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Environmental Report – Non-Technical Summary

Yorkshire Water's Water Resources Management Plan

Strategic Environmental Assessment

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Yorkshire Water

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Environmental Assessment of the WRMP

Contact:

Anne Fairhead
Ricardo Energy & Environment
Bright Building, First Floor
Manchester Science Park
Manchester, M15 6GZ
United Kingdom

T: +44 (0) 1235 753 488

E: Anne.Fairhead@ricardo.com

Author:

Katie Moran, Connor Fulham, Ben Sullivan, Mark Spence

Approved by:

Anne Fairhead

Date:

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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 NTS1**. 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.

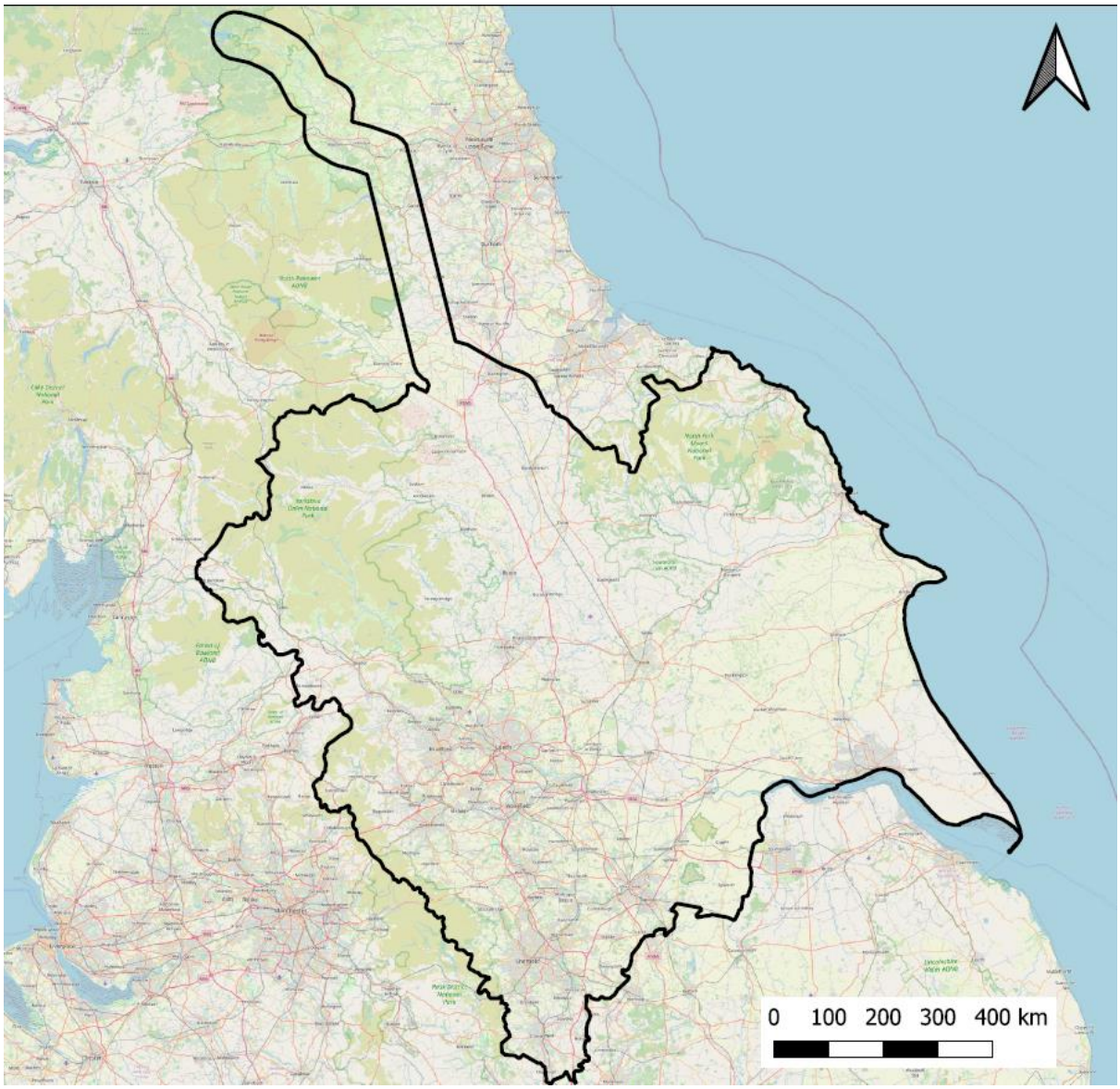
This Environmental Report covers the full duration of the current WRMP, i.e. 2024/5 to 2049/50. The statutory process requires WRMPs to be produced every five years, as such, the schemes and programmes for balancing supply and demand for water will be reviewed again and subject to SEA in 2028/29. Future 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



