 13 year construction phase where elements of the construction will overlap with DV8B.

The DV7a(vi) and DV8B schemes are likely to have overlapping construction phases and there is therefore potential for cumulative impacts between two schemes related to construction impacts on biodiversity (Objective 1.1, Objective 1.3), population and human health (Objective 2.1), material assets and resource use (Objective 3.1), air quality (Objective 6.1), archaeology and cultural heritage (Objective 7.1), and landscape and visual amenity (Objective 8.1). Construction measures that need to be incorporated into the scheme design and/or planning to avoid or mitigate potential effects will be agreed during the detailed design and planning stage should these schemes be progressed. The DV7a(vi) scheme will cover a large geographical area (pipeline construction from the River Tees to Ouse) as will the DV8B scheme (New WTW and Ouse to South Yorkshire pipeline) and therefore until detailed construction plans are available it is not possible to identify if works in proximity to sensitive receptors will coincide. However, any such cumulative impacts would be expected to be minor, as most of these activities would be localised and small in scale, and could be effectively mitigated through careful project management and best practice construction methods

Options R3, R3a and DV8B all impact the River Ouse during in operation:

- R3a – implemented in 2027 – the operation of the scheme would see up to 15Ml/d of the York WTW 1 license transferred to another York WTW to allow additional abstraction when flows are below the lowest flow bands <650Ml/d. The scheme would provide a benefit as an annual average of 0.3Ml/d as it would only be a benefit when flows are in the lower flow bands.
- R3 – implemented in 2028 – would allow a York WTW to abstract up to full licence capacity (150Ml/d). This scheme assumes the additional yield under normal operations will be constrained to 10Ml/d (134Ml/d total) with the ability to increase to provide the full 150Ml/d as a temporary measure if required in an emergency situation.
- DV8B – implemented in 2035 – would increase the abstraction at York WTW1 by up to full licensed rates.

The River Ouse is known to support the migratory qualifying features of the Humber Estuary SAC; sea lamprey and river lamprey. As such, the operation of numerous abstractions on the River Ouse could result in a deterioration of offsite functionally linked spawning habitat. Despite there being no risk to the physical habitats as a result of additional abstraction, the WINEP investigation could not rule out any impact on the aquatic ecology in the River Ouse, particularly fish, due to the potential for the reduction in flow resulting in the exacerbation of dissolved oxygen sags that were observed in the river. Although the primary driver for these dissolved oxygen sags are water quality pressures (most can be timed as attributable to stormwater discharges), it was identified that any reduction in flow has the potential to reduce the dilution of any water quality pressure and potentially cause a greater impact to the fish community in the River Ouse. The investigation concluded that, with flow not being the driver for the potential dissolved oxygen pressure to the fish community, abstraction from the River Ouse should not be constrained. Subject to approval of the Business Plan by Ofwat, Yorkshire Water are committed to making improvements to storm overflow discharges through the WINEP to meet the obligations of the Environment Act. It is worth noting that, at the time of writing this WRMP, Yorkshire Water are still in consultation with the Environment Agency over the closure of the investigation.

Prior to further it appeared there was potential for cumulative adverse effects during operation of Options R3, R3a, DV8B, R91, R13 and R37b(ii) as all involve additional abstractions from waterbodies upstream of the Humber Estuary European Marine Site (EMS). However, hydrological modelling undertaken as part of the WRMP24 has concluded that there would be an indiscernible change in freshwater flow input to the Upper Humber Estuary as a result of implementing options within the Preferred Plan. No cumulative adverse effects are therefore anticipated on the Humber Estuary EMS.

There would be benefits associated with implementation of each option in parallel, i.e. increasing the overall volume of water savings made or water provided for supply.

Mitigation

Consideration of mitigation measures has been an integral part of the SEA process. The assessment has assumed the implementation of standard best practice mitigation measures and identified any additional measures as shown in the option SEA matrices (see **Appendix E**). The significance of effects identified in the matrices relates to residual effects after mitigation.

Certain assumptions have been made regarding this:

- Where suitable mitigation measures are known and identified, these have been taken into account and reported, such that the resultant residual impact has been determined.
- In line with recommendations made in the UKWIR SEA Guidance, the SEA appraisals have assumed the implementation of reasonable mitigation, such as the use of best practice construction methods.

Mitigation of both construction and operation components for each option are presented in **Table NTS 10**. 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. In other cases, best practice design requires consideration of mitigation measures at an early stage along with consultation with potentially affected parties. In this way, effective mitigation plans can be developed to minimise many of the residual adverse effects currently identified in the SEA appraisals.

The CEMP should include further measures to minimise, or where possible, eliminate, adverse effects on various receptors. Mitigation measures employed to reduce the potential adverse effects on sensitive receptors are categorised under each SEA Objective. Mitigation measures are set out in detail in Section 8.3. Examples of mitigation measures are detailed below:

Biodiversity

- where supporting habitat will be directly lost as a result of open cut pipeline installation, the habitat must be reinstated, or trenchless/ directional drilling pipeline installation methods should be alternatively used

Population and human health

- plan construction traffic movements to avoid routes with sensitive receptors and avoid peak traffic hours

Soils, geology and land use

- agricultural soils will be managed, preserved, retained and reinstated in accordance with Department for Environment, Food and Rural Affairs (Defra)

The SEA process has identified potential residual impacts of the WRMP preferred plan after mitigation measures have been taken into consideration. **Table NTS 10** summaries the residual effects attributable to the preferred plan for the Yorkshire Water WRMP24.

Table NTS 10 Residual adverse impacts of options within the preferred plan for the WRMP24

Reference	Option	Construction	Operation

C1d	Household customer audits and water efficiency retrofits	No significant effects	No significant effects
C6a	Non-household water use audit and retrofit	No significant effects	No significant effects
C6a(ii)	Non-household domestic water use audit and retrofit	No significant effects	No significant effects
C12a3	Rainwater harvesting for commercial customers	No significant effects	No significant effects
C13c	Household tariffs	No significant effects	No significant effects
C15d	Installation of internal household flow regulators	No significant effects	No significant effects
C23b1	Rainwater harvesting for agriculture	No significant effects	No significant effects
C27d	School visits	No significant effects	No significant effects
C28e	Household media campaign	No significant effects	No significant effects
C30a	Water labelling- baseline	No significant effects	No significant effects
C32c	Rainwater harvesting for households- new developments	No significant effects	No significant effects
C34a	Non-household media campaign	No significant effects	No significant effects
C35c	Water retailer incentives	No significant effects	No significant effects
LSM	Leakage reduction and smart metering glidepath (50%)	No significant effects	No significant effects
DV7a(vi)	Tees to York Pipeline - NWL import 140 Ml/d	Biodiversity, flora and fauna; Population and human health; Material assets and resource use; Water quantity, Soil, geology and land use; Air and climate; Archaeology and cultural heritage; and, Landscape and visual amenity	No significant effects
DV8B	New York WTW and new north to south internal transfer connection	Biodiversity, flora and fauna; Population and human health; Material assets and resource use; Water quantity, Soil, geology and land use; Air and climate; Archaeology and cultural heritage; and, Landscape and visual amenity	No significant effects

R3	Increased River Ouse pumping capacity	Cultural heritage	No significant effects
R3a	River Ouse licence transfer	No significant effects	No significant effects
R8g	Sherwood Sandstone Boreholes support to North Yorkshire	No significant effects	No significant effects
R13	East Yorkshire Groundwater Option 2	Biodiversity, flora and fauna, water quantity	No significant effects
R31a	Additional bankside storage at York WTW	Biodiversity, flora and fauna	No significant effects
R37b (ii)	River Aire Abstraction option 4	Biodiversity, flora and fauna	No significant effects
R91	New internal transfer to North Yorkshire WTW	No significant effects	No significant effects

Potential water resource impacts that could arise due to future, as yet, unknown new abstractions from common sources would be assessed and considered by the Environment Agency as informed by detailed environmental assessment work as part of the abstraction licensing and water resources planning processes.

Liaison with local planning authorities will also be essential to assess any required mitigation measures from any identified cumulative effects on development plans and projects.

Monitoring

Monitoring will be required to track the residual environmental effects to show whether they arise as anticipated in the SEA appraisal, to help identify any adverse impacts and trigger deployment of any of the mitigation measures.

Monitoring recommendations are based on the current understanding of the scheme design. As options are brought forward for development, further monitoring requirements may be set out in planning applications, borehole drilling and pump test consents, or in Yorkshire Water voluntary best-practice monitoring plans accompanying scheme development. This will be discussed with relevant key regulatory bodies and stakeholders. In practice, close dialogue should occur between Yorkshire Water, Environment Agency, Natural England and any affected third parties to agree the appropriate scale and duration of such scheme-specific monitoring activities proportionate to the assessed environmental risks.

Table NTS 11 lists the potential impacts that may arise from implementation of the WRMP preferred plan, and which require monitoring in accordance with the SEA Regulations.

Key monitoring parameters at the strategic WRMP level will be those relating to the abstraction of water and the effects that this may have on waterbodies and their functions as habitats (see **Table NTS 11**). There are also direct potential impacts on humans, the built environment, terrestrial habitats, the atmosphere, landscape and heritage assets, which may arise from construction activities and/or option operation (see **Table NTS 11**). These parameters should, therefore, be included within the monitoring programme where it is practicable to do so. Extensive primary data collection is neither feasible nor appropriate for this programme level of monitoring, and use should be made where possible of existing datasets and monitoring regimes.

Site-specific monitoring requirements for the resource options included in the preferred plan will be developed during the planning process closer to the time of implementation.

Table NTS 11 Proposed SEA monitoring parameters - strategic WRMP monitoring

Impacted receptor/topic	Proposed strategic indicators	Indicative timescale	Commentary
Biodiversity	Condition of protected sites, biological monitoring (e.g. macroinvertebrates, macrophytes, fisheries, bird surveys), INNS presence	During and post-construction	Yorkshire Water will be responsible for collecting data and will engage with Environment Agency and Natural England to ensure most up-to-date information is being utilised which will help identify any potential issues.
Water resources, water quality	River flows, river levels, lake and reservoir levels. Groundwater levels. Surface and ground water quality (including proportion of surface water and groundwater bodies at 'Good; WFD status)	Annual (subject to data availability)	Yorkshire Water to undertake WFD assessments for all relevant projects pre- and during construction. Monitor status of water bodies (relevant to projects) using publicly available information. Previous studies e.g. WINEP investigations may be used to inform monitoring and assessment.
Flood risk	Number of properties that experience internal flooding from public sewers.	During construction	Yorkshire Water presently collect and report this data.
Soils, geology and land use	Area of previously undeveloped land used during construction Area of agricultural land (by grade) lost to WRMP schemes	During construction	Yorkshire Water should report the area of land (by type) that is used for development of WRMP schemes.
Climate Factors	Net greenhouse gas emissions per million litres (Ml) of treated water (kg CO_2 equivalent emissions per Ml) for Yorkshire Water supply area Energy use used in the operation of options. Renewable energy generated or purchased by Yorkshire Water.	Annually	Yorkshire Water already collect this information as part of their carbon reduction strategy and journey towards net zero.
Transport	Transport fleet fuel consumption, emissions and business mileage, as monitored by Yorkshire Water	During construction	Yorkshire Water to record vehicle movements during the construction period of any schemes.
Nuisance/ Community/ Local Economy	Scheme level community disruption of capital works would be monitored through an Environmental Monitoring Plan if required. Number of nuisance-related complaints (e.g. noise, dust) logged with Yorkshire Water and Local Authority EHOs. Pollution and flooding incidents Responses gauged through Yorkshire Water customer satisfaction surveys. Community investment, employee volunteering and match funding by Yorkshire Water.	During and post-construction	Yorkshire Water to collect information regarding complaints received during construction at project level.

Impacted receptor/topic	Proposed strategic indicators	Indicative timescale	Commentary
Recreation and Tourism	Number of recreation or tourism assets created	Post-construction	Yorkshire Water could also collect data on visitor numbers to existing recreational facilities.
Waste and resource use	Leakage Water saved through demand management / water efficiency measures. Amount of recycled / re-used materials. Proportion of waste sent to landfill. Chemical usage in water treatment.	Annually	Yorkshire Water to collect data on material and waste arisings
Air Quality	Scheme related issues of capital works would be monitored through an Environmental Monitoring plan if required. Changes in air quality are monitored by the Automatic Urban and Rural Network[26] administered by Bureau Veritas, and this data would be available if required to inform a baseline	During construction	Yorkshire Water may undertake project level air quality assessments to identify sensitive receptors where monitoring may be required.
Cultural Heritage	Loss / damage or discovery / protection of cultural, historic and industrial heritage features. Condition of buried archaeology would be monitored during construction e.g. through appropriate archaeological investigations and watching briefs as required. Consultation with relevant stakeholders to ensure impacts are minimised, e.g. to water level dependent assets, where they cannot be avoided in the first instance. Historic England monitor parameters such as Listed Buildings and Scheduled Monuments, in order to maintain a 'Heritage at risk' register.	During and post-construction	Yorkshire Water could record information at a project level on heritage assets in the area. Historic England records can be accessed to provide detail on the condition of heritage assets. Yorkshire Water should record any actions undertaken to avoid historic assets or enhancements made.
Landscape	Loss or damage to landscape character and features of designated sites.	Post-construction	Yorkshire Water could record the number and size of infrastructure built within designated landscape areas, amount of landscaping provided or number of complaints received

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

Five-yearly assessment of monitoring and any measures taken would be included within the SEA for the subsequent draft WRMP development. Through the proposed monitoring and analysis of the results

[26] Accessed at http://www.bv-aurnsiteinfo.co.uk/

obtained over the five-year period, the SEA will inform and influence the development of the WRMP for future periods.

Consultation

The SEA Regulations require consultation at the scoping stage and on the assessments documented in the Environmental Report. Scoping with the statutory consultation bodies defined by the SEA Regulations (the Environment Agency, Natural England and Historic England) is mandatory at both stages. Consultation with the public is only mandatory at the Environmental Report stage.

The Environmental Report was published alongside the draft WRMP24 for consultation on 18 November 2022 for a period of 14 weeks and closed on the 24 February 2023. The Environmental Report provided a useful reference point for consultees wishing to express their views on Yorkshire Water's draft WRMP. A Statement of Response was produced, setting out responses to the representations ahead of the WRMP24 being completed.

Following this, Yorkshire Water received a request for further information from Defra in February 2024. As a result, this Environmental Report has been updated to reflect the comments made. Further consultation has been held with Natural England following submission of the rdWRMP24 and Statement of Response, including a meeting on 7 March 2024, to allow further updates to the rdWRMP24 to address any outstanding key concerns.

Yorkshire Water received permission to publish the final WRMP in a letter from Defra dated 21 August 2024. On adoption of the final WRMP, anticipated to be October 2024, Yorkshire Water will publish an SEA Post-Adoption Statement setting out how the SEA and any views expressed by the consultation bodies or the public have influenced the final WRMP.

Table of Contents

Appendices

1 Introduction

SEA is a statutory requirement under the Environmental Assessment of Plans and Programmes Regulations 2004 ('the SEA Regulations') requiring the assessment of effects of certain plans and programmes on the environment. The objective of SEA is to:

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

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

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

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

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

The SEA Regulations transposed the requirements of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment. Following the UK's exit of the EU and the end of the transition period (31st December 2020), the SEA Directive no longer applies to the UK.

1.1.1 Information requirements

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

- An outline of the contents and main objectives of the plan or programme, and of its relationship with other relevant plans and programmes. (see Section 3).
- The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme (see Section 4).
- The environmental characteristics of areas likely to be significantly affected (see Section 3).
- Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC (the 'Birds Directive') and 92/43/EEC (the 'Habitats Directive') (see Sections 1.4 and 1.5).
- The environmental protection objectives, established at international, (European) Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation" (see Section 5).

1.1.2 The Environmental Report

SEA incorporates the following generic stages as set out in the UK Government Practical Guide[27]:

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

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

This Environmental Report documents stages B and C of the SEA being undertaken by Yorkshire Water to establish the environmental effects of water resources planning for Yorkshire. The purpose and scope of the WRMP is explained in more detail in Section 1.2.

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

> *'identify, describe and evaluate the likely significant effects on the environment of-*
>
> *a) implementing the plan or programme; and*
>
> *b) reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme.*

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

1.1.3 SEA approach

The UK Government has produced generic SEA guidance[27] that sets out the stages of the SEA process. This, along with specific guidance for undertaking SEA, Water Framework Directive (WFD) compliance assessments and Habitats Regulations Assessment (HRA) of WRMPs[28], is being used to inform the SEA of Yorkshire Water's WRMP. The Water Resources Planning Guideline[29] (WRPG) also provides guidance on the role of SEA within the water resources management planning process. This includes supplementary guidelines on Best Value Planning and Environment and Social Decision Making, which contains a number of requirements and recommendations for the scope of WRMP environmental assessment, in particular in relation to SEA, Biodiversity Net Gain (BNG) and Natural Capital Assessment (NCA).

SEA incorporates the following generic stages:

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

Table 1.1 is an extract from the ODPM Practical Guide[27] that sets out the main stages of the SEA process and the purpose of each task within the process. This Environmental Report documents stages B and C of the SEA process. Specific guidance on the application of the SEA process to WRMPs is provided by UKWIR[28].

[28] UKWIR (2021) Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans. Report Ref 21/WR/02/15.
[29] Environment Agency, Ofwat and Natural Resources Wales (2023) Water Resources Planning Guideline (online). *Available at https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline*

Table 1.1 SEA Stages and Tasks

SEA Stages and Tasks	Purpose
Stage A: Setting the context and objectives, establishing the baseline and deciding on the scope	
Task A1. Identifying other relevant plans, programmes and environmental protection objectives	To establish how the plan or programme is affected by outside factors to suggest ideas for how any constraints can be addressed, and to help identify SEA objectives.
Task A2. Collecting baseline information	To provide an evidence base for environmental problems, prediction of effects, and monitoring; to help in the development of SEA objectives.
Task A3. Identifying environmental problems	To help focus the SEA and streamline the subsequent stages, including baseline information analysis, setting of the SEA objectives, prediction of effects and monitoring.
Task A4. Developing SEA Objectives	To provide a means by which the environmental performance of the plan or programme and alternatives can be assessed.
Task A5. Consulting on the scope of the SEA	To ensure the SEA covers the likely significant environmental effects of the plan or programme.
Stage B: Developing and refining alternatives and assessing effects	
Task B1. Testing the plan or programme objectives against SEA objectives	To identify potential synergies or inconsistencies between the objectives of the plan or programme and the SEA objectives and help in developing alternatives.
Task B2. Developing strategic alternatives	To develop and refine strategic alternatives.
Task B3. Predicting the effects of the plan or programme, including alternatives	To predict the significant environmental effects of the plan or programme and its alternatives.
Task B4. Evaluating the effects of the plan or programme, including alternatives	To evaluate the predicted effects of the plan or programme and its alternatives and assist in the refinement of the plan or programme.
Task B5. Mitigating adverse effects	To ensure that adverse effects are identified and potential mitigation measures are considered.
Task B6. Proposing measures to monitor the environmental effects of plan or programme implementation	To detail the means by which the environmental performance of the plan or programme can be assessed.
Stage C: Preparing the Environmental Report	
Task C1. Preparing the environmental report	To present the predicted environmental effects of the plan or programme, including alternatives, in a form suitable for public consultation and use by decision-makers.
Stage D: Consulting on the Draft Plan or programme and the Environmental Report	
Task D1. Consulting the public and consultation bodies on the draft plan or programme and the Environmental Report	To give the public and the consultation bodies an opportunity to express their opinions on the findings of the Environmental Report and to use

SEA Stages and Tasks	Purpose
	it as a reference point in commenting on the plan or programme. To gather more information through the opinions and concerns of the public
Task D2. Assessing significant changes	To ensure that the environmental implications of any significant changes to the draft plan or programme at this stage are assessed and taken into account.
Task D3. Making decisions and providing information	To provide information on how the Environmental Report and consultees opinions were taken into account in deciding the final form of the plan or programme to be adopted.
Stage E: Monitoring the significant effects of the plan or programme on the environment	
Task E1. Developing aims and methods for monitoring	To track the environmental effects of the plan or programme to show whether they are as predicted; to help identify adverse effects.
Task E2. Responding to adverse effects	To prepare for appropriate responses where adverse effects are identified.

1.1.4 Purpose of the Environmental Report

This Environmental Report documents stages B and C (see **Table 1.1**) of the SEA being undertaken by Yorkshire Water to establish the environmental effects of meeting its obligation for the long-term reliable supply of water to its customers, as identified in the company's WRMP. The purpose and scope of the WRMP is explained in more detail in Section 2.

An SEA Scoping Report was produced and issued to external stakeholders as listed in the SEA Regulations in April 2020. The basis and approach for the SEA was developed through the scoping process and refined as a result of consultation with Environment Agency, Natural England and English Heritage. This consultation was undertaken in accordance with Regulation 12(5) of the SEA Regulations. Stakeholder feedback was collated and summarised so key issues could be addressed and any changes to the approach considered (see **Appendix A**).

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

> *'identify, describe and evaluate the likely significant effects on the environment of-*
>
> *a) implementing the plan or programme; and*
>
> *b) reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme.*

Schedule 2 of the SEA Regulations lists specific items of information which should be included in the Environmental Report. The Practical Guide provides a Quality Assurance checklist to help ensure that the requirements of the SEA Directive are met throughout the entire process. Compliance against this checklist is set out in **Appendix B**.

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

1.1.5 Role of SEA in WRMP decision-making

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

The WRMP follows a 'twin track' approach to addressing the supply-demand deficit, with implementation of distribution management and leakage reduction measures to further reduce water consumption per person/per property within Yorkshire Water's supply area. These distribution management and leakage reduction measures compliment options that deliver new water resources.

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

1.1.6 The difference between SEA and EIA

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

The SEA and EIA processes have similarities, however the aim and approach to these processes are significantly different. While not exhaustive, **Table 1.2** provides a brief overview of the differences between these processes.

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

Table 1.2 Key differences between SEA and EIA

Topic	SEA	EIA
Aim	To provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparations and adoption of **plans and programmes** with a view of promoting sustainable development.	To ensure that planning decisions are made with full knowledge of a **project**'s likely significant environmental effects, and that any negative effects are prevented, reduced or offset, while positive effects are enhanced.
Approach	Pro-active approach to development plans and programmes	Reactive approach to project-level development proposal
Impact assessment	Assesses impacts at a strategic level, with regard to environmental objectives. More qualitative assessment.	Identifies specific impacts on the environment. More quantitative assessment.
Alternatives	Considers broad range of potential alternatives	Considers limited number of feasible alternatives
Assessment outcome	Provides information to be taken account of in the decision but **does not determine it**. A post-	**In determining** the project application, the competent authority is required to have

Topic	SEA	EIA
	adoption statement must be produced outlining changes made to the plan or programme as a result of the SEA, responses to consultations, and the reasons for choosing the plan in light of other reasonable alternatives dealt with.	regard to the Environmental Statement, as well as to other material considerations.

1.2 SEA screening for Yorkshire Water's Water Resources Management Plan

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

The UKWIR Guidance, from which **Figure 1.1** is adapted, provides directions as to how the requirement for SEA should be determined for WRMPs. The boxes and arrows highlighted in green on **Figure 1.1** describe the provisions and route through the flow chart applicable to Yorkshire Water's WRMP and demonstrate that the WRMP falls within the scope of the SEA Directive. Notably, it is possible that the WRMP will include schemes that will require EIA (Box 3 in **Figure 1.1**).

Acknowledging that the WRMP process intrinsically includes some consideration of environmental and social effects, SEA can add value to the process. It promotes consideration of a wider range of effects than cannot be monetised; it contributes to the development and assessment of alternative solutions; and it provides a mechanism for consideration of potential cumulative effects within the WRMP, and with other plans and programmes. Additionally, it facilitates consultation and includes consideration of Habitats Regulations[30] and WFD[31] implications for the WRMP (as explained further in Sections 1.4 and 1.5 below).

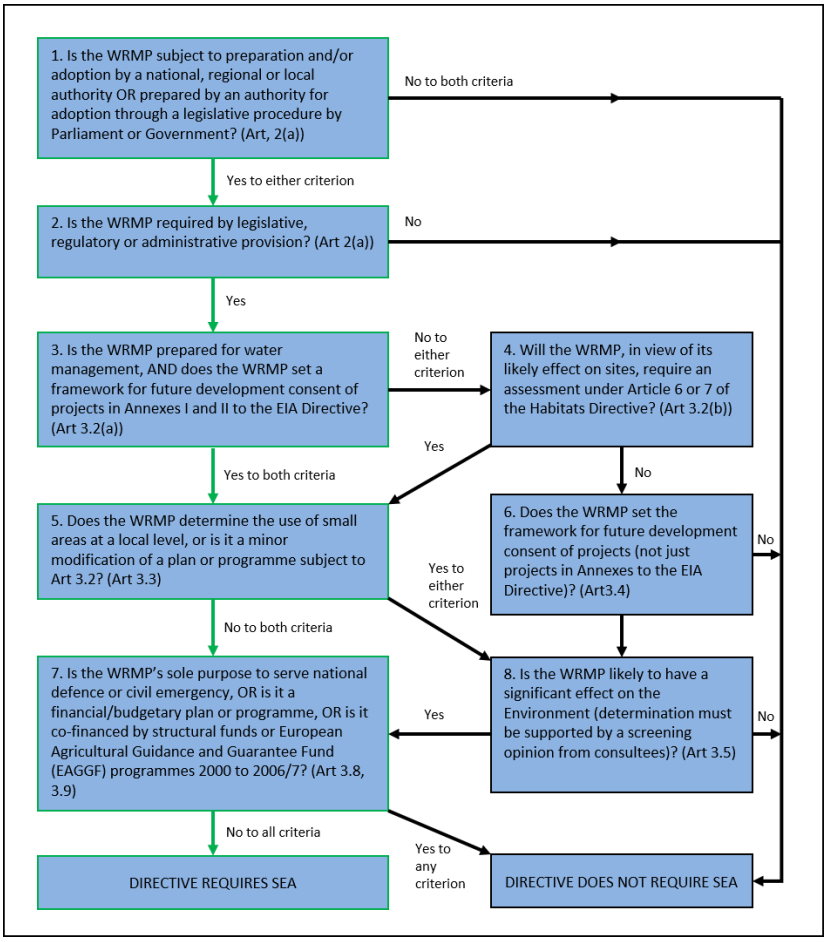
1.3 SEA and water resources management planning

In the context of water resource management planning, SEA can assist in the identification of the potential environmental effects (adverse and beneficial) of the options available to ensure long-term resilient water supplies to Yorkshire Water's customers. Knowledge of these effects can help to identify a preferred plan of options for each water resource zone (WRZ)[32] that make up Yorkshire Water's supply area to ensure a balance is maintained between available water supplies and demand for water. The SEA informs the consideration of each option and the programme appraisal process, as well as development of the overall WRMP. The SEA can identify cumulative effects between different environmental and social aspects of a particular option, programme or plan, as well as between alternative options and programmes. SEA also helps to identify potential cumulative effects of the WRMP with other plans, programmes and projects.

The WRMP process, as set out by guidance[29,28,33] already requires a substantial element of environmental assessment and consideration. Certain environmental and social effects are monetised and incorporated into the planning process by adding them to the capital and operating costs. The SEA process requires further environmental assessment and consideration of assessment outcomes. Care must be taken to ensure that environmental and social effects are not 'double-counted' as monetised and SEA assessed effects, potentially skewing the options and programme appraisal process.

[30] The Conservation of Habitats and Species Regulations 2017 (as amended)
[31] Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy
[32] UK Water Industry Research/Environment Agency define a WRZ as: 'The largest possible zone in which all resources, including external transfers, can be shared, and hence, the zone in which all customers will experience the same risk of supply failure from a resource shortfall.'
[33] Environment Agency (2021) Water resources planning guideline supplementary guidance – Environment and society in decision-making, External guidance: 18643. November 2021.

