
# Environmental Report Non-Technical Summary

## Yorkshire Water Services Limited

Report for Yorkshire Water Services, in association with Ove Arup and Partners

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# 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. Since publishing the statement of response, Yorkshire Water has made further changes to the WRMP2019 to adjust the implementation of it's future leakage activity and to include a proposal to increase a river abstraction licence that will provide additional winter resilience.

In preparing its WRMP, Yorkshire Water has considered the environmental and social impact assessment of each alternative option 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) screening and a Water Framework Directive (WFD) compliance assessment. These assessments are reported 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 Plans and Programmes Regulations 2004 (subsequently referred to as the SEA Regulations), must themselves determine if their WRMP falls within the scope of the SEA Directive.

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 Directive, principally due to the risk that the plan may include schemes which rewill 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 the 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 identifies 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 May 2017 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. The findings of the SEA are presented within this Environmental Report which were subject to public consultation on the draft WRMP.

## Assessment methodology

The assessment has been 'objectives-led'. 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 and fauna, population and human health, material assets and resource use, water, soil, geology and land use, air and climate, archaeology and cultural heritage, and landscape and visual amenity and 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 resource management plan options.

The outputs of the assessment are a completed detailed appraisal framework table for each of the different 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 resource 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 Directive Article 3(5) and Annex II, and 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 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 WRMP2019. It is only with knowledge of baseline conditions that potential impacts of the WRMP2019 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 2013) that will continue in the absence of the new 2019 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. 2019/20-2044/45. 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 2023-24. 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 required.

The SEA study area comprises the entirety of Yorkshire Water's supply area which is also considered to be the natural catchment of the water company's operations. The study area also includes an additional 10 km 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.

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 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 storage capacity of all the supply reservoirs amounts to some 160,000 Ml.

Key issues arising from the review of baseline conditions for each of the SEA topics are summarised in Table NTS1. These key issues have been used to support the development of the SEA objectives in Section 5.

**Table NTS1 Summary of key sustainability issues from the review of the baseline conditions**

| SEA topic | Key issues |
|---|---|
| Biodiversity, flora and fauna | • The need to protect or enhance the region's biodiversity, particularly protected sites designated for nature conservation.<br>• The need to avoid activities likely to cause irreversible damage to natural heritage.<br>• The need to take opportunities to improve connectivity between fragmented habitats.<br>• The need to control the spread of Invasive Non-Native Species (INNS).<br>• 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 or vulnerable communities<br>• The need to ensure continued improvements in levels of health across the region, particularly in urban areas and deprived areas.<br>• The need to ensure public awareness of drought conditions and importance of maintaining security of supply without the need for emergency drought measures. |

| SEA topic | Key issues |
|---|---|
| | • The need to ensure water quantity and quality is maintained for other users including tourists, recreational users and other users such as farmers.<br>• 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 resources and the natural and historic environment.<br>• The need to accommodate an increasing population.<br>• 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<br>• 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.<br>• Need to reduce leakage from the water supply system.<br>• Daily consumption of water resources is higher than the national average in the area and there is a need to encourage more efficient use. |
| Water | • The need to further improve the quality of the regions river, estuarine and coastal waters taking into account WFD status targets.<br>• The need to maintain the quantity and quality of groundwater resources taking into account WFD status targets.<br>• 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.<br>• The need to ensure sustainable abstraction.<br>• The need to ensure that people understand the value of water.<br>• 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.<br>• 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).<br>• 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 emissions and limit air emissions to comply with air quality standards.<br>• The need to mitigate against climate change through the reduction in greenhouse gas emissions to contribute to risk reduction over the long term.<br>• The need to adapt to the impacts of climate change for example through, sustainable water resource management, specific aspects of |

| SEA topic | Key issues |
|---|---|
| | 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 AONBs and other areas of natural beauty. |

Table NTS2 summarises the future environmental baseline in the absence of WRMP2019 based on available information.

