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Northumbrian Water - Water Resources Management Plan 2024

Environmental Report

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Contents

Abbreviations

Abbreviation	Definition
AONB	Areas of Outstanding Natural Beauty
AQMA	Air Quality Management Area
BNG	Biodiversity Net Gain
CAMS	Catchment Abstraction Management Strategies
CEMP	Construction Environment Management Plan
CROW	Countryside and Rights of Way
CTMP	Construction Traffic Management Plan
DCLG	Department for Communities and Local Government
DLUHC	Department for Levelling Up, Housing and Communities
DWP	Diffuse Water Pollution
EA	Environment Agency
EAAP	Ecosystems Approach Action Plan
EIA	Environmental Impact Assessment
ELD	Environmental Damage
ENCA	Enabling a Natural Capital Approach
ESW	Essex and Suffolk Water
FRA	Flood Risk Assessment
FRMP	Flood Risk Management Plan
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GWDTE	Groundwater Dependent Terrestrial Ecosystems
HER	Historic Environment Record
HLS	High-Level Environmental Screening
ICES	International Council for the Exploration of the Sea
IMD	Index of Multiple Deprivation
INNS	Invasive Non-Native Species
IPENS	Improvement Programme for England's Natura 2000 Sites
LNR	Local Nature Reserve
LWS	Local Wildlife Sites
MCZ	Marine Conservation Zone
MPA	Marine Protected Area
MPS	Marine Policy Statement
NAP	National Adaptation Programme
NCA	National Character Area
NCA	Natural Capital Assessment
NEA	National Ecosystem Assessment
NERC	Natural Environment and Rural Communities
NHH	Non-Household
NNR	National Nature Reserve
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project

Abbreviation	Definition
NW	Northumbrian Water
NWL	Northumbrian Water Limited
ODPM	Office of the Deputy Prime Minister
RAPID	Regulator's Alliance for Progressing Infrastructure Development
RBD	River Basin District
RBMP	River Basin Management Plan
RIGS	Regionally Important Geological Site
ROWIP	Public Rights of Way Improvement Plan
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SEPA	Scottish Environment Protection Agency
SHE	Safety, Health and Environment
SIP	Site Improvement Plan
SPA	Special Protection Area
SRO	Strategic Resource Option
SSSI	Sites of Special Scientific Interest
SUDS	Sustainable Urban Drainage Systems
UK NEA	UK National Ecosystem Assessment
UKCP	UK Climate Projections
WFD	Water Framework Directive
WINEP	Water Industry National Environment Programme
WRE	Water Resources East
WReN	Water Resources North
WRMP	Water Resources Management Plan
WRPG	Water Resource Planning Guideline
WRZ	Water Resource Zone
WTW	Water Treatment Works

Executive summary

Introduction

Northumbrian Water operates in the North East of England, providing water supply to nearly three million people from Berwick in the northernmost part of the region, to Middlesborough and Darlington in the southernmost part of the region. The region is split into two Water Resource Zones (WRZ), Kielder WRZ and Berwick and Fowberry WRZ.

Water companies have a statutory obligation to produce a Water Resources Management Plan (WRMP), which sets out how a company intends to maintain the balance between supply and demand for water over a minimum 25-year period. In the development of a WRMP, companies must follow the Water Resource Planning Guideline[1] (WRPG). WRMPs should ensure a secure and sustainable supply of water, focus on efficiently delivering the outcomes that customers want, while reflecting the value that society places on the environment.

The WRPG states that in developing a WRMP in England and Wales, water companies should screen for a Strategic Environmental Assessment (SEA) and carry out a full SEA if required.

According to the SEA Regulations Part 2 (5) SEA Regulations:

'the responsible authority shall carry out, or secure the carrying out of, an environmental assessment, in accordance with Part 3 of these Regulations, during the preparation of that plan or programme and before its adoption or submission to the legislative procedure.'

And Schedule 2 (6) confirms that the list of topics to be considered includes; biodiversity, flora and fauna, population and human health, soil, water, air, climatic factors, material assets, cultural heritage, and landscape. The SEA also considers the inter-relationship between these topics.

Northumbrian Water WRMP24

Northumbrian Water (NW) have been working with regional stakeholders and neighbouring water companies to identify the best options to include as part of the Water Resources North (WReN) Regional Plan and in the company's WRMP24. They have adopted a planning approach that uses least-cost optimisation as well as broader criteria to develop a Best Value Plan (Northumbrian Water's preferred plan) which takes account of 'best value' decision making criteria:

- Cost to build and operate the plan.
- Adaptability and flexibility of the plan to cope with uncertain future needs.
- Alignment to the Water Resources North regional strategy.
- Resilience of the plan to severe and extreme drought and other hazards, and the residual risks.
- Deliverability of the plan with timescales needed to manage risks.
- Alignment to customer preferences.
- Environmental and social impacts of the plan, including net environmental benefit.

[1]Environment Agency, Natural Resources Wales, Department for Environment, Food & Rural Affairs and Office for Water Services (2021) Water resources planning guideline. Available at: https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline

The SEA and other environmental studies undertaken were used as part of the decision-making criteria on environmental and social impacts of the plan to develop the WRMP.

Demand management is a priority for NW. In developing their WRMP, NW has first considered what could be offset by utilising demand management, before seeking to develop supply-side options. Despite this ambitious demand management strategy, NW initially considered that the scale of the challenge could still require carefully targeted investment in supply-side capacity. As a result, five feasible supply options were initially developed. However, following modelling to determine the likely deficit of water availability in the Northumbrian Water Region, a final plan supply surplus was forecast, demonstrating that there was no requirement for physical supply options to be included in NW's WRMP. Consequently, it was originally proposed that NW's Best Value Plan would only include their preferred demand management package and a Yorkshire Water transfer option, which is required by Yorkshire Water's Best Value Plan to meet their water supply requirements. However, as a result of updated modelling, NW have since proposed a new supply-side option to be taken forwards as part of their Best Value Plan – The 'Supplying Teesside Industrial Water' option. Further information and context on this option is provided in the main section of this report. As such, Northumbrian Water's final WRMP24 now includes their preferred package of demand management options, a Yorkshire Water transfer option, and the Supplying Teesside Industrial Water option. For completeness, a summary of the five feasible supply options initially considered are included in this report.

The strategy for water resource management in the Northumbrian Region:

- Prioritises demand management, which aligns with customers' expectations.
- Challenges NW and its customers to push the boundaries of what is achievable, with respect to levels of future consumption.
- Maximises the use of existing resources before developing new ones.
- Provides future flexibility over the location and type of new resource inputs.
- Delivers significant additional resilience across the region both to drought and non-drought events (e.g., freeze-thaw).
- Delivers environmental benefits, by reducing abstraction from the environment and ensuring no deterioration in the ecological status of water bodies in the region.

The supply-side option types that where initially considered include:

Supply-side Option Types:

- **Abstraction Borehole** – borehole options involve the creation of a new borehole or the re-installation of an old disused borehole in order to abstract more water for the area. The option would also normally involve a pipeline to allow the additional water to enter the supply.
- **Transfers** – transfers usually involve water being piped from one WRZ to another, or from one water company to another. However, they can also be a component of another option type such as a desalination plant. They will transfer water from the new asset to a suitable delivery point.

The demand management option types that were considered include:

- **Metering consumption reduction** – involves reducing water consumption by installing meters in currently unmeasured properties. It can include compulsory metering for household and non-household uses, smart metering, and other metering such as optant metering.
- **Other consumption reduction** – involves reducing household and non-household consumption in ways other than metering.

- **Tariffs/fees** - introduction of special fees, changes to existing measured tariffs, introduction of special tariffs for specific users.
- **Water recycling** - rainwater harvesting / grey water reuse for new or existing household and non-household.
- **Water efficiency measures** - water use audit and inspection, awareness campaigns, sponsoring water efficiency enabling activities by others, home visits to reduce plumbing losses, and the promotion of water saving devices.
- **Loss reduction** – involves reducing distribution system leakage, including service reservoir losses and trunk main leakage, as well as reducing customer supply pipe leakage. Leakage reduction options include capital investments to both the company-side and customer-side assets and operational improvements and policy changes. Examples include pressure management, mains renewal, increasing efficiency of active leakage control, etc. Customer supply pipe leakage reduction typically includes increased customer engagement/education or incentives to repair their supply pipes between the distribution main and the property.
- **Non-household water efficiency activity** – comprises thirteen water efficiency options within six categories:
  - Information Provision – Customer side leakage education, customer specific alerts, and free water efficiency assessment.
  - Infrastructure and Leak Investigation – Leak Investigation, rain/greywater re-use, find & fix leaky facilities, toilet replacements, and landscaping redesign.
  - Water Efficiency Solutions for Domestic-Type Use – domestic use self-serve, and individual tailored audits.
  - Water Efficiency Solutions for Mixed-Type Use – Free water efficiency visit
  - Water Efficiency Consultancy for Industry – This option will start with the highest water users and work downward in order to better understand water use in industry, identify areas where water is not being used efficiently, and provide suggestions and solutions to reduce water waste.
  - Golf Course Water Efficiency – Supporting golf courses to use water more efficiently through introducing rainwater harvesting and other smart irrigation solutions to reduce consumption of potable use, supplying courses with an irrigation audit where options are explored to reduce their consumption, and undertaking water saving visits for clubs and hospitality venues.

NW's Best Value Plan includes Demand Management Options (DMOs) that will meet government aspirations including a preferred option package to reduce leakage by 55% by 2050[2]; an enhanced optant smart metering programme where all existing meters will be replaced with smart meters by 2035; and a water efficiency programme which with our smart metering programme, should achieve a per capita consumption (PCC) of 110l per person per day by 2050. The DMO packages also comprise a non-household (NHH) water efficiency target reduction of 9% by 2037/8. These options increase actual headroom in the Berwick WRZ and address the baseline deficit in the Kielder WRZ. All options were assessed as part of the integrated environmental assessment, with DMO-Low, DMO-High, and DMO-Preferred, which now allows for 55% leakage reduction alongside the previous 'medium' package metering and water efficiency measures. Reductions in leakage by 2050 will help to further reduce abstraction.

[2] Implementing a 55% reduction in leakage in our Northumbrian region by 2050, together with a 40% reduction in our Essex & Suffolk area, where current leakage rates are already industry leading, will allow us, when taking both supply areas together, to meet the government aspiration of a 50% reduction in leakage by 2050.

Intra and Inter-regional Water Transfer Options

The Yorkshire Water WRZ has a forecast supply deficit and so both WReN and this WRMP24 have considered the following intra-region options to export:

- 15Ml/d of treated water from a River Tees Water Treatment Works to Yorkshire Water's network; and
- 140Ml/d of raw water from the River Tees in our Kielder WRZ to Yorkshire Water's Elvington Water Treatment Works (WTW) (York).

Yorkshire Water's Best Value Plan includes the 140Ml/d sub-potable (partially treated) water transfer built in 2040. The water would be extracted from an existing intake, albeit Yorkshire Water would need to install an additional pump. This may require new incoming electricity supply although this cannot be confirmed until an application for the new connection has been made and granted. The water will then be partially treated at source to remove the risk of INNS through the provision of a new sub-potable WTW. The River Tees is a regulated river with flows maintained by releases from Cow Green reservoir.

This option has been looked at in the context of the NW SEA Framework and the results of the SEA (undertaken originally by Yorkshire Water) can be found in Section 5.4, reported as DV7a(vi).

Sensitivity Scenarios

As part of WRMP24, Northumbrian Water have considered a 'sensitivity scenario' that could be taken forwards instead of the Best Value Plan (DMO Preferred Scenario and Yorkshire Water Transfer built in 2040). This scenario is:

- Demand Management Preferred Option and Transfer to United Utilities with the earliest available delivery date of 2040.

The NW WRMP has considered inter-region options including the export of raw water directly from Kielder reservoir to United Utilities reservoirs in the North West of England. This option was investigated by Water Resources West (WRW) and United Utilities as an option to increase resilience in United Utilities own supply area as well as a national resilience scheme to facilitate the transfer of water down to serious water stressed regions such as that covered by WRSE. However, given the need to construct long large diameter pipelines across difficult terrain and the high pumping costs, the cost of the scheme was higher than other WRW options and so was not chosen for inclusion in its Best Value Plan. As such, the export has been considered at a high level by NW as a 'sensitivity scenario' but is not included in either WReN's plan or as part of either United Utilities' or Northumbrian Water's Best Value Plan for WRMP24.

For further detail on the sensitivity scenario and a summary of its anticipated SEA and other environmental assessment results, as well as an outline of its potential cumulative effects, please see section 6.5. Following the environmental assessment undertaken by United Utilities, significant potential negative effects were identified during construction across 13 of their 17 SEA categories. This means that there are potential cumulative negative effects between the United Utilities Transfer and the Best Value Plan DMO for objectives across all seven of the SEA Topics as set out in this report. However, as specific locations for works associated with leakage reduction for the DMO are not yet known, no detailed assessment of cumulative effects for the scenario can be made at this stage. Instead, the potential for cumulative effects can only be highlighted for further investigation should the option be progressed, and when more detailed option engineering becomes available.

Environmental Baseline

The Scoping Report included a review of current baseline information for environment and socioeconomics within the NW region. Furthermore, the specific assessments of each option provide a higher level of area-specific detail where each option is located. The baseline GIS used in the environmental assessments included buffers so close receptors (such as designated sites) and potential pathways are captured. Surface water catchments that could potentially be affected and that fall either partially, or wholly outside the WReN region and the Northumbrian Water supply area are shown in the Appendix D maps. These include:

- The Northumberland Rivers
- Tyne
- Wear
- Tees

The complete baseline information with supporting maps is presented in Appendix D, however the list below provides a summary of the conducted baseline for each of the SEA Directive topics.

- **Biodiversity, flora, and fauna** – The NW region overlaps with numerous sites designated and managed for their biodiversity values. This includes Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) in the UK's national site network (previously part of the Natura 2000 network under the EU Habitats and Birds Directives), Ramsar sites (Wetlands of International Importance), Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs) and Local Nature Reserves (LNRs). Marine Protection Areas (MPAs) and Marine Conservation Zones (MCZs) are also present along the coast of areas covered by the WRMP24. The WRMP24 region is rich in species and habitat diversity. Important biodiversity is present both within designated protected areas and priority habitats across the wider landscape including deciduous woodland, and wetland, coastal and estuarine habitats, and species.
- **Soil –** The WReN region is a hub for agriculture with cereal and livestock grazing being the predominant type of farming. Agricultural land is classified on a scale of 1 to 5 where 1 is the highest quality and 5 is the lowest. The agricultural land classification of the region is predominantly Grade 3 followed by Grade 5, with pockets of urban and non-agricultural land. The North East of England has a significant number of landfill sites. Currently, there are approximately 96 authorised landfill sites across the NW region.
- **Water** - The Northumbrian Water supply region is a relatively wet area in the UK, with the average annual rainfall exceeding 1500mm and is classed as an area with no serious water stress**.** The main rivers in the Northumbrian Water supply region are shown in in Appendix B4. There is one main River Basin District (RBD) within the Northumbrian Water supply region; Northumbria. The entire NW supply area falls within the Northumbria River basin district. Within the Northumbria RBD, change to the natural flow and level of water, pollution from rural areas, pollution from abandoned mines, pollution from wastewater and pollution from towns, cities, and transport, as well as physical modifications, affect the highest proportions of water bodies.
- **Flood Risk -** The Northumbria RBD has over 2.78 million residents, with over 6,000 residents at high risk of flooding from rivers and the sea and over 13,000 also at risk from surface water flooding. There are no significant flood-risk areas identified in the Northumbria RBD during the Preliminary Flood Risk Assessment process.
- **Covid-19 Impacts on Water Demand** - data collated for this report indicate that demand and PCC were impacted by the Covid-19 pandemic. Namely, household demand increased, non-household demand decreased, with an overall increase of total demand. These impacts will continue to affect PCC and demand in the next few years with potential permanent

changes. Quantitative models anticipate that the observed PCC increase could reduce to between 2-3% by 2025 compared to an estimated 4-5% for 2021/22.