Figure 1.1 SEA screening process



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

1.4 Habitats Regulations Assessment

As a competent authority, Yorkshire Water must also ensure that its WRMP meets the requirements of the Habitats Regulations prior to implementation. If the WRMP (i.e. one or more schemes within it) may cause a likely significant effect on one or more European sites[34], either alone or in-combination with other schemes, plans or projects, the WRMP must be subject to Appropriate Assessment. In accordance with the Habitats Regulations, Yorkshire Water is undertaking a HRA of its WRMP in parallel to the SEA. The process has four potential stages:

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

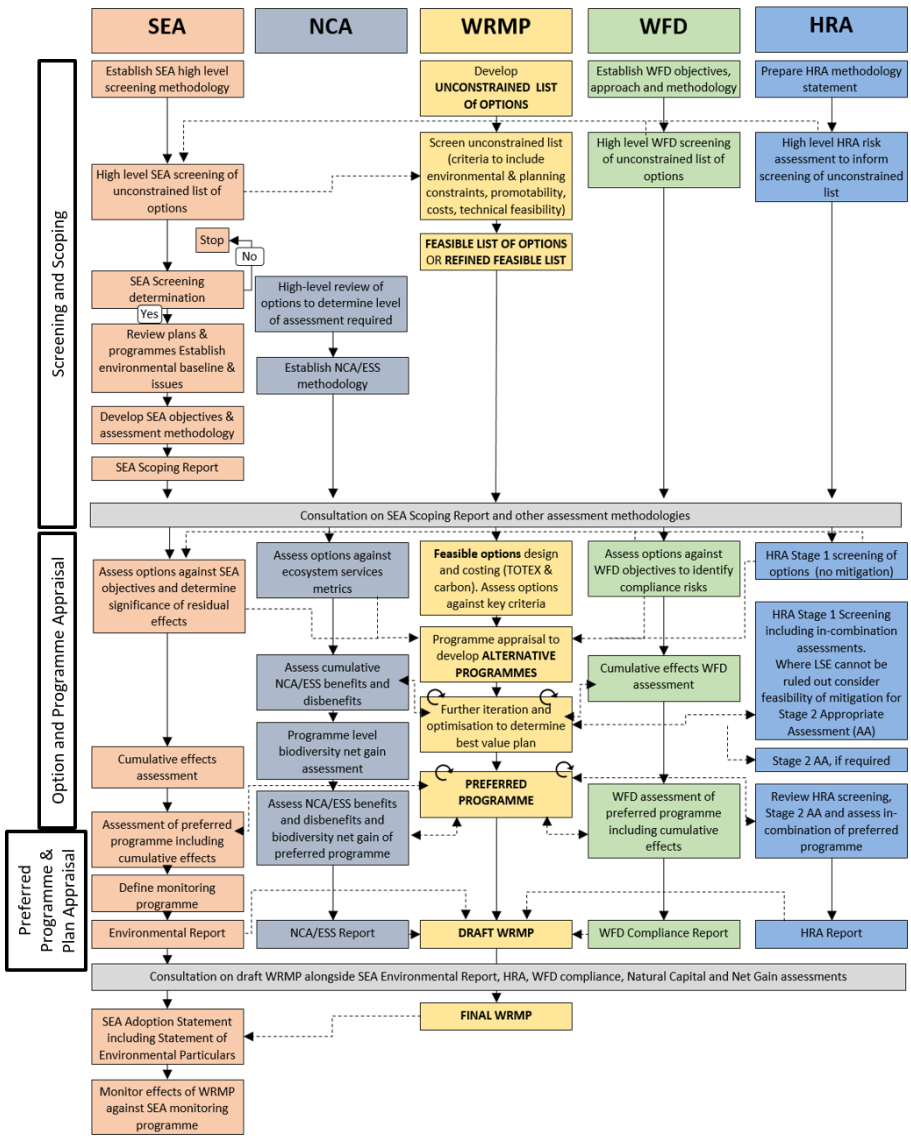
Stages 3 and 4 are only invoked if an option were to be included in the preferred programme that may cause likely significant effects on a European site.

The findings from the HRA have informed the SEA at each stage of the assessment process, in particular the SEA topics of 'biodiversity, flora and fauna' and 'water'. **Figure 1.2** (adapted from the UKWIR guidance[28]) illustrates how the SEA and HRA processes are aligned with the WRMP development process.

It should be noted that revision of the WRMP is being undertaken in parallel with preparation of the SEA and HRA, and the results of these latter two assessments will feed into the revision of the WRMP in an iterative process.

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

Figure 1.2 SEA and HRA aligned with the WRMP Process (adapted from the UKWIR Guidance)



1.5 Water Framework Directive Assessment

The WFD compliance assessment's purpose is to ensure the WRMP both helps to avoid the deterioration and contribute to the improvement of the status of water bodies, including rivers, lakes, groundwater and estuarine and coastal waters.

A robust, practical approach has been used to deliver a proportionate WFD compliance assessment that complies with statutory requirements and regulatory guidelines. The approach has been primarily based on that set out in the updated UKWIR Guidance[35].

A sequential 4-stage process for undertaking WFD compliance assessments has been applied through the development of the WRMP. The sequential four steps are as follows:

1. WFD compliance assessment screening: involves a preliminary assessment of each option and identifies whether there may be any risk of deterioration in WFD status. This is based on expert judgement. Where a risk is identified, the option is subject to the WFD compliance assessment.

2. WFD compliance assessment: This involves assessment of the likely changes to hydro-morphology and water quality occurring as a result of the construction or operation of the option and the possible risks to WFD status. In addition, the potential effects on WFD protected areas are assessed.

3. Option level WFD compliance assessment: This involves summarising WFD compliance assessments of each of the options on the feasible list (from Steps 1 and 2).

4. Preferred plan WFD compliance statement: This involves a statement of the compliance of the preferred plan against each of the WFD compliance objectives (set out below). This involves assessment of the set of options within the programme, both alone and in combination with other options within the programme. The assessment is also used to identify where multiple options potentially impact on the same WFD waterbody, and potentially downstream waterbodies where appropriate.

Findings from the WFD compliance assessment have been integrated into assessments of relevant SEA topics.

1.6 Consultation

The SEA Regulations require consultation at the scoping stage and on the assessments documented in the Environmental Report. Scoping with the statutory consultation bodies defined by the SEA Regulations (the Environment Agency, Natural England and Historic England) is mandatory at both stages. Consultation with the public is only mandatory at the Environmental Report stage.

Scoping consultation comments received from statutory consultees and Yorkshire Water's response to those comments are set out in **Appendix A**, along with the consequent actions. The assessment stage was undertaken according to the scope and approach agreed through consultation on the Scoping Report.

The Environmental Report was published alongside the draft WRMP24 for consultation on 18 November 2022 for a period of 14 weeks and closed on the 24 February 2023. The Environmental Report provided a useful reference point for consultees wishing to express their views on Yorkshire Water's draft WRMP. A Statement of Response was produced, setting out responses to the representations ahead of the revised draft WRMP24 (rdWRMP24) being completed. Yorkshire Water submitted a revised draft WRMP24 to the regulators (Defra, Environment Agency and Ofwat) on 31 October 2023 for further feedback, along with revised environmental assessment reports including this SEA Environmental Report.

Following this, Yorkshire Water received a request for further information from Defra in February 2024. As a result, this Environmental Report has been updated to reflect the comments made. Further

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

consultation has been held with Natural England following submission of the rdWRMP24 and Statement of Response, including a meeting on 7 March 2024, to allow further updates to the rdWRMP24 to address any outstanding key concerns. An updated revised Environmental Report was submitted to the regulators for review on 15 May 2024.

Yorkshire Water received permission to publish their WRMP24 from Defra on 21 August 2024. This Environmental Report accompanies Yorkshire Water's final WRMP24.

On adoption of the final WRMP, anticipated to be October 2024, Yorkshire Water will publish a SEA Post-Adoption Statement setting out how the SEA and any views expressed by the consultation bodies, or the public have influenced the final WRMP.

1.7 Structure of the Environmental Report

This Environmental Report is the output of Stages B and C of the SEA process and documents the findings throughout the SEA process as described in Section 1.1. It has been prepared to facilitate consultation on the SEA process and outcomes (Stage D). The Environmental Report is structured as follows:

This Section (**Section 1**) of the report describes the requirement for, purpose and process of the SEA, and its context in relation to the WRMP.

The remainder of the report is structured as follows:

- **Section 2** – describes Yorkshire Water's supply system and its approach to water resources management planning; describes how Yorkshire Water will develop its plan to provide reliable and resilient water supplies to its customers over the long-term planning horizon.
- **Section 3** – policy context; identifies key messages and environmental protection and social objectives from a review of relevant policies and plans.
- **Section 4** – environmental baseline review; draws out the key environmental and social issues that Yorkshire Water intends considered in the SEA. Identifies the current and future baseline conditions within the area of potential influence of the WRMP. Also included is a discussion of limitations identified in the data and the reasoning behind any assumptions made. The baseline review is structured in accordance with the SEA topics identified in Section 1.2. These topics comprise and are presented in full in **Appendix D**:
  - Biodiversity, flora and fauna.
  - Population and human health.
  - Material assets and resource use.
  - Water.
  - Soil, geology and land use.
  - Air and climate.
  - Archaeology and cultural heritage.
  - Landscape and visual amenity.
- **Section 5** – Describes the methodological framework and processes that have been used to undertake the SEA of the individual options and assess any potential cumulative effects of options included in Yorkshire Water's WRMP. Assessment of individual water resource options presents the potential impacts of the various options against the SEA framework. Full details are provided in **Appendix E**.
- **Section 6** – Provides a summary of the Habitats Regulations Assessment
- **Section 7** – Provides an assessment of options and cumulative effects assessment, discussing the potential in-combination impacts of individual options (intra-zone and inter-zone) and with other relevant programmes, plans and projects.
- **Section 8** – SEA and programme appraisal highlights the role of SEA in programme and WRMP decision making and looks at SEA of alternative programmes**.** Outlines the SEA of the WRMP in

a wider context, providing a cumulative effects assessment of the WRMP preferred plan and its impact with other plans, programmes and projects.

- **Section 9** – Mitigation and enhancement, discusses measures envisaged to prevent, reduce and offset any significant adverse effects of implementing the WRMP.
- **Section 10** – Monitoring to track the environmental effects against the assessments, to help identify any adverse impacts and trigger deployment of any mitigation measures where necessary.

2 Planning

2.1 Introduction

This section provides a brief overview of the water resource management planning process, the Yorkshire Water supply system and Yorkshire Water's WRMP24. Full details can be found in the WRMP published alongside this Environmental Report.

Water resource management planning is undertaken by all water companies in England and Wales in order to ensure a long-term, sustainable balance between water supply availability and the demand for water from water company customers. It is the process of working out how much water customers will need over a 25-year planning period (assessing demand) and how best to provide it (assessing options to manage distribution and/or provide additional water supply). Companies are required to prepare a WRMP every 5 years. It also forms a component part of the company business plan submitted every five years by each water company to Ofwat (the water industry economic regulator) as part of the regulatory periodic price review process. The next periodic price review will take place in 2024 – this will be the eighth price review for the water industry since it was privatised in 1989. Engagement with regulators, licensed water suppliers, other water companies, customers and stakeholders is key to the WRMP process, and formal consultation was undertaken on the draft WRMP alongside this Environmental Report.

In developing its draft WRMP, Yorkshire Water has examined the supply/demand balance for each of its water resources zone (WRZ)[36] and determined how any deficits between demand and available supply should be addressed over the 25-year planning period 2025 to 2050. Section 2.3 provides an overview of the Yorkshire Water supply system and WRZs.

The planning process considers key issues which affect water supply and demand, such as:

- Population growth
- Climate change
- Potential reductions to water abstraction from sources identified as having a detrimental impact on the environment ('sustainability reductions')
- Raw water quality deterioration.

2.2 Regional Planning

Water Resources North (WReN)[37] is one of five regional water resources groups working under the National Framework for Water Resources (the 'National Framework')[38]. WReN is designed to oversee water resources planning for Yorkshire and the North East of England. It is formed of three water companies operating in the north east of England, including Yorkshire Water, Northumbrian Water and Hartlepool Water (part of Anglian Water).

WReN are working with water companies and their customers, other water dependent sectors of the economy such as the agriculture and power sectors, and environmental groups and regulators. WReN have developed a long-term plan for managing water resources in the region, which was published for consultation in 2022. Where the Regional Plan impacts on public water supply it will be reflected in the individual water companies' WRMPs.

The Yorkshire Water WRMP24 has been developed in parallel to the WReN Regional Plan and the Regional Plan objectives have been considered in WRMP decision making in formulating the WRMP best value plan. The final solution of the WRMP (the 'preferred plan') is aligned with the WReN Regional Plan solution.

[36] UKWIR/Environment Agency define a WRZ as: 'The largest possible zone in which all resources, including external transfers, can be shared, and hence, the zone in which all customers will experience the same risk of supply failure from a resource shortfall.

[37] https://www.waterresourcesnorth.org/

[38] https://www.gov.uk/government/publications/meeting-our-future-water-needs-a-national-framework-for-water-resources

2.3 Yorkshire Water's supply and resource system

Yorkshire Water's supply area is geographically bounded in the west and north by the Pennine Hills and the North York Moors respectively. The southern and eastern parts of the company' supply region are low lying and bounded by the North Sea to the East and the Yorkshire / Lincolnshire border to the south. Annual average rainfall in the region is highest in the Pennine areas whilst low lying areas average less than half as much rainfall each year and with little seasonal variation.

Urban areas in the west and south of Yorkshire are principally supplied from reservoirs in the Pennines. Reservoirs located in the Pennines and the valleys of the River Don, Aire, Wharfe, Calder, Nidd and Colne provide the largest upland sources of water in the region. Yorkshire Water operates over 100 impounding reservoirs of which two are major pumped storage reservoirs. The total storage capacity of all the supply reservoirs amounts to some 160,000 million litres (Ml).

In the eastern and northern parts of the region, river and groundwater abstractions, chiefly from the rivers of the North York Moors and the Yorkshire Wolds respectively, are the major water sources.

Approximately 45% of the water supplied by Yorkshire Water is from reservoirs, 30% from rivers and 25% from boreholes (see **Figure 2.1**). This varies from year to year depending on weather conditions. Yorkshire Water has an agreement with Severn Trent Water to abstract up to 21,550 Ml per year from the Derwent Valley Reservoirs in Derbyshire for supply to parts of Sheffield, dependent on the control lines in the reservoirs. The majority of the company's water resources are connected together by a regional grid network. This enables highly effective conjunctive use of different water resources, which mitigates risk and allows optimal planning, source operation and resilient sources of supply both in drought and during floods.

The Yorkshire Water region is currently divided into two water resource zones for planning purposes (see **Figure 2.2**). Each zone represents a group of customers who receive the same level of service for water supply reliability from either groundwater or surface water sources. The Grid Surface Water Zone (SWZ) represents a highly integrated surface and groundwater zone that is dominated by the operation of lowland rivers and Pennine reservoirs (see **Figure 2.1**). The East SWZ is supplied by a river abstraction and springs in the Whitby Area.

Figure 2.1 Yorkshire Water Grid System

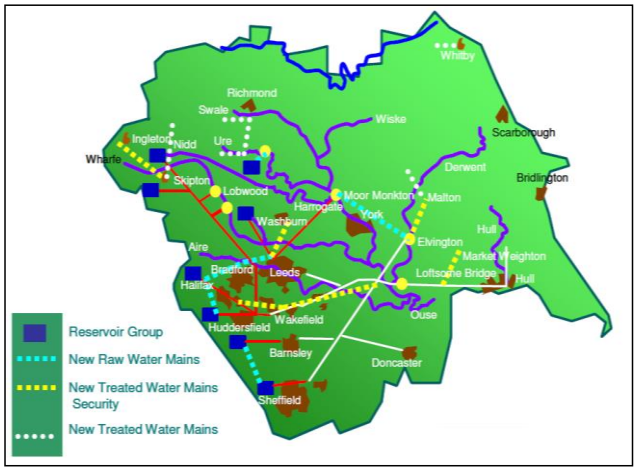
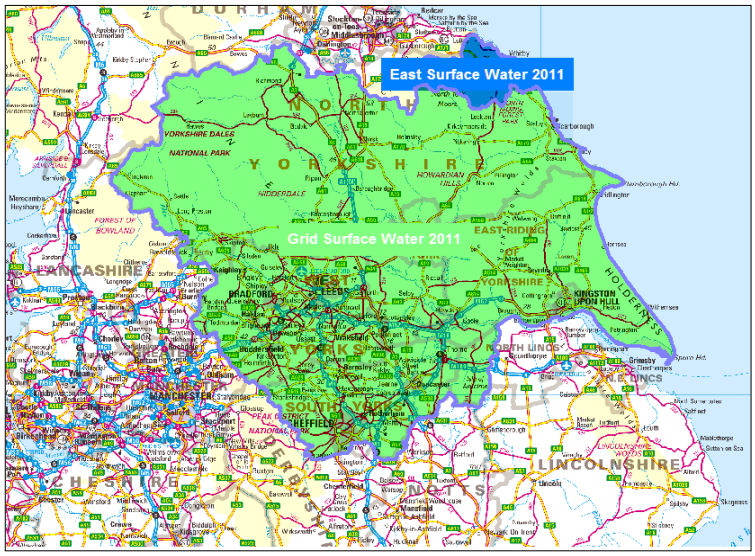


Figure 2.2 Yorkshire Water's Water Resource Zones



2.4 Yorkshire Water's water resource management plan 2024

In line with regulatory requirements, Yorkshire Water has prepared a WRMP that is published alongside this Environmental Report. In developing its plan, there are several key future challenges faced by Yorkshire Water in providing a reliable and sustainable water supply over the next 25 years. These include potential effects of climate change, risks of raw water quality deterioration and measures to improve the environment by modifying the operation of some of its water sources ('sustainability reductions') to help achieve good ecological status or potential under the Water Framework Directive.

As a result of these various pressures, actions will be required to ensure that sustainable and secure supplies to customers continue to be maintained over the 25-year planning horizon. Full details are provided in the WRMP.

The spatial scope of the options considered for the WRMP extent beyond the boundaries of the supply area shown in **Figure 2.2**, as discussed further in later sections of this Environmental Report. The temporal scope of the plan covers a planning period of 25 years between 2024/25 and 2049/50. However, as WRMPs are required to be updated every five years, the schemes and programmes for balancing supply and distribution will be reviewed and subject to SEA, HRA and WFD assessment again during the period 2029-30.

2.4.1 Yorkshire Water's feasible list of WRMP options

Yorkshire Water investigated an unconstrained list of potential options to balance future supply and demand. Unconstrained options include all options that could technically be used to meet the deficit. To identify which of the options included in the unconstrained list should be investigated further, Yorkshire Water reviewed the technical, environmental, carbon and social attributes of each option at a high level. The technical attributes considered were yield increase / demand decrease, construction / delivery costs; time to implement; asset life of infrastructure; and resilience benefits. This resulted in a sub-set of the unconstrained list of options, which is referred to as the "feasible" list. A number of options were constrained out during this process, hence numbering of options in the feasible list is not sequential. Options on the 'feasible' list were grouped according to the following four categories:

- Customer management options
- Leakage management options

- Resource management options

The individual options in each group are documented in **Table 2.1**. For each option, baseline information was collated to permit SEA, WFD and HRA assessments to be completed, focussing on:

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

Table 2.1 WRMP24 feasible list of options

Reference	Scheme
Customer management	
C1d	Household customer audits and water efficiency retrofits
C2	Metering domestic meter optants (growth)
C4	Metering on change of occupancy
C5	Metering on asset end of life
C6a	Non-household water use audit and retrofit
C6a(ii)	Non-household domestic water use audit and retrofit
C11c	Household Rainwater Harvesting Retrofit
C12a3	Rainwater harvesting for commercial customers
C13c	Household tariffs
C15d	Installation of internal household flow regulators
C18c	Leaky loo fixes
C21c	Community Incentives
C23b1	Rainwater harvesting for agriculture
C27d	School visits
C28e	Household media campaign
C29c	Household incentives
C30a	Water labelling- baseline
C30b	Water labelling- low demand common reference scenario
C32c	Rainwater harvesting for households- new developments
C34a	Non-household media campaign
C35c	Water retailer incentives
C36	Metering domestic meter optants (enhanced programme)
C37	Metering new developments (growth)
Leakage management	
D1a-e	Active leakage control

Reference	Scheme
D2a-c	Pressure management
D3a-e	Mains renewal/ replacement
D5a-j	Trunk main metering and logging
D6a	Above ground pressure management
D7a-e	Permanent acoustic logging
D9a-j	High tech active leakage control
D15a-e	Intensive active leakage control
D16a-e	Trunk main active leakage control
D17a	Transient pressure management
Resource management	
DV3	South Yorkshire groundwater
DV6(iv)	Tees to South Yorkshire Pipeline Option 1
DV6(v)	Tees to South Yorkshire Pipeline Option 2
DV6(vi)	Tees to South Yorkshire Pipeline Option 3
DV7a(iv)	Tees to Ouse Pipeline Option 1
DV7a(v)	Tees to Ouse Pipeline Option 2
DV7a(vi)	Tees to York Pipeline Option 3
DV8(iv)	York WTW to South Yorkshire pipeline 1
DV8(iv)A(i)	York WTW to South Yorkshire pipeline 2 – dual main
DV8(iv)A(ii)	York WTW to South Yorkshire pipeline 2 – single main
DV8(v)	York WTW capacity increase
DV8(v)A	New York WTW
DV8B	New York WTW and York WTW to South Yorkshire pipeline 2 – dual main
R1a	River Ouse water treatment works extension
R1c	Grid network enhancement: New River Ouse WTW to York
R1c(i)	Grid network enhancement: New River Ouse WTW to York
R1d	Grid network enhancement: New River Ouse WTW to North Yorkshire 1
R1e	Grid network enhancement: New River Ouse WTW to North Yorkshire 2
R1f	Grid network enhancement: New River Ouse WTW to North Yorkshire 3
R1g	Grid network enhancement: New River Ouse WTW to York
R2	Ouse Raw Water Transfer
R3	Increased River Ouse pump storage capacity
R3a	River Ouse licence transfer
R5	Aquifer Storage and Recovery Scheme 1
R6	South Yorkshire Groundwater Option 1

Reference	Scheme
R8b	Sherwood Sandstone and Magnesian Limestone Boreholes Option 2
R8c	Sherwood Sandstone and Magnesian Limestone Boreholes Option 3
R8f	Sherwood Sandstone and Magnesian Limestone Boreholes Option 6
R8g	Sherwood Sandstone Boreholes support to North Yorkshire
R8h	New groundwater (Sherwood Sandstone) supply to existing North Yorkshire WTW
R12	East Yorkshire Groundwater Option 1
R13	East Yorkshire Groundwater Option 2
R17	Reuse abandoned third party groundwater source Option 2
R18	GW source Option 3
R19	GW source Option 4
R29	Reservoir De-silting
R31a	Additional bankside storage on the River Ouse
R34	River Calder Abstraction Option 1
R35	River Aire Abstraction Option 1
R37b(ii)	River Aire Abstraction Option 4
R49	Supply Dales from the Tees - raw Option 1
R51	Supply Dales from the Tees - treated
R58	Transfer from UU Option 3
R59	Transfer from UU Option 4
R61	Yorkshire coast desalination
R78	Tidal Abstraction Reservoir
R85	Recommission Kirklees WTW
R86	Aire and Calder new WTW
R87	Rebuild Northallerton WTW
R88	Increase storage at an existing WTW in North Yorkshire
R89	Convert Wensleydale springs to boreholes
R90	North Yorkshire annual licence increase
R91	New internal transfer to North Yorkshire WTW
Export	
E2	Yorkshire grid network to Severn Trent Water

3 Policy Context

3.1 Introduction

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

> *'An outline of the contents and main objectives of the plan or programme, and of its relationship with other relevant plans and programmes.'*
>
> *'the environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation.'*

In accordance with the Regulations, a review of relevant plans and programmes is presented in Section 3.2. A summary of their key objectives is presented in **Table 3.1**. These objectives were originally identified in the WRMP24 SEA Scoping Report[39].

3.2 Review of plans, policies and programmes

A summary of key messages derived from the review is presented below in **Table 3.1**. The review identifies how Yorkshire Water's WRMP might be influenced by other plans, policies, programmes, and other objectives which the WRMP should consider. This information has helped to identify and inform the scope of the assessment, in particular the objectives for the SEA process.

Relevant plans, policies and programmes were identified from the wide range that has been produced at an international, national, regional and local level. 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.

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

[39] Yorkshire Water (2020) WRMP24 SEA Scoping Report. Report produced by Ricardo Energy & Environment, April 2020.

Table 3.1 Key policy messages and objectives derived from the review of the plans, policies and programmes

SEA Topic	Key Messages and Objectives
Biodiversity, flora and fauna	Conservation and enhancement of the natural environment and of biodiversity, particularly internationally and nationally designated sites and priority habitats and species (NERC act Section 41 for England), whilst taking into account future climate change. Promote a catchment-wide approach to water use to ensure better protection of biodiversity. To achieve favourable condition for priority habitats and species in particular designated sites. Avoidance of activities likely to cause irreversible damage to natural heritage. Support well-functioning ecosystems, respect environmental limits and capacities, and maintain / enhance coherent ecological networks, including provision for fish passage and connectivity for migratory/mobile species. Strengthen the connections between people and nature and realise the value of biodiversity. Protection, conservation and enhancement of natural capital. Ecosystem services from natural capital contributes to the economy and therefore should be protected and, where possible, enhanced. Avoidance of activities likely to cause the spread of Invasive Non-Native Species (INNS) A need to protect the green infrastructure network.
Population and human health	Water resources play an important role in supporting the health and recreational needs of local communities and businesses. To ensure all communities have a clean, safe and attractive environment in which people can take pride. To ensure secure, safe, reliable, dependable, sustainable and affordable supplies of water are provided for all communities. Access to high quality open spaces and opportunities for sport and recreation can make an important contribution to the health and well-being of communities. Promotion of healthy communities and protection from risks to health and wellbeing. Promotion of a sustainable economy supported by access to essential utility and infrastructure services.
Material assets and resource use	Promote sustainable production and consumption whilst seeking to reduce the amount of waste generated by using materials, energy and water more efficiently. Consider issues of water demand, water supply and water quality in the natural environment and ensure a sustainable use of water resources.

SEA Topic	Key Messages and Objectives
	Contribute to a resource efficient, green and competitive low carbon economy. Maintain a reliable public water supply and ensure there is enough water for human uses, whilst seeking to maintain a healthy water environment.
	Minimise the production of waste, ensure waste management is in line with the 'waste hierarchy', and eliminate waste sent to landfill.
	Promote the sustainable management of natural resources.
Water	Promote sustainable water resource management, including a reduction in water consumption.
	Maintain and improve water quality and water resources (surface waters, groundwater and bathing water).
	Meet protected area targets related to water quality and flow in the Water Framework Directive.
	Expand the scope of water quality protection measures to all waters, surface waters and groundwater.
	Improve the quality of the water environment and the ecology which it supports and continue to provide high levels of drinking water quality.
	Ensure appropriate management of abstractions and protect flow and level variability across the full range of regimes from low to high conditions.
	Prevent deterioration of water body status.
	Balance the abstraction of water for supply with the other functions and services the water environment performs or provides.
	Steer new development to areas with the lowest probability of flooding and manage any residual flood risk, taking account of the impacts of climate change.
	Promote measures to enable and sustain long term improvement in water efficiency.
	Promote a catchment-based approach to the management and work with local stakeholders to deliver catchment-based solutions to water quantity and quantity.
	Develop a resilient and flexible water management approach to cope with changing climate, population and economic conditions.
	Reduce flood risk to people, residential and non-residential properties, community facilities and key transport links, as well as designated nature conservation sites and heritage assets and landscapes of value.
	Reduce risk of flooding by changing operation of reservoirs.

SEA Topic	Key Messages and Objectives
Soil, geology and land use	Protect and enhance the quality and diversity of geology (including geological SSSIs) and soils, including geomorphology and geomorphological processes which can be lost or damaged by insensitive development. Ensure that soils will be protected and managed to optimise the varied functions that soils perform for society (e.g. supporting agriculture and forestry, protecting cultural heritage, supporting biodiversity, as a platform for construction), in keeping with the principles of sustainable development. Promote catchment-wide approach to land management by relevant stakeholders, in order to benefit natural resources, reduce pollution and develop resilience to climate change. Promote mixed use developments and encourage multiple benefits from the use of land in urban and rural areas, recognising that some open land can perform many functions. Encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value.
Air and climate	Reduce greenhouse gas emissions. Targets include: reduce the UK's greenhouse gas emissions by at least 80% (relative to 1990 levels) by 2050. Reduce the effects of air pollution on ecosystems. Improve overall air quality. Minimise energy consumption, support the use of sustainable/renewable energy and improve resilience to climate change. Build in adaption to climate change to future planning and consider the level of urgency of associated risks of climate change impacts accordingly. Need for adaptive measures to respond to likely climate change impacts on water supply and demand. Achieve and sustain compliance with and contribute towards national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Minimise energy consumption, support the use of sustainable/renewable energy and improve resilience to climate change.