**Table NTS2 Summary of future environmental baseline in the absence of WRMP2019**

| SEA topic | Future environmental baseline |
|---|---|
| Biodiversity, flora and fauna | As part of the post 2010 policy framework for SSSIs, Natural England has developed a trajectory to achieve the move from "recovering" into "favourable" condition with monitoring of sites to measure success.<br><br>The Natural Environment White Paper[1] identifies the Government's aims to work to achieve more, bigger, better and less-fragmented areas for wildlife, including no net loss of priority habitat and an increase of at least 200,000 hectares in the overall extent of priority habitats and at least 50% of SSSI to be in favourable condition, while maintaining at least 95% in favourable or recovering condition.<br><br>Natural England has also published a conservation strategy for the 21st century[2] that sets out the measures that Natural England will take to protect England's natural environments and landscapes, for the public enjoyment and ecosystem services that they provide. |
| Population and human health | Population is expected to grow at a rate between 8.2% and 16.5% across the region (see Table 4.5), 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]. |

[1] Defra (2011) The Natural Choice: securing the value of nature, The Natural Environment White Paper.

[2] Natural England (2016). Conservation 21: Natural England's conservation strategy for the 21st century. [Online]. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/562046/conservation-21.pdf [Accessed 3 November 2017].

[3] ONS (2010) Housing Statistical Release - Household Projections 2008 to 2033, England.

| SEA topic | Future environmental baseline |
|---|---|
| | 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 National Planning Policy Framework (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.<br><br>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.<br><br>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]. |
| Material assets and resource use | The Government's National Infrastructure Plan[7] (2011) includes visions to manage natural capital sustainably; treat water and waste in ways that sustain the environment and enable the economy to prosper; ensure a supply of water that meets the needs of households, businesses and the environment now and in the future and deal with waste in accordance with the waste hierarchy moving towards a zero-waste economy. Yorkshire Water's current economic level of leakage target is to reduce its regional level of water leakage from 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 2019 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 WFD sets 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 until 2021 or 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 NPPF11. 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. |

[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.

[7] HM Treasury Infrastructure UK (2011). National Infrastructure Plan.

[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] Communities and Local Government (2012) Technical guidance to the National Policy Planning Framework

| SEA topic | Future environmental baseline |
|---|---|
| | The Environment Agency has produced 77 Catchment Flood Risk Plans (CFMPs) for England and Wales. The role of CFMPs is to establish flood risk management policies which will deliver sustainable flood risk management for the long term. For the Yorkshire Water supply region, the following CFMPs have been produced; River Esk and Coastal Streams; River Derwent; River Ouse; River Hull & Coastal Streams; River Aire; River Calder; River Don; and The River Tyne, River Wear and River Tees CFMPs, which will aid the future development of the Tees Swale Transfer<br><br>Yorkshire Water's 2014 Water Resource Management Plan[12] and its 2013 DP 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 throughout the planning period to 2034/35.<br><br>The Environment Agency Water Resource Strategy for the Yorkshire and North East Region[13] used future scenarios to look at future pressures on water resources. By 2050, climate change could reduce summer river flows by up to 80%. Greater concentrations of rainfall in intense events are likely to result in increased ratios of runoff to recharge, leading to further reductions in recharge rates of groundwater.<br><br>The action plan for the Water Resource Strategy for Yorkshire and North East Region identified three key priorities (with associated actions), including; catchment management, valuing water and minimising and adapting to the impacts of climate change (see Section 4.2 of Appendix D for further details).<br><br>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. The findings of the assessment highlight several key issues, including; increasing pressure on the UK's water resources; major supply-demand deficits; increases in water demand for irrigation of crops; lower summer river flows; an increase in precipitation in winter months, and flash-flooding from combine sewer overflows (see Section 4.2 of Appendix D for further details). |
| Soil, geology and land use | The vision of Defra's Soils Strategy for England[15] is for all England's soils to be managed sustainably and degradation threats tackled successfully by 2030. This will improve the quality of England's soils and safeguard their ability to provide essential services for future generations.<br><br>The Water White Paper described the Government's intentions to take forward a catchment-based approach to water quality and diffuse pollution and work towards Common Agricultural Policy reforms that will promote the farming industry's role as custodian of the natural environment (see Section 5.2 of Appendix D for further details)[16]. These policy objectives were reflected in regulatory guidance from Government for the 2014 water resources management planning process and the 2014 water company price review process. The catchment-based approach has now been implemented across England, with |

[12] Yorkshire Water (2009), Water Resources Management Plan 2010-2035

[13] Environment Agency (2009) Water Resources Strategy – A Regional Action Plan for Yorkshire and North East Region.