- **Air** - Air quality in the Northumbrian Water region is varied and there are certain areas with higher concentrations of air pollutants - likely associated with urbanisation, transport, or business activities. Air Quality Management Areas (AQMAs) are declared where the national air quality objectives are not being met. There are seven AQMAs in the Northumbrian Water supply area.
- **Climatic Factors** - Current observations indicate that the UK is continuing to warm. In 2021, temperature records were set, including a high of 28.6°C and a new winter record of -23.0°C. The decade 2010-2020 was on average 0.3°C warmer than the 1981-2010 climatic average and 0.9°C warmer than 1961-1990. Annual precipitation has increased across the UK in recent decades with 116% more rainfall in 2020 compared to the 1981-2010 average.
- **Historic environment –** The WReN area is rich in heritage, with listed buildings, scheduled monuments, registered parks and gardens, and registered battlefields. Most Local Authorities within the region hold a Historic Environment Record (HER), which is a database of archaeological sites, listed buildings and other historic buildings, and finds of historic objects. There are hundreds of entries on the HERs from churches and houses to roman coin finds and medieval finds. There is also potential for unidentified heritage assets and archaeological remains to be present within the region.
- **Landscape** - The landscape across the Northumbrian Water region is diverse; it is low and flat near the North Sea coast and increasingly mountainous toward the northwest. The region also has a striking stretch of coastline, including sandy beaches, sand dunes, rugged cliffs and isolated islands, and picturesque seaside villages. National Character Areas (NCAs) divide England's landscape into 159 distinct areas defined by a unique combination of aspects such as landscape, biodiversity, geodiversity, and economic activity, and Areas of Outstanding Natural Beauty (AONB) are protected to conserve and enhance their natural beauty and distinctiveness. There are 17 NCAs and two AONBs within the Northumbrian Water WRZ.
- **Population and Human Health** - Settlements in the North East of England are diverse and range from large population centres such as Newcastle, Sunderland and Durham to small rural hamlets and seaside towns. Ethnicity in the region is predominately White British. There are much smaller proportions of Black, Asian, and Mixed ethnicities in the rural areas of the region compared to urban areas. The total population as determined by Northumberland County Council local authority is 319,030 (2017). The Office of National Statistics population projections (2016 based) predict that by 2033 the total population will increase by 18,970 people to a total of 338,000, an increase of 8.3% from 2017 estimates. The distribution of age amongst the population in the North East is similar to the UK average where 17.6% are aged 15 and under, 62.3% are between 16 and 64, and 20.1% are over 65. The average age is 41.6 years old, and the region has a total population of 2.4 million residents.
- **Economy** – the North East of England contributes around 6.7% of the total UK economy. Gross Domestic Product (GDP) per head is £24,068 which is lower than the national UK average of £32,857. According to the Northumberland County Council, 8% of the county population live in areas within the 10% most deprived decile of the Index of Multiple Deprivation (IMD) 2019.
- **Material Assets** - The production industry dominates the employment sector across the North East region, which is in line with the rest of the UK. The Northumbrian Water supply region has an extensive transport network which connects people, places and services both within the region and beyond to support the regional and national economy. In the wider WReN region, the A1(M) runs north-south through the region whilst a number of key A roads (A1, A58, A69, A696, and the A19) cross the region, mostly travelling outwards from

Newcastle upon Tyne. These main trunk routes are maintained by Highways England. A variety of other major roads run through the region, maintained by county council.

- **Resource Use and Waste** - In 2019/20 the total amount of local authority managed waste was 25.6 million tonnes. Eastern England managed 1.2 million tonnes of waste in 2019/20, with 36.2% of this collected waste sent for recycling, 56.9% sent to incineration, 5.6% sent to landfill and the remaining 1.2% fell within the 'other' category. The recycling rate for the North East of England was the second lowest in the nation, with only London (30%) performing worse.
- **Natural Capital** - The Northumbrian Water WRZ contains a diverse range of Natural Capital stocks that provide a wealth of ecosystem services at national, regional, and local levels. It contains all eight broad habitat types within the UK's National Ecosystem Assessment (NEA), with farmland comprising the largest land cover type (47%), with grasslands (11.5%) and woodlands (9%) also making up a substantial portion of the land cover.

It is recognised that the baseline conditions set out here could change in response to future key trends and decision making, The key trends that have been identified, and are considered likely to continue, potentially resulting in changes to baseline conditions for the NW region, are outlined in section 3.4 'Future Baseline'.

SEA Methodology

The purpose of this environmental report is to review the feasible options for the WRMP and to identify any potential effects (positive and negative). This has been enabled through the following Environmental Assessment process:

- **A high-level environmental screening assessment** – Undertaken to highlight environmental risks and constraints at an early stage in the options development process. Findings were used to inform rejection of options to avoid potentially significant environmental effects where possible, and to identify suitable mitigation measures to be incorporated into option development.
- **Detailed options-level assessments**
  - **SEA** – Undertaken to assess whether a proposed option would help meet or prevent achievement of the SEA objectives during construction and operation, with potential effects considered pre-mitigation and post-mitigation (residual effects). Potential effects are assessed using a qualitative scale ranging from positive effects (minor, moderate, major) to negative effects (minor, moderate, major), with neutral used for no or negligible effects. The SEA process produces a series of four post-mitigation metrics (positive construction, negative construction, positive operation, and negative operation) that summarise the output information for each option.
  - **Habitats Regulations Assessment (HRA)** – Undertaken to identify potential effects upon a Habitats Site, and to assess whether these are likely to be significant. If the Screening (Stage 1) identifies that the project or plan, alone or in combination, may have likely significant effects on a Habitats Site and/or its features of interest, or if there is uncertainty, an Appropriate Assessment (Stage 2) of the implications for that Site in view of that Site's conservation objectives is triggered. Where mitigation has been proposed to avoid or minimise likely significant effects, Appropriate Assessment includes assessment of the likely effectiveness of any mitigation applied. A key outcome of the Appropriate Assessment is to identify whether the integrity of the Habitats Site(s) is likely to be adversely affected by the plan/project. Should they be required, two further stages can be triggered.
  - **Water Framework Directive (WFD)** – Undertaken to assess whether an option meets WFD targets relating to the ecological and chemical status of waterbodies. WFD assessment is required for any works which could affect the hydro-morphology, ecology

or water quality of any classified waterbody to assess whether there may be any adverse impacts, and to outline how these will be mitigated and where possible, how the status of a waterbody could be enhanced to achieve required 'good status' targets.

- **Natural Capital Assessment (NCA)** – Undertaken to assess the impact of each option on natural capital stocks. The results of the assessment are reported in total losses and gains within each option's zone of influence, and the calculated change in natural capital stocks is used to inform the assessment against ecosystem services to assess the impact on natural capital.
- **Biodiversity Net Gain (BNG)** – Undertaken to develop a biodiversity baseline used to calculate BNG change resulting from post-construction land use change within the option boundary. The biodiversity value of the footprint of each option is determined prior to construction, and post-construction land use change is estimated to calculate the post-construction biodiversity score.
- **Invasive Non-Native Species (INNS)** – Undertaken to identify if there are any species present, to identify relevant pathways and receptors, and to assess risks. If an asset or raw water transfer scenario is determined as high risk for the potential spread of INNS, a mitigation options appraisal will then be conducted. This will review known mitigation technologies and determine their effectiveness with regard to species type, transmission pathway and feasibility.

The SEA results for the five supply side options initially considered (or the Berwick Upon Tweed supply side options), the new Supplying Teesside Industrial Water option, the demand management options, and the Yorkshire Water transfer option are summarised below under the SEA Results sub-heading. The Yorkshire Water transfer is considered to be appropriately assessed in the Yorkshire Water WRMP and is only referenced here for completeness.

A cumulative effects assessment was undertaken for both intra-plan effects, and effects with other plans, programmes and projects (inter-plan effects). For intra-plan effects, the three options which make up the Best Value Plan were reviewed against the SEA objectives, in which potential effects under the same objective were drawn together to determine whether there would be any likely cumulative effects. Professional judgement, following the SEA framework, was used to determine the significance of the cumulative effects identified; neutral, minor, moderate or major positive or negative. For each identified cumulative effect, a narrative is provided outlining the anticipated effects relating to the specific SEA objective from each option, and a statement as to how cumulative effects may arise is provided.

For inter-plan effects, other plans and developments within the zone of influence of the demand management option were identified where possible, and a statement on the likelihood of cumulative effects with these is provided. Given the nature of the proposed demand management option at this stage, specific spatial information in relation to its associated works is unknown and so only a high-level assessment can be provided. The cumulative effects of the Yorkshire Water option with other plans, programmes and projects, is considered to be reported in the Environmental Report published by Yorkshire Water as part of their WRMP, as well as within the WReN Regional Plan.

A summary of the results of these cumulative assessments is provided below under the 'Assessment of the WRMP' sub-heading.

SEA Results

Summary of Berwick Upon Tweed Supply Side Options SEA

Construction

During the construction phase, most of the options are not anticipated to result in significant residual effects to the SEA objectives. Only BOT-ABS-007 and BOT-TRA-002 result in moderate negative effects to biodiversity objectives. These are as a result of potential construction phase effects on Natura 2000s sites and to habitats required to deliver BNG. Other effects during the construction phase are considered to be minor and therefore not significant.

During construction, there are not anticipated to be any significant positive environmental effects. There are potential minor positive effects related to increased employment opportunities during the construction phases however this is not deemed to be significant.

Operation

During the operational phase, there are considered to be moderate, and therefore significant, residual negative effects to water and biodiversity objectives for BOT-ABS-002, and to water objectives for BOT-ABS-007. This is associated with changes to abstraction activities and outfall for existing water sources in the region, as well as to potential changes in the water table, resulting in likely negative effects on designated sites and their qualifying features.

During operation, there are anticipated to be no significant residual positive effects to SEA objectives. Any residual positive effects during the operation phase are considered to be minor, and therefore not significant. All options will have minor positive effects on population and human health, while TRA-001, 001 and 004 also have minor positive effects on water objectives.

Summary of Yorkshire Water Option SEA

Construction

During the construction phase, there are considered to be a number of major and moderate, and therefore significant, residual negative effects posed by the Yorkshire Water option (DV7a(vi)) to biodiversity, soil, air quality, landscape, historic environment, and population and human health SEA objectives. These are as a result of the close proximity of the proposed pipeline to designated sites, its required temporary land take within a large quantity of greenfield, best and most versatile agricultural land, and a small quantity of Agricultural Land Classification Grade 2 (land of medium to high value), its anticipated temporary adverse effects on local air quality in surrounding urban areas and its potential to cause nuisance from noise, dust and vibration as a result of construction and vehicle movements, its proximity to AONB, scheduled monuments and numerous listed buildings in which there is potential for temporary adverse construction effects on the setting of these designations coming from construction activities and vehicle movements, its temporary disruption to a range of recreational facilities, and its significant use of materials. Any other residual negative effects are considered to be minor, and therefore not significant. Further detail can be found in Yorkshire Water's WRMP Environmental Report[3].

[3] Yorkshire Water (2022) Draft Water Resources Management Plan, Strategic Environmental Assessment Available at: yorkshire-water-draft-wrmp24-sea-environmental-report.pdf (yorkshirewater.com)

During construction, there are not anticipated to be any significant residual positive effects to SEA objectives. There is also anticipated to be no minor positive effects. Further detail can be found in Yorkshire Water's WRMP Environmental Report.

Operation

During the operational phase, there are considered to be major, and therefore significant, residual negative effects posed by the Yorkshire Water option (DV7a(vi)) to climatic factors and material assets SEA objectives. These are as a result of the significant use of materials and the large quantity of embodied carbon emissions associated with the proposed pipeline, as well as from carbon emissions associated with anticipated HGV movements and construction activities, and from electricity requirements required for pumping during operation. Any other residual negative effects are considered to be minor, and therefore not significant. Further detail can be found in Yorkshire Water's WRMP Environmental Report.

During operation, there are anticipated to be major and moderate, and therefore significant, residual positive effects to biodiversity, climatic factors, and population and human health SEA objectives. These are as a result of potential beneficial opportunities for areas of habitat affected by construction through compensatory planting and habitat enhancement, in particular grassland and woodland habitat local to the scheme, the proposed pipeline helping to secure a supply-demand balance over the next 25 years, thus helping to maintain essential public water supplies and therefore help maintain public health and well-being, as well as improved resilience to the threats of climate change. No minor positive effects are anticipated. Further detail can be found in Yorkshire Water's WRMP SEA Environmental Report (ED13785).

Summary of Northumbrian Water Demand Management Options SEA

Construction

During the construction phase, there are considered to be no significant residual negative effects to SEA objectives as a result of all three demand management option scenarios. Any residual negative effects during the construction phase are considered to be minor, and therefore not significant. The DMO-Preferred option scenario (the preferred option included in the Best Value Plan), and the DMO-High option scenario were assessed as having minor negative effects to objectives in all SEA topics, with the DMO-Low option scenario having minor negative effects to objectives in all SEA topic apart from water.

During construction, none of the demand management option scenarios were considered to have significant residual positive effects to SEA objectives. Additionally, no minor positive effects were anticipated.

Operation

During the operational phase, none of the demand management option scenarios were considered to have significant residual negative effects to SEA objectives. Additionally, no minor negative effects were anticipated.

During operation, there are anticipated to be significant residual positive effects to water and population and human health SEA objectives as a result of all three demand management option scenarios, with DMO-Preferred and BOT-High also having significant residual positive effects to climatic factors objectives. The BOT-High option was also assessed as having potential residual positive effects to landscape objectives. Positive effects are generally associated with improved water efficiency, resulting in lower water demand, and therefore less extraction of water from natural environments for human consumption. This could, for example, increase resilience of water supplies and natural systems to droughts, help to enhance or maintain surface water quality, flows and quantity, as well as providing other significant positive

effects. Through improved water efficiency, and leakage reduction of 55% by 2050, the DMO-Preferred scenario is anticipated to yield an annual water saving of 52,246.1 Ml for the year 2074/75 (143.14 Ml/d average). The DMO-High scenario (improved water efficiency and 50% leakage reduction by 2050) is anticipated to yield an annual water saving of 63,919.1 Ml for the year 2074/75 (183.34 Ml/d average). The DMO-Low scenario (improved water efficiency and 30% leakage reduction by 2050) is anticipated to yield an annual water saving of 30,324.2 Ml for the year 2074/75 (83.08 Ml/d average).