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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 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.
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. 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.

SEA Topic	Key issues
	The need to ensure sustainable abstraction to protect 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.
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[3]. In response to recent studies access to the recreational resources, green spaces and the historic environment will have greater importance in future planning[4]. 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[5] Partnership with civil society to support the development of green infrastructure in England. Improvements to the quality of the water environment and certain potential climate change impacts will present opportunities for an expanding tourist industry in the region[6].

[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] ONS (2010) Housing Statistical Release - Household Projections 2008 to 2033, England.
[4] Defra (2011) The Natural Choice: securing the value of nature, The Natural Environment White Paper
[5] 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.
[6] Defra (2012) The UK Climate Change Risk Assessment 2012 Evidence Report.

SEA topic	Future Environmental Baseline
Material assets and resource use	The Government's National Infrastructure Strategy[7] (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[8], Flood Zone 2[9], Flood Zone 3a[10] 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[11]. 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 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

[7] 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
[8] Low probability of river or sea flooding (<0.1%) which has critical drainage problems
[9] Medium probability of river (1%-0.1%) or sea flooding (0.5%-0.1%)
[10] High probability of river (>1%) or sea flooding (>0.5%)
[11] 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
	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[12] 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[13] 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[14]. The first of these schemes, the Sustainable Farming Incentive, will pay farmers to manage their land in an environmentally sustainable way. The scheme designates standards based on a feature e.g. hedgerows or grassland, and contains a series of actions required to meet the criteria. The scheme is currently being piloted but is due to launch in 2022. The Local Nature Recovery Scheme is intended to encourage collaboration between farmers and will pay for actions that support nature recovery which meet local environmental priorities. The Local Nature Recovery Scheme is due to launch in 2024. Finally, the Landscape Recovery scheme support long-term projects to recover landscape and ecosystems. Examples of projects include the restoration of peatland and salt marshes, large-scale tree planting and the re-wilding of landscapes where appropriate. Again, this scheme is due to come online in 2024.
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 headroom's of 36 and 384 MtCO2e respectively and is currently

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

SEA topic	Future Environmental Baseline
	projected to meet the third carbon budget with a headroom of around 26 MtCO2e (until 2022)[15]. 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[16] and PM10[17] 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[18] will not be achieved by 2020[19]. 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"[20]. 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[21].
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

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

SEA topic	Future Environmental Baseline
	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.
	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.

Topic	Objective
Soil, geology and land use	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 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.

Minor beneficial effects have been identified for the majority of the customer management options, in relation to sustainable and efficient use of water resources. There are a number of options that, in isolation, will result in negligible beneficial impacts for every SEA objective. C4, and C5, are likely to result in reductions in water savings of a magnitude considered to be of a 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 L4, L5 and L6 are anticipated to have major benefits on population and human health, material assets and resource use, surface and ground water flows, efficient use of water and climate resilience due to the savings created by these leakage control options.

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 five SEA objectives: DV6(vi), DV7a(vi), DV8(iv). All the Derwent Valley (DV) resource options, with the exception of DV3 and DV8(v), 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 Ouse 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.