[14] Defra (2016) The UK Climate Change Risk Assessment 2017 Evidence Report

[15] Defra (2009), Safeguarding our soils – A Strategy for England

[16] Defra (2011) Water for Life - Water White Paper

| SEA topic | Future environmental baseline |
|---|---|
| | catchment partnerships now in place across the YWSL region to take forward the approach over the coming years.<br><br>One of the core planning principles of the 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 (for further information regarding other areas of importance in the NPPF, see Section 5.2 of Appendix D).<br><br>The current agri-environment scheme for landowners is Countryside stewardship. Continued development of this scheme is expected to see an improvement in land use in the future. The UK Countryside Stewardship scheme provides financial incentives for land managers to engage in activities to improve the quality of the management the environment[17]. The scheme allocates funding according to the significance of the designated sites, in three levels; Mid-Tier, Higher Tier and Capital Grants. Applicants choose management options and capital items which provide the environmental priorities for their local area, based on the statements of priorities |
| Air and climate | Government and international targets indicate significant cuts in greenhouse gas emissions will take place by 2027. The UK is currently projected to meet its first three legislated carbon budget targets (until 2022)[18]. 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 $NO_2$[19] and PM10[20] are flattening or even reversing at a number of locations, despite current policy measures. Projections suggest with a high degree of certainty that objectives for $PM_{10}$, $NO_2$ and $O_3$[21] will not be achieved by 2020[22].<br><br>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 Figure D8 (see Section 6.2 of Appendix D).<br><br>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.<br><br>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.<br><br>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. |

[17]Gov.UK © (2017). Rural Grants and Payments: Countryside Stewardship. [Online]. Available from: https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-environmental-land-management [Accessed 3 November 2017].

[18] DECC (2015) Updated energy and emissions projections 2015 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/501292/eepReport2015_160205.pdf

[19] Nitrogen dioxide

[20] Particulates with a diameter of 10µm or less

[21] Ozone

[22] Defra (2007), The Air Quality Strategy for England, Scotland and Wales

| SEA topic | Future environmental baseline |
|---|---|
| Archaeology and cultural heritage | The NPPF was introduced in 2012 to replace the Planning Policy Statements. The NPPF aimed to make the planning system less complex and more accessible, and changed the emphasis on planning to have a presumption in favour of development. However, core planning principles 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"23.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[24]. |
| 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. |

[23] CLG (2012) National Planning Policy Framework, Communities and Local Government. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

[24] English Heritage, now known as Historic England, (2010) Climate Change and the Historic Environment

# Findings of the assessments

The findings of the SEA are summarised below. **Table NTS3** sets out the SEA topics and objectives which are identified in **Tables NTS5, NTS6, NTS7** and **NTS8**.

For each SEA objective, a residual effects assessment was determined against a significance matrix (**Table NTS3**) 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 NTS5, NTS6, NTS7** and **NTS8**.

**Table NTS3 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. |
| 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, 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. |
| | 4.4 To increase awareness of water sustainability and efficient use of water. |
| Soil, geology and land use | 5.1 To protect and enhance geology, 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 NTS4 SEA significance matrix**

| Significance of effect | | Value/sensitivity of receptor | | |
|---|---|---|---|---|
| | | High | Medium | Low |
| Effect magnitude | 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 | Moderate Beneficial / Moderate Adverse | Minor Beneficial / Minor Adverse | Negligible |

Significance levels identified in **Table NTS4** 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 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.

## Customer management options

The SEA of customer management options, including supply pipe leakage reduction, business customer audits and retrofit, and metering, concluded that they are unlikely to have any major or moderate adverse effects on any of the SEA objectives (**Table NTS5**). Vehicle journeys undertaken to fit water meters, take meter readings and carry out audits may have minor adverse effects on air quality and greenhouse gas emissions. Minor beneficial effects have been identified for the customer management options in relation to sustainable and efficient use of water resources.