Summary of SEA of Supplying Teesside Industrial Water Option

Construction

During the construction phase, there are considered to be no significant residual negative or positive effects to SEA objectives as a result of the Supplying Teesside Industrial Water Option. Minor adverse effects were identified for six objectives during the construction phase of the Tee; further details can be found in Appendix K.

Operation

During the operation phase potential significant residual negative effects were identified for the objective 'To avoid spreading and, where required, manage invasive and non-native species (INNS)' due the physical transfer of untreated water between two locations. No other significant residual adverse effects were identified. Positive effects were identified for securing resilient water supplies for the health and wellbeing of customers. Minor adverse effects were identified for six additional objectives during the operation phase of the Supplying Teesside Industrial Water Option; further details can be found in Appendix K.

Modelling previously undertaken of potential supply and demand in the Northumbrian Water region had determined that there would be no deficit in the region. As a result, none of the five feasible supply options initially proposed by Northumbrian Water were planned to be taken forward for implementation as part of their WRMP24. As such, it was originally proposed that their WRMP24 would include just the Preferred package of demand management options and a transfer option which will take water from the Northumbrian Water Region to Yorkshire Water. However, as a result of updated modelling, Northumbrian Water have since proposed a sixth supply-side option that will be taken forwards – The 'Supplying Teesside Industrial Water' option. NW's final WRMP24 Best Value Plan is set out in Table 1.1.

Table 1.1: Options Forming the WRMP24 Best Value Plan

Option name	Description overview
DMO-Preferred	This option includes Option 2 Metering Smart by 2035 and 55% leakage reduction by 2050. It also includes a Medium impact water efficiency plan comprising 12 household water efficiency options within five categories (Water Use Audit and Inspection, Advice and Information on Leakage Detection and Fixing Techniques, Water Efficiency Enabling Activities, Promotion of Water Saving Devices, and Targeted Water Conservation Information (advice on appliance water usage). The DMO-Preferred package targets a NHH water efficiency reduction of 9% by 2037/8.
DV7a(vi)	This scheme involves the transfer of 140 Ml/d of partially treated water from the NW abstraction point at Blackwell on the Tees to Yorkshire Water's Elvington WTW (York) via a new 85km pipeline. The scheme would require use of the NW Kielder (Tyne to Tees) link, and comprises abstraction and associated pumping infrastructure, new water treatment infrastructure at Blackwell (for partial treatment), a new 1200mm 85km pipeline with booster station along route, and upgrades to the existing treatment stream at Elvington WTW. The scheme is expected to be operational by 2040, providing its first year of benefit within the Best Value Plan following a 15-year construction phase.

Option name	Description overview
Supplying Teesside Industrial Water	This option involves bringing the existing but currently unused Low Worsall RWPS on the Tees back into use, installing Eel Regs compliant eel screens at Low Worsall RPWS and increasing abstraction licences at Low Worsall RWPS back up to 2016 levels and at Blackwell RWPS back up to historic (pre-2016) levels. In order to supply the increased raw water demand, the Blackwell licence is proposed to be increased to pre 2016 volumes (58,075 Ml/yr, 159 Ml/d) along with installing eel screens (assume Hydrolox eel exclusion screens) at Low Worsall and increasing the licence to 2016 volumes (150Ml/d peak, 85Ml/d annual average).

Cumulative Effects Assessment (Intra-Plan Effects)

Potential intra-plan cumulative effects during construction were identified to seven SEA Topics: Biodiversity, Soil, Air, Landscape, Historic Environment, Population and Human Health, and Material Assets. Potential intra-plan cumulative effects during operation were identified to four SEA Topics: Biodiversity, Water, Climatic Factors, and Population and Human Health. Cumulative narratives are provided in Table 6.4 and Table 6.6. These provide a high-level assessment of how cumulative effects may arise for each SEA Objective flagged as having potential cumulative effects.

As one of the three options included within the Best Value Plan is a demand management option, in which specific locations of works to be undertaken are not yet known, no detailed assessment of cumulative effects involving this option can be made at this stage. Instead, the potential for cumulative effects from this option can only be highlighted for further investigation once more detailed information on specific activities is known. For now, it is considered that cumulative effects might occur where activities required to resolve leakage issues could coincide geographically with construction of the other Yorkshire Water transfer option, or from where they could occur one after another within a short period of time and at the same location.

Some potential intra-plan cumulative effects have been identified between the DV7a(vi) and the Supplying Teesside Industrial Water options. High-level assessments of how cumulative effects may arise for each SEA Objective flagged as having potential cumulative effects are provided in Table 6.4 and Table 6.6.

Cumulative Effects with other Plans, Programmes and Projects (Inter-Plan Effects)

At the time of writing, there are 13 Nationally Significant Infrastructure Projects (NSIPs) located within the Northumbrian Water region at various stages. These are detailed in Table 6.7.

Due to the nature of the preferred demand management option (DMO-Preferred), it is possible for potential cumulative effects with all of these NSIPs, as they are all within the potential zone of influence of the option. The DMO-Preferred option includes 55% leakage reduction by 2050 across the Northumbrian Water region. Whilst specific locations are not yet known, works associated with leakage reduction could coincide with the construction and/or operation of these NSIPs, thus resulting in potential cumulative effects. Although this only provides a high-level overview of potential cumulative effects with NSIPs at this stage, it does however flag key projects that should be monitored for progress and considered throughout the lifespan of the option, so that potential cumulative effects can be assessed when specific locations of works are known at a later stage. Construction phase timeframes will also need to be established at a later stage to assess for any overlap. There is also potential for leakage works to coincide with developments outlined in Local Plans, however until specific locations are known no further assessment of potential cumulative effects can be made. It is anticipated that cumulative effects could be reduced and/or minimised through appropriate scheduling of construction works so as to avoid any concurrent or consecutive works.

Given the proposed works for the Supplying Teesside Industrial Water option, it is considered that significant cumulative effects for this option with the identified NSIPs are unlikely. All new infrastructure proposed as part of the Supplying Teesside Industrial Water option is to be built within the existing Low Worsall RWPS. All other aspects of the option involve reinstatement of existing infrastructure and/or increases in operational abstraction. As such, it is considered that there is no potential for spatial overlap between the option and the identified NSIPs. There is potential for cumulative effects from increased carbon emissions across the region as a result of their construction and operation. Additionally, there is potential for cumulative effects to occur should construction works associated with the option and the identified NSIPs coincide, however if any effects should arise, then they are likely to be minor, relating to short-term/temporary nuisances. It is expected that any cumulative effects will be reduced and/or minimised through appropriate mitigation.

The cumulative effects of the Yorkshire Water transfer option (DV7a(vi)), in-combination with other plans, programmes and projects, is considered to be reported in the Environmental Report published by Yorkshire Water as part of their WRMP.

Mitigation and Enhancement Measures

Mitigation and enhancement measures were suggested as part of the SEA options assessment process and are recorded in the assessment tables in the appendix. For the demand management option, which is included in the WRMP, these measures have also been collated into a register (see Table 7.1). It is anticipated that mitigation measures specific to the Yorkshire Water option are reported in the Yorkshire Water Environmental Report supporting the WRMP, however a summary of the option and its likely approach to mitigation is provided in section 7.2. Incorporation of these measures at this early strategic stage will help deliver a WRMP that benefits the environment and reduces the risk of significant negative effects and cost-prohibitive mitigation measures further down the line during detailed design of specific options. Northumbrian Water (NW) is committed to delivering all mitigation measures identified by the SEA and HRA.

Monitoring the negative effects of implementing the WRMP is an essential on-going element of the SEA process. Monitoring helps ensure that the identified SEA objectives are being achieved and allows for early identification of unforeseen adverse effects and thus appropriate remedial action can be taken. Monitoring will be an important requirement to measure performance and ensure the WRMP is being successfully implemented. The Department for Communities and Local Government (DCLG) guidance states that it is inappropriate to monitor everything, but that monitoring proposals should be focused on the following areas:

- Identify potential breaches of international, national, or local legislation, recognised guidelines, or standards.
- Actions which may give rise to irreversible damage, with a view to identifying trends before such damage occurs.
- Where there was any uncertainty in the SEA and where monitoring would enable prevention or mitigation measures to be taken.

Negative effects or uncertainty identified during the SEA process focused on effects on ecology, carbon emissions, landscape, and the historic environment. The SEA monitoring proposals for the WRMP are presented in Table 8.1.

Next Steps and Consultation

A draft version of the SEA Environmental Report was published for consultation, with the consultation period running from 18 November 2022 to 24 February 2023. Following the closure of the consultation period, all consultation responses were reviewed and considered, and the

SEA Environmental Report was updated where appropriate to reflect these comments, as well as any proposed changes to the WRMP24.

Consequently, a revised version of the SEA Environmental Report was issued for the next stage of the WRMP process alongside the revised WRMP24 and Northumbrian Water's Statement of Response in July 2023. Following the inclusion of the new Supplying Teesside Industrial Water option and responses received relating to the Statement of Response, the SEA Environmental Report has been updated in April 2024 for issue alongside the final WRMP24 and Northumbrian Water's Statement of Response.

Following adoption of the WRMP24s, a Post-Adoption statement will be produced which outlines how the SEA process has influenced the development of WRMPs, how consultation comments were taken into consideration and how the WRMPs will be monitored. This summary will provide enough information to make it clear how the NW WRMP24 was influenced as a result of the SEA process and consultation.

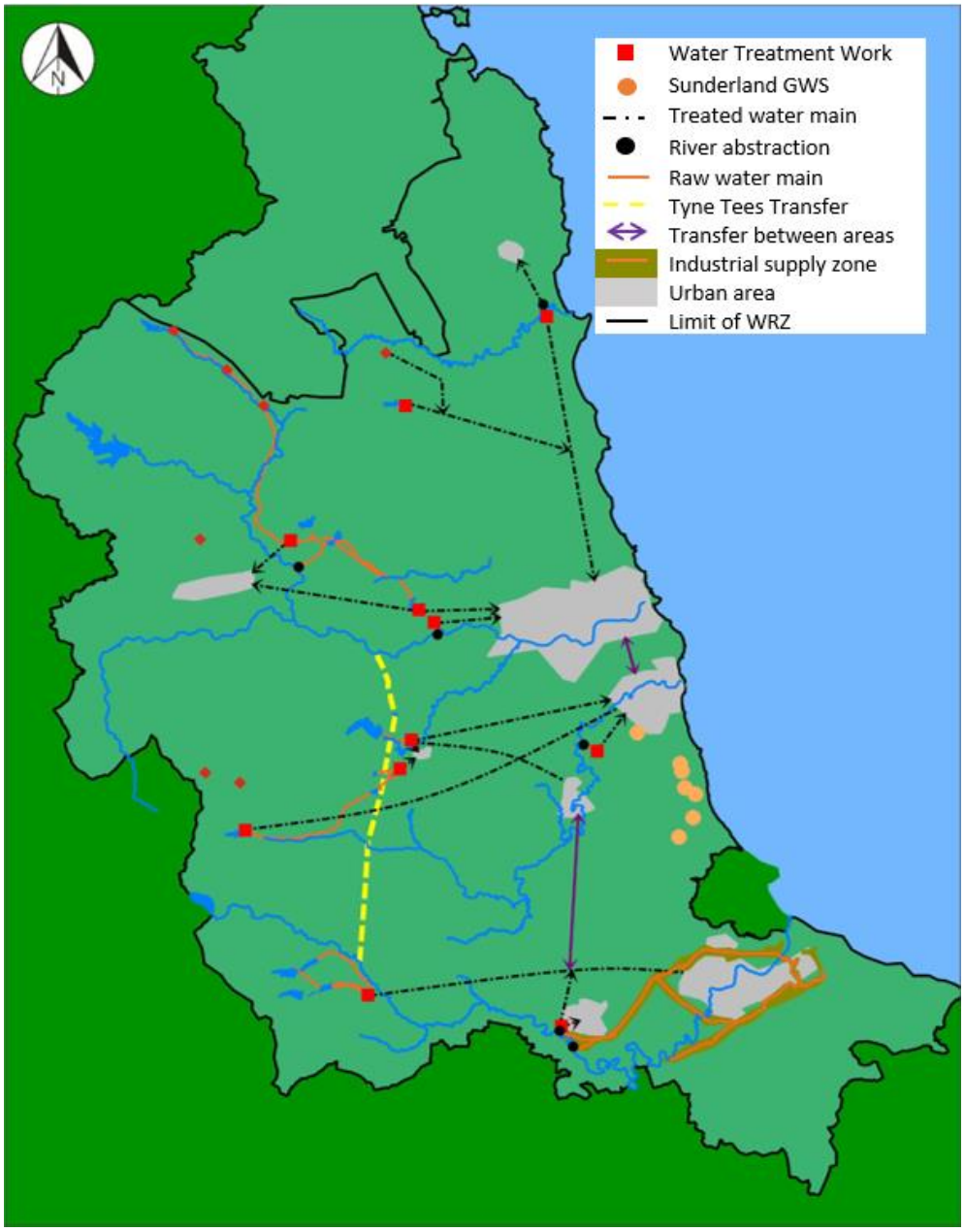
Stage E 'Monitoring implementation of the plan' of the SEA process will be carried out by Northumbrian Water. It is likely that monitoring of the WRMP24 will be incorporated with the annual monitoring process. Monitoring proposals will be developed as part of the SEA process and presented in the SEA Environmental Report.

1 Introduction to the Environmental Report

1.1 Introduction

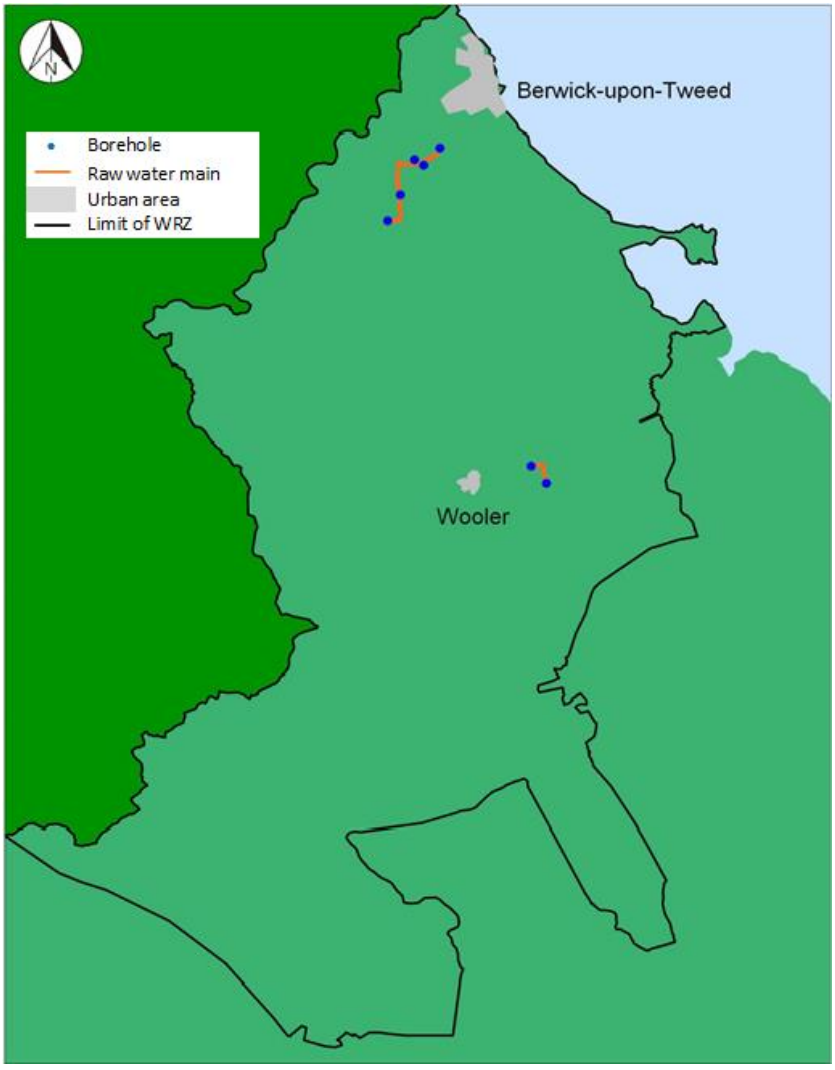
1.1.1 Northumbrian Water operates in the North East of England, providing water supply to nearly three million people from Berwick in the northernmost part of the region, to Middlesborough and Darlington in the southernmost part of the region. The region is split into two Water Resource Zones, Kielder WRZ and Berwick and Fowberry WRZ. The Northumbrian Water supply area and water transfer network is presented in Figure 1.1 and Figure 1.2.