SEA Topic	Key Messages and Objectives
Archaeology and cultural heritage	Built development in the vicinity of historic buildings and Scheduled Monuments could have implications for the setting and/or built fabric and cause damage to any archaeological deposits present on the site. Ensure active management of the Region's environmental and cultural assets. Ensure effects resulting from changes to water level (surface or sub-surface) on all historical and cultural assets are avoided. Consider effects on important wetland areas with potential for paleo-environmental deposits. Promote the conservation and enhancement of the historic environment, including the promotion of heritage and landscape as central to the culture of the region and conserve and enhance distinctive characteristics of landscape and settlements. Conserve and enhance the historic environment, heritage assets and their settings.
Landscape and visual amenity	Protection and enhancement of landscape (including designated landscapes, landscape character, distinctiveness, and the countryside) Abstraction and low river flows could negatively affect landscape and visual amenity. Enhance the value of the countryside by protecting the natural environment for this and future generations. Improve access to valued areas of landscape character in sustainable ways to enhance its enjoyment and value by visitors and stakeholders.

4 Environmental Baseline Review

4.1 Introduction

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

> *'the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme'*
>
> *'the environmental characteristics of areas likely to be significantly affected'*
>
> *'any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Council Directive 79/409/EEC on the conservation of wild birds and the* [92/43/EEC] *Habitats Directive.'*

An essential part of the SEA process is to identify the current baseline conditions and their likely evolution in the absence of the WRMP. It is only with knowledge of baseline conditions that potential impacts of the WRMP and its schemes can be identified, monitored, and if necessary mitigated. However, it is important to note that the future baseline is not a 'do nothing' option with respect to water resources planning. There will be elements of Yorkshire Water's current WRMP (published in 2019) that will continue in the absence of the new 2024 plan (e.g. increased water metering, continuing leakage reduction and water efficiency measures to implement Yorkshire Water policy), which will act to alter the future baseline.

Baseline data have been drawn from a variety of sources, including a number of the plans, policies and programmes reviewed and summarised earlier in **Table 3.1** and **Appendix C**.

The baseline data are presented in **Appendix D**. The likely future trends in the environmental and social issues considered (where information is available to do so) are also summarised. The key issues arising from the review of baseline conditions (and of relevant plans, programmes and policies) are summarised in Section 3.5.

4.2 Spatial extent of the SEA

The SEA study area comprises the entirety of Yorkshire Water's supply area in addition to a 10 km wide "corridor" of the Tyne and Tees to cover the potential development of pipeline schemes to transfer water to the Yorkshire Water region. This corridor is within the Kielder SWZ which is included in the environmental baseline review.

4.3 Temporal scope of the SEA

The temporal scope of the WRMP must cover a minimum statutory planning period of 25 years. This Environmental Report therefore covers the full duration of the current WRMP, i.e. 2024/25-2049/50. However, as the statutory process requires WRMPs to be produced every five years, the schemes and programmes for balancing supply and demand for water will be reviewed again and subject to SEA in 2028-29. Future WRMP cycles will revisit options beyond the current plan's period and the SEA will be updated at that time.

In **Appendix D**, the current environmental and social baseline for the SEA geographical area under consideration is described together with the likely future changes to this baseline as currently understood. Over the long-term planning horizon of the WRMP, there is uncertainty as to how the future baseline will evolve. Consequently, it is sensible to adopt a scenario approach to test the sensitivity of the WRMP against the central assessment of environmental and social effects based on the known or likely changes to the baseline conditions. In this way, the resilience of the WRMP options, programmes and the overall plan can be assessed and used to inform decision-making as well as recommendations for future monitoring to provide data for subsequent WRMPs and the associated SEA.

In considering this approach to the future environmental and social baseline, it is important to recognise that WRMP options for implementation beyond 2029 will be further assessed by Yorkshire Water through the next statutory WRMP due to be published in 2029; this will also be subject to SEA. This process is currently assumed to be repeated every subsequent five years. This regular statutory update and review will ensure that actual changes to the baseline and updated forward projections can be taken into account in subsequent WRMPs and SEAs.

4.4 Limitations of the data and assumptions made

The principal limitations surround the future social and environmental baseline where there are substantial differences in the availability and temporal resolution of robust projections across the various SEA topic areas: for example, whilst the WRMP incorporates planning up to 80 years ahead and climate change estimates extend to a similar horizon, regional population and housing forecasts rarely go beyond a 40 year horizon and forecasts of how the natural environment may change are very limited.

The study area for the SEA is relatively large and covers a number of different geographical and political regions, which makes establishing a baseline at the sub-regional level challenging. There are also challenges around extrapolating information from data collated at differing spatial resolutions. Spatial data have been obtained for most of the SEA topics, and the baseline is presented graphically as mapped information where appropriate. In some instances, reporting cycles mean that available information is dated.

SEA is a high-level assessment aimed at highlighting potential environmental concerns. The environmental data to be used in this assessment is based on that which is readily available from existing sources, e.g. statutory organisations. No primary research or survey work has been carried out specifically to inform the SEA and therefore it is possible that at the individual option level, there may be additional environmental issues that could have an influence on a WRMP option. At a later stage during the implementation of WRMP options, major schemes that have the potential to give rise to likely significant environmental effects would be subject to EIA.

The baseline information presented in this Environmental Report may not identify specific, localised issues that are reflective of the general trends of the region. For example, this may include locally important sites for recreation or any localised differences in environmental quality.

Data have generally been sourced from national or regional bodies where information is collected for the Yorkshire region using consistent methods. This allows for a more effective comparison between the regional and national averages; however, reliance on these data sets has in some cases meant that information is a number of years old.

4.4.1 Intra-regional water transfer options

Yorkshire Water's WRMP features several feasible options (e.g. R49, R51, DV6 and DV7) which include a transfer from Northumbrian Water and within the larger WReN region. These options have been considered due to Yorkshire Water forecasting a deficit during the planning period. As a result, Yorkshire Water is responsible for undertaking any assessments for export options where additional water resource is required. Yorkshire Water have liaised with Northumbrian Water throughout the WRMP process and have shared the outputs of any assessments for inclusion in their own reports.

4.5 Overview

The Yorkshire Water region has a varied landscape with the Pennines stretching to the west, the North York Moors in in north, and the low lying southern and eastern parts of the region. Annual average rainfall across the region varies. The highest rainfall is near the Pennines, whilst low lying areas average less than half that volume of rainfall each year, with little seasonal variation.

Urban areas in the west and south of Yorkshire are principally supplied from reservoirs in the Pennines. Reservoirs located in the Pennines and the valleys of the River Don, Aire, Wharfe, Calder, Nidd and Colne provide the largest upland sources of water in the region. Yorkshire Water operates over 100 impounding reservoirs of which two are major pumped storage reservoirs. The total shortage capacity of all the supply reservoirs amounts to some 160,000Ml.

4.6 Key issues

The baseline was set out in the Scoping Report and has been updated based on feedback provided through consultation. The baseline is detailed further in **Appendix D**. Key issues arising from the review of baseline conditions for each of the SEA topics are summarised in **Table 4.1**. These key issues have been used to support the development of the SEA Objectives in Section 5.

Table 4.1 Summary of key issues

SEA Topic	Key issues
Biodiversity, Fauna and Flora	The need to protect or enhance the region's biodiversity, particularly protected sites designated for nature conservation. The need to avoid activities likely to cause irreversible damage to natural heritage. The need to take opportunities to improve and not reduce connectivity between fragmented habitats. The need to control the spread of Invasive Non-Native Species (INNS). The need to engage more people in biodiversity issues so that they personally value biodiversity and know what they can do to help, including through recognising the value of the ecosystem services.
Population and Human Health	The need to ensure water supplies remain affordable especially for deprived and vulnerable communities. The need to ensure continued improvements in levels of health across the region, particularly in urban areas and deprived areas. The need to ensure public awareness of drought conditions and importance of maintaining resilient, reliable public water supplies without the need for emergency drought measures. The need to ensure water quantity and quality is maintained for other users including tourists, recreational users and other users such as farmers. The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities for local residents and tourists, including opportunities for access to recreation resources and the natural and historic environment. The need to accommodate an increasing population. The need to contribute towards maintaining sustainable growth in the region. Sites of Nature Conservation Importance, heritage assets, water resources, important landscapes and public rights of way contribute to recreation and tourism opportunities and subsequently health and well-being and the economy.
Material Assets and Resource Use	The need to minimise the consumption of resources, including water and energy. The need to reduce the total amount of waste produced in the region, from all sources, and to reduce the proportion of this waste sent to landfill. The need to continue to reduce leakage from the water supply system. Daily consumption of water is higher than the national average in the area and consequently there is a continued need to encourage more efficient water use. The need to support regional and national commitments to decarbonisation.

SEA Topic	Key issues
Water	The need to further improve the quality of the regions river, estuarine and coastal waters taking into account WFD status targets. The need to maintain the quantity and quality of groundwater resources taking into account WFD status targets. The need to improve the resilience, flexibility and sustainability of water resources in the region, particularly in light of potential climate change impacts on surface waters and groundwaters. The need to ensure sustainable abstraction to protected the water environment. The need to ensure that people understand the value of water. The need to reduce and manage flood risk.
Soil, Geology and Land-use	The need to protect geological features of importance and maintain and enhance soil function and health. The need to manage the land more holistically at the catchment level, benefitting landowners, other stakeholders, the environment and sustainability of natural resources (including water resources). The need to make use of previously developed land (brownfield land) and to reduce the prevalence of derelict land in the region.
Air and Climate	The need to reduce air pollutant and greenhouse gas emissions and limit air emissions to comply with air quality standards. The need to mitigate against climate change through the reduction in greenhouse gas emissions in order to contribute to risk reduction over the long term. The need to adapt to the impacts of climate change for example through, sustainable water resource management, water use efficiencies, specific aspects of natural ecosystems (e.g. connectivity) as well as accommodating potential opportunities of climate change.
Archaeology and Cultural Heritage	The need to conserve or enhance sites of archaeological importance and cultural heritage interest, particularly those which are sensitive to the water environment.
Landscape and Visual Amenity	The need to protect and improve the natural beauty of the region's National Parks, AONBs, and other areas of natural beauty. It is envisaged that landscape and designated sites will be maintained and enhanced for the enjoyment of the public.

5 Assessment Methodology

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

5.1 SEA Objectives

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

Assessment objectives have been developed based on:

- The key policy messages, social and environmental protection objectives identified in the review of policies, other plans and programmes (see Section 3). It is important that the assessment takes these objectives into account as this will help it to highlight any area where the WRMP may help or hinder the achievement of the objectives of other plans (e.g. at local, national and international level).
- The current state of the environment in the area under consideration for the SEA (see Section 4) and the key environmental issues identified.

Draft SEA objectives are set out in **Table 5.1** alongside the key messages identified from the review of policies, plans and programmes and the key issues highlighted from the review of baseline information. The following sections describe how Yorkshire Water will use these SEA objectives in the assessment of the environmental effects of the options, programmes and the WRMP. These SEA objectives are intended to reflect changes that contribute to sustainability. By assessing each option against the objectives, it is more apparent where there might be adverse effects and where options could be developed to provide beneficial effects.

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

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

Table 5.1 SEA Objectives and Assessment Approach

SEA topic	PPP Key Messages	Baseline Key Issues	SEA Objectives	Indicator Questions
Biodiversity, flora and fauna	• Conservation and enhancement of the natural environment and of biodiversity, particularly internationally and nationally designated sites and NERC act priority habitats and species , whilst taking into account future climate change. • Promote a catchment-wide approach to water use to ensure better protection of biodiversity. • To achieve favourable condition for priority habitats and species in particular designated sites. • Avoidance of activities likely to cause irreversible damage to natural heritage. • Support well-functioning ecosystems, respect environmental limits and capacities, and maintain/enhance coherent ecological networks, including provision for fish passage and connectivity for migratory/mobile species. • Strengthen the connections between people and nature and realise the value of biodiversity. • Protection, conservation and enhancement of natural capital. Ecosystem services from natural capital contributes to the economy	• The need to protect or enhance the region's biodiversity, particularly protected sites designated for nature conservation. • The need to avoid activities likely to cause irreversible damage to natural heritage. • The need to take opportunities to improve connectivity between fragmented habitats. • The need to control the spread of Invasive Non-Native Species (INNS). • The need to engage more people in biodiversity issues so that they personally value biodiversity and know what they can do to help, including through recognising the value of the ecosystem services.	• To protect and enhance biodiversity, ecological functions, capacity, and habitat connectivity within Yorkshire Water's supply and source area. • To provide opportunities for habitat creation or restoration and a net benefit/gain for biodiversity. • To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy. • To avoid introducing or spreading INNS. • To provide opportunities for habitat creation or restoration and a net benefit/gain for biodiversity (ha)	• Will it avoid damage to aquatic, transitional and terrestrial species and habitats including fish populations (particularly migratory fish)? • Will it enhance aquatic, transitional and terrestrial species and habitats? • Will it protect the most important sites for nature conservation? • Will it affect HRA compliance? • Is the option likely to affect ancient woodland? • Will the option affect a priority habitat on the priority habitat inventory? • Are there any opportunities for habitat creation or restoration and a net benefit/gain for biodiversity? • Will the option contribute to the loss or gain in habitat connectivity? • Will it ensure the sustainable management of natural habitats, taking into account climate change adaptability? • Will it affect WFD compliance e.g. good ecological potential / status?

SEA topic	PPP Key Messages	Baseline Key Issues	SEA Objectives	Indicator Questions
	and therefore should be protected and, where possible, enhanced. • Avoidance of activities likely to cause the spread of Invasive Non-Native Species (INNS) • A need to protect the green infrastructure network.			• Does it protect, conserve and enhance biodiversity natural capital and the ecosystem services the natural capital provides? • Is there a possibility for INNS to be spread/ introduced? • Is there an opportunity to improve biodiversity value through removal of INNS?
Population and human health	• Water resources play an important role in supporting the health and recreational needs of local communities. • To ensure all communities have a clean, safe and attractive environment in which people can take pride. • To ensure secure, safe, reliable, sustainable and affordable supplies of water are provided. • Access to high quality open spaces and opportunities for sport and recreation can make an important contribution to the health and well-being of communities. • Promotion of healthy communities and protection from risks to health and wellbeing. • Promotion of a sustainable economy supported by universal access to essential utility and infrastructure services.	• The need to ensure water supplies remain affordable especially for deprived or vulnerable communities • The need to ensure continued improvements in levels of health across the region, particularly in urban areas and deprived areas. • The need to ensure public awareness of drought conditions and importance of maintaining security of supply without the need for emergency drought measures. • The need to ensure water quantity and quality is maintained for other users including tourists, recreational users and other users such as farmers. • The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities local residents and tourists, including opportunities for access to recreation	• To protect and improve health and well-being and promote sustainable socio-economic development through provision of access to a resilient, high quality, sustainable and affordable supply of water over the long term • To protect and enhance the water environment for other users including recreation tourism and navigation.	• Will it help to ensure access to a resilient and secure supply of drinking water? • Will it help to promote healthy communities and protect from risks to health and wellbeing? • Will it assist in provision of essential infrastructure and services to support health and well-being and a sustainable economy? • Will it avoid negative effects on human health or quality of life, e.g. through noise, air quality or transport impacts? Will it protect or enhance opportunities for recreation, tourist activities and navigation? • Will it avoid the disruption to the availability and quality of recreational facilities including greenspace (ha)?

SEA topic	PPP Key Messages	Baseline Key Issues	SEA Objectives	Indicator Questions
		resources and the natural and historic environment. • The need to accommodate an increasing population. • Sites of nature conservation importance, heritage assets, water resources, important landscapes and public rights of way contribute to recreation and tourism opportunities and subsequently health and well-being and the economy.		• Will it help to ensure access to a resilient and secure supply of drinking water by reducing the impact of unplanned outages through asset capacity enhancement and/or increased supply system reinforcements (Ml/d)? • Will the option affect Public Rights of Way? • Will the option have an effect on active lifestyles, such as impacts on active travel through disruption to pedestrian and cycle routes? Does the option improve access to the natural environment for recreation, including those living within deprived areas?
Material assets and resource use	• Promote sustainable management of natural resources, sustainable production and consumption whilst seeking to reduce the amount of waste generated by using materials, energy and water more efficiently. • Consider issues of water demand, water supply and water quality in the natural environment and ensure a sustainable use of water resources. • Contribute to a resource efficient, green and competitive low carbon economy. Maintain a reliable public water supply and ensure there is enough water for human uses, as	• The need to minimise the consumption of resources, including water and energy • The need to reduce the total amount of waste produced in the region, from all sources, and to reduce the proportion of this waste sent to landfill. • Need to reduce leakage from the water supply system. • Daily consumption of water resources is higher than the national average in the area and there is a need to encourage more efficient use.	• To reduce, and make more efficient, the domestic, industrial and commercial consumption of resources, minimise the generation of waste including leakage from the water supply system, encourage its re-use and eliminate waste sent to landfill.	• Will it minimise the demand for water and/or increase efficiency in water use through achieving reduced leakage from the water supply system (Ml/d)? • Will it minimise the use of energy and promote energy efficiency? • Will it minimise waste, and increase the proportion sent to reuse or recycling? • Will it make use of existing infrastructure? • Will it help to encourage sustainable design or use of

SEA topic	PPP Key Messages	Baseline Key Issues	SEA Objectives	Indicator Questions
	well as providing an improved water environment. • Minimise the production of waste, ensure waste management is in line with the 'waste hierarchy', and eliminate waste sent to landfill. • Promote the sustainable management of natural resources.			sustainable materials (e.g. supplied from local resources)? • Will the option affect major built assets and infrastructure, including transport infrastructure? • Will it minimise process wastage, and increase the proportion of recycled treated effluent, grey water and surface water used as a potable substitute (Ml/yr)?
Water	• Maintain and improve water quality (surface waters and groundwater). • Improve the quality of the water environment and the ecology which it supports, and continue to provide high levels of drinking water quality. • Expand the scope of water protection to all waters, surface waters and groundwater. • Ensure appropriate management of abstraction and protect flow and level variability across the full range of regimes from low to high conditions. • Develop a resilient and flexible water management approach to cope with changing climate, population and economic conditions. • Balance the abstraction of water for supply with the other functions and	• The need to further improve the quality of the regions river, estuarine and coastal waters taking into account WFD status targets. • The need to maintain the quantity and quality of groundwater resources taking into account WFD status targets. • The need to improve the resilience, flexibility and sustainability of water resources in the region, particularly in light of potential climate change impacts on surface waters and groundwaters. • The need to ensure sustainable abstraction. • The need to ensure that people understand the value of water. • The need to reduce and manage flood risk.	• To maintain or improve the quality of rivers, lakes, groundwater, estuarine and coastal waterbodies. • To avoid adverse impact on surface and groundwater levels and flows, and ensure sustainable management of abstractions. • To reduce and manage flood risk, taking climate change into account. • To increase awareness of water sustainability and efficient use of water.	• Will it avoid contamination of groundwater? • Will it help to minimise risks associated with unsustainable abstraction of ground and surface waters? • Will it abstract from a water resource with resource availability (with reference to CAMS status and WFD considerations)? • Is the option likely to contribute to or conflict with the achievement of WFD objectives? • Will it alter the flow or level regime or residence time of surface waters or groundwaters? • Will it enable flexible control over the level of abstraction at short notice in response to

SEA topic	PPP Key Messages	Baseline Key Issues	SEA Objectives	Indicator Questions
	services the water environment performs or provides. • Encourage more efficient use of water and promote awareness of water sustainability. • Steer new development to areas with the lowest probability of flooding and manage any residual flood risk, taking account of the impacts of climate change. • Promote a catchment based approach to the management and work with local stakeholders to deliver catchment-based solutions to water quantity and quantity. • Develop a resilient and flexible water management approach to cope with changing climate, population and economic conditions. • Reduce flood risk to people, residential and non-residential properties, community facilities and key transport links, as well as designated nature conservation sites and heritage assets and landscapes of value. • Reduce risk of flooding from reservoirs.			changing environmental conditions? • Will it avoid reducing flood plain storage, or provide opportunities to improve flood risk management? • Will it enable a sustainable use of water resources that balances demand for water with environmental protection? • Will it contribute towards improving the awareness of water sustainability and its true value? • Will it encourage efficient water use (Per Capita Consumption)? • Will the option protect and enhance the environmental resilience of the water environment to climate change, flood risk and drought?
Soil, geology and land use	• Protect and enhance the quality and diversity of geology (including geological SSSIs) and soils, including geomorphology and geomorphological processes which	• The need to protect geological features of importance and maintain and enhance soil function and health. • The need to manage the land more holistically at the catchment level,	• To protect and enhance geology, geomorphology, and the quality and quantity of soils.	• Will it avoid damage to and protect geologically important sites? • Will it avoid damaging the quality of agricultural land?

SEA topic	PPP Key Messages	Baseline Key Issues	SEA Objectives	Indicator Questions
	can be lost or damaged by insensitive development. • Ensure that soils will be protected and managed to optimise the varied functions that soils perform for society (e.g. supporting agriculture and forestry, protecting cultural heritage, supporting biodiversity, as a platform for construction), in keeping with the principles of sustainable development. • Promote catchment-wide approach to land management by relevant stakeholders, in order to benefit natural resources, reduce pollution and develop resilience to climate change. • Promote mixed use developments, and encourage multiple benefits from the use of land in urban and rural areas, recognising that some open land can perform many functions. • Encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value.	benefitting landowners, other stakeholders, the environment and sustainability of natural resources (including water resources). • The need to make use of previously developed land (brownfield land) and to reduce the prevalence of derelict land in the region.		• Will it protect, maintain and enhance soil function and health? • 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 ensure the restoration of land-based and marine habitats including grassland, woodland, wetland, moorlands, heathlands, and floodplains (ha)? • Will it avoid contributing to coastal erosion through restoration of coastal margins (ha)?
Air and climate	• Reduce greenhouse gas emissions. Targets include: reduce the UK's greenhouse gas emissions by at least 80% (relative to 1990 levels) by 2050.	• The need to reduce air pollutant and greenhouse emissions and limit air emissions to comply with air quality standards. • The need to mitigate against climate change through the reduction in	• To maintain and improve air quality. • To minimise greenhouse gas emissions. • To adapt and improve resilience to	• Will it reduce or minimise air pollutant emissions? • Will it increase emissions to air in an areas sensitive to emissions (e.g. in proximity to an AQMA or sensitive habitat)?

SEA topic	PPP Key Messages	Baseline Key Issues	SEA Objectives	Indicator Questions
	• Reduce the effects of air pollution on ecosystems. • Improve overall air quality. • Minimise energy consumption, support the use of sustainable/renewable energy and improve resilience to climate change. • Build in adaption to climate change to future planning and consider the level of urgency of associated risks of climate change impacts accordingly. • Need for adaptive measures to respond to likely climate change impacts on water supply and demand. • Sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. • Minimise energy consumption, support the use of sustainable / renewable energy and improve resilience to climate change.	greenhouse gas emissions in order to contribute to risk reduction over the long term. • The need to adapt to the impacts of climate change for example through, sustainable water resource management, specific aspects of natural ecosystems (e.g. connectivity) as well as accommodating potential opportunities of climate change.	the threats of climate change.	• Will it reduce or minimise transport or energy requirements, and associated air and greenhouse gas emissions? • Is there potential for the option to incorporate climate mitigation measures to reduce its carbon footprint, such as lower embodied carbon or incorporating renewable energy? • Is the option vulnerable to climate change effects? • Will it reduce vulnerability to risks associated with climate change effects (e.g. reduce the adverse effects of droughts and floods)?
Archaeology and cultural heritage	• Built development in the vicinity of historic buildings could have implications for the setting and/or built fabric and cause damage to	• The need to conserve or enhance sites of archaeological importance and cultural heritage interest, particularly those which are sensitive to the water environment.	• To conserve and enhance the historic environment, heritage assets and their settings, and	• Will it avoid damage to and protect the historic environment, heritage assets and their settings, places and spaces that enhance local distinctiveness?

SEA topic	PPP Key Messages	Baseline Key Issues	SEA Objectives	Indicator Questions
	any archaeological deposits present on the site. • Ensure active management of the Region's environmental and cultural assets. • Ensure effects resulting from changes to water level (surface or sub-surface) on all water dependent historical and cultural assets are avoided. Consider effects on important wetland areas with potential for paleo-environmental deposits. • Promote the conservation and enhancement of the historic environment, including the promotion of heritage and landscape as central to the culture of the region and conserve and enhance distinctive characteristics of landscape and settlements. • Conserve heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of this and future generations.		protect archaeologically important sites.	• Will abstraction alter the hydrological setting of water-dependent assets? • Will it improve access, value, understanding or enjoyment of heritage assets and culturally/historically important assets in the region?
Landscape and visual amenity	• Protection and enhancement of landscape (including designated landscapes, landscape character, distinctiveness and the countryside).	• The need to protect and improve the natural beauty of the region's AONBs and other areas of natural beauty.	• To protect and enhance designated and undesignated landscape, townscape and the countryside.	• Will it avoid adverse impacts and enhance designated landscapes? • Will the option affect visual amenity? • Will it improve access to valued areas of landscape character,

SEA topic	PPP Key Messages	Baseline Key Issues	SEA Objectives	Indicator Questions
	• Abstraction and low river flows could negatively affect landscape and visual amenity. • Enhance the value of the countryside by protecting the natural environment for this and future generations. • Improve access to valued areas of landscape character in sustainable ways to enhance its enjoyment and value by visitors and stakeholders.			e.g. the countryside and open space? • Will the option create or improve green infrastructure which contributes to access to the landscape? • 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?

5.1.1 Interactions between objectives

Schedule 2, paragraph 6 of the SEA Regulations requires that the inter-relationship between the issues referred to between SEA topics shall be explored. The matrix in **Table 5.2** identifies potential interactions between the proposed SEA objectives. In most cases the interactions are identified as compatible, or no interactions occur. Exceptions comprise:

- Potential incompatibility between objectives 2.1 and 4.4, as efforts to increase water efficiency could exacerbate inequalities by disproportionately impacting low income or vulnerable communities.
- Potential mixed interactions between objectives 4.2, 6.3 and 8.1, as actions to improve water resource management and climate change resilience (e.g. water management infrastructure) could be considered to enhance or detract from landscape quality.

Table 5.2 SEA objective interaction matrix

		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
1.1	To protect and enhance biodiversity, ecological functions, capacity, and habitat connectivity within Yorkshire Water's supply and source area.																	
1.2	To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	✓																
1.3	To avoid introducing or spreading INNS.	✓	✓															
1.4	To provide opportunities for habitat creation or restoration and a net benefit/gain for biodiversity	✓	✓	✓														
2.1	To protect and improve health and well-being and promote sustainable socio-economic development through provision of access to a resilient, high quality, sustainable and affordable supply of water over the long term.	✓	✓		✓													
2.2	To protect and enhance the water environment for other users, including recreation, tourism and navigation.	✓	✓	✓	✓	✓												
3.1	To reduce, and make more efficient, the domestic, industrial and commercial consumption of resources, minimise the generation of waste, encourage its re-use and eliminate waste sent to landfill.		✓			✓	✓											
4.1	To maintain or improve the quality of rivers, lakes, groundwater, estuarine and coastal waterbodies	✓	✓	✓	✓	✓	✓											
4.2	To avoid adverse impact on surface and groundwater levels and flows, and ensure sustainable management of abstractions.	✓	✓	✓	✓	✓	✓		✓									
4.3	To reduce and manage flood risk, taking climate change into account.	✓	✓		✓		✓											
4.4	To increase awareness of water sustainability and efficient use of water.	✓	✓		✓	✗	✓	✓		✓								
5.1	To protect and enhance geology, geomorphology, and the quality and quantity of soils.	✓	✓		✓				✓	✓	✓							
6.1	To maintain and improve air quality.	✓	✓		✓	✓	✓	✓		✓			✓					
6.2	To minimise greenhouse gas emissions.	✓	✓		✓	✓	✓	✓		✓			✓	✓				
6.3	To adapt and improve resilience to the threats of climate change.	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓			
7.1	To conserve and enhance the historic environment, heritage assets and their settings and protect archaeologically important sites.	✓				✓	✓			✓	✓			✓		✓		
8.1	To protect and enhance designated and undesignated landscapes, townscapes and the countryside.	✓	✓		✓	✓	✓		~	~	✓		✓			~	✓	
	SEA objective	1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1

✓ Compatible
✗ Incompatible
~ Mixed
(blank) No direct interaction

5.2 Assessment framework

5.2.1 Primary assessment

An appraisal framework was used to assess each of the potential WRMP measures against the SEA objectives. The appraisal framework has been applied to test the performance of each of the alternative measures against the SEA objectives. The assessment will be used to inform the selection and phasing of measures for inclusion in Yorkshire Water's WRMP24.