## Distribution management options

Yorkshire Water have adopted an ambitious target to reduce leakage by 40% during implementation of the WRMP. The distribution management options are also unlikely to have any major adverse effects on any of the SEA objectives (**Table NTS6**). Minor adverse effects were identified on population and human health due to construction activities, material assets due to resource use and waste to landfill, and air and climate due to vehicle movements. Major to minor beneficial effects have been identified

for the distribution management options in relation to sustainable and efficient use of water resources. Water savings brought about by these options would support population health and economic development, and improve climate change resilience.

## Production management options

The four production management options involve reduction of process losses from water treatment works (WTW) at specific sites. The sites are sufficiently distanced from sites designated for habitats and landscapes for significant adverse construction effects to occur. Physical improvements at the WTWs are likely to be small-scale and within existing site footprints. Minor adverse impacts on population and human health, and air and climate were identified for all production management options due to noise, disturbance, and air and greenhouse gas emissions associated with construction activities. They would have negligible to minor beneficial effects on water efficiency and sustainable water use, climate change resilience and resource efficiency (**Table NTS7**).

## Resource management options

A wide variety of resource management options were identified and assessed, resulting in 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). The smaller scale options generally have fewer environmental effects, and many of the options have no greater than minor adverse effects (**Table NTS8**). However, some options may have moderate or major adverse, including:

- The Ouse Raw Water Transfer (R2) is anticipated to have three moderate adverse effects on biodiversity, greenhouse gas emissions, and archaeology and cultural heritage due to the construction of the Ouse abstraction and new pipeline.
- There is a potential moderate adverse impact on archaeology relating to the pipeline of the Increased River Ouse pump storage capacity option (R3).
- The two options located on Aquifer Storage and Recovery Scheme 1 (R5) and Reuse abandoned third party GW source option 1 (R16)) have minor adverse impacts on biodiversity, population, air and climate; all related to option construction.
- Some of the smaller groundwater abstraction options (e.g. R6, R13 and R12) are situated in a sandstone aquifer where groundwater levels are already below sea level. Therefore, increased abstraction (even within existing licence conditions) may have an adverse effect on sustainable water resources and groundwater quality.
- The dam raising options (R21, R23, R24) have the potential for adverse effects on European sites (e.g. special areas of conservation (SAC) and special protection areas (SPA)). Further investigation as to the revised surface area of the reservoir in relation to designated habitats is required, particularly those supporting designated bird species. There is potential for both adverse and beneficial on the landscape and visual amenity. The increased surface water area may be seen as having beneficial effect, but this could be offset by minor inundation of other landscape features.
- The reservoir desilting option (Option R29) relates to 26 separate reservoirs, some of which could lead to adverse effects on European sites depending on the method of desilting that is adopted in the detailed design stage. The risks associated with this scheme would be specific to the reservoir and method chosen. Any option to de-silt would be subject to careful planning and further investigation, and individual reservoirs may be removed from this option if significant environmental impacts cannot be avoided.
- 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.
- There is also one potential moderate adverse impact for the River Aire Abstraction option 1 (R35), relating to archaeology and cultural heritage due to the pipeline route potentially passing through a World Heritage Site (WHS).

- The River Wharfe annual abstraction increase option at River Wharfe Licence Increase (R72) would provide water for public supply which would deliver minor beneficial impacts on population and human health due to the minor deployable output and continued water supply for economic activity. The option will deliver beneficial impacts with regard to sustainable water supply. The option utilises existing infrastructure and so would have minor beneficial impacts on material assets and resource use, as no construction is required.
- Six of the options that involve raw water transfers (R51, R54, R56, R58,R59 and R62) have a variety of minor to major adverse impacts due to the scale of construction needed. Major adverse effects include impacts on designated sites for habitats (R54 and R56 ). Moderate adverse effects include impacts on designated habitats (R62), resource use (R51, R54, R56, R59 and R62), water (R54 and R56), local air quality (R62) cultural heritage (R51, R54 and R56) and landscape (R59).
- The two transfer options to import water from United Utilities Integrated Resource Zone (R58 and R59) vary in impacts. Option R58 only anticipates minor adverse impacts since it utilises existing assets. Option R59 may lead to moderate adverse impacts on resource use and landscape due to the use of construction materials and temporary impacts on an Area of Outstanding Natural Beauty (AONB).
- The East Yorkshire coast desalination (R61) has the potential for major adverse effects on biodiversity as it may impact on the Humber Estuary SAC/SPA/Ramsar, and intersects the impact zone of several SSSIs. In addition, major adverse effects are associated with the significant amount of resource use and energy required to operate this option.