- All South Yorkshire Groundwater options (R6, R6b, R6c, R6d) are anticipated to result in significant adverse effects. 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. R6b South Yorkshire Groundwater Option 2, R6c South Yorkshire Groundwater Option 3, R6d South Yorkshire Groundwater Option 4 have potential to result in major adverse effect on biodiversity due to potential for construction phase impacts on a SSSI and other sensitive ecological receptors, as well as on archaeology and cultural heritage.
- 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 effects 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.
- 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 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
C1a Domestic customer audits and retrofit	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C1b Domestic customer audits and retrofit	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C1c Domestic customer audits and retrofit	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C1d Domestic customer audits and retrofit	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
C1e Domestic customer audits and retrofit	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C2a-e Metering (domestic meter optants)	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
	Beneficial				None		None						None				None	None
C5 Smart metering	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C6a Commercial water user	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
audits and retrofit	Beneficial				None								None				None	None
C6b Commercial water user audits and retrofit	Adverse				None								None				None	None
	Beneficial				None								None				None	None
C6c Commercial water user audits and retrofit	Adverse				None								None				None	None
	Beneficial				None								None				None	None
C6d Commercial water user audits and retrofit	Adverse				None								None				None	None
	Beneficial				None								None				None	None
C6e Commercial water user audits and retrofit	Adverse				None								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
C7a-e Commercial water user audits and retrofit - customer pays	Adverse				None								None				None	None
	Beneficial				None								None				None	None
C15a Household Flow Regulator - Internal	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C15b Household Flow Regulator – Internal	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C15c Household Flow Regulator – Internal	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C15d Household Flow	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
Regulator – Internal	Beneficial				None		None						None				None	None
C15e Household Flow Regulator - Internal	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
C21a Housing Associations – targeted programme	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C21b Housing Associations – targeted programme	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C21c Housing Associations – targeted programme	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
C21d Housing Associations – targeted programme	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None
C21e Housing Associations – targeted programme	Adverse		None		None		None						None				None	None
	Beneficial				None		None						None				None	None

Key:

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

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
L1 Active Leakage Control 14Ml/d	Adverse				None													
	Beneficial				None													
L2 Active Leakage Control 30Ml/d	Adverse				None													
	Beneficial				None													
L3 Active Leakage Control 46Ml/d	Adverse				None													
	Beneficial				None													
L4 Active Leakage Control 62Ml/d	Adverse				None													
	Beneficial				None													
L5 Active Leakage Control 78Ml/d	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													
L6 Active Leakage Control 95Ml/d	Adverse				None													
	Beneficial				None													

Table NTS 7 Visual evaluation matrix summary for resource 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
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						
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						

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(v) 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(v) - York WTW Capacity increase	Adverse				None							None						
	Beneficial											None						
E2 - Yorkshire grid network to STW	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
R1a River Ouse water treatment works extension	Adverse				None							None						
	Beneficial											None						
R1c Grid network enhancement: New River Ouse WTW to York	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 River Ouse WTW to North Yorkshire 3	Adverse				None					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
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 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
R6 South Yorkshire Groundwater Option 1	Adverse				None							None						
	Beneficial											None						
R6b South Yorkshire Groundwater Option 2	Adverse				None							None						
	Beneficial	None										None						
R6c South Yorkshire Groundwater Option 3	Adverse				None							None						
	Beneficial	None										None						
R6d South Yorkshire Groundwater Option 4	Adverse				None							None						
	Beneficial	None										None						
R8b: Sherwood Sandstone and Magnesian Limestone Boreholes 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
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						
R12 East Yorkshire Groundwater Option 1	Adverse				None													
	Beneficial																	
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
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																	
R29 Reservoir De-silting	Adverse				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
R34 River Calder Abstraction Option 1	Adverse				None							None						
	Beneficial											None						
R35 River Aire Abstraction Option 1	Adverse				None							None						
	Beneficial											None						
R37b River Aire abstraction Option 4	Adverse											None						
	Beneficial											None						
R51 Dales from the Tees - treated	Adverse				None													
	Beneficial																	
R58 Transfer from UU Option 3	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
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																	
R85 Recommission Kirklees WTW	Adverse				None						None	None	None					
	Beneficial				None						None	None	None					
R86 Aire and Calder new WTW	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
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					
R90 North Yorkshire annual license increase	Adverse				None		None					None	None	None				None
	Beneficial				None		None					None	None	None				None