Figure 1.1: Map of Kielder Water Resource Zone



Source: Northumbrian Water 2022

Figure 1.2: Map of Berwick and Fowberry Water Resource Zone



Source: Northumbrian Water 2022

1.1.2 Water companies have a statutory obligation to produce a Water Resources Management Plan (WRMP), which sets out how a company intends to maintain the balance between supply and demand for water over a minimum 25-year period. In the development of a WRMP, companies must follow the WRPG. WRMPs should ensure a secure and sustainable supply of water, focus on efficiently delivering the outcomes that customers want, while reflecting the value that society places on the environment.

1.1.3 The WRPG state that in developing a WRMP in England and Wales, water companies should screen for a SEA and carry out a full SEA if required.

1.1.4 According to the SEA Regulations Part 2 (5) SEA Regulations:

'the responsible authority shall carry out, or secure the carrying out of, an environmental assessment, in accordance with Part 3 of these Regulations, during the preparation of that plan or programme and before its adoption or submission to the legislative procedure.'

1.1.5 And Schedule 2 (6) confirms that the list of topics to be considered includes:

'The likely significant effects on the environment, including short, medium and long-term effects, permanent and temporary effects, positive and negative effects, and secondary, cumulative and synergistic effects, on issues such as—

(a) biodiversity;

(b) population;

(c) human health;

(d) fauna;

(e) flora;

(f) soil;

(g) water;

(h) air;

(i) climatic factors;

(j) material assets;

(k) cultural heritage, including architectural and archaeological heritage;

(l) landscape; and

(m) the inter-relationship between the issues referred to in sub-paragraphs (a) to (l).'

1.2 Water Resources Planning Guideline

1.2.1 The WRPG sets out the framework and requirements for developing a WRMP with the objective 'to efficiently deliver resilient, sustainable water resources for your customers and the environment, both now and in the long term'[4].

1.2.2 The WRPG highlight the following key environmental considerations:

- Reflect the government's 25-year Environment Plan including:
  - Setting out ambitions for environmental sustainability and resilience
  - Supporting nature recovery
  - Using natural capital in decision-making
  - Using a catchment approach
  - Delivering net gain for the environment
- Considering the impact of climate change with regard to river flows and groundwater recharge, and any future supply options.
- Considering the issue of the spread of INNS and proposed measures to mitigate that risk.
- Enhancing the natural resilience of catchments by effective catchment management planning, to increase the amount and/or quality of water available for abstraction without posing unacceptable pressures on the environment.
- Considering whether abstractions are truly sustainable, looking across a catchment as a whole.

[4] Environment Agency, Natural Resources Wales, Department for Environment, Food & Rural Affairs and Office for Water Services (2021) Water resources planning guideline, section 1.1.1

- Considering the requirement to demonstrate BNG for options and the plan.
- A stronger focus and detailed guidance on natural capital including the five minimum ecosystem services to be considered and natural capital metrics.
- Improved guidance on approaches to integrate environmental outputs into options decision-making and programme appraisal.

1.2.3 The supplementary guidance note 'Environment and society in decision-making'[5] provides additional detail on how to integrate environmental and social considerations into decision-making in the WRMP process through SEA, biodiversity net gain assessment and natural capital assessment.

1.2.4 The WRPG state there is a need to comply with environmental legislation, SEA and Habitats Regulations Assessments. The results of the SEA and other environmental assessments aids decision-making on mitigation requirements, options development, and selection of preferred options for the WRMP, with the aim of developing a WRMP that meets legislative environmental requirements and provides environmental net gain.

1.3 WRMP Environmental Assessment and the Regional Planning Process

1.3.1 Regional water resource plans taking a long-term view of water planning to 2100 are currently being prepared for each region. The NW WRMP24 SEA was undertaken in the context of these plans and falls within the Water Resources North (WReN) Regional Plan. The proposed approach to the SEA aligns with the regional methodologies and provides efficiencies through use of regional environmental assessments as a basis for further assessment work as part of the NW WRMP24 development.

1.3.2 Environmental assessments including SEA are being undertaken for both regional plans and for WRMP24. However, rather than having two separate processes that duplicate effort, the regional planning assessments provide much of the assessment work for the WRMP24 – further described below and outlined in Figure 1.3. The water resource options within the NW WRMP24 largely come from the options selected in the WReN Regional Plan, therefore efficiencies between the regional planning process and WRMP process can be achieved.

1.3.3 This report is the Environmental Report prepared specifically for the NW WRMP24 to meet legislative requirements and provide the local level details for WRMP24 including the local level plans and programmes review, baseline information and key issues and opportunities specific to the Northumbria Region, which was included in the Scoping Report. The SEA framework including objectives and assessment criteria has been largely taken from the WReN SEA methodology to ensure consistency and allow use of SEA results from the regional plan in the wider WReN WRMP24.

1.4 The SEA Process

1.4.1 This SEA is required for the NW WRMP24 under the European Union Directive 2001/42/EC, more commonly known as the SEA Directive. The Directive was transposed into United Kingdom (UK) law via the Environmental Assessment of Plans and Programmes Regulations 2004 ('SEA Regulations') and retained following withdrawal from the European Union. This requires an assessment of the effects of certain plans and programmes on the environment. Part 2 (5) (2) of the SEA Regulations states that an SEA is required for plans and programmes

[5] Environment Agency (2023) Water resources planning guideline supplementary guidance – Environment and society in decision-making (England). External guidance: 18643.

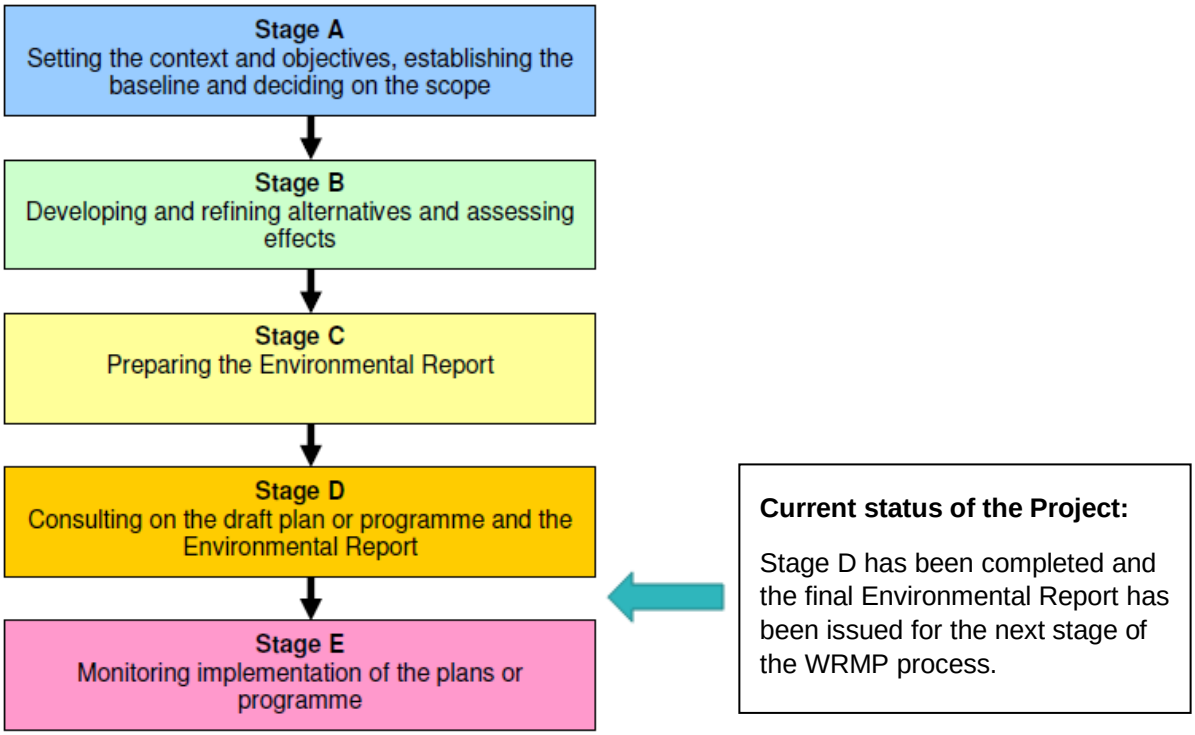
which are prepared for water management plans and options and sets the framework for development consents.

1.4.2 The SEA also works to inform the decision-making process through the identification and assessment of significant and cumulative effects a plan or programme may have on the environment. The SEA process is conducted at a strategic level and enables consultation on the potential effects of a plan with a wide range of stakeholders. Figure 1.3 shows the different stages in the SEA process. Appendix A presents the different tasks involved in each of the SEA stages.

1.4.3 The SEA process will follow current and emerging guidance on the application of SEA within water resource planning including incorporating best practice within the proposed approach. The current and emerging guidance documents include:

- Strategic Environmental Assessment: Core Objective Identification, 2020, All Company Working Group.
- Strategic Environmental Assessment and Habitats Regulations Assessment - guidance for water resources management plans and drought plans, 2012, UK Water Industry Research.
- Strategic Environmental Assessment and Habitats Regulations Assessment - guidance for water resources management plans and drought plans, Update ongoing, UK Water Industry Research.
- Water Resource Planning Guidelines, 2021, Environment Agency, Ofwat, Natural Resources Wales.
- Best practice topic guidance on SEA and biodiversity, climate and heritage from Natural England, the Environment Agency and Historic England.
- Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans (UKWIR 2021).
- Environment Agency, 2021, Water resources planning guideline draft supplementary guidance – Environment and society in decision-making (England).
- Office of the Deputy Prime Minister (ODPM) (now the Department for Levelling Up, Housing and Communities (DLUHC)) (2005). A Practical Guide to the Strategic Environmental Assessment Directive.

Figure 1.3: SEA process Steps



1.5 Purposes of the Environmental Report

1.5.1 Article 5 (1) of the SEA Directive requires that an environmental report is prepared as part of the assessment (Stage C in Figure 1.3). The environmental report should address 'the likely significant effects on the environment of implementing the plan or programme, and reasonable alternatives…'. This environmental report has been prepared in accordance with the requirements of the SEA Directive.

1.5.2 The purpose of this environmental report is to review the feasible options for the WRMP and reasonable alternatives, to identify any potential effects (positive and negative). This has been enabled through the following Environmental Assessment process:

- A high-level environmental screening assessment.
- Detailed options-level assessments (including SEA, HRA, WFD, Natural Capital, BNG, and INNS assessments).
- Programme Appraisal, including cumulative and in-combination effects for SEA, HRA, WFD, Natural Capital, BNG, and INNS.

1.5.3 The draft WRMP and Environmental Report was issued for formal consultation to Defra in October 2022, and to the public in December 2022. Following such consultation, responses were reviewed, and the Environmental Report has been updated as appropriate. A log of consultation comments is provided as an annexe in the final Environmental Report.

1.5.4 To produce this Environmental Report, Mott MacDonald has relied on published data and information provided by WReN, NW and from third party organisations. The baseline information collected is the most up-to-date available at the time of writing, however it is possible that conditions described in this report may have changed or will change over the plan period.

1.6 Compliance with the SEA Regulations

1.6.1 The Environmental Report has been prepared in accordance with the requirements of the SEA Regulations. Table 1.1 indicates where the specific requirements in the SEA Regulations relating to the Environmental Report (SEA Regulations Schedule 2) can be found within this report.

Table 1.1: SEA Regulations Requirement Signposting Table

SEA Regulations Environmental Report Requirements	Section of Environmental Report where Requirement is Found
An outline of the contents, main objectives of the plan or programme and relationship with other relevant plans and programmes	Section 2 and 6
The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme	Section 3 and Appendix F
The environmental characteristics of areas likely to be significantly affected	Section 5
Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC and 92/43/EEC	Section 5, 6 and 7
The environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation	Section 3
The likely significant effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, historic environment16, landscape and the interrelationship between the above factors	Section 5 and 6
The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme	Section 7 and 8
An outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information	Section 5 and 6
A description of the measures envisaged concerning monitoring in accordance with Article 10	Section 8
A non-technical summary of the information provided under the above headings	Executive Summary

1.7 Environmental Report Structure

1.7.1 The Environmental Report is structured as follows:

- Section 1 – Introduction to the WRMP and SEA process and requirements
- Section 2 – Description and context of the WRMP
- Section 3 – Scoping summary and relationships with other plans
- Section 4 – Environmental assessment methodology, effects beyond the WRMP boundary and how this plan influences the development of the WReN regional plan.
- Section 5 – Options assessment
- Section 6 – Assessment of the WRMP
- Section 7 – Mitigation measures and enhancement opportunities
- Section 8 – Monitoring proposals
- Section 9 – Consultation and next steps
- Section 10 – References
- Appendix A – SEA Process Tasks
- Appendix B – Scoping Report Consultation Log
- Appendix C – Policies, Plans and Programmes Review
- Appendix D – Baseline Review and Baseline Maps

- Appendix E – Integrated Environmental Assessment – Information Packs
- Appendix F – Habitat Regulations Assessment Appendix
- Appendix G – Water Framework Directive Appendix
- Appendix H – Biodiversity Net Gain and Natural Capital Approach Appendix
- Appendix I – Invasive Non-Native Species Appendix
- Appendix J – High Level Screening Appendix
- Appendix K – SEA Assessment Matrices

2 Description and Context of Northumbrian Water's WRMP24

2.1 Background and Purpose

2.1.1 As outlined within Section 1, water companies have a statutory obligation to produce a WRMP, which sets out how a company intends to maintain the balance between supply and demand for water over a minimum 25-year period. New WRMPs are prepared every five years and Northumbrian Water is due to publish its next WRMP in 2024, which is the subject of this Environmental Report.