**Table NTS5 Visual evaluation matrix summary for customer management options**

| Option | Impact | SEA objective | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.1 | 1.2 | 1.3 | 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-e Domestic customer audits and retrofit | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| C2 Metering – domestic meter optants | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| C4a-e Metering on change of occupancy | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| C5a-d Smart metering | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| C6a-e Commercial water user audits and retrofit | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |

**Table NTS6 Visual evaluation matrix summary for distribution management options**

| Option | Impact | SEA objective | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.1 | 1.2 | 1.3 | 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 |
| D1 Active leakage control: increased find and fix | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| D4 Customer-side | Adverse | | | | | | | | | | | | | | | | |

| Option | Impact | SEA objective | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.1 | 1.2 | 1.3 | 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 | | | | | | | | | | | | | | | | |
| D5 Trunk main metering | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| D6 DMA engineering & pressure management | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| D7 Acoustic logging | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| D8 Satellite technology | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| D10 Smart networks | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| D11 Service pipe renewal | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| D1 Active leakage control: increased find and fix | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |

**Table NTS7 Visual evaluation matrix summary for distribution management options**

| Option | Impact | SEA objective | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.1 | 1.2 | 1.3 | 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 |
| P1 Reduction in WTW process losses Option 1 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| P2 Reduction in WTW process losses Option 2 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| P3 Reduction in WTW process losses Option 3 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| P4 Reduction in WTW process losses Option 4 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |

**Table NTS8 Visual evaluation matrix summary for resource management options**

| Option | Impact | SEA objective | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.1 | 1.2 | 1.3 | 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 | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R2 Ouse Raw Water Transfer | Adverse | | | | | | | | | | | | | | | | |

| Option | Impact | SEA objective | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.1 | 1.2 | 1.3 | 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 | | | | | | | | | | | | | | | | |
| R3 Increased River Ouse pump storage capacity | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R5 Aquifer Storage and Recovery Scheme 1 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R6 South Yorkshire Groundwater Option 1 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R9 North Yorkshire Groundwater Option | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R12 East Yorkshire Groundwater Option 1 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R13 East Yorkshire Groundwater Option 2 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R16 Reuse abandoned third party GW source option 1 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R17 Reuse abandoned third party GW source option 2 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |

| Option | Impact | SEA objective | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.1 | 1.2 | 1.3 | 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 |
| R18 Reuse abandoned third party GW source option 3 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R19 Reuse abandoned third party GW source option 4 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R21 Dam Raising Option 1 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R23 Dam Raising Option 3 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R24 Dam Raising Option 4 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R29 Reservoir De-silting | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R34 River Calder Abstraction option 1 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R35 River Aire Abstraction option 1 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R37 River Aire Abstraction option 3 | Adverse | | | | | | | | | | | | | | | | |

| Option | Impact | SEA objective | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.1 | 1.2 | 1.3 | 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 | | | | | | | | | | | | | | | | |
| R72 River Wharfe Licence Increase | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R49 Supply Dales from the Tees – treated | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R50 Supply Dales from the Tees - raw 1 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R51 Supply Dales from the Tees - raw 2 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R54 Tees - Ouse Pipeline Option 1 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R58 Transfer from UU Option 3 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R59 Transfer from UU Option 4 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R61 East Yorkshire coast desalination | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |

| Option | Impact | SEA objective | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.1 | 1.2 | 1.3 | 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 |
| R62 North Yorkshire rural distribution | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R63 North Yorkshire Groundwater 2 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |

# Formulation of the preferred plan

The SEA evaluation of individual WRMP options indicated that, for the majority of options, effects are no greater than minor adverse. All schemes have beneficial effects on SEA objectives linked to water supply, such as population and human health and climate change resilience. However, a small number of schemes were identified as having moderate to major adverse effects for some SEA objectives.