An example appraisal framework table is given in **Table 5.3**.The appraisal framework is structured as follows:

- The first and second columns set out the SEA topics and objectives.
- The scale of the effect, which might relate to either geographical scale or the size of the population affected, is identified in the third column on a scale of small, medium to large.
- The impact evaluation includes consideration of the nature of the impact, certainty of effect, duration and permanence (fourth, fifth and sixth columns of **Table 5.3)** in compliance with criteria for determining the likely significance of effects specified in the SEA Directive Article 3(5) and Annex II, and the SEA Regulations Part 2, Regulation 9(2a) and Schedule 1. With respect to duration of temporary effects, short-term impacts are defined as those that last for up to six months, medium term impacts are those that extend for six months to two years whilst longer term temporary impacts are assessed as those that extend to two to five years. A 'significant long term' temporary impact category is used for those temporary effects that continue beyond five years in duration.
- The seventh column identifies the magnitude of the effect on a scale of low, medium and high.
- The value/sensitivity of the receptor(s) is identified in the eighth column on a scale of low, medium and high.
- The ninth column will be populated during the assessment with a commentary and evaluation of the impact of each alternative measure on the objectives for each topic, with reference to the indicator questions set out in column three. The assessment will assume the implementation of standard best practice in implementing the measures and any defined mitigation measures (which will be set out) so that the significance of effects relates to the residual effects after mitigation in line with the ODPM Practical Guide and UKWIR SEA national guidance. The mitigation measures for any identified adverse effects will be identified within the appraisal framework.
- The residual adverse and beneficial effects (after application of best practice approaches and any appropriate mitigation measures) are identified in the tenth and eleventh columns respectively. These were identified separately so as to avoid mixing adverse and beneficial effects. The commentary in column nine, combined with the magnitude (column seven) and value/sensitivity (column eight) informs the residual adverse or beneficial effects.

Table 5.3 Example of a SEA appraisal framework to be completed for each potential WRMP option

Topic	SEA objective	Scale of effect: geographical &/or population affected (Small/ Medium/ Large)	Certainty of effect (Low/ Medium/ High)	Duration of effect (short/ medium /long term)	Permanence of effect (permanent/ temporary)	Magnitude of effect (Low/ Medium/ High)	Value/ sensitivity of receptor (Low/ Medium/ High)	Potential residual effect on sensitive receptors (assuming good practice construction methods)	Residual Adverse Effect (likely to remain after reasonable mitigation)	Residual Beneficial Effect (likely to remain after reasonable mitigation)
Biodiversity, fauna and flora	1.1 To protect and enhance biodiversity, ecological functions, capacity, and habitat connectivity within the WReN region.									
	1.2 To provide opportunities for habitat creation or restoration and a net benefit/gain for biodiversity.									
	1.3 To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.									
	1.4 To avoid introducing or spreading INNS.									

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The SEA appraisal framework was used to capture the assessment for each option (one table completed per option), alternative WRZ programmes and the WRMP as a whole.

Varying levels of uncertainty are inherent within the assessment process. The assessment minimised uncertainty through the application of expert judgement. The level of uncertainty of the option assessment for each SEA objective was reported in the appraisal framework. Where there was significant uncertainty which precludes an effects assessment category being assigned for a particular option and SEA objective, an "uncertain" residual effects assessment label was able to be applied to that specific SEA objective, although for the WRMP24 assessment this has not been required.

The assessment of the options and the overall WRMP were carried out using the effects assessment matrix shown in **Figure 5.1**, taking account of the scale, duration and permanence of the effect. The definitions for the effect significance are explained beneath **Figure 5.1**.

The effects assessment took account of any proposed mitigation measures that were incorporated into the option conceptual design and costs, i.e. it was the residual effects after the application of mitigation that were assessed.

The resulting significance of effects was considered in the prioritisation of options and programmes of options. Where major adverse residual effects were predicted, measures envisaged to prevent, reduce and as fully as possible offset these effects on the environment (as a result of implementing the WRMP) are outlined in the Environmental Report where appropriate. These are in addition to any mitigation that has already been included in the conceptual design and costs of each alternative option. Mitigation may include additional provisions within the WRMP itself and/or measures to be applied during the WRMP implementation stage. It may also include proposals for changing other plans and programmes to address significant cumulative residual effects. Yorkshire Water will consider how any remaining significant residual effects identified are to be monitored to identify any unforeseen adverse effects and to enable appropriate remedial action to be taken.

Figure 5.1 Significance matrix used to assess effects of each WRMP option on each SEA objective

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

5.2.1.1 General Significance Definitions

Major - effects represent key factors in the decision-making process. They are generally associated with sites and features of international, national or regional importance. The magnitude of effect includes consideration of the scale of effect and a high significance of effect may relate to impacts on a large geographical scale (the entirety of the SEA study area or larger) or where a considerable size of the population is affected. If adverse, such resources/features are generally those which cannot be replaced or relocated.

Moderate - effects are likely to be important considerations at a regional or district scale or consistent with a medium effect magnitude (e.g. temporary effects of a medium-term scale of six months to two years). If adverse, they are likely to be of potential concern.

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

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

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

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

All options have been assessed to the same level of detail, in line with the SEA legislative requirements, national SEA guidance and the UKWIR SEA guidance. The level of detail for the environmental assessment of each option is consistent with the strategic nature of SEA. This is a high-level, strategic assessment, carried out without the detailed information which would be support an EIA. In the event that new options are introduced at a later stage (which may have less detailed information available) every endeavour will be made to ensure that the assessment is undertaken to a similar standard.

The analysis used a detailed suite of environmental and social datasets that are available at a consistent quality across the geographical footprint of all the options under consideration. The HRA[44] and WFD[45] assessments also informed the assessment at each key stage, with any adverse implications for Habitats Regulations or WFD compliance flagged during option assessments and used inform decision-making at the programme appraisal stage.

The assessment includes some quantitative analysis of environmental and social effects. The WRMP decision making methodology also includes metrics which relate to environmental and social aspects. These metrics are incorporated in a multi criteria analysis (MCA) approach to producing a best value plan. Where there is a clear overlap between the decision-making metrics and the SEA objectives, the SEA outputs have provided the data for measuring the metric[40].

Each feasible option is also assessed against the natural, social, human and financial and manufactured capitals. The natural, social and human capitals overlap with the SEA objectives. The approach of combining the SEA with the capitals creates a risk that the costs and benefits could be double counted at both an option and plan level and the Supplementary Guidance 'Environment and society in decision making'[33] recognises it is not possible to avoid this completely. At the end of the option appraisal process, an assessment will be made of the environmental and social impacts of the preferred plan to identify if any double counting could be a factor.

The assessment also considers effects on sites designated at a national and local level. The assessment of effects on SSSIs took account of conservation objectives established by Natural England, and SSSI Impact Risk Zone (IRZ) datasets. Effects on other designated sites set out in the WRPG have also been assessed, comprising National Nature Reserves, Local Nature Reserves, Marine Conservation Zones, Scheduled Ancient Monuments, World Heritage Sites, National Parks and Areas of Outstanding Natural Beauty. Information on Local Wildlife Sites has been included in the assessment where data are available, however detailed assessment of impacts on Local Wildlife Sites would occur during project-level EIA preparation.

5.2.2 Secondary, cumulative and synergistic environmental effects

Schedule 2(6) of the SEA Regulations requires the assessment of "*The likely significant effects on the environment, including short, medium and long-term effects, permanent and temporary effects, positive and negative effects, and secondary, cumulative and synergistic effects….*" These can be defined as follows:

- Secondary or indirect effects are effects that are not a direct result of the plan, (e.g. an abstraction that changes local groundwater levels and thus affects the ecology of a nearby wetland).

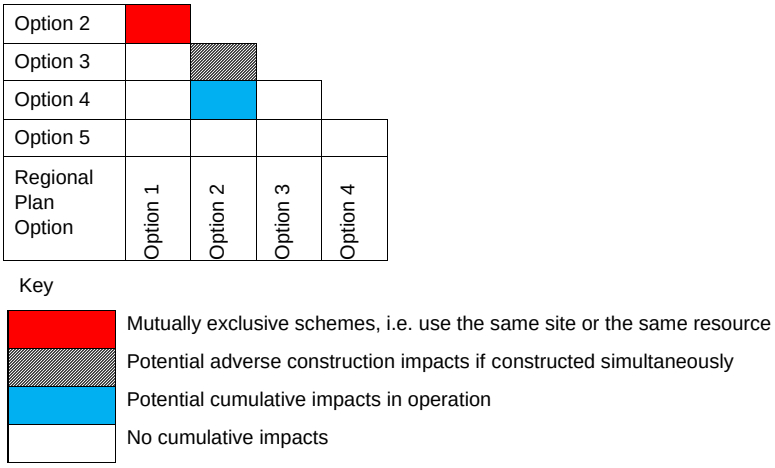
[40] WReN (2022) Emerging Regional Plan for Informal Consultation (January 2022) – Appendix 4 Objective and metric development.

- Cumulative effects arise, for instance, where several nearby groundwater sources each have insignificant effects but together have a measurable effect on river flows; or where several individual effects of a water resource zone programme (e.g. traffic disruption) have a combined effect.
- Synergistic effects interact to produce a total effect greater than the sum of the individual effects. Synergistic effects often happen as habitats, resources or human communities get close to capacity. For instance, a wildlife habitat can become progressively fragmented with limited effects on a particular species until the last fragmentation makes the areas too small to support the species at all.

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

A matrix such as the example provided in **Figure 5.2** will be used to help consider interactions between options. In assessing these effects, consideration will be given to other factors which may affect the receiving environment in the short, medium and long term.

Figure 5.2 Cumulative Effects Assessment Matrix



5.2.2.1 Programme and WRMP level cumulative effects assessment

To meet the requirements of the SEA Regulations, cumulative effects between the preferred plan have been assessed, as have those of the WRMP with other relevant plans, programmes or projects, including Yorkshire Water's Drought Plan, the WReN Regional Plan and neighbouring water companies' WRMPs and Drought Plans.

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

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

The following cumulative assessments have therefore been completed:

- An assessment of cumulative effects of options that could potentially be implemented at the same time. Mutually exclusive options (e.g. those that draw upon the same resource or use the same site) have been identified.
- Assessment of cumulative effects of the Yorkshire Water WRMP with the Yorkshire Water Drought Plan, the WReN Regional Plan, other water company Drought Plans and WRMPs, Environment Agency Drought Plans and other relevant water management plans. The potential for a neighbouring company implementing options under its WRMP simultaneously has been considered. Neighbouring water companies will be included as consultees to the WRMP and associated SEA Environmental Report in order to identify any trans-boundary issues.
- Assessment of potential cumulative effects of the Yorkshire Water WRMP with any other identified relevant programmes, plans and strategic projects that may be in place / implemented during the period of the WRMP.

5.2.3 Considerations of reasonable alternatives

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[41] on the SEA Directive discusses possible interpretations of handling 'reasonable alternatives'. It states that "*The alternatives chosen should be realistic. Part of the reason for studying alternatives is to find ways of reducing or avoiding the significant adverse effects of the proposed plan or programme. Part of the reason for studying alternatives is to find ways of reducing or avoiding the significant adverse effects of the proposed plan or programme*". Echoing this, Government guidance[42] 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.

For the purposes of this SEA, the feasible options have been considered as reasonable alternatives to the preferred options (that comprise the preferred plan).

In addition, reasonable alternatives that operate at the plan level have also been considered. The cumulative effects have been identified, described and evaluated for each reasonable alternative plan, for consideration along with the preferred plan.

5.3 Consideration of effects outside the WRMP boundary

Yorkshire Water has considered several options in developing its WRMP, including potential transfer options from neighbouring water companies and others in proximity to the boundary which could result in cross boundary effects in adjacent areas. As discussed in Section 4.2, the spatial scope of the SEA included a 10km corridor of the Tyne and Tees to cover the potential for options from Northumbrian Water. Additionally, all assessments have been undertaken using GIS data and included buffers that may extend beyond the boundaries covered by the WRMP. This approach ensures all potential receptors have been considered in the assessment.

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

5.4 Limitations of the study

The SEA Regulations require identification of any difficulties encountered during the assessment process. This may include technical deficiencies or a lack of knowledge.

SEA is a high-level assessment aimed at highlighting potential environmental concerns. The environmental data used in this assessment are based on that which is readily available from existing sources. Difficulties encountered in undertaking this SEA included the requirement to rely on varying levels of detail in design specifications of schemes, many of which are at conceptual or outline design stage only. Assessment of impacts is necessarily limited when, for example, pipeline routes are at an indicative stage only. For some demand management options (e.g. leakage reduction), the location of works are unknown at this stage and further detailed analysis during implementation of the WRMP would be required. As a consequence, effects on some objectives, such as biodiversity, are uncertain for these options and this has been reflected in the assessment.

Where particular limitations or outstanding issues are known, these are briefly described in the SEA appraisal tables for the relevant option concerned. Similarly, where mitigation measures have been applied these have been identified in the SEA appraisals. It is important to note that the residual effects assessment have accounted for “reasonable” mitigation measures only, such as the use of best practice construction measures or where suitable mitigation measures are known and identified. Further mitigation measures may be employed. Detailed assessments of options will be conducted in project-level EIA closer to the time of option implementation, this will include identification of specific mitigation measures to be implemented.

The assessment of cumulative effects as a result of implementing the 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 assessment of WRMPs.

6 Assessment of options

Options appraisal is an overarching term for the identification and assessment of options under consideration for the WRMP. Through this process, options which are found to have unacceptable adverse effects have been identified through the SEA options assessment to inform the programme appraisal modelling. The findings of the HRA and WFD compliance assessments informed the SEA assessment.

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

6.1 Customer management options

Table 6.1 provides a summary of the SEA evaluation for each customer management option in the WRMP. The detailed appraisal framework tables for each option are provided in **Appendix E**.

The customer management options are unlikely to have any major or moderate adverse effects on any of the SEA objectives. Minor adverse effects have been identified in relation to the air and climate objectives regarding reduction of air pollutant and greenhouse gas emissions. Most of the options will have an impact on air emissions through the increased number of vehicle journeys made to fit water meters, take meter readings or carry out audits. C13c will also experience a minor adverse effect in relation to population and human health as 'premium' charges will negatively impact high user households.

Minor beneficial effects have been identified for the majority of the customer management options as the additional yield will support the health and economic wellbeing of the population, contribute to the sustainable and efficient use of water resources and improve the Yorkshire Water's supply area resilience to climate change impacts. There are a number of options that, in isolation, will result in negligible beneficial impacts for every SEA objective. C2, C4, C5 and C30a will likely result in water savings of a magnitude considered to be of moderate beneficial effect meanwhile 30b of a major beneficial effect.

Table 6.1 Visual evaluation matrix summary for customer management options

Option	Impact	SEA Objective 1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	Summary Commentary
C1d Household customer audits and water efficiency retrofits	Adverse		None		None		None						None				None	None	Two minor adverse effects have been identified on air and GHG emissions as a result of increased number of vehicle journeys made to deliver water audits and fit appropriate water efficient devices.
	Beneficial				None		None						None				None	None	The scheme would have minor beneficial effects on population and human health, water and air and climate. There are additional negligible beneficial effects with respect to biodiversity, flora and fauna, material assets and resource use, water and air and climate.
C2 Metering domestic meter optants (growth)	Adverse		None		None		None						None				None	None	Two minor adverse effects have been identified on air and climate as a result of increased number of vehicle journeys made to survey premises, fit meters at properties and conduct subsequent meter reading activities.
	Beneficial				None		None						None				None	None	Three moderate beneficial effects are anticipated with respect to population and human health, water and air and climate. One minor beneficial effect is anticipated for material asset and resource use.
C4 Metering on change of occupancy	Adverse		**None**		**None**		**None**						**None**				**None**	**None**	Two minor adverse effects have been identified on air and climate as a result of increased number of vehicle journeys made to survey premises, fit meters at properties and conduct subsequent meter reading activities.
	Beneficial				None		None						None				None	None	Three moderate beneficial effects have been identified regarding population and human health, water and climate change resilience. One minor beneficial effect has been identified regarding material assets and resource use. These are all associated with the savings achieved in demand and the corresponding reduced need to abstract.
C5 Metering on asset end of life	Adverse		None		None		None						None				None	None	Two minor adverse effects have been identified on air and GHG emissions as a result of increased number of vehicle journeys made to fit smart meters at properties.
	Beneficial				None		None						None				None	None	Three moderate beneficial effects have been identified regarding population and human health, water and climate change resilience. One minor beneficial effect has been identified for material assets and resource use. These are all associated with the savings achieved in demand and the corresponding reduced need to abstract.
C6a Non-household water use audit and retrofit	Adverse				None								None				None	None	Two minor adverse effects have been identified on air and GHG emissions as a result of increased number of vehicle journeys made to deliver audits and install appropriate water saving retrofit devices in individual commercial properties.
	Beneficial				None								None				None	None	The scheme would have thirteen negligible beneficial effects with respect to biodiversity, flora and fauna, population and human health, material assets and resource use, water and air and climate.
C6a(ii)-Non-household domestic water use audit and retrofit	Adverse				None								None				None	None	Two minor adverse effects have been identified on air and GHG emissions as a result of increased number of vehicle journeys made to deliver audits and install appropriate water saving retrofit devices in individual commercial properties.
	Beneficial				None								None				None	None	The scheme would have three minor beneficial effects with respect to population and human health, water and air and climate.
C11c Retrofits of rainwater harvesting for households	Adverse		None		None		None						None				None	None	Two minor adverse effects have been identified on air and GHG emissions as a result of increased number of vehicle journeys made to install appropriate water saving retrofit devices in individual existing houses.
	Beneficial				None		None						None				None	None	The scheme would have one minor beneficial effect with respect to material assets and resource use.

Option	Impact	SEA Objective 1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	Summary Commentary
C12a3 Rainwater harvesting for commercial customers	Adverse		None		None		None						None				None	None	Two minor adverse effects have been identified on air and GHG emissions as a result of increased number of vehicle journeys made to install appropriate water saving retrofit devices in individual commercial properties.
	Beneficial				None		None						None				None	None	The scheme would have four minor beneficial effects with respect to population and human health, material assets and resource use, water and air and climate.
C13c Household tariffs	Adverse				None		None						None				None	None	A minor adverse effect has been identified with respect to population and human health as 'premium' charges will negatively impact high user households.
	Beneficial				None		None						None				None	None	Only negligible beneficial impacts are expected to result from this scheme.
C15d Installation of internal household flow regulators	Adverse				None		None						None				None	None	All adverse effects have been assessed as negligible.
	Beneficial				None		None						None				None	None	One minor beneficial effect has been identified with respect to water efficiency.
C18c Leaky loo fixes	Adverse				None		None						None				None	None	Two minor adverse effects have been identified on air and GHG emissions as a result of increased number of vehicle journeys made to investigate and repair plumbing losses in households.
	Beneficial				None		None						None				None	None	Only negligible beneficial impacts are expected to result from this scheme.
C21c Community Incentives	Adverse		None		None		None						None				None	None	Two minor adverse effects have been identified on air and GHG emissions as a result of increased number of vehicle journeys made to deliver water audits and fit appropriate water efficient devices.
	Beneficial				None		None						None				None	None	The scheme would have negligible beneficial effects with respect to biodiversity, flora and fauna, population and human health, material assets and resource use, water and air and climate.
C23b1 Rainwater harvesting for agriculture	Adverse				None		None						None				None	None	Two minor adverse effects have been identified on air and GHG emissions as a result of increased number of vehicle journeys made to install rainwater harvesting equipment.
	Beneficial				None		None						None				None	None	The scheme would have two minor beneficial effects with respect to population and human health and water (associated with promotion of water efficiency).
C27d School visits	Adverse		None	None	None		None						None				None	None	Two minor adverse effects have been identified on air and GHG emissions as a result of increased number of vehicle journeys made to visit schools.
	Beneficial			None	None		None						None				None	None	The scheme would have four minor beneficial effects with respect to population and human health, material assets and resource use, water and climate resilience.
C28e Household media campaign	Adverse				None		None						None				None	None	Two minor adverse effects have been identified on air and GHG emissions as a result of increased number of vehicle journeys made to implement these social media campaigns.

Option	Impact	SEA Objective 1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	Summary Commentary
	Beneficial				None		None						None				None	None	The scheme would have six minor beneficial effects for biodiversity, flora and fauna, population and human health, material assets and resource use, water resources (abstraction), and climate resilience.
C29c Household incentives	Adverse				None		None						None				None	None	Any adverse effects are considered to be negligible adverse.
	Beneficial				None		None						None				None	None	Any beneficial effects are considered to be negligible beneficial.
C30a Water labelling-baseline	Adverse			None	None								None				None	None	Any adverse effects are considered to be negligible adverse.
	Beneficial			None	None								None				None	None	Three moderate beneficial effects are anticipated for population and human health, water efficiency and climate resilience. One beneficial effect is anticipated for material assets and resource use.
C30b Water labelling-low demand common reference scenario	Adverse			None	None								None				None	None	Any adverse effects are considered to be negligible adverse.
	Beneficial			None	None								None				None	None	Three major beneficial effects are anticipated for human health, water efficiency and climate resilience.
C32c Rainwater harvesting for households-new developments	Adverse				None		None						None				None	None	Two minor adverse effects have been identified on air and GHG emissions as a result of increased number of vehicle journeys made to install rainwater harvesting equipment in new household developments.
	Beneficial				None		None						None				None	None	The scheme would have five minor beneficial effects with respect to population and human health, material assets and resource use, water and air and climate.
C34a Non-household media campaign	Adverse	None			None		None						None	None	None		None	None	Any adverse effects are considered to be negligible adverse.
	Beneficial				None		None						None	None	None		None	None	There is one minor beneficial effect in relation to the encouragement of water efficiency and sustainability. The remaining are considered to be negligible beneficial.
C35c Water retailer incentives	Adverse			None	None								None				None	None	Any adverse effects are considered to be negligible adverse.
	Beneficial			None	None								None				None	None	Any beneficial effects are considered to be negligible beneficial.
C36 Metering domestic meter optants (enhanced programme)	Adverse				None		None						None				None	None	Only negligible adverse effects have been identified for this option.
	Beneficial				None		None						None				None	None	The scheme would have three minor beneficial effects with respect to population and human health, water and air and climate.

Option	Impact	SEA Objective 1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	Summary Commentary
C37 Metering new developments (growth)	Adverse		None		None		None		None	None	None		None				None	None	One minor negligible effect are anticipated for air and GHG emissions.
	Beneficial		None		None		None		None	None	None		None				None	None	The scheme would have three minor beneficial effects with respect to population and human health, water and air and climate.

Note: See Section 5.2 for description of SEA objectives.

Key:

- Major adverse
- Moderate adverse
- Minor adverse
- Negligible adverse
- None — Not applicable
- Major beneficial
- Moderate beneficial
- Minor beneficial
- Negligible beneficial

6.2 Leakage options

Table 6.2 provides a summary of the SEA evaluation for each of the leakage management options in the WRMP as well as Option LSM (Leakage Reduction and Smart metering glidepath). The detailed appraisal framework tables for each option are provided in **Appendix E**.

The majority leakage options are unlikely to have any major or moderate adverse effects on any of the SEA objectives. Three options are anticipated to have minor adverse effects on health and wellbeing of local populations, reduction in consumption of resources, improvement in air quality. These minor adverse effects are predominantly resulting from disturbances created from the physical maintenance activities of these options, which would result in temporary increases in noise and air pollution, disturbance to communities and changes in local views and settings.

Options D3a-e and D9a-j are anticipated to have moderate benefits on population and human health, material assets and resource use, efficient use of water and climate resilience due to the savings created by these leakage control options.

The glidepath option (LSM) involves both leakage reduction activities and roll out of smart metering. The assessment of this option identified moderate adverse effects on material assets and resource use due to the materials required to undertake activities such as pipework renewal and for the production of metering equipment. Furthermore, major beneficial effects are anticipated on SEA objectives for human health, water efficiency and climate change resilience as a result of the significant projected demand savings (115.85Ml/d).

Table 6.2 Visual evaluation matric summary for leakage options

Option	Impact	SEA Objective 1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	Summary Commentary
D1a-e Active Leakage Control	Adverse				None														The developments required are mainly concentrated in urban/suburban areas where impacts on European sites are likely to be limited. However, development of this scheme would result in minor adverse effects on air and climate, populations and health, material assets and resource use, archaeology and cultural heritage and landscape and visual amenity which would be reduced to negligible following implementation of mitigation measures.
	Beneficial				None														The scheme would be beneficial by reducing the amount of water required to be abstracted. Three moderate beneficial effects have been identified for population and human health, water efficiency and climate change resilience. Furthermore, four minor beneficial effects have been identified on biodiversity, resource use and water.
D2a-c Pressure management	Adverse				None														The developments required are mainly concentrated in urban/suburban areas where impacts on European sites are likely to be limited. However, development of this scheme would result in minor adverse effects on air and climate, populations and health, material assets and resource use, archaeology and cultural heritage and landscape and visual amenity.
	Beneficial				None														The scheme would be beneficial by reducing the amount of water required to be abstracted. Seven minor beneficial effects have been identified on biodiversity, population and human health, resource use, water and climate change resilience.
D3a-e Mains renewal/ replacement	Adverse				None														The developments required are mainly concentrated in urban/suburban areas where impacts on European sites are likely to be limited. However, development of this scheme would result in minor adverse effects on populations and health and material assets and resource use and air quality.
	Beneficial				None														The scheme would be beneficial by reducing the amount of water required to be abstracted. Four moderate beneficial effects have been identified on population and human health, material assets and resource use, water and climate change resilience. Three minor beneficial effects have been identified for biodiversity, flora and fauna and water.
D6a Above ground pressure management	Adverse				None														The developments required are mainly concentrated in urban/suburban areas where impacts on European sites are likely to be limited. However, development of this scheme would result in negligible adverse effects on air and climate, populations and health, material assets and resource use, archaeology and cultural heritage and landscape and visual amenity.
	Beneficial				None														The scheme would be beneficial by reducing the amount of water required to be abstracted. Two minor beneficial effects have been identified on material assets and resource use and water.
D7a-e Permanent acoustic logging	Adverse				None														Development of this scheme would result in minor adverse effects on air and climate, populations and health and material assets and resource use. The remaining effects are considered to be negligible adverse.
	Beneficial				None														Three moderate beneficial effects have been identified on population and human health, water and climate change resilience.
D9a-j High tech active leakage control	Adverse			None	None	None	None						None	None	None		None	None	All adverse effects identified have been given a negligible adverse scoring.
	Beneficial			None	None		None						None	None	None		None	None	The scheme would be beneficial by reducing the amount of water required to be abstracted. Four moderate beneficial effects have been identified of population and human health, resource use, water and climate change resilience. Three minor beneficial effects have been identified for biodiversity, flora and fauna and water.
D15a-e Intensive active leakage control	Adverse				None														The developments required are mainly concentrated in urban/suburban areas where impacts on European sites are likely to be limited. However, development of this scheme would result in minor adverse effects on air and climate, populations and health, material assets and resource use, archaeology and cultural heritage and landscape and visual amenity.

Option	Impact	SEA Objective 1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	Summary Commentary
	Beneficial				None														The scheme would be beneficial by reducing the amount of water required to be abstracted. Five minor beneficial effects have been identified on population and human health, resource use, water and climate change resilience.
D16a-e Trunk main active leakage control	Adverse				None														The developments required are mainly concentrated in urban/suburban areas where impacts on European sites are likely to be limited. However, development of this scheme would result in minor adverse effects on air and climate, populations and health, material assets and resource use, archaeology and cultural heritage and landscape and visual amenity.
	Beneficial				None														The scheme would be beneficial by reducing the amount of water required to be abstracted. Six minor beneficial effects have been identified on biodiversity, population and human health, resource use, water and climate change resilience.
D17a Transient Pressure Management	Adverse				None														The developments required are mainly concentrated in urban/suburban areas where impacts on European sites are likely to be limited. However, development of this scheme would result in negligible adverse effects only when considering best practice mitigation measures.
	Beneficial				None														The scheme would be beneficial by reducing the amount of water required to be abstracted however all effects are assessed as negligible given the relatively small yield.
LSM Leakage reduction and smart metering glidepath (50%)	Adverse				**None**														The developments required are mainly concentrated in urban/suburban areas where impacts on European sites are likely to be limited. However, development of this scheme would result in one moderate adverse effect on material assets and resource use along with three minor adverse effects on air and climate and population and health.
	Beneficial				**None**														The scheme would be beneficial by reducing the amount of water required to be abstracted. Three major beneficial effects have been identified for population and human health, water efficiency and climate change resilience. Furthermore, one moderate beneficial effect has been identified for resource use in addition to four minor beneficial effects across biodiversity and water.