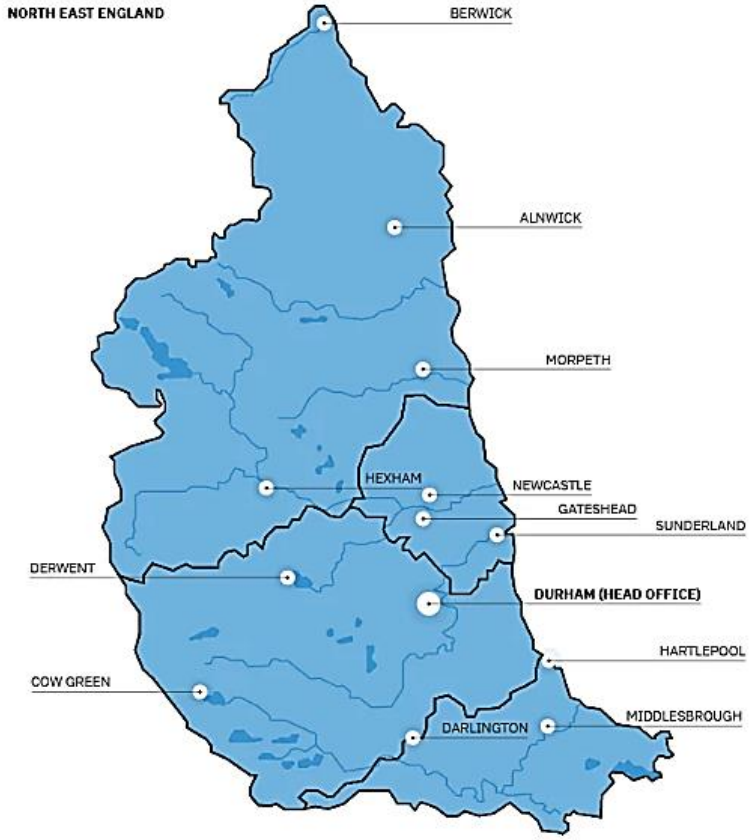
2.1.2 Northumbrian Water Limited (NW) is comprised of NW and ESW. NW operates in the north east of England, providing water supply to nearly three million people[6] from Berwick in the northernmost part of the region, to Middlesborough and Darlington in the southernmost part of the region, as outlined below in Figure 2.1 (see Figure 1.1 and Figure 1.2 for the NW water transfer network), whereas ESW operate in the south east of England. The scope of this WRMP and accompanying documents refer specifically to the NW supply area in the north east of England. A separate WRMP is being produced for the ESW region.

2.1.3 The NW supply region is a relatively wet area in the UK, with the average annual rainfall exceeding 1500mm. As such, it is currently classed as an area with no serious water stress[7]. However, future water supply may come under increasing pressure from a combination of factors including economic- and population growth, climate change, sustainability reductions and the need to increase resilience of water supplies to severe drought throughout the UK. The NW supply region also contains several nationally and internationally important wetlands and other water-dependent habitats. Therefore, the management of water resources remains an important priority.

[6] Northumbrian Water (2022) 'Our supply area', Available at: https://www.nwl.co.uk/help/supply-area/

[7] Environment Agency (2021). Water Stressed Areas – Final Classification 2021. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/998237/Water_stressed_areas___final_classification_2021.odt

Figure 2.1: Overview of Northumbrian Water's supply area



Source: Northumbrian Water 2022[4]

2.2 Northumbrian Water's WRMP24

2.2.1 A WRMP is required to set out how a company intends to maintain the balance between supply and demand for water over a minimum 25-year period. It forecasts supply and demand from 2025 to 2100 to identify appropriate solutions to meet future pressures, albeit with a focus on the statutory minimum 25-year planning period (2025 to 2050). This statutory minimum planning period aligns to the long-term planning period that Ofwat uses when appraising water company business plans into which WRMPs feed.

2.2.2 The WRMP24 has been developed as part of Northumbrian Water's Price Review 2024 process (PR24). Ofwat is the economic regulator of the water industry and every five years it sets the investment and service package that customers receive including the price water companies charge their customers. As part of the Price Review process, water companies submit a business plan which sets out the investment and outcomes for customers and the environment that they are required to deliver and how this would impact customer bills. The Business plan will include the investment needed to deliver the WRMP24 Best Value Plan (Northumbrian Water's preferred plan).

2.2.3 NW has adopted a planning approach to develop both its Best Value and alternative plans for WRMP24 that uses least-cost optimisation through an Economics of Balancing Supply and Demand (EBSD) optimiser model. The EBSD model considers the supply-demand balance for

each water resource zone at annual timesteps and selects options to address deficits based on a cost per Ml/d and the earliest available date of supply for relevant options.

2.2.4 This tool does not consider other monetised criteria such as carbon or other societal and environmental impacts and benefits. As such the model results represent a least-cost plan with no optimisation.

2.2.5 Best Value Planning aims to determine whether the inclusion of further monetised and non-monetised criteria would identify a plan that delivers the best value, defined by the WRPG as 'one that considers factors alongside economic cost and seeks to achieve an outcome that increases the overall benefit to customers, the wider environment and overall society'.

2.2.6 Using least-cost optimisation, as well as broader criteria, Northumbrian Water have developed a Best Value Plan which takes account of 'best value' decision making criteria:

- Cost to build and operate the plan
- Adaptability and flexibility of the plan to cope with uncertain future needs
- Alignment to the Water Resources North regional strategy
- Resilience of the plan to severe and extreme drought and other hazards, and the residual risks
- Deliverability of the plan with timescales needed to manage risks.
- Alignment to customer preferences
- Environmental and social impacts of the plan (primarily derived from the SEA Assessments), including net environmental benefit

2.2.7 In producing their Best Value Plan, Northumbrian Water have considered government policy as set out in the Water Resources Management Plan Direction 2022 and in a regulatory document called Government Expectations for Water Resources Planning (Defra, 2022) including the requirement to:

- Provide a secure and clean water supply as expected by customers in a way that provides value for customers, society and the environment over the long term.
- Improve supply resilience by planning to raise customer levels of service for a Level 4 drought plan restrictions (stand pipes and rota cuts) from 1 in 200 years to 1 in 500 years by 2040.
- Reduce household Per Capita Consumption (PPC) to 110l/head/day by 2049/50 as well as working with retailers to implement actions to assist non-household users to sustainably reduce their water use.
- Reduce leakage by 55% in the North of the region and 45% in the South, in order to cumulatively reduce leakage by 50% from 2017/18 levels by 2049/50 with water companies helping customers reduce water demand and water lost through leaks by adopting consistent approaches to support repair and replacement of supply pipes.
- Install smart meters as a standard.
- Consider compulsory metering in regions assessed by the Environment Agency (EA) to be a Serious Water Stressed Area.
- Adapt to climate change.
- Demonstrate a step change in rectifying overreliance on unsustainable water sources.

2.2.8 The strategy for water resource management in the Northumbrian Region:

- Prioritises demand management, which aligns with customers' expectations.
- Recognises the environmental benefits of demand management, such as offsetting treatment and pumping costs and carbon.

- Challenges NW and its customers to push the boundaries of what is achievable, with respect to levels of future consumption.
- Maximises the use of existing resources before developing new ones.
- Provides future flexibility over the location and type of new resource inputs.
- Delivers significant additional resilience across the region both to drought and non-drought events (e.g. freeze-thaw).
- Delivers environmental benefits, by reducing abstraction from the environment and ensuring no deterioration in the ecological status of water bodies in the region.

2.2.9 Northumbrian Water have set the following objectives to be achieved through their Best Value Plan:

- Achieve a secure, resilient, and sustainable supply of water for their customers, moving to a 1 in 500 level of resilience by 2049/50.
- Protect and enhance the environment, ensuring their abstractions are sustainable both in the short and long term.
- Reduce leakage from their network and from customer's homes, contributing to a national target of 55% reduction from 2017/18 levels by 2049/50.
- Reduce customer demand to 110l/head/day by 2049/50.
- For all their meters to be smart meters by 2035.

Baseline Supply Forecast

2.2.10 Northumbrian Water are required to produce a final plan with no supply deficits in any of their water resource zones over the final planning period. Consequently, they have undertaken a Baseline Supply Forecast. This forecast confirms the amount of Water Available For Use (WAFU) in Ml/d in each WRZ across the planning period. This can then be compared against forecast demand to present a supply demand balance. Where demand is greater than supply in a given year, then a supply deficit is forecast. If demand management options to deliver government targets for leakage reduction and per capita consumption do not restore a supply surplus, then new supply schemes may be required.

2.2.11 WAFU is the deployable output (DO) of each source (or group of sources) totalled for the WRZ. A baseline DO should be resilient in a drought with a 1 in 500-year return period (i.e. a 0.2% annual chance of failure caused by drought) which is more extreme than any historic drought the Northumbrian Water Region has experienced.

Surface Water Deployable Output Assessment

2.2.12 Without drought plan demand savings, Northumbrian Water's baseline modelling calculated the 1 in 500 years DO to be 637.52Ml/d for the three main demand centres (Tyneside, Sunderland and Teesside). When combined with the local demand centres, this gives an overall 1 in 500-year surface water DO of 756.85Ml/d.

2.2.13 The baseline model was run again but with the drought plan demand savings. This increased the 1 in 500-year surface water DO by approximately 24Ml/d to 661.38Ml/d for the three main demand centres (Tyneside, Sunderland and Teesside) and to 780.79Ml/d when combined with the local demand centres.

Groundwater Deployable Output Assessment

2.2.14 In the Kielder WRZ, the expected deployable output from all groundwater sources, after reductions arising from the drought analyses, is 45.22Ml/d. In the Berwick and Fowberry WRZ, the expected deployable output from all groundwater sources is 11.58Ml/d.

Baseline Supply Demand Balance

2.2.15 The baseline supply demand balance calculation is used to identify whether a WRZ is predicted to have a supply deficit at any point over the planning horizon (from 2024/25 until 2079/80).

2.2.16 The baseline supply demand balance for the Berwick and Fowberry WRZ confirms a 1 in 500-year supply surplus across the planning period. The baseline supply demand balance for the Kielder WRZ confirms a small supply deficit across the planning period. Demand management is a priority for NW. In developing their WRMP, NW has first considered what could be offset by utilising demand management, before seeking to develop supply-side options. Despite this ambitious demand management strategy, NW initially considered that the scale of the challenge could still require carefully targeted investment in supply-side capacity. As a result, five feasible supply options were initially developed. However, following modelling to determine the likely deficit of water availability in the Northumbrian Water Region, a final plan supply surplus was forecast, demonstrating that there was no requirement for physical supply options to be included in NW's WRMP. Consequently, it was originally proposed that NW's Best Value Plan would only include their preferred demand management package and a Yorkshire Water transfer option, which is required by Yorkshire Water's Best Value Plan to meet their water supply requirements. However, as a result of updated modelling, NW have since proposed a new supply-side option to be taken forwards as part of their Best Value Plan – The 'Supplying Teesside Industrial Water' option. Further information and context on this option is provided in the main section of this report. As such, Northumbrian Water's final WRMP24 now includes their preferred package of demand management options, a Yorkshire Water transfer option, and the Supplying Teesside Industrial Water option. For completeness, a summary of the five feasible supply options initially considered are included in this report.

Uncertainties and Future Scenarios

2.2.17 The WRMP includes an adaptive strategy to deal with uncertainties and future scenarios that could require further investment (e.g. further future sustainability reductions). In some cases, there may not be a long lead time to implement schemes and therefore NW need to develop a plan which identifies thresholds beyond which they need to take further action.

2.2.18 The supply-side options previously considered for inclusion in the WRMP were identified as part of the adaptive strategy. These strategic supply side options were initially considered as it was thought that they may be required to adapt to uncertainties and future scenarios.

Sustainability Changes / Reductions

2.2.19 To support healthy ecology and the natural resilience of rivers, wetlands and aquifers, sustainable abstraction is essential. As a result, in preparing their WRMP24 supply forecast, Northumbrian Water have considered whether:

- any of their abstraction licences are unsustainable at the full annual licensed quantity; and
- if not, whether they need to implement any sustainability reductions to reduce the annual licensed quantities to a sustainable level of abstraction.

2.2.20 This will prevent deterioration of a water body's condition and support achievement of water body status and environmental objectives as set out in the Northumbria River Basin Management Plan.

2.2.21 Further investigations into Northumbria Water's Berwick & Fowberry WRZ have concluded that abstraction is at sustainable levels for each of their sources. These have been used in their baseline groundwater DO assessments.

2.2.22 The EA has confirmed that where an abstraction licence sustainability change is necessary to prevent deterioration in England, groundwater licences will either be capped at recent actual

average utilisation or at the maximum peak abstraction, depending on the risk that deterioration will occur. This capping will occur on licence renewal, for affected time limited licences or licences with a time limited variation, and by 31 March 2030 for all affected permanent groundwater licences.

2.2.23 Northumbrian Water have several groundwater abstraction licences with time limited variations which are due for renewal. The EA has confirmed that none of these licences are considered to pose a risk of deterioration and so will not be subject to capping on renewal. Northumbrian Water have therefore not included any further sustainability reductions within their WRMP24.

Long Term Environmental Destination

2.2.24 In 2020 the Environment Agency published a policy document titled 'Meeting our Future Water Needs: a National Framework for Water Resources'. This framework identifies that significant changes are needed to improve the water environment and address unsustainable abstractions from it to improve resilience to drought and climate change, and increase environmental protection, by 2049/50. To help deliver the changes needed, the policy document also outlines a range of environmental destination scenarios that Regional Water Resource Groups and their constituent water companies need to build into their WRMP24s.

2.2.25 Northumbrian Water have worked with WReN, their regional water resources group, and the EA, to identify a longer-term environmental destination for their region, helping to deliver longer term sustainability and environmental resilience. Using WReN's Business as Usual Plus (BAU+) Environment Destination scenario[8] (which includes proposed sustainability reductions arising from previous investigations, and thus which are already included in Northumbrian Water's baseline WRMP24 supply forecast), no further abstraction or licence reductions are necessary, and so no environmental destination reductions in deployable output are needed within Northumbrian Water's WRMP24.

Alternative Plans

2.2.26 The development of a WRMP is a complex process involving the generation and assimilation of different types of information and data, and the application of modelling and decision making. As part of the WRMP24 plan-making process and a requirement of the *SEA Regulations,* NW were required to generate and assess alternative plans as part of the wider best-value plan making (as summarised above).

2.2.27 Within their WRMP24, Northumbrian Water are required to present four plans: an Ofwat Core Plan, a Least Cost Plan, a Best Value Plan (the preferred final plan), and a Best Environment Plan. These plans consider the WRMP24 from different perspectives, taking into account different expectations, information, and scenarios.

2.2.28 Following the BVP modelling Northumbrian Water concluded that all alternative plans would have the same outcome as the Best Value Plan, and thus only the Best Value Plan is to be considered in this report and taken forward as the Preferred Final Plan. The alternative plans are each outlined below with a summary provided as to how they match the Best Value Plan.