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 draft WRMP24 preferred plan is set out in **Table NTS 8.** The plan includes two demand management options: L6 Active leakage control 95Ml/d and C5 Smart metering and water efficiency. 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 C5 Smart metering and water efficiency option is assessed as resulting in moderate beneficial effects relation to sustainable and efficient use of water resources. The SEA findings also conclude that C5 Smart metering and water efficiency will result in minor beneficial effects across a range of other SEA objectives. The L6 Active leakage control 95Ml/d option is assessed as resulting in major beneficial effects across five SEA objectives in relation to human health and wellbeing, sustainable and efficient use of water resources and climate change resilience. 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.

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 draft WRMP24. Major adverse impacts for options DV7a(vi) Tees to York Pipeline Option 3 and DV8 (iv) York 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 four resource options within the preferred plan are anticipated to result in moderate adverse effects on biodiversity in relation to scheme construction and minor adverse effects across a number of SEA objectives including for population and human health and cultural heritage. The remaining six 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.

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[22].

The WFD compliance assessment has informed SEA findings against the water topic objectives and has identified uncertain impacts associated with multiple WFD water bodies in relation to four schemes within the preferred plan: R8b Sherwood Sandstone and Magnesian Limestone Boreholes Option 2, R8g Sherwood Sandstone Boreholes support to North Yorkshire, R13 East Yorkshire Groundwater Option 2, and DV7a(vi) Tees to York Pipeline Option 3. Further investigations will need to be carried out to confirm these impacts before the schemes could be implemented. 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[23].

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.

Table NTS 8 WRMP 2024 preferred plan

Category	Option Reference	Scheme	Benefit (Ml/d) on full implementation	First Year of Benefit
Customer management	C5	Smart metering	31	2025
Leakage	L6	Active leakage control 95 Ml/d	95	2025
Resource	DV3	South Yorkshire groundwater	5	2027
Resource	DV7a(vi)	Tees - York Pipeline Option 3	140	2049
Resource	DV8(iv)	York to South Yorkshire pipeline	N/A – 50Ml/d capacity required to transfer new source of supply to South Yorkshire	2035
Resource	DV8(v)	York WTW capacity increase	50	2029
Resource	R3a	River Ouse licence transfer	0.3 (15 maximum)	2027

[22] Ricardo Energy & Environment (2022) Habitats Regulation Assessment of the Draft WRMP24. Report prepared for Yorkshire Water Services, September 2022.
[23] 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
Resource	R8b	Sherwood Sandstone and Magnesian Limestone Boreholes Option 2	5	2027
Resource	R8g	Sherwood Sandstone Boreholes support to North Yorkshire	15	2028
Resource	R13	East Yorkshire Groundwater Option 2	6 (8 maximum)	2025
Resource	R31a	Additional bankside storage on the River Ouse	11	2066
Resource	R37b(ii)	River Aire Abstraction Option 4	34	2025
Resource	R85	Recommission Kirklees WTW	8	2068

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
C5 Smart Metering and Water Efficiency	Adverse				None		None						None				None	None
	Beneficial				None		None						None				None	None
L6 Active Leakage Control 95Ml/d	Adverse				None													
	Beneficial				None													
DV3 - South Yorkshire Groundwater	Adverse				None							None						
	Beneficial											None						
DV7a(vi) - Tees - York Pipeline Option 1	Adverse				None							None						
	Beneficial											None						
DV8(iv) - York to South Yorkshire Pipeline	Adverse				None					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
DV8 (v) - York WTW Capacity increase	Adverse				None							None						
	Beneficial											None						
R3a River Ouse licence transfer	Adverse				None		None											None
	Beneficial				None		None											None
R8b: Sherwood Sandstone and Magnesian Limestone Boreholes Option 2	Adverse				None							None						
	Beneficial											None						
R8g Sherwood Sandstone Boreholes 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						
R85 Recommission Kirklees WTW	Adverse				None						None	None	N/A					
	Beneficial				None						None	None	None					

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.