Note: See Section 5.2 for description of SEA objectives.

Key:

- Major adverse
- Moderate adverse
- Minor adverse
- Negligible adverse
- None — Not applicable
- Major beneficial
- Moderate beneficial
- Minor beneficial
- Negligible beneficial

6.3 Resource management options

A wide variety of options have been assessed, leading to a range of environmental effects being identified. These reflect the scale of abstraction and/or the location of the option in relation to sensitive environments (aquatic and terrestrial). As may be expected, the smaller scale options generally have the lower environmental effects, but differences do occur between such options due to their environmental setting. Many of the options have no greater than minor adverse effects. However, some options may have moderate or major adverse effects for some of the SEA objectives, as discussed in the following paragraphs.

Table 6.3 provides a summary of the SEA evaluation for each of the resource management options in the WRMP. The detailed appraisal framework tables for each option are provided in **Appendix E**.

All resource management options are anticipated to result in adverse impacts to SEA objectives apart from R90. A total of 20 options are anticipated to cause major adverse impacts to SEA objectives.

Three schemes are anticipated to have major adverse effects against a total of six SEA objectives: DV8(iv)A(i), DV8(iv)A(ii) and DV8B. A further two schemes are anticipated to have major adverse effects against a total of five SEA objectives: DV6(vi) and DV8(iv). All the Derwent Valley (DV) resource options, with the exception of DV3, DV8(v) and DV8(v)A, are anticipated to lead to major adverse impacts on biodiversity. Major adverse impacts for these options are also anticipated in relation to material assets and resource use, protection and enhancement of geology/soil quality, and minimisation of greenhouse gas emissions. However, these options are also anticipated to be associated with major to moderate beneficial effects on population and human health and climate change resilience due to the increase in available public water supply.

The Ouse Raw Water Transfer (R2) option is anticipated to have two moderate adverse effects on biodiversity, and archaeology and cultural heritage due to the construction of the abstraction and new pipeline. However, two major beneficial effects were identified, related to population and human health and climate change resilience due to a yield of 60Ml/d, therefore maintaining the supply-demand balance. The River Ouse water treatment works extension (R1a) option may also lead to moderate adverse effects on biodiversity.

The Grid network enhancement: New River Ouse WTW to York (R1c) option and associated pipelines option to North Yorkshire (R1d and R1f) have been identified as having a major adverse effect on biodiversity. The Grid network enhancement: New River Ouse WTW to North Yorkshire 3 Option (R1f) is also anticipated to result in moderate adverse effects for material assets and resource use, air and climate and archaeology and cultural heritage. R1g Grid network enhancement: New River Ouse WTW to York is not anticipated to result in any moderate or major adverse effects, but has the potential for moderate benefits to biodiversity given the opportunities for habitat enhancement and to climate reliance in relation to deployable output increases.

R6 South Yorkshire Groundwater Option 1 has been identified as having a moderate adverse effect on water due to a potential impact on ground water balance and surface water flows.

The Sherwood Sandstone and Magnesian Limestone Boreholes Option 3 (R8c) is anticipated to lead to three moderate adverse effects; for population and human health, due to construction work being required in residential areas, and for cultural heritage, due to construction impacting upon the quality and settings of Scheduled Monuments and several Grade II Listed Buildings. R8f Sherwood Sandstone and Magnesian Limestone Boreholes Option 6 has been identified as having potential for a major adverse effect on biodiversity due to its proximity to designated sites as well as a moderate effect on archaeology and cultural heritage. Moderate benefits are however anticipated for population and human health due to the increase in supply of up to 20Ml/d. R8g Sherwood Sandstone Boreholes support to North Yorkshire is also expected to have moderate benefits for population and human health with an increased deployable output of 15Ml/d.

The R13 East Yorkshire Groundwater Option 2 is associated with moderate adverse effects on biodiversity due to the potential for adverse temporary effects on nearby ancient woodland. Moderate adverse effects on groundwater are also associated with the option pending further investigation.

The R29 Reservoir desilting option is assessed as having a major adverse effect on biodiversity and the quality of habitat in a number of nationally and internationally designated sites. If desilting requires extensive drawdown of the reservoirs, there will also likely be temporary moderate adverse effects on landscape and visual amenity given the setting of these reservoirs. Desilting works have the potential to temporarily cause adverse effect on water quality both within the reservoir and in the downstream watercourses due to elevated turbidity in the compensation flow release water. Desilting would only occur following careful planning and further investigations, and that the list of reservoirs included in the option may decrease if unacceptable environmental impacts are identified. An increase of 11Ml/d in deployable output will likely lead to moderate beneficial effects on population and human health and adapting to climate change.

Option R34 (River Calder Abstraction Option 1) has the potential for moderate adverse effects on population and human health, and archaeology and cultural heritage. A large proportion of the pipeline route will pass through heavily built areas, leading to temporary adverse effects from noise, dust and vibration and temporary adverse impacts on a range of recreational facilities and historical assets.

The is also one possible moderate adverse effect for the River Aire Abstraction option 1 (R35), relating to archaeology and cultural heritage due to the proximity of the pipeline route potentially passing to a World Heritage Site (WHS). It will however provide a 10Ml/d yield on most days, contributing to moderate beneficial impacts.

Option R49 (Supply Dales from the Tees - raw) is expected to result in moderate adverse effects on biodiversity, material assets and resource use and cultural heritage given the proximity of construction to sensitive assets, including areas of ancient woodland and scheduled monuments) as well as the materials required to construct the scheme which will be consistent with the scale. However, the scheme will provide up to 15Ml/d which can support the health and economic wellbeing of the public and enhance climate resilience resulting in moderate beneficial effects.

The construction phase of the R51 Supply Dales from the Tees – treated option is anticipated to result in adverse effects on material assets and resource use, and archaeology and cultural heritage given the scale and location of construction. However, given the provision of an additional 15Ml/d essential public water supplies will be maintained bringing moderate beneficial effects to population and human health, air and climate through increased resilience to climate change, and biodiversity through habitat enhancement.

The East Yorkshire coast desalination (R61) and Tidal Abstraction Reservoir (R78) options have the potential for major adverse effects on biodiversity as it may impact on the Humber Estuary SAC/SPA/Ramsar. In addition, major adverse effects are associated with the significant amount of resource use and energy required to operate R61. However moderate benefits are anticipated for both options in relation to population and human health and climate resilience, associated with the maintenance of essential public water supply

The Aire and Calder new WTW (R86) option may result in moderate adverse impacts on biodiversity and material assets and resource use during the construction phase, however given the increase of up to 70Ml/d benefit to public water supply, moderate benefits have been identified for population and human health and climate resilience.

Increased abstraction related to the Rebuild Northallerton WTW (R87) option has the potential to have a major adverse effect on surface water flows and moderate adverse effects on water quality during implementation.

Assessment of Convert Wensleydale springs to boreholes (R89) has identified the potential for groundwater drawdown during operation to result in major adverse effects on flows in the associated surface water body, and for major adverse effects on groundwater quality.

Table 6.3 Visual evaluation matric summary for resource management option

Option	Impact	SEA Objective 1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	Summary Commentary
DV3 South Yorkshire GW	Adverse				None							None							Minor negative effects are anticipated for population and human health due to construction works taking place in close proximity to residential dwellings; material assets due to materials being required for construction; air quality and greenhouse gases due to emissions arising from construction. Minor negative effects on landscape are anticipated due to construction work being required in a greenbelt.
	Beneficial											None							Minor positive effects are anticipated on community health and resilience to climate change due to an increase in potable water supply in the region. Minor beneficial effects are also anticipated on opportunities for biodiversity enhancements.
DV6(iv) Import Tees to South Yorkshire Pipeline	Adverse				None							None							Major adverse effects associated with pipeline construction are anticipated on biodiversity, flora and fauna, resource use, soils and geology, air quality, greenhouse gas (GHG) emissions and landscape and visual amenity. Seven moderate adverse effects were identified for population and human health, water, and cultural heritage.
	Beneficial											None							Moderate beneficial effects on human health and wellbeing associated with the provision of an additional supply to maintain public water supplies. Moderate beneficial effects are also anticipated for resilience to climate change.
DV6(v) Import Tees to South Yorkshire Pipeline	Adverse				None							None							Four major adverse effects are anticipated with regard to biodiversity, flora and fauna, resource use, soils and geology, air quality, GHG emissions and landscape and visual amenity, due to pipeline construction. Seven moderate adverse effects were identified for population and human health, water, and cultural heritage.
	Beneficial											None							Major beneficial effects on human health and wellbeing associated with the provision of an additional supply to maintain public water supplies. Major beneficial effects are also anticipated for resilience to climate change. Moderate beneficial effects are also anticipated on opportunities for biodiversity enhancements
DV6(vi) Tees to South Yorkshire Pipeline	Adverse				None							None							Four major adverse effects are anticipated with regard to biodiversity, flora and fauna, resource use, soils and geology, air quality, GHG emissions and landscape and visual amenity, due to pipeline construction. Six moderate adverse effects were identified for population and human health, water, and cultural heritage
	Beneficial											None							Major beneficial effects on human health and wellbeing associated with the provision of an additional supply to maintain public water supplies. Major beneficial effects are also anticipated for resilience to climate change. Moderate beneficial effects are also anticipated on opportunities for biodiversity enhancements
DV7a(iv) Tees to Ouse Pipeline Option 1	Adverse				None							None							Four major adverse effects are anticipated with regard to biodiversity, flora and fauna, resource use, soils and geology and GHG emissions, due to pipeline construction. Five moderate adverse effects were identified for population and human health, air quality, cultural heritage and landscape and visual amenity.
	Beneficial											None							Moderate beneficial effects on human health and wellbeing associated with the provision of an additional supply to maintain public water supplies. Moderate beneficial effects are also anticipated for resilience to climate change. Moderate beneficial effects are also anticipated on opportunities for biodiversity enhancements
DV7a(v) Import Tees to Ouse Pipeline Option 2	Adverse				None							None							Four major adverse effects are anticipated with regard to biodiversity, flora and fauna, resource use, soils and geology and GHG emissions, due to pipeline construction. Five moderate adverse effects were identified for population and human health, air quality, cultural heritage and landscape and visual amenity.
	Beneficial											None							Major beneficial effects on human health and wellbeing associated with the provision of an additional supply to maintain public water supplies. Major beneficial effects are also anticipated for resilience to climate change. Moderate beneficial effects are also anticipated on opportunities for biodiversity enhancements
DV7a(vi) Tees to York Pipeline Option 3	Adverse				None							None							Four major adverse effects are anticipated with regard to biodiversity, flora and fauna, resource use, soils and geology and GHG emissions, due to pipeline construction. Five moderate adverse effects were identified for population and human health, water resources, air quality, cultural heritage and landscape and visual amenity.
	Beneficial											None							Major beneficial effects on human health and wellbeing associated with the provision of an additional supply to maintain public water supplies. Major beneficial effects are also anticipated for resilience to climate change. Moderate beneficial effects are also anticipated on opportunities for biodiversity enhancements
DV8(iv) York to South Yorkshire Pipeline	Adverse				None					None		None							Five major adverse impacts are anticipated on Biodiversity, material assets and resource, soil, geology and land-use, and air and climate due to the scheme land-take, size and construction impacts.
	Beneficial									None		None							Major beneficial effects are anticipated on opportunities for biodiversity enhancements.

Option	Impact	SEA Objective 1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	Summary Commentary
DV8(iv)A(i) York to South Yorkshire Pipeline	Adverse									None		None							Six major adverse effects are anticipated with regard to biodiversity, flora and fauna, resource use, soils and geology, air quality, GHG emissions and cultural heritage, due to pipeline construction. Four moderate adverse effects were identified for population and human health, flood risk and landscape and visual amenity.
	Beneficial									None		None							Moderate beneficial effects are anticipated for biodiversity net gain and in improving resilience to climate change as the scheme would provide resilience through allowing 50 Ml/d of supply to be used elsewhere in the Yorkshire WRZ.
DV8(iv)A(ii) York to South Yorkshire Pipeline	Adverse									None		None							Six major adverse effects are anticipated with regard to biodiversity, flora and fauna, resource use, soils and geology, air quality, GHG emissions and cultural heritage, due to pipeline construction. Four moderate adverse effects were identified for population and human health, flood risk and landscape and visual amenity.
	Beneficial									None		None							Moderate beneficial effects are anticipated for biodiversity net gain and in improving resilience to climate change as the scheme would provide resilience through allowing 50 Ml/d of supply to be used elsewhere in the Yorkshire WRZ.
DV8(v) York WTW Capacity increase	Adverse				None							None							One moderate adverse impact is anticipated with regard to biodiversity as a result of direct effects on internationally designated sites in close proximity to the scheme. The scale of the construction scheme is likely to create minor adverse impacts through construction activity.
	Beneficial											None							Moderate beneficial effects on human health and wellbeing associated with the provision of an additional supply to maintain public water supplies. Moderate beneficial effects are also anticipated for resilience to climate change. Minor beneficial effects are also anticipated on opportunities for biodiversity enhancements
DV8(v)A New York water treatment works	Adverse											None							Three moderate adverse effects were identified for biodiversity, material assets and resource use and air quality and GHG emissions. Seven minor adverse effects were identified for population, Water, soil and geology, air and climate, cultural heritage and landscape.
	Beneficial											None							Three moderate beneficial effects were identified for biodiversity net gain, population and human health and climate resilience. One minor beneficial effect was identified for material assets.
DV8B New York water treatment works & dual main interconnector	Adverse											None							Six major adverse effects are anticipated with regard to biodiversity, flora and fauna, resource use, soils and geology, air quality, GHG emissions and cultural heritage, due to pipeline construction. Four moderate adverse effects were identified for population and human health, flood risk and landscape and visual amenity.
	Beneficial										None								Moderate beneficial effects are anticipated for biodiversity net gain and in improving resilience to climate change as the scheme would provide resilience through allowing 50 Ml/d of supply to be used elsewhere in the Yorkshire WRZ.
E2 network to STW	Adverse											None							Moderate negative effects are anticipated on soil and land use is anticipated, as the proposed pipeline intersects a permitted and an historic landfill site; on community health, due to construction works in a densely populated area, recreation, due to the proximity of the construction to Rother Valley Country Park, and air quality, as construction works will be required within the Sheffield Citywide AQMA. Minor negative effects are anticipated for natural capital assets, as construction may affect tranquillity, material assets, as the construction will require novel materials, flood risk, as there will be construction works required in Flood Zones 2 and 3, greenhouse gas emissions, heritage, as the construction would be within 1km of a number of heritage assets, and landscape, due to construction within areas of the South and West Yorkshire Greenbelt.
	Beneficial											None							Moderate positive effects are anticipated for community health and resilience to climate, due to an increase of 20-25Ml/d into the potable water supply for the region. Moderate beneficial effects are also anticipated on opportunities for biodiversity enhancements
R1a River Ouse water treatment works extension	Adverse				None							None							Moderate adverse effects on biodiversity are identified as were nine minor adverse effects on the biodiversity, flora and fauna; population and human health; material assets and resource use; water; air and climate; and landscape and visual amenity topics.
	Beneficial											None							The scheme would have moderate beneficial effects with regard to provision of water supplies for population and human health; and resilience to the threat of climate change.

Option	Impact	SEA Objective 1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	Summary Commentary
R1c Grid network enhancement: New River Ouse WTW to York 30Ml/d	Adverse				None							None							One major adverse effect was identified for Biodiversity due to the construction on land functionally supportive for designated sites. Two moderate adverse effects have also been identified for population & human health and landscape. Minor effects were identified on biodiversity, archaeology, air and climate, and soil, geology and land use.
	Beneficial											None							Moderate positive effects are anticipated for community health and resilience to climate, due to an increase supply of up to 60Ml/d. Moderate beneficial effects are also anticipated on opportunities for biodiversity enhancements
R1c(i) Grid network enhancement: New River Ouse WTW to York 60Ml/d	Adverse				None							None							Major adverse effects on biodiversity flora and fauna are identified as were two moderate adverse effects on population and human health and landscape and visual amenity. Nine minor adverse effects were identified on the INNS; recreation and tourism; material assets and resource use; water (flows and flood risk); soils and geology; air and climate; historic environment and landscape and visual amenity topics.
	Beneficial											None							The scheme would have moderate beneficial effects with regard to provision of water supplies for population and human health; resilience to the threat of climate change and biodiversity net gain.
R1d Grid network enhancement: New River Ouse WTW to North Yorkshire 1	Adverse				None					None		None							One major adverse effect was identified for Biodiversity due to the construction on land functionally supportive for designated sites. Two moderate adverse effects have also been identified for material assets and resource us and air & climate. Minor effects were identified on biodiversity, archaeology, air and climate, and soil, geology and land use.
	Beneficial									None		None							Moderate positive effects are anticipated for community health and resilience to climate, due to an increase supply of up to 15Ml/d. Moderate beneficial effects are also anticipated on opportunities for biodiversity enhancements
R1e Grid network enhancement: New River Ouse WTW to North Yorkshire 2	Adverse				None					None		None							Two moderate adverse effects were identified for biodiversity and air and climate. Minor effects are also anticipated for biodiversity, population and human health, material assets and resource use, soil, geology and land use, air and climate, Archaeology and cultural heritage and landscape.
	Beneficial									None		None							Minor positive effects were identified for community health and resilience to climate due to the increase of up to 5Ml/d deployable output. Minor benefits are also anticipated for biodiversity for enhancement opportunities.
R1f Grid network enhancement: New River Ouse WTW to North Yorkshire 3	Adverse				None					None		None							One major adverse effect was identified for Biodiversity due to the construction on land functionally supportive for designated sites. Three moderate adverse effects have also been identified for material assets and resource use, air & climate and archaeology and cultural heritage. Minor effects were identified on biodiversity, archaeology, air and climate, and soil, geology and land use.
	Beneficial									None		None							Minor positive effects were identified for community health and resilience to climate due to the increase of up to 10Ml/d deployable output. Moderate benefits are anticipated for opportunities for compensatory planting and habitat enhancement.
R1g Grid network enhancement: New River Ouse WTW to York	Adverse				None					None		None							Minor adverse effects have been identified for biodiversity, population and human health, material assets and resource use, archaeology, air and climate, and soil, geology and land use.
	Beneficial									None		None							Moderate positive effects are anticipated for community health and resilience to climate, due to an increase supply of up to 30Ml/d. Minor beneficial effects are also anticipated on opportunities for biodiversity enhancements
R2 Ouse Raw Water Transfer	Adverse				None							None							Two moderate adverse effects were identified – for biodiversity and archaeology and cultural heritage. Eight minor adverse effects were identified, including those relating to population and human health, material assets, water quality and water levels/flows, soil and land use, and air quality.
	Beneficial											None							Two major beneficial effects were identified, related to population and human health and an increase in deployable output as a result of the scheme of 60Ml/d (maintaining the supply-demand balance), and climate change adaptation. The scheme also provides the potential for minor beneficial effects on biodiversity enhancements.
R3 Increased River Ouse pump storage capacity	Adverse				None							None							One moderate adverse effect was identified relating to archaeology and cultural heritage. Six minor adverse effects were regarding biodiversity, population and human health, material assets, water, soil and land use, and GHG emissions.
	Beneficial											None							The scheme also provides the potential for moderate beneficial effects on biodiversity enhancements. Two minor beneficial effects were identified relating to climate change adaptation

Option	Impact	SEA Objective 1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	Summary Commentary
																			and population and human health due to the increase of 10Ml/d into the regional potable water supply.
R3 River Ouse licence transfer	Adverse				None		None											None	Minor adverse effects on biodiversity are identified in relation to uncertainty in the HRA around the impacts on the Humber estuary. A HRA Stage 2 Appropriate Assessment would be required should this scheme be selected in the preferred programme.
	Beneficial				None		None											None	Two minor beneficial effects were identified relating to climate change adaptation and population and human health, both regarding the increased output into the regional water supply.
R5 Aquifer Storage and Recovery Scheme 1	Adverse				None														Eleven minor adverse effects were identified, including those relating to biodiversity, population/human health, material assets, water, soil and land use, air and GHG emissions, archaeology and landscape amenity.
	Beneficial																		Three minor beneficial effects were identified relating to population/human health, material assets/resource and climate change resilience.
R6 South Yorkshire Groundwater Option 1	Adverse				None							None							The construction and operation of this scheme is not associated with any major European sites. However, the scheme may have one moderate adverse effect on water flows. Several minor negative effects on population and human health, resource use, water quality, soils and geology, GHG emissions, and landscape and visual amenity.
	Beneficial											None							Three minor beneficial effects were identified for population and human health (supply of a resilient water supply), climate change resilience and resource efficiency.
R8b Sherwood Sandstone and Magnesian Limestone Boreholes Option 2	Adverse				None							None							Eleven minor adverse effects were identified, including those relating to biodiversity, population/human health, material assets, water, soil and land use, air and GHG emissions, archaeology and landscape amenity, including minor adverse effects were determined for biodiversity as the construction works would be within proximity of one SSSI and rural populations.
	Beneficial											None							Minor beneficial effects are anticipated for population health and climate change resilience, both associated with additional water supplies being available. The scheme also provides the potential for minor beneficial effects on biodiversity die to the potential for biodiversity enhancements associated with the scheme.
R8c Sherwood Sandstone and Magnesian Limestone Boreholes Option 3	Adverse				None							None							Three moderate adverse effects were identified – for population and human health, water quality, and archaeology and cultural heritage. Eight minor adverse effects were identified, including those relating to population and human health, material assets, water quality and water levels/flows, soil and land use, and air quality.
	Beneficial											None							Minor beneficial effects are anticipated on community wellbeing and on climate resilience due to an increased potable water supply for the region. It also provides the potential for minor beneficial effects on biodiversity enhancement.
R8f Sherwood Sandstone and Magnesian Limestone Boreholes Option 6	Adverse				None							None							One major adverse effect was identified for biodiversity due to the proximity of the proposed pipeline to designated sites. A moderate effect is anticipated for archaeology.
	Beneficial											None							Minor positive effects are anticipated for community health and resilience to climate, due to an increase supply of up to 20Ml/d. Moderate beneficial effects are also anticipated on opportunities for biodiversity enhancements
R8g Sherwood Sandstone Boreholes support to North Yorkshire	Adverse				None							None							Twelve minor adverse effects were identified, including those relating to biodiversity, population/human health, material assets, water, soil and land use, air and GHG emissions, archaeology and landscape amenity, including minor adverse effects were determined for biodiversity as the construction works would be within proximity of one SSSI and rural populations.
	Beneficial											None							Minor positive effects are anticipated for community health and resilience to climate, due to an increase supply of up to 15Ml/d. Moderate beneficial effects are also anticipated on opportunities for biodiversity enhancements
R8h New groundwater (Sherwood Sandstone) supply	Adverse				None		None					None							Nine minor adverse effects were identified, including those relating to biodiversity, population/human health, material assets, water, soil and land use, air and GHG emissions, archaeology and landscape amenity.

Option	Impact	SEA Objective 1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	Summary Commentary
to existing North Yorkshire WTW	Beneficial						None					None							The scheme would have minor beneficial effects with regard to biodiversity net gain and minor beneficial effects with regards to provision of water supplies for population and human health and resilience to the threat of climate change.
R12 Yorkshire Groundwater Option 1	Adverse				None														Eight minor adverse impacts have been identified relating to biodiversity, population and human health, material assets, water quality and quantity, air & climate and landscape.
	Beneficial																		Two minor beneficial effects have been identified relating to population and human health, and climate change adaptation.
R13 East Yorkshire Groundwater Option 2	Adverse				None							None							Two moderate adverse effects were identified for biodiversity and water levels and flows. Six minor adverse effects were identified for population and human health, water quality, flood risk, and air and greenhouse gas emissions.
	Beneficial											None							Two minor beneficial effects were identified for population and human health, and climate change adaptation.
R17 Reuse abandoned third party Groundwater source Option 2	Adverse				None														One moderate adverse effect is anticipated for archaeology and cultural heritage due to the proximity to heritage assets. Eight minor benefits have been identified for biodiversity, population and human health, water, soil, geology and land use, air and climate and landscape.
	Beneficial																		Two minor beneficial effects have been identified relating to biodiversity enhancements and population and human health.
R18 Reuse abandoned third party Groundwater source Option 3	Adverse				None														Seven minor adverse effects have been identified for population and human health, water, air and climate and archaeology and cultural heritage.
	Beneficial																		One minor beneficial effect is anticipated for biodiversity for the opportunity for compensatory planting and habitat enhancement.
R19 Reuse abandoned third party Groundwater source Option 4	Adverse				None														Six minor adverse effects are anticipated for material assets and resource use, water, air and climate and archaeology and cultural heritage.
	Beneficial																		One minor beneficial effect is anticipated for biodiversity for the opportunity for compensatory planting and habitat enhancement.
R29 Reservoir De-silting	Adverse				None														One major adverse effect was identified for biodiversity, and a moderate adverse effect were identified for landscape and visual amenity. Seven minor adverse effects relating to population and human health, material assets, water quality, air quality and greenhouse gas emissions, and archaeology/cultural heritage.
	Beneficial				None														Three minor beneficial effects were identified relating to population and human health (increase in deployable output/water supply) and climate change resilience, use of existing infrastructure.
R31a Additional bankside storage on the River Ouse	Adverse				None							None							One moderate adverse effect has been identified for biodiversity due to proximity to designated sites. Fiver other minor adverse effects are anticipated for population and human health, material assets and resource use, soil, geology and land use, air and climate and archaeology and cultural heritage.
	Beneficial											None							Minor positive effects are anticipated for community health and resilience to climate, due to an increase of 4300Ml of storage. Minor beneficial effects are also anticipated on opportunities for biodiversity enhancements.
R34 River Calder Abstraction Option 1	Adverse				None							None							Two moderate adverse effects were identified relating to population and human health and archaeology and cultural heritage. Nine minor adverse effects were identified, including those relating to biodiversity, flora and fauna, material assets, water, air and GHG emissions and landscape and visual amenity.