Ofwat Core Plan

2.2.29 The Ofwat Core Plan represents the options needed to meet government expectations on demand management and on sustainable abstraction as well as any no or low regret options that are required to maintain a supply surplus in all years of the planning period. As the Berwick WRZ has a baseline supply surplus forecast for all years of the planning period, the Ofwat Core

[8] WReN (2022), Emerging regional plan for consultation, Appendix 6: Environmental Destination, Available from: https://www.waterresourcesnorth.org/globalassets/water-resources-north/appendices/wren-jan-2022---appendix-6---environmental-destination.pdf

Plan for this WRZ would only include the preferred demand management options as no further supply schemes would be required. Consequently, the Ofwat Core Plan is the same as the Best Value Plan.

Least Cost Plan

2.2.30 The Least Cost Plan is determined using only economic cost information and as its name suggests, is the plan with the lowest cost to restore a supply surplus in all years of the planning period should there have been a baseline supply deficit forecast. The Least Cost Plan does not consider other monetised criteria such as carbon or other societal and environmental impacts and benefits. As the Berwick WRZ has a baseline supply surplus forecast for all years of the planning period, the Least Cost Plan for this WRZ would also only include the preferred demand management options and additional Supplying Teesside Industrial Water option. Consequently, the Least Cost plan is the same as the Best Value Plan.

Best Environment Plan

The Best Environment Plan presents a plan with the lowest level of abstraction from existing sources (high Environmental Destination scenario) as well as the lowest level of leakage and PCC. No further abstraction sustainability reductions are required under any of the Environmental Destination scenarios for the Kielder and Berwick & Fowberry WRZ's. Additionally, the Best Value Plan for the Northumbrian Water region already proposes leakage reduction of 55% by 2049/50 and PCC reduction to 110l/head/day by 2049/50. As a result, the Best Environment Plan baseline supply demand balance would be the same as the Best Value Plan as only the preferred demand management options and additional Supplying Teesside Industrial Water option would be needed to restore a supply surplus across the planning period. Consequently, the Best Environment Plan is the same as the Best Value Plan.

Sensitivity Scenarios

2.2.31 As part of the WRMP24, Northumbrian Water have considered a 'sensitivity scenario' that could be taken forwards instead of the Best Value Plan (DMO Preferred Scenario and Yorkshire Water Transfer built in 2040). This scenario proposes a change to the Best Value Plan, with the Yorkshire Water Transfer being replaced by a United Utilities Transfer (with the earliest available delivery date of 2040). This is included in this section for flagging as a potential future scenario that could be implemented as part of this WRMP. Additionally, there are also uncertainties associated with the scenario that would need to be further investigated should it be progressed. For further detail on the 'sensitivity scenario' and a summary of its anticipated SEA and other environmental assessment results, as well as an outline of its potential cumulative effects, please see section 6.5.

Consultation Period

2.2.32 The draft WRMP was published for consultation to Defra in October 2022, and to the public in December 2022, allowing interested stakeholders and customers to review and comment upon the proposals. The feedback received from the consultation process played a significant role in shaping the WRMP.

2.3 WRMP Option Types

2.3.1 The WRMP includes supply side options and those which focus on demand management. Note that demand management options are combined to form 'demand management portfolios' which comprised of a number of demand management measures. The options within the portfolios will be delivered in parallel and are not mutually exclusive, thus the environmental assessment of these has been completed at the portfolio-level.

2.3.2 The supply-side option types that where initially considered include:

Supply-side Option Types:

- Abstraction Borehole – borehole options involve the creation of a new borehole or the re-installation of an old disused borehole in order to abstract more water for the area. The option would also normally involve a pipeline to allow the additional water to enter the supply.
- Transfers – transfers usually involve water being piped from one WRZ to another, or from one water company to another. However, they can also be a component of another option type such as a desalination plant. They will transfer water from the new asset to a suitable delivery point.

The demand management option types that were considered include:

- **Metering consumption reduction** – involves reducing water consumption by installing meters in currently unmeasured properties. It can include compulsory metering for household and non-household uses, smart metering, and other metering such as optant metering.
- **Other consumption reduction** – involves reducing household and non-household consumption in ways other than metering.
- **Tariffs/fees** - introduction of special fees, changes to existing measured tariffs, introduction of special tariffs for specific users.
- **Water recycling** - rainwater harvesting / grey water reuse for new or existing household and non-household.
- **Water efficiency measures** - water use audit and inspection, awareness campaigns, sponsoring water efficiency enabling activities by others, home visits to reduce plumbing losses, and the promotion of water saving devices.
- **Loss reduction** – involves reducing distribution system leakage, including service reservoir losses and trunk main leakage, as well as reducing customer supply pipe leakage. Leakage reduction options include capital investments to both the company-side and customer-side assets and operational improvements and policy changes. Examples include pressure management, mains renewal, increasing efficiency of active leakage control, etc. Customer supply pipe leakage reduction typically includes increased customer engagement/education or incentives to repair their supply pipes between the distribution main and the property.
- **Non-household water efficiency activity** – comprises thirteen water efficiency options within six categories:
  - Information Provision – Customer side leakage education, customer specific alerts, and free water efficiency assessment.
  - Infrastructure and Leak Investigation – Leak Investigation, rain/greywater re-use, find & fix leaky loos, toilet replacements, and landscaping redesign.
  - Water Efficiency Solutions for Domestic-Type Use – domestic use self-serve, and individual tailored audits.
  - Water Efficiency Solutions for Mixed-Type Use – Free water efficiency visit.
  - Water Efficiency Consultancy for Industry – This option will start with the highest water users and work downward in order to better understand water use in industry, identify areas where water is not being used efficiently, and provide suggestions and solutions to reduce water waste.
  - Golf Course Water Efficiency – Supporting golf courses to use water more efficiently through introducing rainwater harvesting and other smart irrigation solutions to reduce consumption of potable use, supplying courses with an irrigation audit where options are

explored to reduce their consumption, and undertaking water saving visits for clubs and hospitality venues.

Intra and Inter-regional Water Transfer Options

2.3.3 Modelling undertaken by Yorkshire Water for their WRMP24 suggests that there could be a loss in deployable output from their River Derwent sources in order for river flow targets to be met. As a result, Yorkshire Water could partially or wholly lose abstraction licences on the River Derwent and is investigating alternative options to offset this surface water loss and address potential environmental risks on the River Derwent. Subsequently, Yorkshire Water WRZ has a forecast supply deficit, and so both the WReN and this WRMP24 have considered the following intra-region options to export:

- 15Ml/d of treated water from a River Tees Water Treatment Works to Yorkshire Water's network; and
- 140Ml/d of raw water from the River Tees in our Kielder WRZ to Yorkshire Water's Elvington WTW (York).

2.3.4 Yorkshire Water's Best Value Plan includes the 140Ml/d partially treated water transfer built in 2040. The raw water would be extracted from an existing intake at Blackwell on the Tees, albeit Yorkshire Water would need to install an additional pump. This may require new incoming electricity supply although this cannot be confirmed until an application for the new connection has been made and granted. The water will then be partially treated at source to remove the risk of INNS through the provision of a new sub-potable WTW, before then being transferred through a new 85km pipeline to Yorkshire Water's Elvington WTW (York) where it will then be further treated. The River Tees is a regulated river with flows maintained by releases from Cow Green reservoir.

2.3.5 This option has been looked at in the context of the NW SEA Framework and the results of the SEA (undertaken originally by Yorkshire Water) can be found in Section 5.4, reported as DV7a(vi).

2.3.6 The NW WRMP has also considered inter-region options including the export of raw water directly from Kielder reservoir to United Utilities reservoirs in the North West of England. This option was investigated by Water Resources West and United Utilities both as an option to increase resilience in United Utilities' own supply area as well as a national resilience scheme to facilitate the transfer of water down to serious water stressed regions such as that covered by WRSE. However, given the need to construct long large diameter pipelines across difficult terrain and the high pumping costs, the cost of the scheme was higher than other WRW options and so was not chosen for inclusion in its Best Value Plan. As such, the export is not included in either WReN's plan or NW's WRMP24.

2.4 Relationship to Water Resources North Regional Plan

2.4.1 There are five regional water resource planning groups in England. Water Resources North (WReN), formed and funded by Northumbrian Water, Hartlepool Water, and Yorkshire Water, is one of these five regional groups. These groups are required to deliver the Water Resources National Framework (WRNF). The Environment Agency led the development of this framework, and together with Ofwat, the Drinking Water Inspectorate and Defra, as well as approximately 40 representatives from the water industry, other water users and environmental NGOs, the WRNF was published in March 2020, and outlines what regional plans must deliver.

2.4.2 In summary, the WRNF states that a regional group must[9]:

- Take account of the national framework and set out its potential contribution to the national need.
- Be reflected in WRMP's.
- Forecast supply and demand over at least 25 years and set out solutions to any deficits.
- Be a single strategic plan with a preferred adaptive solution.
- Take a multi-sector approach.
- Look beyond regional boundaries and use technical approaches compatible with other regions.
- Include enhanced environmental improvements and demand management.
- Take a catchment-based approach.
- Consider wider resilience benefits, including reducing flood risk, when developing options.
- Be open to market mechanisms.
- Take into account growth ambition.
- Comply with SEA and HRA legislation.

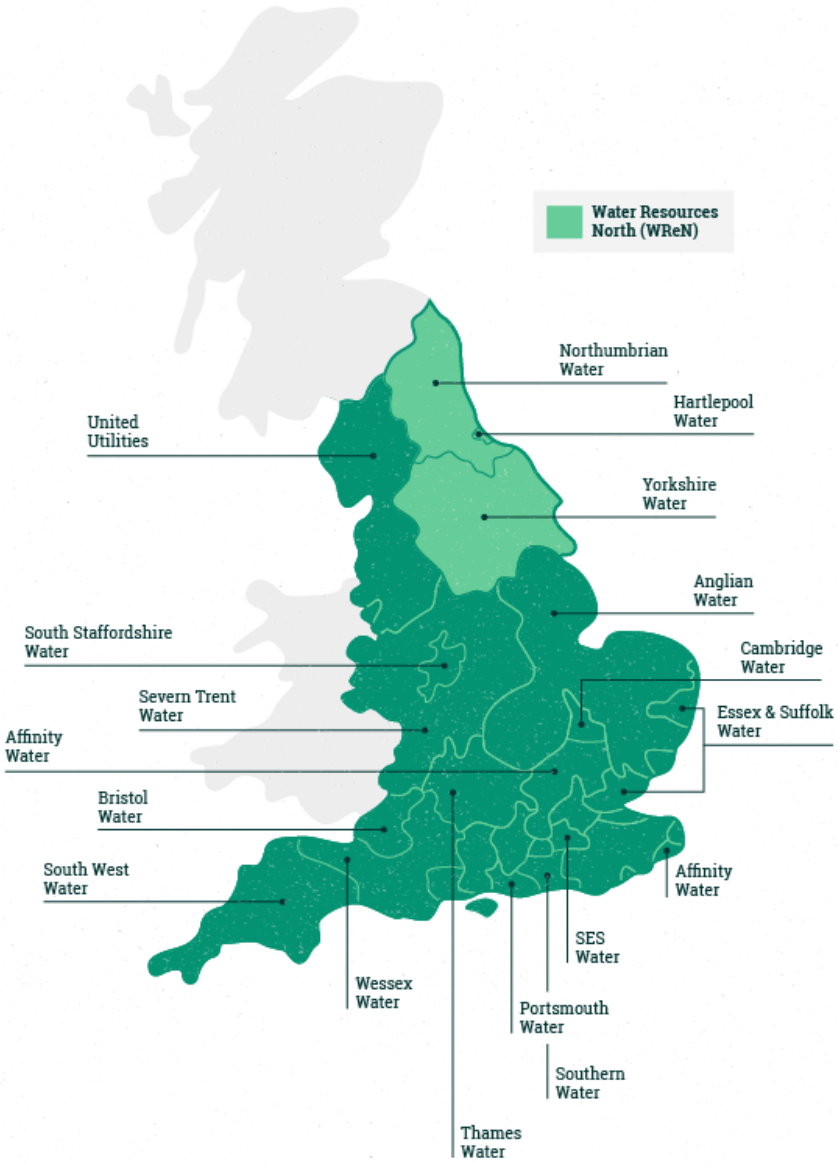
2.4.3 To deliver the WRNF, regional groups are required to produce a regional plan for their water resources. Northumbrian Water's WRMP24 has been produced in the context of the WReN Regional Plan.

2.4.4 WReN is designed to coordinate long-term regional water resources planning for Yorkshire and the North East of England looking ahead to 2050 and beyond. WReN aims to establish a sustainable, long-term plan for water resources that protects the region's resilience in the face of challenges such as climate change and population growth, as well as the region's high value environment. As the region has a surplus of water, WReN is working with other regional water resources groups (principally Water Resources West and Water Resources East) to help secure resilient water supplies for the country as a whole.

2.4.5 An overview of water companies in England and the location of WReN's regional coverage is shown in Figure 2.2.

[9]Water Resources North (20220. Draft Regional Plan. Available at: wren-drp-2022---draft-regional-plan-for-consultation---main-report (1).pdf

Figure 2.2: Overview of Water Companies in England and location of WReN's regional coverage



Source: WReN, 2022[10]

2.4.6 The main objectives, as presented in WReN's Regional Plan[11], are to:

- Protect and support sustainable economic growth across the region.
- Protect and enhance the region's resilience.
- Protect and enhance the region's precious and diverse environment.

[10] Water Resources North (2022): About us. Available at: https://www.waterresourcesnorth.org/about-us/

[11] Water Resources North (2020) Water Resources North Initial Resources Position. Available at: wren-initial-resource-position-v3-final.pdf (nwg.co.uk)

- Contribute to regional, local and sectoral ambitions towards zero climate emissions and using a six capitals approach[12]
- Lead an integrated catchment approach to water management, recognising the importance of water quality and flood risk, as well as the need to protect water resources for all sectors.
- Work with other regional groups to contribute to national resilience.

2.4.7 WReN's vision is to provide an integrated long-term strategy, prepared through multi-sector collaboration and planning, that takes account of the needs of all of those in the WReN region with an interest in the management and use of water. The ambition is that water companies in the region collaborate with others and agree a long-term water resource strategy which then be used to guide the development of the draft 2024 WRMPs. WReN's overall aim is to deliver a reliable, sustainable, and affordable system of water supply to meet multi-sector requirements (including the environment) across the North of England for the next 50 years and beyond towards the end of the century.

2.4.8 Regional Plans must also uphold aims which support the Government's 25-year environment plan[13], which pledged that 'we would be the first generation to leave the environment in a better condition than we found it'. Of particular relevance to water resources are the following objectives set out under the 25-year environment plan:

- Reducing the damaging abstraction of water from rivers and groundwater.
- Reaching or exceeding objectives for rivers, lakes, coastal and ground waters that are specially protected, whether for biodiversity or drinking water as et out in River Basin Management Plans.
- Supporting Ofwat's ambitions on leakage, minimising the amount of water lost through leakage year on year, with water companies expected to reduce leakage by at least an average of 15% from 2020 to 2025.

2.4.9 WReN have used the WRNF expectations, the objectives of the 25-year environment plan and those from other regulators and stakeholders, to help shape their approach to their regional plan.

2.4.10 The WReN regional plan suggests that its environmental assessments, including the SEA, can be used as a framework for the WReN member water companies such as Northumbrian Water when undertaking their WRMP24 statutory environmental assessments[14].