The preferred plan has been selected in accordance with Yorkshire Water's goal to use demand management and leakage reduction 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. Yorkshire Water has selected 40% leakage reduction, delivery of which will commence in the last year of AMP6 and continue through to AMP11, as the preferred plan. This removes the deficit forecast from 2035 onwards in the 25-year WRMP period. The preferred plan also includes resilience options at North Yorkshire Groundwater Option and East Yorkshire Groundwater Option 2, which will help to reduce outages. Implementation of these options will be dependent on meeting Environment Agency licensing requirements, and East Yorkshire Groundwater Option 2 will be within any constraints imposed following Water Industry National Environment Programme (WINEP) investigations.

# Preferred plan

The preferred plan for Yorkshire Water's WRMP is set out in **Table NTS9**. Whilst the primary criterion in selecting a plan 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 Guideline (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 water supply-demand deficit identified for the Grid Surface Water Zone (SWZ) is 6.49Ml/d in 2035/36, rising to 33.97Ml/d by 2044/45. The preferred plan to address this deficit is presented in Table NTS1. The plan focusses on distribution management options such as leakage reduction (achieving a leakage reduction target of 40%), and also includes investment in resilience options at North Yorkshire Groundwater Option and East Yorkshire Groundwater Option 2 boreholes. To meet the 40% leakage reduction target, distribution management options will commence in the last year of AMP6 (2019) and continue throughout implementation of the WRMP.

Investigations indicate there is no supply-demand deficit for the East SWZ, so the preferred plan does not include resource options targeted at the East SWZ.

**Table NTS9 WRMP2019 preferred plan**

| Reference | Option | Implementation | Yield benefit (Ml/d) |
|---|---|---|---|
| D1a-D1j | Active leakage control: find and fix | 2019-2044 | 35.94 |
| D4a-D4f | Customer-side | 2019-2044 | 1.37 |
| D5a-D5f | Trunk main metering | 2019-2044 | 5.23 |
| D6a-D6f | DMA engineering & pressure management | 2019-2044 | 53.98 |
| D7a-D7d | Acoustic logging | 2019-2044 | 18.84 |
| D8a-D8f | Satellite technology | 2019-2044 | 4.06 |
| D10a-D10f | Smart networks | 2019-2044 | 13.41 |

| Reference | Option | Implementation | Yield benefit (Ml/d) |
|---|---|---|---|
| D11a-D11f | Service pipe renewal | 2019-2044 | 3.87 |
| R9 | North Yorkshire Groundwater Option | 2022 | 2.00 |
| R13 | East Yorkshire Groundwater Option 2 | 2025 | 6.00 |
| **25-year deficit** | | | **33.97** |
| **Total leakage benefit** | | | **136.70** |
| **Total benefit all options** | | | **144.70** |

A visual summary of SEA findings for each of the schemes included in the preferred plan is provided in **Table NTS10**.

All of the demand management options have no greater than minor adverse effects. However, the resource management option, East Yorkshire Groundwater Option 2 (R13) may have moderate adverse effects, including impacts on designated sites for habitats, impacts on natural capital and ecosystem services and adverse effects on sustainable water resources and groundwater quality.

Conversely, several of the demand management options have moderate to major beneficial effects. Major beneficial effects are associated with D1 Active leakage control: find and fix, including benefits towards human health and wellbeing, resource use, sustainable water resources and groundwater quality and resilience to the threats of climate change. Moderate beneficial effects were also identified for these same areas for three of the demand management options (D6, D7 and D11).