Option	Impact	SEA Objective 1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	Summary Commentary
	Beneficial											None							Two minor beneficial effects were identified with regards to population and human health and climate change resilience.
R35 River Aire Abstraction Option 1	Adverse				None							None							One moderate adverse effect was identified relating to archaeology and cultural heritage. Ten minor adverse effects were identified, including those relating to biodiversity, population & human health, material assets, water, soil and land use, air and GHG emissions and landscape/visual amenity.
	Beneficial											None							The scheme provides the potential for moderate beneficial effects on habitat restoration due to the requirement of compensatory habitat. Three minor beneficial effects were identified relating to population and human health, air and climate and material assets and resource use.
R37b(ii) River Aire abstraction Option 4	Adverse											None							Moderate adverse effects are anticipated on biodiversity due to the abstraction influencing flows affecting downstream designations. Eleven minor adverse effects are anticipated.
	Beneficial											None							Moderate positive effects are anticipated for community health and resilience to climate, due to an increase of 10-50Ml/d deployable output. Minor beneficial effects are also anticipated on opportunities for biodiversity enhancements.
R49 Supply Dales from the Tees - raw	Adverse				None														Three moderate adverse impacts are anticipated with regard to biodiversity, resource use and archaeology and cultural heritage due to pipeline construction. Minor adverse impacts were identified for biodiversity, population and human health, water, soils and geology, air quality and GHG emissions and landscape and visual.
	Beneficial																		Moderate beneficial effects on human health and well being associated with the provision of an additional 15 Ml/d which would help to maintain essential public water supplies and therefore help maintain public health and well-being. Moderate beneficial effects on improving resilience to climate change as the scheme would negate the need for North Area Reservoir 1 water to be treated at Thornton Steward and would provide resilience to the Dales area. The scheme also provides the potential for moderate beneficial effects on habitat restoration due to the requirement of compensatory habitat.
R51 Dales from the Tees - treated	Adverse				None														Two moderate adverse impacts are anticipated with regard to resource use and archaeology and cultural heritage due to pipeline construction. Minor adverse impacts were identified for biodiversity, population and human health, water, soils and geology, air quality and GHG emissions and landscape and visual.
	Beneficial																		Moderate beneficial effects on human health and wellbeing associated with the provision of an additional 15 Ml/d which would help to maintain essential public water supplies and therefore help maintain public health and well-being. Moderate beneficial effects on improving resilience to climate change as the scheme would negate the need for North Area Reservoir 1 water to be treated at the WTW and would provide resilience to the Dales area. The scheme also provides the potential for moderate beneficial effects on biodiversity enhancement.
R58 Transfer from UU Option 3	Adverse		None		None														Two minor adverse effects have been identified for population and human health and archaeology and cultural heritage.
	Beneficial		None		None														Three minor beneficial effects are anticipated for population and human health, material assets and resource use and air and climate.
R59 Transfer from UU Option 4	Adverse				None														Moderate adverse effects are anticipated for material assets and resource use and landscape. Minor effects have also been identified for biodiversity, population and human health, water, soil, geology and land use, air and climate and archaeology and cultural heritage.
	Beneficial																		Moderate benefits have been identified for biodiversity given the opportunities for habitat enhancement. Three minor beneficial effects are anticipated for population and human health, material assets and resource use and air and climate.
R61 East Yorkshire coast desalination	Adverse				None							None							Three major adverse effects are anticipated with regards to biodiversity, flora and fauna, material assets and resource use and GHG emissions. Two moderate adverse impact on natural capital enhancement and air emissions. Minor adverse impacts were identified for biodiversity, population and human health, water, soils and geology, air quality, archaeology and cultural heritage, and landscape and visual.
	Beneficial											None							Moderate beneficial effects on human health and well being and climate change resilience associated with maintenance of essential public water supplies. A minor beneficial effect on surface and groundwater levels, as operation of the desalination plant should reduce reliance on

Option	Impact	SEA Objective 1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	Summary Commentary
																			these assets. It also provides the potential for minor beneficial effects on habitat restoration due to the requirement of compensatory habitat.
R78 Tidal Abstraction Reservoir	Adverse				None														One major adverse effect has been identified for biodiversity due to the proximity to designated sites and associated impacts on species populations. Four moderate effects are anticipated for biodiversity, population and human health, material assets and resource use and soil, geology and land use.
	Beneficial																		Moderate beneficial effects on human health and well being and climate change resilience associated with maintenance of essential public water supplies. It also provides the potential for minor beneficial effects on habitat restoration due to the requirement of compensatory habitat.
R85 Recommission Kirklees WTW	Adverse				None						None	None	None						Five minor adverse effects are anticipated for population and human health, material assets and resource use, air and climate and landscape.
	Beneficial				None						None	None	None						Two minor beneficial effects have been identified for population and human health and climate resilience.
R86 Aire and Calder new water treatment works	Adverse											None							Moderate adverse effects are anticipated on biodiversity and material assets and resource use. Eleven minor adverse effects have also been identified for biodiversity, population and human health, water, air and climate, archaeology and cultural heritage and landscape.
	Beneficial											None							Moderate positive effects are anticipated for community health and resilience to climate, due to an increase of 70Ml/d deployable output. Moderate beneficial effects are also anticipated on opportunities for biodiversity enhancements.
R87 Rebuild Northallerton WTW	Adverse										None	None	None						Major adverse effects have been identified for surface and groundwater due to the increased abstraction. Moderate adverse effects are also anticipated for water quality as a result of option implementation.
	Beneficial				None						None	None	None						Two minor beneficial effects have been identified for population and human health and climate resilience.
R88 Increase storage at an existing WTW in North Yorkshire	Adverse				None							None							Four minor adverse effects are anticipated for population and human health, material assets and resource use, soil, geology and land use and air and climate.
	Beneficial											None							Minor positive effects are anticipated for community health and resilience to climate, due to an increase of 48Ml/d deployable output. Minor beneficial effects are also anticipated on opportunities for biodiversity enhancements.
R89 Convert Wensleydale springs to boreholes	Adverse				None						None	None	None						Two major adverse effects are anticipated for water quality and surface and groundwater levels and flows. One moderate adverse impact is also anticipated for biodiversity.
	Beneficial				None						None	None	None						No beneficial effects have been identified.
R90 North Yorkshire annual license increase	Adverse				None		None					None	None	None				None	No adverse effects have been identified.
	Beneficial				None		None					None	None	None				None	Two minor beneficial impacts have been identified for air and climate.
R91 New internal transfer to North Yorkshire WTW	Adverse											None							Ten minor adverse effects were identified, including those relating to population and human health, material assets, water, soils and landuse, air and GHG emissions, archaeology and heritage and landscape and visual amenity.

Option	Impact	SEA Objective																	Summary Commentary
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	
	Beneficial											None							Two minor beneficial effects were identified with regards to biodiversity net gain and climate change resilience.

Note: See Section 5.2 for description of SEA objectives.

Key:

- Major adverse
- Moderate adverse
- Minor adverse
- Negligible adverse
- None — Not applicable
- Major beneficial
- Moderate beneficial
- Minor beneficial
- Negligible beneficial

6.4 Drought options

Following comments received from regulators on the draft WRMP24, The WRMP24 now includes the use of drought orders and permits. For the purposes of water resources planning, these have been grouped by option type (e.g. Rivers, Reservoirs and Demand Reductions). These options were previously assessed in Yorkshire Water's Drought Plan 2022 and the findings are reported in the Drought Plan SEA Environmental Report[43]. As these have already been subject to assessment in the Drought Plan SEA (and HRA) and to avoid unnecessary duplication, these options have only been considered 'in-combination' with the preferred plan supply options.

7 Assessment of the Yorkshire Water WRMP 2024

Following consultation on the draft WRMP, Yorkshire Water has reviewed its best value plan for WRMP24. In addition to the changes made in response to feedback received, there were additional external factors that have influenced changes to Yorkshire Water's WRMP24 since publication of the draft WRMP24, including a targeted refresh of technical assessments and the confirmation that the import from Severn Trent Water will cease in 2035. Further detail is available in the WRMP24 main report.

As a result, the preferred plan contained in the draft WRMP24 has been amended to align with the latest position.

7.1 The preferred plan

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

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

As described in the WRMP, Yorkshire Water reviewed its initial least-cost plan against the SEA findings, including ensuring that the environmental and social impacts were not 'double-counted' in both the monetisation process and the SEA, as this could potentially skew the options and programme appraisal process.

The preferred plan has been selected in accordance with Yorkshire Water's goal to use demand management and leakage reduction measures to meet the predicted supply-demand deficit as far as possible. This is also in line with guidance from Ofwat and Defra, and preferences expressed by Yorkshire Water customers. Whilst the WRMP optimisation model delivers a least cost solution, this does not consider regulatory and customer preferences or any wider resilience benefits from alternative solutions. The WRMP24 has been developed in parallel to the Water Resources North (WReN) Regional Plan and the objectives of both plans are aligned.

Option DV8B was mandated into the plan by Yorkshire Water as it this is the only option available to backfill against the loss of the STW import, which is due to cease in 2035.

The WRMP24 preferred plan is set out in **Table 7.1**. The plan includes 14 demand management options, including LSM Leakage reduction and smart metering glidepath. The plan aligns with the previous WRMP19 plan to implement significant leakage reduction over the long term and includes a target to achieve 50% reduction of compared with 2017/18 leakage by 2050. The demand measures

[43] Ricardo (2022) SEA Environmental Report. Yorkshire Water's Drought Plan 2022. (https://www.yorkshirewater.com/media/c2qgvnsf/yorkshire-water-drought-plan-2022-sea-environmental-report.pdf)

within the preferred plan also include customer demand management measures to further reduce water consumption per person/per property within Yorkshire Water's supply area.

The demand management measures result in predominantly negligible beneficial and adverse effects on SEA objectives. Minor adverse effects have been identified in relation to the air and climate SEA objectives regarding use of material resources, air pollutant and greenhouse gas emissions associated with vehicle usage to visits properties and undertake audits and retrofits. A mixture of moderate and minor beneficial effects are anticipated on SEA objectives for population and human health, efficient use of water resources and climate resilience. The LSM Leakage and smart metering glidepath option will result in major beneficial effects across the same objectives due to the significant savings of over 100Ml/d projected. The same option also has moderate adverse effects assessed for material resource use in relation to the amount of materials that will be required to undertake leakage reduction activities and roll out smart metering.

However, given the scale of the supply-demand balance deficit it has been necessary to also include a range of supply side measures within the WRMP24. A total of nine supply options are included in the preferred plan. Major adverse impacts for options DV7a(vi) Tees to York Pipeline Option 3 and New York water treatment works and North to South Yorkshire Pipeline within the preferred plan are anticipated in relation to biodiversity, material assets and resource use, protection and enhancement of geology/soil quality, and minimisation of greenhouse gas emissions. However, these options are also anticipated to be associated with major to moderate beneficial effects on population and human health and climate change resilience due to the increase in available public water supply.

The construction phases of an additional three resource options (R13, R31a and R37b(ii)) within the preferred plan are anticipated to result in moderate adverse effects on biodiversity in relation to scheme construction. R13 also experiences moderate adverse effects on water quantity as although abstraction would be within existing limits, the increase in abstraction could have moderate effects on quantitative status of the groundwater body. Option R3 has assessed a moderate adverse effect for cultural heritage due to the proximity of heritage assets to the proposed pipeline. The remaining three supply side options in the preferred plan are assessed resulting in negligible to minor adverse effects only across all SEA objectives. The majority of resource options provide opportunities to result in biodiversity enhancement (habitat creation/restoration), provide beneficial effects on population and human health and in relation to climate change resilience.

Following Regulator requests, the WRMP24 Preferred Plan has included the use of drought orders and permits. The options were previously assessed in the Drought Plan (April 2022) and the SEA, HRA and WFD assessments that supported the plan. The options have been grouped into three categories; rivers, reservoirs and demand reduction measures and the assessments taken from the Drought Plan 2022 have been combined into these groups. The SEA assessed major adverse effects are assessed across all drought option categories. DO16 River Drought Permits have major adverse effects on water quality and DO17 Demand Reduction may result in major adverse effects on population and human health, due to the potential disruption, as well as adaptation to climate change. Meanwhile, the reservoir options have the potential to cause major adverse effects on water quality and water quantity. The river drought options may also result in major beneficial effects on population and human health due to provision of large deployable output and continued water supply. The HRA concluded that apart from the North Area Reservoir 1 and the North Yorkshire Groundwater increased abstraction drought option, all of the other options within the plan were not considered to have likely significant effects on the qualifying features of European sites. No further assessment has been completed within this WRMP, however the potential for in-combination effects between the plans is considered in Section 7.4.1.

The HRA of the WRMP preferred plan has concluded that following inclusion of appropriate mitigation measures during the construction phase of relevant schemes that no adverse effects on the integrity of any European site are anticipated. Further details are provided within the HRA report which accompanies this Environmental Report[44].

[44] Ricardo Energy & Environment (2022) Habitats Regulation Assessment of the Draft WRMP24. Report prepared for Yorkshire Water Services, September 2022.

The WFD compliance assessment has informed SEA findings against the water topic objectives, and has identified potential non-compliance in relation to three options associated with one WFD water body; R3a, R3 and DV8B. The potential WFD compliance issue has been identified following an AMP7 WINEP investigation undertaken by Yorkshire Water. The risk of deterioration as a result of flow reductions, and potential for exacerbated dissolved oxygen sags, is considered to be significantly reduced if Yorkshire Water continue their commitment to making improvements to storm overflow discharges through the WINEP to meet obligations of the Environment Act. However, it is important to note that Yorkshire Water are still in consultation with the Environment Agency over the closure of the investigation. The WFD compliance assessment also concluded further uncertain impacts associated with multiple WFD water bodies in relation to three schemes within the preferred plan: R8g Sherwood Sandstone Boreholes support to North Yorkshire, R13 East Yorkshire Groundwater Option 2 and R91 New internal transfer to North Yorkshire WTW. Further investigations will need to be carried out to confirm these impacts before the schemes could be implemented. R13 East Yorkshire Groundwater Option 2 will be within any constraints imposed following Water Industry National Environment Programme (WINEP) investigations. Further details are provided within the WFD compliance assessment report which accompanies this Environmental Report[45].

Implementation of the options above, as well as options R37b(ii) River Aire Abstraction Option 4 and DV3 South Yorkshire GW, will be dependent on meeting Environment Agency licensing requirements.

Implementation of this plan will result in no deficit in the 25-year period of the WRMP.

A visual summary of SEA findings for each of the schemes included in the preferred plan is provided in **Table 7.2**.

Table 7.1 WRMP24 preferred plan

Category	Option Reference	Scheme	Benefit (Ml/d) on full implementation	First Year of Benefit
Customer management	C1d	Household customer audits and water efficiency retrofits	3.3	2025
Customer management	C6a	Non-household water use audit and retrofit	0.2	2025
Customer management	C6a(ii)	Non-household domestic water use audit and retrofit	4.5	2026
Customer management	C12a3	Rainwater harvesting for commercial customers	2.0	2025
Customer management	C13c	Household tariffs	0.4	2025
Customer management	C15d	Installation of internal household flow regulators	0.5	2025
Customer management	C23b1	Rainwater harvesting for agriculture	1.0	2025
Customer management	C27d	School visits	1.0	2025
Customer management	C28e	Household media campaign	1.7	2025

[45] Ricardo Energy & Environment (2022) Water Framework Directive Regulations Compliance Assessment of the Draft WRMP24. Report prepared for Yorkshire Water Services, September 2022.

Category	Option Reference	Scheme	Benefit (Ml/d) on full implementation	First Year of Benefit
Customer management	C30a	Water labelling- baseline	39.6	2025
Customer management	C32c	Rainwater harvesting for households- new developments	1.4	2025
Customer management	C34a	Non-household media campaign	0.8	2025
Customer management	C35c	Water retailer incentives	0.3	2025
Leakage/ Customer management	LSM	Leakage reduction and smart metering glidepath (50%)	115.9	2025
Resource	DV7a(vi)	Tees to York Pipeline - NWL import 140 Ml/d	140.0	2040
Resource	DV8B	New York WTW and new north to south internal transfer connection	50.0	2035
Resource	R3	Increased River Ouse pumping capacity	10.0	2028
Resource	R3a	River Ouse licence transfer	<1ML/d annual but up to 15Ml/d peak	2027
Resource	R8g	Sherwood Sandstone Boreholes support to North Yorkshire	15.0	2035
Resource	R13	East Yorkshire Groundwater Option 2	6.0	2028
Resource	R31a	Additional bankside storage at York WTW	10.6	2082
Resource	R37b (ii)	River Aire Abstraction option 4	33.5	2073
Resource	R91	New internal transfer to North Yorkshire WTW	5.0	2028
Drought	DO16	Drought Supply Rivers Drought Permits - Dry Year Annual Average until 2028	4.6	2025

Category	Option Reference	Scheme	Benefit (Ml/d) on full implementation	First Year of Benefit
Drought	DO17	WRMP Demand Reduction Dry Year Annual Average - 2028 Year Benefits Ends	19.2	2026
Drought	DO18	WRMP Drought Supply Reservoir Compensation Drought Permits Dry Year Annual Average 2028 Yr Benefit Ends	17.9	2025

Table 7.2 Visual evaluation matrix summary for options in the WRMP24 preferred plan

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C1d Household customer audits and water efficiency retrofits	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C6a Non-household customer audits and water efficiency retrofits (schools, leisure centres and hospitality)	Adverse				None								None				None	None
	Beneficial				None								None				None	None
C6a(ii) Non-household customer audits and water efficiency retrofits (general domestic use only)	Adverse				None								None				None	None
	Beneficial				None								None				None	None
C12a3 Rainwater harvesting for commercial customers	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C13c Household tariffs	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C15d Installation of internal household flow regulators	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C23b1 Rainwater harvesting for agriculture	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C27d School Visits	Adverse		None	None	None		None						None				None	None
	Beneficial			None	None		None						None				None	None
C28e Household water efficiency media campaign	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C30a Water labelling- baseline	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None
C32c Rainwater harvesting for households- new developments	Adverse				None		None						None				None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
	Beneficial				None		None						None				None	None
C34a Non-household water efficiency media campaign	Adverse	None			None		None						None	None	None		None	None
	Beneficial				None		None						None	None	None		None	None
C35c Non-household water efficiency incentive scheme	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None
LSM Leakage reduction and smart metering glidepath (50%)	Adverse				None													
	Beneficial				None													
DV7a(vi) NWL import - York Pipeline Option 1	Adverse				None							None						
	Beneficial											None						
DV8B New York WTW and Dual Main	Adverse											None						

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
	Beneficial										None							
R3 Increased River Ouse pump storage capacity	Adverse				None							None						
	Beneficial											None						
R3a Increased River Ouse pump storage capacity	Adverse					None											None	
	Beneficial					None											None	
R8g Sherwood Sandstone Abstraction support to North Yorkshire	Adverse				None							None						
	Beneficial											None						
R13 East Yorkshire Groundwater Option 2	Adverse				None							None						
	Beneficial											None						
R31a Additional bankside storage on the River Ouse	Adverse				None							None						
	Beneficial											None						

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
R37b(ii) River Aire Abstraction option 4	Adverse											None						
	Beneficial											None						
R91 New internal transfer to North Yorkshire WTW	Adverse											None						
	Beneficial											None						
DO16 Drought Supply Rivers Drought Permits - Dry Year Annual Average until 2028*	Adverse		None		None	None		None			None	None	None	None		None	None	
	Beneficial	None	None	None	None				None	None		None	None	None	None		None	None
DO17 WRMP Demand Reduction Dry Year Annual Average - 2028 Year Benefits Ends*	Adverse		None	None	None			None		None	None	None						
	Beneficial		None	None	None		None						None	None				
DO18 WRMP Drought Supply Reservoir Compensation Drought Permits Dry Year Annual Average 2028 Yr Benefit Ends*	Adverse		None	None	None	None		None			None	None		None	None	None	None	
	Beneficial	None	None	None	None		None		None	None		None	None	None	None		None	None

#Note: See Section 5.2 for description of SEA objectives.

**Note: The drought permit option assessments originate from the Drought Plan 2022 SEA. The options (and their assessments) have been amalgamated into three categories for water resources planning (River, Reservoir and Demand Reduction)*

Key:

	Major adverse		Major beneficial
	Moderate adverse		Moderate beneficial
	Minor adverse		Minor beneficial
	Negligible adverse		Negligible beneficial
None	Not applicable		

7.2 Alternative plans

In determining the WRMP24 preferred plan of options, Yorkshire Water used the findings of the option-level assessments to inform the programme appraisal process and to determine the preferred programme along with reasonable alternative programmes and adaptive pathways to provide additional resilience.

This section evaluates the likely significant effects of implementing reasonable alternative plans, in line with SEA Regulation 12(2) and as discussed in Section 5.2.3. Effects of each alternative plan have been considered along with the preferred plan.

Options within the following alternative programmes along with those in preferred programme have been assessed and an overview of the performance of each alternative programme when compared to the preferred plan has been provided, where appropriate:

- Least Cost Solution
- Ofwat Core Programme
- Enhanced Environmental Destination
- Low Environmental Destination
- Low Demand
- Half Demand Benefit

Table 7.3 provides an overview of the options included within the preferred plan alongside the alternative adaptive pathways Yorkshire Water have considered in their WRMP24.

Table 7.3 Options included in Yorkshire Water's WRMP24 Preferred Plan and alternative Adaptive Pathways, including year of first benefit

Option ID	Option Name	Best Value Plan	Ofwat Core Plan	Enhanced Environmental Destination Plan	Least Cost Plan	Low ED	Low Demand	Half Demand Benefit
		Year of first benefit						
C1d	Household customer audits and water efficiency retrofits	2025	2025	2025	2025	2025	2025	Not selected
C4	Metering on change of occupancy	Not selected	Not selected	Not selected	2025	Not selected	Not selected	Not selected
C6a	Non-household water use audit and retrofit	2025	2025	2025	2025	2025	2025	Not selected
C6a(ii)	Non-household water use audit and retrofit	2026	Not selected	Not selected	2026	Not selected	Not selected	Not selected
C12a (3)	Rainwater harvesting - commercial customers	2025	2025	2025	2025	2025	2025	Not selected
C13c	Household Tariffs	2025	2025	2025	2025	2025	2025	Not selected
C15d	Installation of internal household flow regulators	2025	2025	2025	2025	2025	2025	Not selected
C23b (1)	Rainwater harvesting for agriculture	2025	2025	2025	2025	2025	2025	Not selected
C27d	School Visits	2025	2025	2025	2025	2025	2025	Not selected
C28e	Household Media Campaign	2025	2025	2025	Not selected	2025	2025	Not selected
C30a	Water Labelling Conservative Baseline	2025	2025	2025	2025	2025	Not selected	Not selected
C30b	Water Labelling Conservative Low CRS	Not selected	Not selected	Not selected	Not selected	Not selected	2025	Not selected
C32c	Household Rainwater Harvesting- New Development	2025	2025	2025	2025	2025	2025	Not selected
C34a	Non Household Media Campaign	2025	2025	2025	2025	2025	2025	Not selected
C35c	Water Retailer Incentives	2025	2025	2025	2025	2025	2025	Not selected
LSM	Leakage reduction and smart metering glidepath (50%)	2025	2025	2025	2025	2025	2025	Not selected
DO03	Drought Supply Rivers Drought Permits - Dry Year Annual Average until 2038	Not selected	Not selected	2025	2025	2025	2025	2025
DO08	Drought Supply Reservoir Compensation Drought Permits Dry Year Annual Average 2038 Yr Benefit Ends	Not selected	Not selected	2025	2025	2025	2025	2025

Option ID	Option Name	Best Value Plan	Ofwat Core Plan	Enhanced Environmental Destination Plan	Least Cost Plan	Low ED	Low Demand	Half Demand Benefit
		Year of first benefit						
DO13	Demand Reduction Dry Year Annual Average – 2038 Year Benefits Ends	Not selected	Not selected	2025	2025	2025	2025	2025
DO16	Drought Supply Rivers Drought Permits - Dry Year Annual Average until 2028	2025	2025	Not selected	Not selected	Not selected	Not selected	Not selected
DO18	Drought Supply Reservoir Compensation Drought Permits Dry Year Annual Average 2028 Yr Benefit Ends	2025	2025	Not selected	Not selected	Not selected	Not selected	Not selected
DO17	Demand Reduction Dry Year Annual Average - 2028 Year Benefits Ends	2026	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected
R3	Increased River Ouse pumping capacity	2028	2028	2028	Not selected	2028	2028	2028
R3a	River Ouse licence transfer	2027	2027	2027	Not selected	2027	2027	2027
R8f	Sherwood Sandstone and Magnesian Limestone Boreholes Option 6	Not selected	Not selected	2070	Not selected	Not selected	Not selected	2066
R8g	Sherwood Sandstone Boreholes support to North Yorkshire	2035	2035	2035	Not selected	2039	2039	2035
R13	East Yorkshire Groundwater Option 2	2028	2028	2028	Not selected	2028	2028	2028
R29	Reservoir Desilting	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected	2082
R31a	Additional bankside storage at York WTW	2082	Not selected	2066	Not selected	2083	Not selected	2039
R37b (ii)	River Aire Abstraction option 4	2073	Not selected	Not selected	2075	2074	Not selected	Not selected
R78	Tidal Abstraction Reservoir	Not selected	Not selected	2077	Not selected	Not selected	Not selected	2074
R85	Recommission Kirklees WTW	Not selected	Not selected	2074	Not selected	Not selected	Not selected	2072
R86	Aire and Calder new WTW	Not selected	Not selected	2039	Not selected	Not selected	Not selected	2039
R87	Rebuild Northallerton WTW	Not selected	Not selected	2083	Not selected	Not selected	Not selected	2079
R91	New internal transfer to North Yorkshire WTW	2028	2028	2028	Not selected	2028	2028	2028

Option ID	Option Name	Best Value Plan	Ofwat Core Plan	Enhanced Environmental Destination Plan	Least Cost Plan	Low ED	Low Demand	Half Demand Benefit
		Year of first benefit						
DV3	South Yorkshire GW	Not selected	Not selected	2084	2073	Not selected	Not selected	2080
DV7a(iv)	Tees to Ouse Pipeline Option 1	Not selected	Not selected	Not selected	Not selected	2062	Not selected	Not selected
DV7a(vi)	Tees to York Pipeline - NWL import 140 Ml/d	2040	2040	2040	2039	Not selected	Not selected	2040
DV8B	New York WTW and new north to south internal transfer connection	2035	2035	2035	2035	2035	2035	2035

7.2.1 Least cost solution

A key step in the process Yorkshire Water have taken to determine the best value (preferred) plan was to utilise the Decision-Making Framework (DMF) 'optimisation model' to create a least cost solution for the Grid SWZ that optimised based on cost (financial capital) alone. Further details of this solution can be found in the WRMP.

The Least cost solution contains 16 out of the 26 options of the preferred plan along with a further two options (DV3 and C4) from the feasible list and three drought options to make up the 21 options selected: four resource options; three drought options (assessed previously within the Drought Plan 2022); and 14 demand options.

Option DV8B was mandated into the plan by Yorkshire Water as it is the only option available to backfill against the loss of the STW import, which is due to cease in 2035.

A visual summary of SEA findings for each of the schemes included in the least cost solution is provided in **Table 7.4**.

There are some major and moderate adverse impacts as well as several minor adverse impacts associated with the resource schemes. DV7a (vi) York Pipeline Option 1 and DV8B New York WTW and North to South Yorkshire Pipeline options have major adverse impacts across a number of SEA objectives, including biodiversity, material assets, soils and land use and greenhouse gas emissions. These impacts are largely in relation to the large scale of the options and potential for impacts on European designated sites. The WFD compliance assessment has identified potential non-compliance issues associated with Option DV8B as additional abstraction may result in a risk to the deterioration in fish status in one water body as a result of existing issues with dissolved oxygen sags largely attributed to stormwater discharges. AMP7 WINEP investigations concluded that through investment to improve storm overflow discharges, this impact and the risk to fish status would be significantly reduced. Yorkshire Water are still in consultation with the Environmental Agency on the closure of the WINEP investigation which could result in further measures to mitigate against potential WFD deterioration. There are also activities in the least cost programme that have been assessed as having uncertain impacts on water bodies in the context of WFD compliance. Option DV7a(vi) has been identified as WFD compliant but with low confidence, however, with the implementation of this option not until 2040, assessment can be refined through future iterations of the WRMP based on a clearer operational regime. The HRA concluded no adverse effects as a result of implementing the Least Cost solution, providing suitable mitigation measures are employed.

7.2.2 Adaptive pathways

The development of the WRMP24 utilises the most up to date information available to Yorkshire Water, although the plan is still based on estimates and incorporates known risks to provide an appropriate level of flexibility. Yorkshire Water created alternative pathways by stress testing the preferred plan against a variety of scenarios. Known risks to Yorkshire Water's WRM24 can be linked to key dates where an alternative pathway could be triggered - these risks include the loss of the STW import and licence reductions to meet environmental destination objectives. Further details on the options appraisal process and development of programmes can be found in the main WRMP24 documentation.

7.2.2.1 Enhanced Environmental Destination Pathway

The enhanced environmental destination pathway contains 30 options and largely follows the preferred plan with the exception of the removal of R37b(ii), removal of C6a(ii), replacement of three drought options (DO16, DO17, DO18 changed to DO03, DO08 and DO13) and the addition of six new resource options (R8f, R86, R85, R78, R87 and DV3) to address a supply deficit should licence reductions be required.

A visual summary of SEA findings for each of the schemes included in the enhanced environmental destination pathway is provided in **Table 7.5**.

Options R78 Tidal Abstraction Reservoir and R8f Sherwood Sandstone and Magnesian Limestone Boreholes Option 6 have identified major adverse effects on biodiversity due to the proximity of some scheme components to designated sites. Consultation with Natural England regarding detailed design

and mitigation for impacts on any designated sites or priority habitats would be required during project planning. Option R87 Rebuild Northallerton WTW has identified major adverse effects on surface flows (SEA Objective 4.2) as the WFD compliance assessment concluded uncertainty around the magnitude and frequency of flow change as a result of implementing the option and how the increase in abstraction would change the spill regime from the reservoir, which contributes a significant portion of the flow. Further investigation would be required to reduce the uncertainty in the assessment.

Overall, the Enhanced Environmental Destination plan results in an increased yield over 80Ml/d. When considering the range and significant of effects identified against the SEA objectives, the addition of six new resource options results in several more significant adverse effects. The increase in clean drinking water would increase resilience and adaptability to the effects of climate change and provide increased support to population and economic growth when compared to the preferred programme.

7.2.2.2 Ofwat Core Pathway

The Ofwat Core pathway represents the minimum interventions required to ensure the future risks are mitigated and Yorkshire Water's supply system is resilient to future drought events.