2.4.11 SEA option assessments carried out for the regional plan were used for the WRMP24 SEA assessment. The regional SEA results were reviewed and where relevant local information was included in the assessments as part of WRMP24. The regional SEA results may also flag where mitigation is needed, which would help inform further options development by NW for the WRMP24. Any new options not included in the regional plans would need full assessment using the defined SEA framework as part of the WRMP24.

2.4.12 Further details on the environmental assessment approach including the SEA methodology can be found in Appendix E of this Environmental Report.

[12] The Capitals are the valuable assets which are critical to the success of any organisation, and effective management of the Capitals helps ensure resilience. The six capitals are: Financial, Manufactured, Natural, Social, Human and Intellectual capital.

[13] HM Government (January 2018): A Green Future: Our 25 Year Plan to Improve the Environment. Available at: 25-year-environment-plan.pdf (publishing.service.gov.uk)

[14] Water Resources North (2021): Regional Plan – Environmental Assessment Scoping report. Available at: https://www.waterresourcesnorth.org/about-us/document-library/

Other guidance and interfacing planning processes

2.4.13 The regional planning process exists in a complex landscape of other plans, legislation and guidance, which WReN have considered during the development of their regional plan.

3 Scoping Summary

3.1 Introduction

3.1.1 The scoping stage of the SEA process (Stage A in Figure 1.3) sets the context and scope for the SEA and Environmental Report. Specifically, the scoping stage aims to:

- Review relevant international, European, national, and local policies, plans and programmes and their implications for WRMP24.
- Establish the baseline environmental and socio-economic information and key sustainability issues and opportunities for the NW WRMP24 area.
- Set the context and objectives of the SEA.
- Decide on the scope for the SEA, ensuring that it covers all the likely significant environment effects of the WRMP.
- Provide an opportunity to engage and collaborate with the Consultation Bodies.

3.1.2 The SEA Scoping Report was issued for consultation, and responses were received from the Environment Agency during the 5-week consultation period which ran from March to April 2022. Once the consultation period finished, all consultation responses comments were carefully reviewed and tabulated, and incorporated as far as possible. A log of comments can be found within Appendix B. Additionally, this report has also been updated in line with comments received from Historic England and Natural England to the Essex and Suffolk draft WRMP Environmental Report as a best practice exercise.

3.1.3 This section of the Environmental Report summarises the outcomes from the scoping stage, including the contents of the scoping report and responses from the scoping consultation period.

3.2 Relationship with other Plans, Policies and Programmes

3.2.1 A review of the policies, plans, and programmes relevant to the WRMP24 was undertaken as part of the SEA Scoping process. The aim was to determine how the emerging WRMP may be affected by these external factors. Furthermore, the WRMP must aim to support current relevant policies, plans, programmes, and environmental protection legislation at international, national, and local levels. The WRMP must aim to support, and where possible, strengthen the objectives of other local plans and strategies within the Northumbrian Water supply region.

3.2.2 A review of these documents is required to identify potential inconsistencies or constraints, and consistencies between these documents and the WRMP to inform the development of the SEA Framework. Table 3.1 lists current relevant policies, plans, and programmes which were considered during the SEA scoping stage. Appendix A presents the policies, plans, and programmes review in full.

Table 3.1: Relevant international, national, and regional policies, plans and programmes

Policies, Plans and Programmes	
International	
• Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979) • Bonn Convention on the Conservation of Migratory Species of Wild Animals (1983) • Convention on Biological Diversity (1992)	• Commitments arising from the World Summit on Sustainable Development, Johannesburg (2002) • Paris Agreement (2015) • Charter for the Protection and Management of Archaeological Heritage (1990)

- Ramsar Convention – The Convention on Wetlands of International Importance (1971)
- UN Framework Convention on Climate Change (1992)
- Kyoto Protocol to the UN Framework Convention on Climate Change (1997)
- The World Heritage Convention (1972)
- Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) (1998)

European

- Ambient Air Quality Directive (2008/50/EC)
- Thematic Strategy on Air Pollution (2005)
- Establishing measures for the recovery of the stock of European eel 2007 (1100/2007)
- Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (2011)
- Fresh Water Fish Directive (2006/44/EC)
- Directive on the Conservation of Wild Birds (79/409/EEC) (as amended)
- Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (92/43/EEC)
- Directive on Animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals (2006/88/EC)
- Limiting Global Climate Change to 2 degrees Celsius – The way ahead for 2020 and beyond (2007)
- A Clean Planet for all: A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (2018)
- Promotion of the use of energy and renewable sources Directive (2009/28/EC)
- Energy Act 2013
- Mainstreaming sustainable development into EU policies: 2009 Review of the European Union Strategy for Sustainable Development
- European Commission Environmental Liability Directive (2004/35/EC)
- Directive on the assessment of the effects of certain plans and programmes on the environment (2001/42/EC)
- The Convention for the Protection of the Architectural Heritage of Europe (Granada Convention) (1985)
- The European Convention on the Protection of Archaeological Heritage (Valletta Convention) (1992)
- The European Landscape Convention (2006)
- The Environmental Noise Directive (2002/49/EC)
- European Soils Charter (2003)
- Thematic Strategy for Soil Protection (2006)
- The Nitrates Directive (91/676/EEC)
- The Water Framework Directive (WFD) (2000/60/EC)
- Urban Wastewater Treatment Directive (91/271/EEC)
- Drinking Water Directive (1998/83/EC)
- Directive on Bathing Water (76/160/EEC); and Directive 2006/7/EC repealing Directive 76/160/EEC (from 2014)
- Groundwater Directive (2006/118/EC)
- Marine Strategy Framework Directive (2008/56/EEC)
- Directive on the Assessment and Management of Flood Risks (2007/60/EC)
- Blueprint to Safeguard Europe's Water Resources (2012)

National

- The Eels (England & Wales) Regulations 2009 (as amended)
- Salmon and Freshwater Fisheries Act 1975
- UK Post-2010 Biodiversity Framework, JNCC and Defra (2012)
- Making Space for Nature – A review of England's Wildlife Sites and Ecological Network (2010)
- Biodiversity 2020: A strategy for England's wildlife and ecosystem services, Defra (2011)
- The Conservation of Habitats and Species Regulations (2010) (as amended)
- The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations (2019)
- Delivering a healthy natural environment. Ecosystem approach action plan, Defra (2010)
- Strategic Environmental Assessment, Sustainability Appraisal and the Historic Environment, Historic Environment (2016)
- The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning 3, Historic Environment (2017)
- Ancient Woodland and Veteran Trees: Protecting them from development, Forestry Commission and Natural England (2014)
- Our Waste, Our Resources: A Strategy for England, HM Government (2018)
- Safeguarding our Soils – A strategy for England, Defra (2009)
- Diffuse Water Pollution Theme Plan
- Water Resources Act 1991
- Water Industry Act 1991

- The Invasive Alien Species (Enforcement and Permitting) Order 2019
- The Great Britain Invasive Non-Native Species Strategy, Defra (2015)
- A narrative for conserving freshwater and wetland habitats in England, Natural England (2016)
- Conservation 21 – Natural England's Conservation Strategy for the 21st Century, Natural England (2016)
- State of Natural Capital Annual Report 2020, Natural Capital Committee (2020)
- Standing Advice on Protected Species, Natural England (2016)
- Nature for People Climate and Wildlife policy paper (2021) – includes the England Peat Action Plan
- Climate Change Act 2008
- UK Climate Change Risk Assessment, Defra (2017)
- The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting, Defra (2018)
- National Planning Policy Framework (NPPF) (2021)
- A Green Future: Our 25 Year Plan to Improve the Environment, UK Government (2018)
- Securing the Future – Delivering the UK Sustainable Development Strategy (2005)
- The Natural Choice: Securing the Value of Nature, Defra (2011)
- Marine and Coastal Access Act (2009)
- The Wildlife and Countryside Act 1981 (as amended)
- Environment Protection Act 1990
- Countryside and Rights of Way (CROW) Act
- The Natural Environment and Communities Act 2006 (NERC Act)
- Creating a better place: Our ambition to 2020, Environment Agency (2018)
- UK National Ecosystem Assessment Follow-on (2014)
- National Infrastructure Delivery Plan 2016–2021, Infrastructure and Projects Authority (HM Government) (2016)
- Fixing the foundations: Creating a more prosperous nation, HM Government (2015)
- Environment Act 2021
- The Environmental Damage (Prevention and Remediation) (England) Regulations 2015
- Environmental Assessment of Plans and Programmes Regulations 2004
- Creating a great place for living: together we are building a green and healthy future (2018)
- Planning (Listed Buildings and Conservation Areas) Act 1990
- The Ancient Monuments and Archaeological Areas Act 1979
- Climate Change and the Historic Environment, English Heritage (2008)
- Water Act 2003 (as amended)
- Preparing for a drier future: England's water infrastructure needs, National Infrastructure Commission (2018)
- Draft National Policy Statement for Water Resources Infrastructure, Defra (2018)
- Water for Life White Paper, Defra (2011)
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (as amended)
- Protect groundwater and prevent groundwater pollution, Environment Agency (2017)
- Groundwater protection technical guidance, Environment Agency (2017)
- The Environment Agency's approach to groundwater protection, Environment Agency (2018)
- The Groundwater (England and Wales) Regulations 2009
- Flood and Water Management Act 2010
- National Flood and Coastal Erosion Risk Management Strategy for England, Environment Agency (2020)
- The Flood and Coastal Erosion Risk Management Policy Statement, Defra (2020)
- Flood risk assessments: climate change allowances, Environment Agency (2016)
- The Water Resources Management Plan Regulations 2007
- Water Resources Planning Framework (2015-2065), Water UK (2016)
- Water Supply (Water Quality) Regulations 2016 (as amended)
- National Policy Statement for Wastewater (2012)
- Climate change approaches in water resources planning – Overview of new methods, Environment Agency (2013)
- Drought response: our framework for England, Environment Agency (2017)
- Future Water: The Government's water strategy for England, Defra (2008)
- Environment Agency, 2021, Water resources planning guideline draft supplementary guidance – Environment and society in decision-making (England).
- British Standard for Biodiversity Net Gain BS8683
- The Urban Waste Water Treatment (England and Wales) Regulations 1994
- The Nitrate Pollution Prevention Regulations 2015
- Managing Water Abstraction, Environment Agency (2016)
- Marine Plans – South East Inshore, South Inshore, South Offshore (Marine Management Organisation)
- UK Marine Policy Statement (2011)
- Scottish Water's Strategic Plan (2020)

Regional and Local	
• Site Improvement Plans for Natura 2000 Sites, Natural England • Local Development Plans (Various) • Public Rights of Way Improvement Plans (ROWIPs) (Various) • Local level Green Infrastructure Plans and Strategies (Various) • National Natural Capital Atlas: Mapping Indicators, Natural England (2020) • AONB Management Plans (Various) • NCA Profiles, Natural England • Draft Northumbria River Basin Management Plan (2021) • Chalk-Streams First: A Permanent and Sustainable Solution to the Chilterns Chalk-Streams Crisis, Various (2020) • National Natural Capital Atlas: Mapping Indicators, Natural England (2020) • Catchment Flood Management Plan: Northumbria River Basin District (2009) • Catchment Abstraction Management Strategies (CAMS) (2016) (Various)	• WReN Regional Plan – Environmental Assessment Scoping Report (2021) • WReN – Revised Water Resources Position Statement, WReN (2021) • WReN – Revised Water Resources Position Statement – Non-Technical Summary, WReN (2021) Initial Resources Position, WReN (2020) • Water Resources Planning Guideline, Various (2021) • Draft Flood Risk Management Plans (FRMPs) summary of consultation responses (2022): Northumbria River Basin District • Meeting our Future Water Needs: A National Framework for Water Resources, Environment Agency (2020) • Long-term water resources environmental destination, Environment Agency (2020) • Forward programme 2021-22, RAPID (2021) • Water Resources North's Regional Plan (2022) • Yorkshire Water's Draft Water Resources Management Plan 2024 (2022) • United Utilities' Revised Draft Water Resources Management Plan 2024 (2023)
Northumbrian Water	
• Environment Strategy (2021) • Biodiversity Strategy (2021) • Pollution Incident Reduction Plan (2020) • Draft Drought Plan 2022 (2021) • PR19 Business Plan (2020) • Safety, Health and Environment (SHE) Statement (2020)	• Emission Possible Plan to achieve net zero by 2027 (2021) • Leakage Target (2020) • Water Environment Improvements / Blue spaces Scheme (2021)

3.2.3 The Policies, Plans and Programmes review also considers neighbouring water company WRMPs and other regional water related plans to determine how Northumbrian Water's WRMP may be affected by these external factors, both now and in the future. The following four plans are considered below: Water Resources North's Regional Plan, Yorkshire Water's WRMP24, United Utilities' WRMP, and Scottish Water's Strategic Plan.

WReN Regional Plan[15]

3.2.4 Water Resources North (WReN) is one of five regional water resources groups working under the Water Resources National Framework (WRNF). Its aim is for the region to have a sustainable, long-term plan for water resources that protects the region's resilience in the face of challenges such as climate change, population growth, and changing demands for water use. Regional water resources groups are required to deliver the WRNF by producing a Regional Plan for their water resources. Regional Plan's, which include strategic and regional solutions, form the basis of more detailed water company WRMP's. As such, Northumbrian Water's WRMP has taken into account the strategic picture outlined in WReN's Regional Plan.

[15] WReN (November 2022): Draft Regional Plan for consultation. Available at: wren-drp-2022---draft-regional-plan-for-consultation---main-report (3).pdf

3.2.5 In producing their Regional Plan, WReN have considered the aims and objectives of the WRNF as well as other policies and plans relevant to England. The document follows a nationally agreed overarching structure. It sets out the region's baseline position, forecasts the region's future resource position, and summarises WReN's approach to developing an adaptive, best-value plan at region level, in the context of the decision-making approaches and supporting metrics. It also summaries the most notable choices and decision areas for the plan, as well as the resulting indicative solutions to meet deficits, and the outcomes of scenario and stress tests. In addition, it explains how WReN have represented environmental destination and accounted for non-public water supply needs as well as customer and stakeholder priorities in the development of the plan.

3.2.6 The key supply-demand challenge within the WReN region occurs in the Yorkshire Grid zone. For Yorkshire Water, investment in both supply and demand reduction options is required, and thus WReN's options appraisal process has been driven by the Yorkshire Water WRMP24. Through demand management options, the scale of the deficit is significantly reduced in Yorkshire Water, although not eradicated.

3.2.7 Through WReN, the potential for transfers between companies and zones in the area has been explored to meet in-region needs. A range of raw water export options from the River Tees (Northumbrian Water) to Yorkshire Water have been considered, supported by Kielder reservoir via the Tune Tees Transfer System. A range of options sizes have been assessed, including modelling to test the impacts and interventions on the Kielder zone. The 140 Ml/d River Tees to Yorkshire Water option is included in the best value plan, by allowing areas of deficit in the region to benefit from those with surplus, albeit it is not required until 2040. A 10Ml/d export of treated water from Northumbrian Water's Darlington Water Treatment Works (WTW) to Yorkshire Water has also been considered, but this has not been selected in the best value plans of either water company.