**Table NTS10 Visual summary for options in the preferred programme**

| Option | Impact | SEA objective | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.1 | 1.2 | 1.3 | 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 |
| D1 Active leakage control: increased find and fix | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| D4 Customerside | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| D5 Trunk main metering | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| D6 DMA engineering & pressure management | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| D7 Acoustic logging | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| D8 Satellite technology | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| D10 Smart networks | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| D11 Service pipe renewal | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R9 North Yorkshire Groundwater Option | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |
| R13 East Yorkshire Groundwater Option 2 | Adverse | | | | | | | | | | | | | | | | |
| | Beneficial | | | | | | | | | | | | | | | | |

Note: See Section 5.1 for description of SEA objectives.

Key:

- Major adverse
- Moderate adverse
- Minor adverse
- Negligible adverse
- Major beneficial
- Moderate beneficial
- Minor beneficial
- Negligible beneficial

# Cumulative impact assessment

A cumulative assessment of the preferred plan has been undertaken to consider whether options constructed or operated together may lead to additional effects on each of the SEA topics.

The majority of distribution management options included in the preferred plan are compatible, with implementation of each option increasing the overall volume of water savings made. There is a small risk that the simultaneous implementation of the distribution management schemes could lead to cumulative adverse impacts, whereby disturbance to human health, resource, and air greenhouse gas emissions could increase due to network repair and enhancement activities. However, any such cumulative impacts would 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 impacts between the two resource management options included in the preferred plan, as they abstract from different aquifers. North Yorkshire Groundwater Option abstract from the confined Millstone Grit Group aquifer, while the East Yorkshire Groundwater Option 2 would target the Sherwood Sandstone Group aquifer.

At a plan level, cumulative effects with other relevant plans, programmes and projects have been considered. These included Yorkshire Water's Drought Plan and drought plans from neighbouring water companies, Environment Agency Drought Plans, Canal and River Trust Management Plans, Local Development Frameworks, National Policy Statements and National/Regional Infrastructure Plans, and major projects. No significant cumulative impacts were identified between the WRMP and any other relevant plans, programmes and projects.

The two resource management options (North Yorkshire Groundwater Option and East Yorkshire Groundwater Option 2) in the WRMP2019 preferred plan were reviewed for potential cumulative effects with resource options in the plans of neighbouring water companies. The options are sufficiently distanced from other resource options for cumulative construction effects to be highly unlikely. During operation, no cumulative adverse effects are anticipated as the options will draw from aquifers that are not hydrologically connected to any surface or groundwater bodies that may be subject to other water company's options.

The distribution management options that make up the rest of the preferred programme were also reviewed for potential cumulative effects with other water company WRMPs. The adverse effects associated with these options do not extend beyond Yorkshire Water's supply area and as such cumulative effects are unlikely.

# Mitigation

Consideration of mitigation measures has been an integral part of the SEA process. The SEA of each option has been based on residual impacts that are likely to remain after the implementation of reasonable mitigation. Mitigation measures have been identified for each option on a case by case basis and are presented in the assessment framework appraisal tables.

Certain assumptions have been made:

- 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.

An example of a mitigation measure is the diversion of a pipeline route to avoid sensitive environmental receptors.

The SEA process has identified potential residual impacts of the preferred plan after mitigation measures have been taken into consideration. **Table NTS11** summarises the residual effects attributable to the preferred plan for the Yorkshire Water WRMP2019. Mitigation of both construction and operation components for each option are presented.

**Table NTS11 Residual adverse impacts of options within the preferred plan for the WRMP2019**

| Ref | Option | Construction | Operation |
|---|---|---|---|
| D1 | Active leakage control: find and fix | No significant effects | No significant effects |
| D4 | Customerside | No significant effects | No significant effects |
| D5 | Trunk mains metering | No significant effects | No significant effects |
| D6 | DMA engineering & pressure management | No significant effects | No significant effects |
| D7 | Acoustic logging | No significant effects | No significant effects |
| D8 | Satellite technology | No significant effects | No significant effects |
| D10 | Smart networks | No significant effects | No significant effects |
| D11 | Service pipe renewal | No significant effects | No significant effects |
| R9 | North Yorkshire Groundwater Option | No significant effects | No significant effects |
| R13 | East Yorkshire Groundwater Option 2 | Biodiversity, flora and fauna | Water resources |