A visual summary of SEA findings for each of the schemes included in the Ofwat Core pathway is provided in **Table 7.6.**

The Ofwat Core pathway contains 22 options, all of which feature in the preferred plan. Options R31a Additional bankside storage on the River Ouse and R37b(ii) River Aire Abstraction option 4 would not be required within this alternative future scenario which would remove moderate adverse effects on biodiversity during the construction phase. Drought option DO17 would not be required in this pathway which would remove major adverse effects on population and human health. Options with significant adverse effects during the construction phase remain in the Ofwat Core pathway as do several with uncertainty within the WFD compliance assessment.

7.2.2.3 Low ED Pathway

The Low ED pathway assumes no abstraction reductions on the groundwater sources or the River Derwent. This pathway is the same as the preferred plan until 2035 with the exception of different drought options (DO16, DO17, DO18 changed to DO03, DO08 and DO13) and R8g Sherwood Sandstone Boreholes support to North Yorkshire would be delayed until 2039. The decision point would be in 2025 when the groundwater WINEP investigations would conclude. Later in the programme, the preferred plan could deviate again following conclusion of the River Derwent WINEP investigation (as discussed further in the HRA) which would delay implementation of DV7a Tees to Ouse Pipeline Option until 2062, where the capacity would also be reduced from 140Ml/d (DV7a(vi)) to 50Ml/d (DV7a(iv)). Other minor differences between this pathway and the preferred plan occur post-2050 where two options, R37b(ii) River Aire abstraction Option 4 and R31a Additional bankside storage on the River Ouse, are delayed by one year.

A visual summary of SEA findings for each of the schemes included in the Low ED pathway is provided in **Table 7.7.**

Overall, there are minimal difference in the environmental performance of the Low ED pathway when compared to the preferred plan. The removal of DV7a(vi) and inclusion of DV7a(iv) results in a 90Ml/d reduction in the yield and therefore beneficial effects on population and human health and climate resilience are reduced.

7.2.2.4 Low Demand Pathway

The Low Demand pathway assumes greater benefits are achieved from Government initiatives for water labelling and building regulations. The Low Demand pathway contains 22 options, 18 of these options are included within the preferred plan. Options from the preferred plan that are not included within this alternative pathway are DO16, DO17, DO18, C6a(ii), C30a, DV7a(vi), R37b(ii) and R31a. This pathway instead includes option C30b Water labelling- low demand common reference scenario and different drought options; DO03, DO08 and DO13. This pathway also delays the R8g Sherwood Sandstone Boreholes support to North Yorkshire from 2035 to 2039.

A visual summary of SEA findings for each of the schemes included in the Low Demand pathway is provided in **Table 7.8.**

The Low Demand pathway generally performs better when compared to the preferred plan due to the removal of several supply options, including DV7a(vi) which had assessed major adverse effects. It is noted that this pathway has high uncertainty.

7.2.2.5 Half Demand Benefit Pathway

This pathway assumes that Yorkshire Water's demand reduction activity will achieve benefits of half of those in the preferred plan. The half demand pathway contains 18 options, only eight of which are included within the preferred plan. This scenario includes resource management and drought options only. Options included in this alternative pathway that are not within the preferred plan are: R8f, R29, R78, R85, R86, R87 and DV3. The plan also involves the replacement of drought options (DO16, DO17, DO18 changed to DO03, DO08 and DO13). This pathway includes six supply options from 2066 onwards, including the R78 tidal abstraction reservoir and the R29 reservoir desilting option. These options were both assessed with significant uncertainty and would require enabling works and environmental assessments. However, due to the timescales this work does not need to start in AMP8 as there is sufficient time to review the need in future WRMPs.

This pathway generally performs worse than the preferred plan due to the inclusion of more supply options with major adverse effects.

A visual summary of SEA findings for each of the schemes included in the half demand benefit pathway is provided in **Table 7.9.**

Table 7.4 Visual evaluation matrix summary for options in the least cost solution

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C1d Domestic customer audits and retrofit	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C4 Metering on change of occupancy	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C6a Commercial water user audits and retrofit	Adverse				None								None				None	None
	Beneficial				None								None				None	None
C6a(ii) Commercial water user audits and retrofit	Adverse				None								None				None	None
	Beneficial				None								None				None	None
C12a3 - Rainwater Harvesting for Commercial Customers	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C13c Tariffs/ Special Fees	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C15d Household Flow Regulator - Internal	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C23b1 Retrofits of rainwater harvesting for agriculture (at cost)	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C27d School Visits	Adverse		None	None	None		None						None				None	None
	Beneficial			None	None		None						None				None	None
C30a Water Labelling Conservative (half artesia)	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C32c Household Rainwater Harvesting - New development	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C34a Non Household Media Campaign	Adverse	None			None		None						None	None	None		None	None
	Beneficial				None		None						None	None	None		None	None
C35c Water Retailer Incentives	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None
LSM Leakage reduction and smart metering glidepath (50%)	Adverse				None													
	Beneficial				None													
DV3 South Yorkshire GW	Adverse				None							None						
	Beneficial											None						

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
DV7a(vi) NWL to York Pipeline Option 1	Adverse				None							None						
	Beneficial											None						
DV8B New York WTW and Dual Main	Adverse											None						
	Beneficial										None							
R37b(ii) River Aire Abstraction option 4	Adverse											None						
	Beneficial											None						
DO03 Drought Supply Rivers Drought Permits - Dry Year Annual Average until 2038*	Adverse		None		None	None		None			None	None	None	None		None	None	
	Beneficial	None	None	None	None				None	None		None	None	None	None		None	None
DO13 WRMP Demand Reduction Dry Year Annual Average - 2038 Year Benefits Ends*	Adverse		None	None	None			None		None	None	None						
	Beneficial		None	None	None		None						None	None				
DO08 WRMP Drought Supply Reservoir Compensation Drought Permits Dry Year	Adverse		None	None	None	None		None			None	None		None	None	None	None	

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
Annual Average 2038 Yr Benefit Ends*																		
	Beneficial	None	None	None	None		None		None	None		None	None	None	None		None	None

**Note: The drought permit option assessments originate from the Drought Plan 2022 SEA. The options (and their assessments) have been amalgamated into three categories for water resources planning (River, Reservoir and Demand Reduction)*

Table 7.5 Visual evaluation matrix summary for options in the enhanced environmental destination pathway

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C1d Domestic customer audits and retrofit	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C6a Commercial water user audits and retrofit	Adverse				None								None				None	None
	Beneficial				None								None				None	None
C12a3 Rainwater Harvesting for Commercial Customers	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C13c Tariffs/ Special Fees	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C15d Household Flow Regulator - Internal	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C23b1 Retrofits of rainwater harvesting for agriculture (at cost)	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C27d School Visits	Adverse		None	None	None		None						None				None	None
	Beneficial			None	None		None						None				None	None
C30a Water labelling- baseline)	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None
C30b Water labelling- low demand common reference scenario	Adverse			None	None								None					
	Beneficial			None	None								None					
C32c Household Rainwater Harvesting - New development	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C34a Non Household Media Campaign	Adverse	None			None		None						None	None	None		None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
	Beneficial				None		None						None	None	None		None	None
C35c Water Retailer Incentives	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None
LSM Leakage reduction and smart metering glidepath (50%)	Adverse				None													
	Beneficial				None													
DV3 South Yorkshire GW	Adverse				None							None						
	Beneficial											None						
DV7a(vi) NWL to York Pipeline Option 1	Adverse				None							None						
	Beneficial											None						
DV8B New York WTW and Dual Main	Adverse											None						

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
	Beneficial										None							
R3 Increased River Ouse pump storage capacity	Adverse				None							None						
	Beneficial											None						
R3a River Ouse licence transfer	Adverse				None		None											None
	Beneficial				None		None											None
R8f Sherwood Sandstone and Magnesian Limestone Boreholes Option 6	Adverse				None							None						
	Beneficial											None						
R8g Sherwood Sandstone Abstraction support to North Yorkshire	Adverse				None							None						
	Beneficial											None						
R13 East Yorkshire Groundwater Option 2	Adverse				None							None						
	Beneficial											None						

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
R31a Additional bankside storage on the River Ouse	Adverse				None							None						
	Beneficial											None						
R78 Tidal Abstraction Reservoir	Adverse				None													
	Beneficial																	
R85 Recommission Kirklees WTW	Adverse				None						None	None	None					
	Beneficial				None						None	None	None					
R86 Aire and Calder new water treatment works	Adverse											None						
	Beneficial											None						
R87 Rebuild Northallerton WTW	Adverse										None	None	None					
	Beneficial				None						None	None	None					

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
R91 New internal transfer to North Yorkshire WTW	Adverse											None						
	Beneficial											None						
DO03 Drought Supply Rivers Drought Permits - Dry Year Annual Average until 2038*	Adverse		None			None	None	None			None	None	None	None		None	None	
	Beneficial	None	None		None			None	None	None		None	None	None	None		None	None
DO13 WRMP Demand Reduction Dry Year Annual Average - 2038 Year Benefits Ends*	Adverse		None					None		None	None	None						
	Beneficial		None		None		None						None	None				
DO08 WRMP Drought Supply Reservoir Compensation Drought Permits Dry Year Annual Average 2038 Yr Benefit Ends*	Adverse		None	None		None	None	None			None	None		None	None	None	None	
	Beneficial	None	None		None			None	None	None		None	None	None	None		None	None

**Note: The drought permit option assessments originate from the Drought Plan 2022 SEA. The options (and their assessments) have been amalgamated into three categories for water resources planning (River, Reservoir and Demand Reduction)*

Table 7.6 Visual evaluation matrix summary for options in the Ofwat Core pathway

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C1d Domestic customer audits and retrofit	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C6a Commercial water user audits and retrofit	Adverse				None								None				None	None
	Beneficial				None								None				None	None
C12a3 Rainwater Harvesting for Commercial Customers	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C13c Tariffs/ Special Fees	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C15d Household Flow Regulator - Internal	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C23b1 Retrofits of rainwater harvesting for agriculture (at cost)	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C27d School Visits	Adverse		None	None	None		None						None				None	None
	Beneficial			None	None		None						None				None	None
C28e Household Media Campaign	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C30a Water Labelling Conservative (half artesia)	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None
C32c Household Rainwater Harvesting - New development	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C34a Non Household Media Campaign	Adverse	None			None		None						None	None	None		None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
	Beneficial				None		None						None	None	None		None	None
C35c Water Retailer Incentives	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None
LSM Leakage reduction and smart metering glidepath (50%)	Adverse				None													
	Beneficial				None													
DV7a(vi) NWL import - York Pipeline Option 1	Adverse				None							None						
	Beneficial											None						
DV8B New York WTW and Dual Main	Adverse											None						
	Beneficial										None							
R3 Increased River Ouse pump storage capacity	Adverse				None							None						

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
	Beneficial											None						
R3a Increased River Ouse pump storage capacity	Adverse					None											None	
	Beneficial					None											None	
R8g Sherwood Sandstone Abstraction support to North Yorkshire	Adverse				None							None						
	Beneficial											None						
R13 East Yorkshire Groundwater Option 2	Adverse				None							None						
	Beneficial											None						
R91 New internal transfer to North Yorkshire WTW	Adverse											None						
	Beneficial											None						
DO16 Drought Supply Rivers Drought Permits - Dry Year Annual Average until 2028*	Adverse		None		None	None		None			None	None	None	None		None	None	
	Beneficial	None	None	None	None				None	None		None	None	None	None		None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
DO18 WRMP Drought Supply Reservoir Compensation Drought Permits Dry Year Annual Average 2028 Yr Benefit Ends*	Adverse		None	None	None	None		None			None	None		None	None	None	None	
	Beneficial	None	None	None	None		None		None	None		None	None	None	None		None	None

**Note: The drought permit option assessments originate from the Drought Plan 2022 SEA. The options (and their assessments) have been amalgamated into three categories for water resources planning (River, Reservoir and Demand Reduction)*

Table 7.7 Visual evaluation matrix summary for options in the Low ED pathway

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C1d Domestic customer audits and retrofit	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C6a Commercial water user audits and retrofit	Adverse				None								None				None	None
	Beneficial				None								None				None	None
C12a3 Rainwater Harvesting for Commercial Customers	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C13c Tariffs/ Special Fees	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C15d Household Flow Regulator - Internal	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C23b1 Retrofits of rainwater harvesting for agriculture (at cost)	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C27d School Visits	Adverse		None	None	None		None						None				None	None
	Beneficial			None	None		None						None				None	None
C28e Household Media Campaign	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C30a Water Labelling Conservative (half artesia)	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None
C32c Household Rainwater Harvesting - New development	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C34a Non Household Media Campaign	Adverse	None			None		None						None	None	None		None	None
	Beneficial				None		None						None	None	None		None	None
C35c Water Retailer Incentives	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None
LSM Leakage reduction and smart metering glidepath (50%)	Adverse				None													
	Beneficial				None													
DV7a(iv) Tees to Ouse Pipeline Option 1	Adverse				None							None						
	Beneficial											None						
DV8B New York WTW and Dual Main	Adverse											None						
	Beneficial										None							
R3 Increased River Ouse pump storage capacity	Adverse				None							None						

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
	Beneficial											None						
R3a Increased River Ouse pump storage capacity	Adverse					None											None	
	Beneficial					None											None	
R8g Sherwood Sandstone Abstraction support to North Yorkshire	Adverse				None							None						
	Beneficial											None						
R13 East Yorkshire Groundwater Option 2	Adverse				None							None						
	Beneficial											None						
R31a Additional bankside storage on the River Ouse	Adverse				None							None						
	Beneficial											None						
R37b(ii) River Aire Abstraction option 4	Adverse											None						

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
	Beneficial											None						
R91 New internal transfer to North Yorkshire WTW	Adverse											None						
	Beneficial											None						
DO03 Drought Supply Rivers Drought Permits - Dry Year Annual Average until 2038*	Adverse		None		None	None		None			None	None	None	None		None	None	
	Beneficial	None	None	None	None				None	None		None	None	None	None		None	None
DO13 WRMP Demand Reduction Dry Year Annual Average - 2038 Year Benefits Ends*	Adverse		None	None	None			None		None	None	None						
	Beneficial		None	None	None		None						None	None				
DO08 WRMP Drought Supply Reservoir Compensation Drought Permits Dry Year Annual Average 2038 Yr Benefit Ends*	Adverse		None	None	None	None		None			None	None		None	None	None	None	
	Beneficial	None	None	None	None		None		None	None		None	None	None	None		None	None

**Note: The drought permit option assessments originate from the Drought Plan 2022 SEA. The options (and their assessments) have been amalgamated into three categories for water resources planning (River, Reservoir and Demand Reduction)*

Table 7.8 Visual evaluation matrix summary for options in the Low Demand pathway

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C1d Domestic customer audits and retrofit	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C6a Commercial water user audits and retrofit	Adverse				None								None				None	None
	Beneficial				None								None				None	None
C12a3 Rainwater Harvesting for Commercial Customers	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C13c Tariffs/ Special Fees	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C15d Household Flow Regulator - Internal	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
C23b1 Retrofits of rainwater harvesting for agriculture (at cost)	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C27d School Visits	Adverse		None	None	None		None						None				None	None
	Beneficial			None	None		None						None				None	None
C28e Household Media Campaign	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C30b Water labelling- low demand common reference scenario	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None
C32c Household Rainwater Harvesting - New development	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C34a Non Household Media Campaign	Adverse	None			None		None						None	None	None		None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
	Beneficial				None		None						None	None	None		None	None
C35c Water Retailer Incentives	Adverse			None	None								None				None	None
	Beneficial			None	None								None				None	None
LSM Leakage reduction and smart metering glidepath (50%)	Adverse				None													
	Beneficial				None													
DV7a(iv) Tees to Ouse Pipeline Option 1	Adverse				None							None						
	Beneficial											None						
DV8B New York WTW and Dual Main	Adverse											None						
	Beneficial										None							
R3 Increased River Ouse pump storage capacity	Adverse				None							None						

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
	Beneficial											None						
R3a Increased River Ouse pump storage capacity	Adverse					None											None	
	Beneficial					None											None	
R8g Sherwood Sandstone Abstraction support to North Yorkshire	Adverse				None							None						
	Beneficial											None						
R13 East Yorkshire Groundwater Option 2	Adverse				None							None						
	Beneficial											None						
R91 New internal transfer to North Yorkshire WTW	Adverse											None						
	Beneficial											None						
DO03 Drought Supply Rivers Drought Permits - Dry Year Annual Average until 2038*	Adverse		None		None	None		None			None	None	None	None		None	None	
	Beneficial	None	None	None	None				None	None		None	None	None	None		None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
DO13 WRMP Demand Reduction Dry Year Annual Average - 2038 Year Benefits Ends*	Adverse		None	None	None			None		None	None	None						
	Beneficial		None	None	None		None						None	None				
DO08 WRMP Drought Supply Reservoir Compensation Drought Permits Dry Year Annual Average 2038 Yr Benefit Ends*	Adverse		None	None	None	None		None			None	None		None	None	None	None	
	Beneficial	None	None	None	None		None		None	None		None	None	None	None		None	None

**Note: The drought permit option assessments originate from the Drought Plan 2022 SEA. The options (and their assessments) have been amalgamated into three categories for water resources planning (River, Reservoir and Demand Reduction)*

Table 7.9 Visual evaluation matrix summary for options in the Half Demand Benefit pathway

Option	Impact	SEA Objective															
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
DV3 South Yorkshire GW	Adverse				None							None						
	Beneficial											None						
DV7a(vi) NWL import - York Pipeline Option 1	Adverse				None							None						
	Beneficial											None						
DV8B New York WTW and Dual Main	Adverse											None						
	Beneficial										None							
R3 Increased River Ouse pump storage capacity	Adverse				None							None						
	Beneficial											None						
R3a Increased River Ouse pump storage capacity	Adverse					None											None	
	Beneficial					None											None	

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
R8f Sherwood Sandstone and Magnesian Limestone Boreholes Option 6	Adverse				None							None						
	Beneficial											None						
R8g Sherwood Sandstone Abstraction support to North Yorkshire	Adverse				None							None						
	Beneficial											None						
R13 East Yorkshire Groundwater Option 2	Adverse				None							None						
	Beneficial											None						
R29 Reservoir De-silting	Adverse				None													
	Beneficial				None													
R31a Additional bankside storage on the River Ouse	Adverse				None							None						
	Beneficial											None						
R78 Tidal Abstraction Reservoir	Adverse				None													

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
	Beneficial																	
R85 Recommission Kirklees WTW	Adverse				None						None	None	None					
	Beneficial				None						None	None	None					
R86 Aire and Calder new water treatment works	Adverse											None						
	Beneficial											None						
R87 Rebuild Northallerton WTW	Adverse										None	None	None					
	Beneficial				None						None	None	None					
R91 New internal transfer to North Yorkshire WTW	Adverse											None						
	Beneficial											None						
DO03 Drought Supply Rivers Drought Permits - Dry Year Annual Average until 2038*	Adverse		None		None	None		None			None	None	None	None		None	None	
	Beneficial	None	None	None	None				None	None		None	None	None	None		None	None

Option	Impact	SEA Objective																
		1.1	1.2	1.3	1.4	2.1	2.2	3.1	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
DO13 WRMP Demand Reduction Dry Year Annual Average - 2038 Year Benefits Ends*	Adverse		None	None	None			None		None	None	None						
	Beneficial		None	None	None		None						None	None				
DO08 WRMP Drought Supply Reservoir Compensation Drought Permits Dry Year Annual Average 2038 Yr Benefit Ends*	Adverse		None	None	None	None		None			None	None		None	None	None	None	
	Beneficial	None	None	None	None		None		None	None		None	None	None	None		None	None

**Note: The drought permit option assessments originate from the Drought Plan 2022 SEA. The options (and their assessments) have been amalgamated into three categories for water resources planning (River, Reservoir and Demand Reduction)*

7.3 Option-level cumulative assessment

A cumulative assessment of the preferred plan was undertaken to consider whether the preferred plan options, when constructed or operated together, led to additional effects on each of the SEA topics. The cumulative assessment presented in this section has been carried out in line with the methodology described in Section 5 based upon the preferred plan of options discussed and presented in Section 8.1 and presented in **Table 7.1**.

Table 7.10 provides a summary of the outcomes of the cumulative assessment for the preferred plan - this excludes identification of additional beneficial operational effects as a result of increasing the overall volume of water savings made or water provided for supply as this affect all options in the plan.

7.3.1 Construction

There are potential cumulative impacts between the following options which would require construction in the vicinity of York WTW should these schemes have overlapping construction phases:

The first year of benefit for R31a within the preferred plan is identified as 2082 (see **Table 7.1**) and this scheme is estimated to be associated with an approximately 4 year construction phase. Option DV8B is associated with a 10-year time-to-build period (of which a large proportion will be construction) and is identified as operational in 2035, and therefore the construction phases will not coincide with that of R31a. The DV7a(vi) scheme is identified as operational in 2040 within the preferred plan (see **Table 7.1**) with an approximately 13 year construction phase where elements of the construction will overlap with DV8B.

The DV7a(vi) and DV8B schemes are likely to have overlapping construction phases and there is therefore potential for cumulative impacts between two schemes related to construction impacts on biodiversity (Objective 1.1, Objective 1.3), population and human health (Objective 2.1), material assets and resource use (Objective 3.1), air quality (Objective 6.1), archaeology and cultural heritage (Objective 7.1), and landscape and visual amenity (Objective 8.1). Construction measures that need to be incorporated into the scheme design and/or planning to avoid or mitigate potential effects will be agreed during the detailed design and planning stage should these schemes be progressed. The DV7a(vi) scheme will cover a large geographical area (pipeline construction from the River Tees to Ouse) as will the DV8B scheme (New WTW and Ouse to South Yorkshire pipeline) and therefore until detailed construction plans are available it is not possible to identify if works in proximity to sensitive receptors will coincide. However, any such cumulative impacts would be expected to be minor, as most of these activities would be localised and small in scale, and could be effectively mitigated through careful project management and best practice construction methods.

7.3.2 Operation

Options R3, R3a and DV8B all impact the River Ouse during in operation:

- R3a – implemented in 2027 – The operation of the scheme would see up to 15Ml/d of the WTW license transferred to York WTW 1 to allow additional abstraction at another York WTW when flows are below the lowest flow bands <650Ml/d. The scheme would provide a benefit as an annual average of 0.3Ml/d as it would only be a benefit when flows are in the lower flow bands.
- R3 – implemented in 2028 – would allow a York WTW to abstract up to full licence capacity (150Ml/d). This scheme assumes the additional yield under normal operations will be constrained to 10Ml/d (134Ml/d total) with the ability to increase to provide the full 150Ml/d as a temporary measure if required in an emergency situation.
- DV8B – implemented in 2035 – would increase the abstraction at York WTW1 by up to full licensed rates.

The River Ouse is known to support the migratory qualifying features of the Humber Estuary SAC; sea lamprey and river lamprey. As such, the operation of numerous abstractions on the River Ouse could result in a deterioration of offsite functionally linked spawning habitat. Despite there being no risk to the physical habitats as a result of additional abstraction, the WINEP investigation could not rule out any impact on the aquatic ecology in the River Ouse, particularly fish, due to the potential for the reduction in flow resulting in the exacerbation of dissolved oxygen sags that were observed in the river. Although

the primary driver for these dissolved oxygen sags are water quality pressures (most can be timed as attributable to stormwater discharges), it was identified that any reduction in flow has the potential to reduce the dilution of any water quality pressure and potentially cause a greater impact to the fish community in the River Ouse. The investigation concluded that, with flow not being the driver for the potential dissolved oxygen pressure to the fish community, abstraction from the River Ouse should not be constrained. Subject to approval of the Business Plan by Ofwat, Yorkshire Water are committed to making improvements to storm overflow discharges through the WINEP to meet the obligations of the Environment Act. It is worth noting that, at the time of writing this WRMP, Yorkshire Water are still in consultation with the Environment Agency over the closure of the investigation.

Prior to further assessment it appeared there was potential for cumulative adverse effects during the operation of Options R3, R3a, DV8B, R91, R13 and R37b(ii) as all involve additional abstractions from waterbodies upstream of the Humber Estuary European Marine Site (EMS). However, hydrological modelling undertaken as part of the WRMP24 has concluded that there would be an indiscernible change in freshwater flow input to the Upper Humber Estuary as a result of implementing options within the Preferred Plan. No cumulative adverse effects are therefore anticipated on the Humber Estuary EMS.

There would be benefits associated with implementation of each option in parallel, i.e. increasing the overall volume of water savings made or water provided for supply, therefore these have been omitted from **Table 7.6.**

Table 7.10 Cumulative impacts matrix for the WRMP24 preferred plan (excluding beneficial effects identified in operation as a result of increased deployable output or demand savings)

		C1d	C6a	C6a(ii)	C12a3	C23b1	C27d	C28e	C30a	C32c	C34a	C35c	DV7a(vi)	DV8B	R3	R3a	R8g	R13	R31a	R37b(ii)	R91	LSM
C1d	Household customer audits and water efficiency retrofits																					
C6a	Commercial water user audits and retrofit (New)																					
C6a(ii)	Commercial water user audits and retrofit (smaller sectors)																					
C12a3	Rainwater harvesting for commercial customers																					
C23b1	Rainwater Harvesting- agriculture																					
C27d	School Visits																					
C28e	Household Media Campaign																					
C30a	Water Labelling Conservative Baseline																					
C32c	Household Rainwater Harvesting- New Development																					
C34a	Non Household Media Campaign																					
C35c	Water Retailer Incentives																					
DV7a (vi)	Tees to York Pipeline Option 1																					
DV8B	New York WTW and Dual Main																					
R3	Increased River Ouse pump storage capacity																					
R3a	River Ouse licence transfer																					
R8g	Sherwood Sandstone Boreholes support to North Yorkshire																					
R13	East Yorkshire Groundwater Option 2																					
R31a	Additional bankside storage on the River Ouse																					
R37b (ii)	River Aire Abstraction Option 4																					
R91	New internal transfer to North Yorkshire WTW																					
LSM	Leakage reduction and smart metering glidepath (50%)																					

	Mutually exclusive
	Operation
	Construction
	None identified

7.4 Programme-level cumulative assessment

Cumulative effects of the WRMP with other relevant plans, programmes and projects have been considered. These include the following:

- Yorkshire Water's Drought Plan
- Neighbouring water companies' drought plans
- Neighbouring water companies' WRMPs (these are to be assessed when published
- Environment Agency Drought Plans
- Canal and River Trust Management Plans
- Local Development Frameworks
- National Policy Statements and National/Regional Infrastructure Plans
- Major Projects

7.4.1 Yorkshire Water's Drought Plan

Yorkshire Water published its Final Drought Plan in 2022. The Drought Plan provides a comprehensive statement of the actions that Yorkshire Water will consider implementing during drought conditions in order to protect essential water supplies for customers and to minimise environmental impact. Yorkshire Water's Drought Plan 2022 comprises a total of 63 drought options (58 supply side options (including 49 supply side standard options and 9 long term supply side options) and 5 demand options). The Plan includes a range of drought management actions (linked to drought triggers), that can be broadly categorised as:

- Demand Side Options (including: publicity campaigns; emergency drought orders; leakage detection; temporary-use bans.
- Supply Side Options (including: abstraction increases; reduced regulated flows; water transfers
- Drought Permits and orders

There are options in the WRMP24 preferred plan that also appear in the Yorkshire Water Drought Plan 2022 i.e. East Yorkshire Groundwater Option 2 (R13) and R37b(ii) River Aire Abstraction Option 4, or are similar schemes which would utilise the same proposed source i.e. R3a River Ouse licence transfer, DV8B New York WTW and dual main and DV7a(vi) Tees - York Pipeline Option 1. At the request of Regulators, Yorkshire Water has included additional drought options in the Preferred Plan to increase overall resilience. No cumulative impacts will arise as the options will be mutually exclusive - either the scheme will be developed as a permanent scheme under the WRMP and therefore no longer a Drought Plan option; or it will be a temporary scheme available, if required, in a drought prior to it becoming a permanent scheme in later years under the WRMP.

The Yorkshire Water Drought Plan 2022 also includes a demand side management option for increased leakage detection and repair activity. Simultaneous implementation of the WRMP leakage management schemes could lead to cumulative adverse impacts with leak detection and repair activity associated with the Drought Plan, however, any such impacts are likely to be no more than minor.

7.4.2 Neighbouring water companies' WRMPs, Regional Plans and Drought Plans

The draft WRMPs, Regional Plans and drought plans from the following water companies/regional groups have been considered for potential cumulative effects with the WRMP24 preferred plan and alternative pathways.