The first year of benefit for R31a within the preferred plan is identified as 2066 (see **Table NTS 8**) and this scheme is estimated to be associated with an approximately 4-year construction phase. Both the DV8(iv) and DV8(v) schemes are also estimated to associate with a four-year construction period are identified as operational in 2035 and 2029 respectively, and therefore the construction phases will not coincide with that of R31a. The DV7a(iv) scheme is identified as operational in 2049 within the preferred plan (see **Table NTS 8**) with an approximately 15-year construction phase. Therefore no cumulative effects are anticipated.

On the basis of current information the construction phases of the DV8(v) scheme are estimated to run for four years and is not currently expected to overlap with that of the DV7a(iv) and DV8(iv) schemes and therefore no cumulative effects are anticipated.

The DV7a(iv) and DV8(iv) 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(iv) scheme will cover a large geographical area (pipeline construction from the River Tees to Ouse) as will the DV8(iv) scheme (Ouse to South Yorkshire) 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

There is no potential for cumulative adverse effects during operation of the schemes included in the preferred plan as there are no water bodies that are impacted by more than one option. 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 under 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

Ref	Option	Construction	Operation
C5	Smart Metering and Water Efficiency	No significant effects	No significant effects
C15a	Household Flow Regulators A	No significant effects	No significant effects
DV3	South Yorkshire Groundwater	No significant effects	No significant effects
DV7a(vi)	Tees to York Pipeline Option 3	Biodiversity, flora and fauna; Population and human health; Material assets and resource use; Soil, geology and land use; Air and climate; Archaeology and cultural heritage; and, Landscape and visual amenity	No significant effects
DV8(iv)	York to South Yorkshire Pipeline	Biodiversity, flora and fauna; Population and human health; Material assets and resource use; Soil, geology and land use; Air and climate; Archaeology and cultural heritage; and, Landscape and visual amenity	No significant effects
DV8(v)	York WTW Capacity increase	Biodiversity, flora and fauna	No significant effects
L6	Active Leakage Control 95 Ml/d	No significant effects	No significant effects
R3a	Increased River Ouse pump storage capacity	No significant effects	No significant effects

Ref	Option	Construction	Operation
R8b	Sherwood Sandstone and Magnesian Limestone Boreholes Option 2	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 quality	No significant effects
R31a	Additional bankside storage on the River Ouse	Biodiversity, flora and fauna	No significant effects
R37b(ii)	River Aire Abstraction Option 4	Biodiversity, flora and fauna	No significant effects
R85	Recommission Kirklees 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	Proposed strategic indicators
Biodiversity	Condition of protected sites, biological monitoring (e.g. macroinvertebrates, macrophytes, fisheries, bird surveys), INNS presence
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)
Flood risk	Number of properties that experience internal flooding from public sewers.
Soils, geology and land use	Area of previously undeveloped land used during construction
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.
Transport	Transport fleet fuel consumption, emissions, and business mileage, as monitored by Yorkshire Water
Nuisance/ Community/ Local Economy	Scheme level community disruption of capital works would be monitored through an Environmental Monitoring Plan if required. Number of nuisance-related complaints (e.g. noise, dust) logged with 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.
Waste and resource use	Leakage Water saved through demand management / water efficiency measures. Amount of recycled / re-used materials. Proportion of waste sent to landfill. Chemical usage in water treatment.
Air Quality	Scheme related issues of capital works would be monitored through an Environmental Monitoring plan if required. Changes in air quality are monitored by the Automatic Urban and Rural Network[24] administered by Bureau Veritas, and this data would be available if required to inform a baseline

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

Impacted receptor	Proposed strategic indicators
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. Historic England monitor parameters such as Listed Buildings and Scheduled Monuments, in order to maintain a 'Heritage at risk' register.
Landscape	Loss or damage to landscape character and features of designated sites.

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 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 is now being published for consultation. It also provides a useful reference point for consultees wishing to express their views on Yorkshire Water's draft WRMP.

On adoption of the final WRMP, after approval by Defra, 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.

T: +44 (0) 1235 753000
E: enquiry@ricardo.com
W: ee.ricardo.com