Attenuation of the residual negative impacts of the preferred plan are proposed. This comprises mitigation of those potential impacts of R13 East Yorkshire Groundwater Option 2:

- The new East Yorkshire Groundwater Option 2 would be located next to an existing reservoir, which is surrounded by Ancient Woodland, a lowland acid oak woodland with ornithological interest. There is existing access to the site. The construction of the new borehole would be likely to cause temporary impacts related to noise, vibration and dust; however, it is expected that these impacts on the neighbouring woodland would be mitigated through best practice construction and timing the construction to avoid adverse impacts on bird populations. The exact route of the pipework connecting the new borehole to the water treatment works and reservoir is unknown and there is a risk of adverse impact on the ancient woodland through disturbance to root structure during excavation activities. Further investigations during design could identify mitigation measures that would avoid impacts on the ancient woodland.
- Water resources were identified as an adverse operational impact of the East Yorkshire Groundwater Option 2. Abstractions will be subject to licensing and may only be allowed to take place at times of high groundwater or river flows. Although abstraction would be within existing licence limits, the increase in actual abstraction could have a moderate adverse effect, although not sufficient to lead to deterioration in WFD status to 'bad'. The previous abstraction abstracted the same quantities as this proposed option. Therefore, it is unlikely to affect the water balance on a groundwater body scale, however further investigation is required.

Mitigation measures for potential cumulative impacts with other plans have also been considered. 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

Appropriate monitoring has been identified that would trigger the deployment of mitigation measures.

The SEA Directive states that monitoring activities must enable appropriate remedial action to be taken. This requires measures to detect trends and ensure that action is taken where trends are progressively adverse. Key monitoring parameters will be those relating to the abstraction of water and the effects that this may have on waterbodies and their functions as habitats. Additionally, there is also potential for impacts on communities, the built environment, terrestrial habitats, the atmosphere, landscape and heritage assets. Extensive primary data collection is not appropriate for this plan level of monitoring, and use will be made where possible of existing datasets collated by Yorkshire Water or other bodies.

**Table NTS12** 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. 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. 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 two resource options included in the preferred plan (R9 and R13) will be developed during the planning process closer to the time of implementation.

**Table NTS12 Proposed SEA monitoring parameters – strategic WRMP monitoring**

| Impacted receptor | Proposed strategic indicators |
|---|---|
| Water resources, water quality, biodiversity | Proportion of surface waters and groundwater waterbodies at 'Good' WFD status, surveys to understand potential changes to WFD status, and species and habitats surveys as required. |
| 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 |
| 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.<br>Complaints logged with Yorkshire Water and Local Authority EHOs.<br>Responses gauged through Yorkshire Water customer satisfaction surveys.<br>Community investment, employee volunteering and match funding by Yorkshire Water. |

| Impacted receptor | Proposed strategic indicators |
|---|---|
| Air Quality | Scheme related issues of capital works would be monitored through an Environmental Monitoring plan if required.<br>Changes in air quality are monitored by the Automatic Urban and Rural Network[25] administered by Bureau Veritas, and this data would be available if required to inform a baseline |
| Cultural Heritage | Condition of buried archaeology would be monitored during construction e.g. through appropriate archaeological investigations and watching briefs as required.<br>Consultation with relevant stakeholders to ensure impacts are minimised, e.g. to water level dependent assets.<br>Historic England monitor parameters such as Listed Buildings and Scheduled Monuments, in order to maintain a 'Heritage at risk' register. |

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

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

# Consultation

This SEA Environmental Report for the draft WRMP was issued for public consultation and comments were used to support Yorkshire Water in producing its Water Resource Plan in 2019. On adoption of the WRMP, Yorkshire Water will publish a Statement of Response to explain how environmental considerations have been taken into account in the formulation of the WRMP.

Yorkshire Water will continue to use the results of the SEA to support future decisions on the implementation of the plan. The company will also monitor for any key changes to the environmental baseline and the effects of any options implemented on the environment, helping to ensure that the potential impacts identified in the SEA are considered in practice.

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


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