- Severn Trent Water
- United Utilities Water
- Northumbrian Water
- Anglian Water Services.
- Water Resources West
- Water Resources East

This section is contingent on access to the other WRMPs and Regional Plans and their assessments which are all running concurrently to Yorkshire Water. As a result, the latest available reports have been used to complete the cumulative assessment.

On the basis of information currently available the potential cumulative effects below are identified as requiring further consideration.

Severn Trent's revised draft WRMP24 requires a number of abstractions on the River Trent, the downstream receptor being the Humber Estuary EMS. Any reduction in freshwater flows could potentially affect qualifying interests for which the Humber Estuary is designated. As discussed in Section 7.3, the effects of Yorkshire Water's Preferred Plan options on the Humber Estuary EMS are not discernible. A similar exercise was undertaken by Severn Trent for their options affecting the River Trent system, and again, no discernible change to freshwater inputs to the Humber Estuary were identified. As such, in-combination effects from both plans are considered unlikely.

Similarly, United Utilities' revised draft WRMP24 includes a number of supply side options However, none of these are in close geographical proximity or hydrological connectivity with the supply-side options in the Yorkshire Water's Preferred Plan and again there are no overlapping European sites within Yorkshire Water's Preferred Plan options.

Anglian Water's revised draft WRMP24 includes the following options which could act in-combination with Yorkshire Water's Preferred Plan on the Humber Estuary EMS:

- Lincolnshire East to Lincolnshire Central potable transfer (29 Ml/d) (LNC25) – this option has construction impacts only and will therefore not act in-combination with Yorkshire Water's operations.
- Lincolnshire East Groundwater (7.5Ml/d) (LNE11) – this option has construction impacts only and will therefore not act in-combination with Yorkshire Water's operations.
- South Humber Bank Non-potable desalination (60Ml/d) (SHB9) – the pathways for impact on the Humber Estuary EMS are different between the Anglian Water option (brine wastestream) and those of the Yorkshire Water options (reduction in water from wider catchment). As such, no in-combination effects are anticipated.
- Mablethorpe desalination Seawater (50Ml/d) (LNE6) – the pathways for impact on the Humber Estuary EMS are different between the Anglian Water option (brine wastestream) and those of the Yorkshire Water options (reduction in water from wider catchment). As such, no in-combination effects are anticipated.
- Lincolnshire Reservoir 50MCM (usable volume) (169Ml/d) (RTN17) – this option includes a transfer from the River Trent which is hydrologically connected to the Humber Estuary. However, the Stage 2 Appropriate Assessment concluded that the transfer is unlikely to occur at a constant rate throughout the year. In reality, it will stop when there is sufficient water in the Witham system, and it will also be subjected to HOF conditions on the Trent. As such, based on the indiscernible change in freshwater flow input to the Humber Estuary from Yorkshire Water's Preferred Plan options, no in-combination effects are anticipated.

The Northumbrian Water revised draft WRMP24 includes demand management options and one export option, the 'Yorkshire 140Ml/d Tees Export' option. This export option is the same as the option included in Yorkshire Water's preferred plan DV7a(vi) Tees to York Pipeline Option 3 and therefore no cumulative effects are identified between the two plans. Furthermore, the draft WReN Regional Plan (which encompasses Northumbrian Water) has undertaken a cumulative effects assessment which specifically covers cumulative effects between options included in the Regional Plan and effects with other Regional Plans and projects. The results of this assessment are detailed in the WReN Regional Plan SEA which will be updated as part of the revised draft WReN Regional Plan.

7.4.3 National/Regional Infrastructure Plans

7.4.3.1 National Policy Statements (NPSs)

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.

The National Policy Statements comprise the government's objectives for the development of nationally significant infrastructure in a particular sector and state, including[46]:

- How this will contribute to sustainable development.
- How these objectives have been integrated with other government policies.
- How actual and projected capacity and demand have been taken into account.
- Consideration of relevant issues in relation to safety or technology.
- Circumstances where it would be particularly important to address the adverse impacts of development.
- Specific locations, where appropriate, in order to provide a clear framework for investment and planning decisions.

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.

It is not expected that the WRMP24 will have any cumulative effects with any NPSs due to the non-site specific nature of NPSs. One NPS, Nuclear Power NPS (EN-6) does outline potential suitable sites for new nuclear power station development, however none of the sites are located within the YW supply area. No significant cumulative effects are therefore anticipated.

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

The NPS for Water Resources was designated in April 2023. This sets out the need and government's policies for the development of nationally significant infrastructure projects relevant to water resources in England. Whilst this NPS is not site specific, implementation of the WRMP24 is compatible with those objectives of the NPS for improving water supply resilience.

7.4.3.2 Nationally Significant Infrastructure Projects (NSIPs)

All NSIPs are listed on the Planning Inspectorate website[47]. At the time of writing, 39 projects located within the Yorkshire and Humber region were at various stages. These are detailed in **Table 7.11**.

Table 7.11 NSIPs in the Yorkshire and Humber Region

Project	Developer	Stage
Little Crow Solar Park	INRG SOLAR (Little Crow) Ltd	Decided
Able Marine Energy Park Material Change 2	Able Humber Ports Ltd	Decided
South Humber Bank Energy Centre	EP Waste Management Limited	Decided
Thorpe Marsh Gas Pipeline	Thorpe Marsh Power Limited	Decided

[46] Planning Inspectorate (2022) National Infrastructure Planning. Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/national-policy-statements/
[47] https://infrastructure.planninginspectorate.gov.uk/projects/

Project	Developer	Stage
A63 Castle Street Improvement-Hull	Highways England	Decided
Hornsea Offshore Wind Farm (Zone 4) - Project One	SMart Wind Ltd	Decided
Ferrybridge Multifuel 2 (FM2) Power Station	Multifuel Energy Ltd	Decided
Drax Re-power	Drax Power Limited	Decided
Dogger Bank Creyke Beck	Forewind	Decided
Dogger Bank Teesside A / Sofia Offshore Wind Farm (formerly Dogger Bank Teesside B) - Project previously known as Dogger Bank Teesside A&B	Forewind Ltd	Decided
North Killingholme Power Project	C.GEN Killingholme Ltd	Decided
Knottingley Power Project	Knottingley Power Limited	Decided
A160 - A180 Port of Immingham Improvement	Highways Agency	Decided
Hornsea Offshore Wind Farm (Zone 4) - Project Two	SMart Wind Limited	Decided
Yorkshire and Humber CCS Cross Country Pipeline	National Grid Carbon Limited	Decided
River Humber Gas Pipeline Replacement Project	National Grid	Decided
Able Marine Energy Park	Able Humber Ports Ltd	Decided
North Doncaster Rail Chord (near Shaftholme)	Network Rail	Decided
White Rose Carbon Capture and Storage Project	Capture Power Limited	Decided
Eggborough CCGT	Eggborough Power Limited	Decided
Keadby 3 Carbon Capture Power Station	Keadby Generation Limited	Decided
VPI Immingham OCGT	VPI Immingham B Ltd	Decided
Drax Bioenergy with Carbon Capture and Storage Project	Drax Power Limited	Decided
North Lincolnshire Green Energy Park	North Lincolnshire Green Energy Park Limited	Decision
Hornsea Project Four Offshore Wind Farm	Orsted Hornsea Project Four Limited	Decided
Yorkshire GREEN	National Grid Electricity Transmission (NGET)	Reccommendation
Viking CCS Pipeline	Chrysaor Production (UK) Limited	Acceptance
Immingham Eastern Ro-Ro Terminal	Associated British Ports	Examination
Immingham Green Energy Terminal	Associated British Ports	Pre Examination
Continental Link Multi-Purpose Interconnector	National Grid Ventures	Pre Application
Able Marine Energy Park Material Change 1	Able Humber Ports Ltd	Pre Application
Peartree Hill Solar Farm	JBM Solar Ltd	Pre Application
Aldbrough Hydrogen Storage	Equinor New Energy Limited	Pre Application
Stallingborough Combined Cycle Gas Turbine (CCGT) generating plant and Carbon Capture Plant (CCP)	RWE Generation UK plc	Pre Application
North Humber to High Marnham	National Grid Electricity Transmission	Pre Application
Tween Bridge Solar Farm	RWE Renewables Limited	Pre Application
Humber Low Carbon Pipelines	National Grid Carbon (NGC)	Pre Application

Project	Developer	Stage
Helios Renewable Energy Project	Enso Green Holdings D Limited	Pre Application
East Yorkshire Solar Farm	East Yorkshire Solar Farm Limited	Pre Application

Four NSIPs have been identified as having potential for cumulative effects with one option as part of the preferred plan. Option R13 (East Yorkshire Groundwater Option 2) is situated within a zone of influence with the four NSIP which are:

- Helios Renewable Energy Project (Pre-Application)
- Drax Bioenergy with Carbon Capture and Storage Project (Decided)
- Drax Re-Power (Decided)
- White Rose Carbon Capture and Storage Project (Decided)

The Helios Renewable Energy Project is approximately 6km from the proposed R13 East Yorkshire Groundwater Option 2 construction location. This NSIP is currently in the Pre-Application stage with expected submission in 2023. There is potential for cumulative effects during construction due to construction traffic, however this is considered uncertain given insufficient planning details for this project.

The remaining three NSIPs within the zone of influence of R13 East Yorkshire Groundwater Option 2, are set to be constructed within the Drax Power Station Site. Although there may be some overlap in construction timeline, given the location, cumulative effects have been identified as small scale.

No other NSIPs have been identified to be within the zone of influence of any other options within the Yorkshire Water preferred plan.

The water demands of all of these NSIPs should be considered in their applications for development consent and if significant demand is forecast, this should be considered by Yorkshire Water during monitoring of the WRMP and in the five year review.

No cumulative operational effects have been identified at this stage.

7.4.4 Local Plans

Potential cumulative effects with Local Plans have been assessed based on plans available in October 2023. Local Plans are relatively high-level policy documents and, whilst they identify potential areas for future development and zones for particular activities, the certainty of developments, the precise spatial location and their timing make it difficult to identify any specific potential cumulative effects; as they would only arise if the timing of the infrastructure required by the WRMP scheme was to coincide.

The 23 preferred plan options are located across the vast Yorkshire Water supply area, thus falling within a large number of Local Authority areas. Uncertainties still remain for a number of the preferred plan options with their exact location and construction start date remaining unconfirmed. At the time of writing, it is not possible to identify all possible potential cumulative effects associated with local plans.

It is anticipated that any negative impacts could be effectively mitigated through appropriate scheduling of all the construction required so as to avoid any concurrent works.

7.5 How the SEA influenced development of WRMP24

This section outlines how the environmental considerations (e.g. SEA, HRA, WFD and BNG) have influenced the development of Yorkshire Water's WRMP24, including selection of the preferred plan and rejection of alternatives. In addition to the environmental considerations, the plan development has also been influenced by a number of other factors outlined through the objectives of the WRMP24, including:

- Closing the supply-demand balance deficit;
- Meeting government targets around demand management (e.g. 50% leakage reduction and PCC of 110 l/h/d by 2050);
- Achieve 1 in 500 drought resilience without reliance on drought measures;
- Increase resilience in the Grid SWZ and localised growth hot spots;
- Offset the Environmental Destination losses; and
- Offset the STW transfer termination.

The overall influence of the SEA process, and broader environmental assessment components (e.g. WFD and HRA), on the WRMP24 can be categorised into three key areas:

1. **Feasible option assessment** – all feasible demand and supply-side options were subject to a full assessment against the SEA framework which was also informed by option-level HRA Stage 1 screening, WFD compliance and BNG assessment.

2. **WRMP24 decision making metrics** – the findings of the SEA were used to inform three best value metrics (flood risk management, multi-abstractor benefit and human and social well-being) used by Yorkshire Water to determine the best value plan. The metric performance of candidate solution programmes (developed through the WRMP24 optimiser model) are compared to assess the impacts of moving away from the least cost solution and identify where metric trade-offs may be required. Although not all SEA objectives are represented in the metrics, these are fully considered and incorporated into the final decision making and preferred plan delivery (e.g. identification of mitigation measures).

3. **Plan appraisal** – the preferred plan solution, along with any alternative plans have been assessed against the SEA framework. A cumulative assessment of the potential impacts of the preferred plan in-combination with each other (intra-plan) as well as with other relevant plans and programmes (inter-plan) has also been undertaken. Where significant effects have been identified, the SEA will highlight potential mitigation measures that may be required and indicate monitoring proposals. At this stage in the process, these will be determined at a high-level and will be further refined during the more detailed design stages of the schemes as they progress forward for implementation.

The SEA influences the selection of the best value plan by providing an option level assessment for each objective that we use to assess the supply-side options included in a solution programme. We assess the environmental impacts of the individual options and the combined impacts of the whole programme. If there is potential to avoid any adverse or major adverse impacts, we may remove an option from the programme and select a less adverse option instead. However, for the programme to close the deficit it is not always possible to avoid adverse impacts completely and we must identify mitigation measures instead.

The inclusion of environmental considerations into decision making has aided the identification of poor performing options. As a result, these options may be removed from contention for the preferred plan or, if there is an overriding need for the option, potential mitigation measures have been suggested. For example, R8f Sherwood Sandstone and Magnesian Limestone Boreholes option 6 showed major adverse impacts on biodiversity and as such an alternative option R8g Sherwood Sandstone Boreholes support to North Yorkshire was selected as it provided additional resilience for the Dales area whilst having no major or moderate adverse impacts.

8 Mitigation and enhancement

8.1 Overview

Key stages of the SEA process comprise Task B5: Mitigating adverse effects and Task B6: Proposing measures to monitor the environmental effects of plan or programme implementation. The sections below describe how these tasks have been addressed and how Yorkshire Water intends to ensure that mitigation measures are implemented for any adverse effects that are identified and the means by which the environmental performance of the WRMP can be assessed.

8.2 Mitigation measures

Consideration of mitigation measures has been an integral part of the SEA process. The assessment has assumed the implementation of standard best practice mitigation measures and identified any additional measures as shown in the option SEA matrices (see **Appendix E**). The significance of effects identified in the matrices relates to residual effects after mitigation.

Certain assumptions have been made regarding this:

- Where suitable mitigation measures are known and identified, these have been taken into account and reported, such that the resultant residual impact has been determined.
- In line with recommendations made in the UKWIR SEA Guidance, the SEA appraisals have assumed the implementation of reasonable mitigation, such as the use of best practice construction methods.

8.3 Residual effects

The potential effects of the WRMP24 are described in the sections above. The SEA process has identified potential residual impacts of the WRMP preferred plan after mitigation measures have been taken into consideration. Proposals to attenuate the residual negative impacts of the preferred plan are set out below.

Table 8.1 summarises the residual effects attributable to the preferred plan for the Yorkshire Water WRMP24. Mitigation of both construction and operation components for each option are presented.

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. In other cases, best practice design requires consideration of mitigation measures at an early stage along with consultation with potentially affected parties. In this way, effective mitigation plans can be developed to minimise many of the residual adverse effects currently identified in the SEA appraisals.

Table 8.1 Residual adverse impacts of options within the preferred plan for the WRMP24

Reference	Option	Construction	Operation
C1d	Household customer audits and water efficiency retrofits	No significant effects	No significant effects
C6a	Non-household water use audit and retrofit	No significant effects	No significant effects
C6a(ii)	Non-household domestic water use audit and retrofit	No significant effects	No significant effects
C12a3	Rainwater harvesting for commercial customers	No significant effects	No significant effects
C13c	Household tariffs	No significant effects	No significant effects

C15d	Installation of internal household flow regulators	No significant effects	No significant effects
C23b1	Rainwater harvesting for agriculture	No significant effects	No significant effects
C27d	School visits	No significant effects	No significant effects
C28e	Household media campaign	No significant effects	No significant effects
C30a	Water labelling- baseline	No significant effects	No significant effects
C32c	Rainwater harvesting for households- new developments	No significant effects	No significant effects
C34a	Non-household media campaign	No significant effects	No significant effects
C35c	Water retailer incentives	No significant effects	No significant effects
LSM	Leakage reduction and smart metering glidepath (50%)	No significant effects	No significant effects
DV7a(vi)	Tees to York Pipeline - NWL import 140 Ml/d	Biodiversity, flora and fauna; Material assets and resource use; Soil, geology and land use; and Air and climate.	No significant effects
DV8B	New York WTW and new north to south internal transfer connection	Biodiversity, flora and fauna; Population and human health; Material assets and resource use; Water quantity, Soil, geology and land use; Air and climate; Archaeology and cultural heritage; and, Landscape and visual amenity	No significant effects
R3	Increased River Ouse pumping capacity	Cultural heritage	No significant effects
R3a	River Ouse licence transfer	No significant effects	No significant effects
R8g	Sherwood Sandstone Boreholes support to North Yorkshire	No significant effects	No significant effects
R13	East Yorkshire Groundwater Option 2	Biodiversity, flora and fauna, water quantity	No significant effects
R31a	Additional bankside storage at York WTW	Biodiversity, flora and fauna	No significant effects
R37b (ii)	River Aire Abstraction option 4	Biodiversity, flora and fauna	No significant effects
R91	New internal transfer to North Yorkshire WTW	No significant effects	No significant effects

There are general best-practice procedures and measures which can be applied to all options proposed in Yorkshire Water's WRMP24. The following guidance outlines the current industry best-practices in dealing with potential construction-related impacts, specifically site-derived pollutants (e.g. fuel, concrete and silt), and should be implemented as minimum standard in addition to any scheme-specific measures which have been identified through option level investigations:

- 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.

The documents above highlight procedures and measures designed to prevent adverse effects on a range of receptors (e.g. European sites) occurring as a result of construction activities. There is also the possibility for the pollution of water courses via surface run off and additional attention should be made when dealing with such contaminants. In these instances, works should be conducted in adherence to the guidance outlined above. For example, all vehicles and any chemical/ oil storage will be fully bunded to prevent any accidental pollution of groundwater or watercourses. Pollution Incident Control Management Plans may also be developed to limit adverse effects arising from pollution events.

In addition to the above, the CEMP should include further measures to minimise, or where possible, eliminate, adverse effects on various receptors. These are outlined below for each SEA topic.

Adverse effects on biodiversity are largely as a result of potential effects on specific species. Most mitigation measures specific to a particular species may only be determined at the option level following appropriate monitoring. Mitigation measures designed to minimise adverse effects on biodiversity receptors during the construction phase should be outlined in the CEMP. Examples of these measures are detailed below, for example:

- where supporting habitat will be directly lost as a result of open cut pipeline installation, the habitat must be reinstated, or trenchless/ directional drilling pipeline installation methods should be alternatively used;
- a programme of works should be established as early as possible to enable any investigations, surveys and mitigation to be established and give sufficient time for consultation with relevant bodies. The programme should take into account any seasonal constraints to avoid adverse effects on sensitive receptors (e.g. breeding birds);
- the site layout must be planned so that machinery and dust causing activities are located away from receptors, as far as is possible;
- consideration of the timing of construction e.g. night-time working to avoid effects on nocturnal species
- the use of lighting will ensure that potential 'displacement' effects on nocturnal animals, particularly designated bat species, are avoided;
- Construction Environmental Management Plan will be implemented with risk assessment for pollution incidents and introduction/ spread of INNS and a response plan if either occurred.
- measures to reduce noise impacts on species (e.g. birds) and residential receptors including; acoustic housing of generators, acoustic cladding surrounding construction site, appropriate siting of plant machinery and silencers or mufflers fitted to machinery where possible.
- measures to reduce adverse effects as a result of dust and air emissions including ensuring vehicles switched off when stationary, ensuring an adequate water supply for appropriate mitigation and covering vehicles entering and leaving sites to prevent escape of materials during transport.
- installation of pipe-caps to prevent species entering and becoming trapped in any laid pipe-work outside of working hours.
- utilise an Ecological Clerk of Works where required
- 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;

- With respect to effects on otters, further mitigation can include: ensuring no net loss of breeding or resting sies; replacement of any lost otter access and habitat connectivity; and provision of an enhanced habitat where areas are lost. Compensation measures could include construction of artificial holts and viaducts or underpasses to allow otters to cross barriers e.g. roads and installation of mammal ledges on bridges and culverts to allow for continued passage alongside water bodies.

Additional mitigation measures employed to reduce the potential adverse effects on sensitive receptors can be categorised under the following:

- Population and human health
  - avoid works near to the most sensitive health receptors, where possible;
  - plan construction traffic movements to avoid routes with sensitive receptors and avoid peak traffic hours;
- Material assets and resource use
  - Production of a waste management plan which details what waste will be generated by the scheme as well as highlight opportunities for reuse or recycling of materials.
  - Minimise waste generation and adopt the waste hierarchy process
- Water
  - Compliance with Pollution Prevention Guidelines, as detailed above
  - Installation of temporary drainage measures (e.g. swales and silt fences) to reduce sediment loads
  -
- Soils, geology and land-use
  - Agricultural soils will be managed, preserved, retained and reinstated in accordance with Department for Environment, Food and Rural Affairs (Defra)
- Air quality
  - Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transport
  - Planning site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
  - Ensure all vehicles switch off engines when stationary - no idling vehicles;
  - Ensuring an adequate water supply for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
  - Reuse and recycle waste to reduce dust from waste materials;
  - Ensure water suppression is used during demolition, excavation and other earth-moving operations;
  - Any demolition or concrete breakout to be undertaken in suitable weather conditions i.e. avoiding windy conditions.
- Climate change
  - utilise on-site renewable energy where possible
  - sustainable design of any new infrastructure to maximise energy efficiency
  - company fleets to utilise low emission or electric vehicles
  - use of low emission plant machinery
  - offsetting residual carbon emissions
- Archaeology and cultural heritage
  - careful consideration being given to the presence of heritage assets when finalising proposals for pipeline routing;
  - 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, where they cannot be avoided in the first instance;

  - where required, archaeological investigations should be carried out prior to commencing construction and the findings will inform detailed mitigation, which will be agreed with the relevant authorities.
- Landscape and visual amenity
  - Landscape and visual assessments to inform landscape mitigation plans
  - Avoid unnecessary tree and vegetation removal
  - High quality design and considerate positioning of new infrastructure
  - Where lighting is required, this should be low level and directed away from sensitive receptors/areas

8.4 Mitigation of cumulative impacts with other plans and programmes

Section 7 explains the potential cumulative impacts with other plans. Potential water resource impacts that could arise due to future, as yet, unknown new abstractions from common sources would be assessed and considered by the Environment Agency as informed by detailed environmental assessment work as part of the abstraction licensing and water resources planning processes.

Liaison with local planning authorities will also be essential to assess any required mitigation measures from any identified cumulative effects on development plans and projects as discussed in Section 7.

9 Monitoring proposals

9.1 Overview

A key stage of the SEA process with regard to monitoring is Stage E: Monitoring the significant effects of the plan or programme on the environment. The sections below describe how these tasks have been addressed and how Yorkshire Water proposes to monitor the effects of implementation of the WRMP.

9.2 Monitoring Requirements

Monitoring will be required to track the residual environmental effects to show whether they arise as anticipated in the SEA appraisal, to help identify any adverse impacts and trigger deployment of any of the mitigation measures.

Monitoring for options identified in the preferred plan is set out in Section 9.3. These monitoring recommendations are based on the current understanding of the scheme design. As options are brought forward for development, further monitoring requirements may be set out in planning applications, borehole drilling and pump test consents, or in Yorkshire Water voluntary best-practice monitoring plans accompanying scheme development. This will be discussed with relevant key regulatory bodies and stakeholders. In practice, close dialogue should occur between Yorkshire Water, Environment Agency, Natural England and any affected third parties to agree the appropriate scale and duration of such scheme-specific monitoring activities proportionate to the assessed environmental risks.

9.3 Proposed Monitoring

Table 9.1 lists the potential impacts that may arise from implementation of the WRMP preferred plan and which require monitoring in accordance with the SEA Regulations.

Key monitoring parameters at the strategic WRMP level will be those relating to the abstraction of water and the effects that this may have on waterbodies and their functions as habitats (see **Table 9.1**). There are also direct potential impacts on humans, the built environment, terrestrial habitats, the atmosphere, landscape and heritage assets, which may arise from construction activities and/or option operation (see **Table 9.1**). These parameters should, therefore, be included within the monitoring programme where it is practicable to do so. Extensive primary data collection is neither feasible nor appropriate for this programme level of monitoring, and use should be made where possible of existing datasets and monitoring regimes.

Site-specific monitoring requirements for the resource options included in the preferred plan will be developed during the planning process closer to the time of implementation.

Table 9.1 Proposed SEA monitoring parameters – strategic WRMP monitoring

Impacted receptor/topic	Proposed strategic indicators	Indicative timescale	Commentary
Biodiversity	Condition of protected sites, biological monitoring (e.g. macroinvertebrates, macrophytes, fisheries, bird surveys), INNS presence	During and post-construction	Yorkshire Water will be responsible for collecting data and will engage with Environment Agency and Natural England to ensure most up-to-date information is being utilised which will help identify any potential issues.

Impacted receptor/topic	Proposed strategic indicators	Indicative timescale	Commentary
Water resources, water quality	River flows, river levels, lake and reservoir levels. Groundwater levels. Surface and ground water quality (including proportion of surface water and groundwater bodies at 'Good; WFD status)	Annual (subject to data availability)	Yorkshire Water to undertake WFD assessments for all relevant projects pre and during construction. Monitor status of water bodies (relevant to projects) using publicly available information. Previous studies e.g. WINEP investigations may be used to inform monitoring and assessment.
Flood risk	Number of properties that experience internal flooding from public sewers.	During construction	Yorkshire Water presently collect and report this data.
Soils, geology and land use	Area of previously undeveloped land used during construction Area of agricultural land (by grade) lost to WRMP schemes	During construction	Yorkshire Water should report the area of land (by type) that is used for development of WRMP schemes.
Climate Factors	Net greenhouse gas emissions per million litres (Ml) of treated water (kg CO_2 equivalent emissions per Ml) for Yorkshire Water supply area Energy use used in the operation of options. Renewable energy generated or purchased by Yorkshire Water.	Annually	Yorkshire Water already collect this information as part of their carbon reduction strategy and journey towards net zero.
Transport	Transport fleet fuel consumption, emissions and business mileage, as monitored by Yorkshire Water	During construction	Yorkshire Water to record vehicle movements during the construction period of any schemes.
Nuisance/ Community/ Local Economy	Scheme level community disruption of capital works would be monitored through an Environmental Monitoring Plan if required. Number of nuisance-related complaints (e.g. noise, dust) logged with Yorkshire Water and Local Authority EHOs. Pollution and flooding incidents Responses gauged through Yorkshire Water customer satisfaction surveys. Community investment, employee volunteering and match funding by Yorkshire Water.	During and post-construction	Yorkshire Water to collect information regarding complaints received during construction at project level.
Recreation and Tourism	Number of recreation or tourism assets created	Post-construction	Yorkshire Water could also collect data on visitor numbers to existing recreational facilities.

Impacted receptor/topic	Proposed strategic indicators	Indicative timescale	Commentary
Waste and resource use	Leakage Water saved through demand management / water efficiency measures. Amount of recycled / re-used materials. Proportion of waste sent to landfill. Chemical usage in water treatment.	Annually / During construction	Yorkshire Water to collect data on material and waste arisings during construction of schemes
Air Quality	Scheme related issues of capital works would be monitored through an Environmental Monitoring plan if required. Changes in air quality are monitored by the Automatic Urban and Rural Network[48] administered by Bureau Veritas, and this data would be available if required to inform a baseline	During construction	Yorkshire Water may undertake project level air quality assessments to identify sensitive receptors where monitoring may be required.
Cultural Heritage	Loss / damage or discovery / protection of cultural, historic and industrial heritage features. Condition of buried archaeology would be monitored during construction e.g. through appropriate archaeological investigations and watching briefs as required. Consultation with relevant stakeholders to ensure impacts are minimised, e.g. to water level dependent assets, where they cannot be avoided in the first instance. Historic England monitor parameters such as Listed Buildings and Scheduled Monuments, in order to maintain a 'Heritage at risk' register.	During and post-construction	Yorkshire Water could record information at a project level on heritage assets in the area. Historic England records can be accessed to provide detail on the condition of heritage assets. Yorkshire Water should record any actions undertaken to avoid historic assets or enhancements made.
Landscape	Loss or damage to landscape character and features of designated sites.	Post-construction	Yorkshire Water could record the number and size of infrastructure built within designated landscape areas, amount of landscaping provided or number of complaints received

[48] Accessed at http://www.bv-aurnsiteinfo.co.uk/

Appendices

Appendix A Statutory consultee responses to the SEA Scoping Report
Appendix B Quality assurance checklist
Appendix C Review of policies, plans and programmes
Appendix D Environmental baseline review
Appendix E Option assessment matrices

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