3.2.8 Yorkshire Water has ensured that the selected export does not impinge on Northumbrian Water's plan position and broader regional impacts have been taken into account. In line with customer feedback, Yorkshire Water are undertaking significant demand-side action in addition to drawing on new supply-side schemes. WReN's approach to metrics has ensured that the costs and impacts cover assets in the Northumbrian Water area developed by/for Yorkshire Water to facilitate the transfer (e.g., carbon, environmental impacts).

3.2.9 Northumbrian Water has sufficient raw water within its Kielder WRZ to meet its own forecast customer demand over the planning period, forecast demand on Industrial Teesside and to provide a 140 Ml/d raw water transfer to Yorkshire Water from 2040. The 1:500-year drought resilience standard is not impacted by the transfer of water for Northumbrian Water, whilst helping to deliver improved resilience in the Yorkshire Grid. Operationally any impacts of the scheme are modest, given the regulated nature of the export from existing Northumbrian Water sources, whilst supporting significant environmental improvements to be delivered elsewhere in the region. Northumbrian Water and its customers receive some financial benefit from the export, reflecting a fair transfer of 'value' within the region for the use of available surplus water.

Yorkshire Water WRMP24[16][17]

3.2.10 Yorkshire Water's WRMP24 is a key component of their long-term, strategic planning framework. It sets out how they plan to maintain a safe and reliable water supply to customers over the long term. Yorkshire Water are forecasting a supply demand deficit in the future,

[16] Yorkshire Water (October 2022): Draft Water Resources Management Plan 2024. Available at: yorkshire-water-draft-water-resources-management-plan-2024-technical-document.pdf (yorkshirewater.com)

[17] Yorkshire Water (October 2022): Non-technical summary of Draft Water Resources Management Plan 2024. Available at: yorkshire-water-draft-water-resources-management-plan-2024-non-technical-summary.pdf (yorkshirewater.com)

resulting from the impacts of climate change, population growth, the need to protect the environment and from the loss of imported water from a neighbouring water company. As a result, Yorkshire Water need to take action to ensure resilient water supplies into the future. Their plan is to mitigate the deficit through a twin track approach to demand reduction and an increase in supply options. Demand management options include leakage reduction, smart metering, and water efficiency.

3.2.11 In respect of supply options, in the early part of their plan (2025-2030) Yorkshire Water will make use of new supplies including four new borehole sources and associated water treatment works. They have also included plans for two new river abstractions and associated treatment. In the medium term their plans include a treated water transfer within their operational areas to offset the loss of imported water from outside their region. In the long term, to mitigate the future resource reductions associated with the need to protect sensitive river environments their plans include a transfer from Northumbrian Water and a new storage and treatment capacity at existing or new water treatment works.

3.2.12 Yorkshire Water currently receive a small but significant proportion of their water supply from a transfer provided by Severn Trent Water (STW). The transfer of water comes from the Derwent Valleys reservoirs in the STW are and feed a water treatment works that Yorkshire Water operate in South Yorkshire. The agreement Yorkshire Water holds with STW runs to 2085, but also allows either party to reduce or cease the transfer in 2035, provided notice is given no later than 2030. Without the import, Yorkshire Water's network can supply this area for short periods through existing connections and alternative sources. However, they would need to be able to meet the current and future needs of the area, on a daily basis, without the transfer. STW's WRMP24 concluded it is likely to require the water currently transferred to South Yorkshire for its own customers at some point in the future. As a result, Yorkshire Water have assumed the loss of the transfer from STW in their WRMP24, and thus have identified alternative sources of supply.

3.2.13 Yorkshire Water's options for increasing available supply are a combination of increasing use of existing available resources and introducing new supplies into their grid network. They include options for importing new supplies from Northumbrian Water in the form of a transfer from the River Tees, supported by Kielder reservoir. Yorkshire Water are continuing to work collaboratively with Northumbrian Water on the validation and development of this transfer option.

3.2.14 Yorkshire Water's supply forecasts also incorporate potential abstraction reductions on groundwater sources as a result of licence changes required to protect the environment. In the longer-term there is a risk that one of their River Derwent abstractions could be reduced, with an assumed loss of 130 ml/d in 2050 as a result. Yorkshire Water have assumed that any reduction on the River Derwent abstraction to meet environmental destination will not occur until 2050. The loss will be offset by investment in the bulk water transfer from Northumbrian Water from the River Tees.

3.2.15 This option will make use of Northumbrian Water's surplus and some existing infrastructure. However, significant additional infrastructure and new assets will be required to transfer the water to Yorkshire Water customers. This would include an additional main and electricity supply at one of Northumbrian Water's pumping stations, a new main from the River Tees to the York area and additional treatment capacity at both source and destination. The water will need to be treated to a sub-potable standard before transferring to Yorkshire to avoid the spread of invasive species. It will then need to be treated to potable standard at the destination. Due to the length of the transfer, the quality of water will deteriorate, and thus it cannot reliably be treated to potable standard at source and transferred to where it is needed. To better inform their understanding of the resource availability from the River Tees and the supporting infrastructure requirements, Yorkshire Water plan to work collaboratively with Northumbrian

Water to establish a Strategic Resource Option (SRO) that they will seek to progress through the RAPID gated process (RAPID is the Regulator's Alliance for Progressing Infrastructure Development).

3.2.16 There are several uncertainties that Yorkshire Water must plan for. The future of the STW transfer is uncertain. The most likely scenario is that the transfer will terminate in 2035 but there is still a possibility that it could continue. Yorkshire Water and Severn Trent Water are investigating the potential of increasing the capacity of Severn Trent's Derwent Valley reservoirs. This alternative to the in-region options would raise the Derwent Valley reservoir dams, increase available resource, and allow the current transfer from Severn Trent Water to be retained. If the outcome is that the reservoirs can be increased sufficiently to meet both Severn Trent Water's future needs and Yorkshire Water's demand in South Yorkshire, then the transfer could be maintained. Yorkshire Water's WRMP24 final plan scenario includes a solution for offsetting the loss and they have an alternative pathway that assumes the continuation of the transfer. Yorkshire Water expect clarity on the future of the transfer to be reached by 2030.

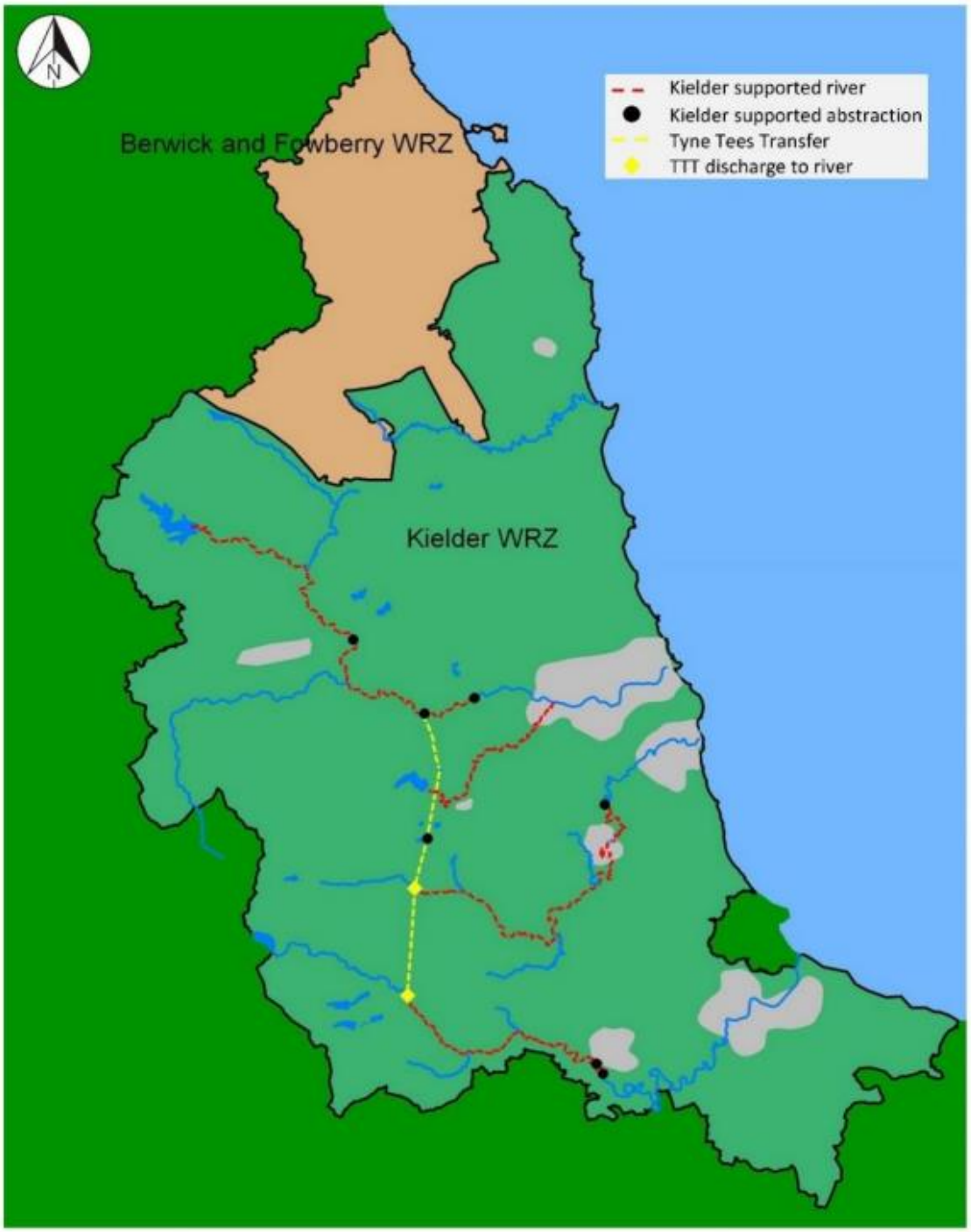
3.2.17 It may also be possible that the River Derwent loss resulting from environmental destination requirements will not occur in the future or conversely, that the impact will be worse than included in Yorkshire Water's baseline. The extent of the loss will not be known until further studies have been completed. These need to consider the potential environmental benefits from any reduction, the scale of any abstraction reduction, and the impact on Yorkshire Water's available supplies. Yorkshire Water have therefore considered pathways for no loss, and for a more extreme loss of 160 Ml/d, compared to the baseline of 130 Ml/d.

3.2.18 Supply option benefits are also uncertain, particularly given that most options will require consents, including planning permissions and abstraction permits that will be subject to impact assessments. Preliminary studies are needed beyond WRMP option development before Yorkshire Water can fully define the benefits.

3.2.19 Yorkshire Water share the Government's ambition to achieve a sustainable water supply for the environment, but they must balance both this ambition and their responsibility to provide a secure water supply for their customers. Further work is required to understand the scale of abstraction loss and the impacts of the reduced abstraction on the River Derwent, and this is required before they proceed with a large-scale transfer that will have significant environmental impacts during delivery and operation. The delivery of the transfer option or any identified alternative could take ten or more years to complete. Significant planning and investigation including creating a biodiversity net gain action plan, will be required before the construction phase can begin. For this reason, Yorkshire Water will progress the proposed SRO well ahead of the decision point for the transfer, ensuring the appropriate planning time to demonstrate this option would represent best value to their customers.

3.2.20 Northumbrian Water are considering a 'sensitivity scenario' that could be taken forwards in place of their WRMP24 Best Value Plan. This scenario would see the Yorkshire Water Transfer be replaced by a United Utilities Transfer. For further information on this 'sensitivity scenario' please see Section 6.4. Additionally, some information on this 'sensitivity scenario' is also provided below in the United Utilities part of this section.

Figure 3.1: Kielder Reservoir and the Tyne Tees Transfer System



Source: Northumbrian Water Draft Water Resources Management Plan 2024 (November 2022)

United Utilities WRMP[18]

3.2.21 United Utilities WRMP is a key part of their wider plans for a stronger, greener and healthier Northwest. It sets out their strategy to make sure the Northwest has an adequate supply of water to meet demand from 2025 to 2050 and beyond. United Utilities is part of the Water Resources West (WRW) planning group (along with Severn Trent Water, Dwr Cymru Welsh Water and South Staffs Water and other stakeholders). They have developed their WRMP in collaboration with the group to align with its overall regional plan. The Water Resources West region spans the Northwest, the Midlands and part of Wales.

3.2.22 United Utilities baseline supply-demand balance shows that without the drought supply and demand measures included in their drought plan there is a potential deficit in their Strategic Resource Zone, of 32.7 Ml/d in 2025/26 and without new interventions this rises to 318.5 Ml/d by 2049/50.This is caused mainly by rising population, climate change and the need to reduce abstraction to protect the environment. All of their other resource zones maintain a positive supply-demand balance across the 25-year planning horizon, meaning that they have a supply-demand surplus. As a result. United Utilities must respond to the forecast deficit in their Strategic Resource Zone from 2025. They plan to resolve this through their demand management strategy, particularly through leakage reduction.

3.2.23 United Utilities have a leading role in WRW and regional planning, and thus they are actively helping to solve some of the largest water supply risks in the country. They sponsor the Northwest Transfer (NWT) Strategic Resource Option (SRO), which is the United Utilities Water component of the Severn to Thames Transfer (STT) SRO. The STT scheme is being developed collaboratively by Severn Trent Water, United Utilities Water and Thames Water. It involves transferring water from the River Severn to the River Thames where it can be abstracted by Thames Water, and potentially other companies in the Southeast. When there is insufficient flow in the River Severn, support is provided by Severn Trent Water SROs and the NWT SRO. The NWT SRO involves potentially transferring up to 180 Ml/d of raw water from Lake Vyrnwy into the River Severn. The size of transfer selected depends on the volumes required by recipient companies. In order to mitigate the impact on customers and the environment, the NWT SRO also involves developing ‘sub-options’ in the Northwest. Support from NWT would only be required at times when water resources in the Southeast are under stress. At other times the sub-options will help to improve resilience in the WRW area.

3.2.24 United Utilities plan included a total of 168 Ml/d of exports to Severn Trent Water and Water Resources Southeast (WRSE) from their Strategic Resource Zone, starting with a 75 Ml/d transfer in 2031. Seven supply options were included in their preferred plan to support these transfers. Transfers to WRSE, however, are no longer selected in United Utilities preferred plan, linked to WRSE companies lowering their demand projections following consultation feedback. The proposed 75 Ml/d transfer to Severn-Trent Water has reduced to 25 Ml/d but brought forward one year from 2031 to 2030. There are, however, significant uncertainties in WRSE’s regional plan meaning that the Severn Thames Transfer (STT), hence NWT, could still be needed by WRSE. These uncertainties include the risk of projected demand management savings not materialising, or preferred supply options not being delivered. In terms of imports, United Utilities have considered multiple options and the most promising appear to be Northumbrian Water’s Kielder and Cow Green transfers, both of which could potentially support the NWT SRO if required in the future. As such, there is potential for a new transfer from Northumbrian Water to Untied Utilities to be required depending on the future need of WRSE companies.

[18] United Utilities (June 2023): Revised Draft Water Resources Management Plan 2024 Main Report. Available at: https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/wrmp24-drafts/revised-draft-wrmp24-main-report.pdf

3.2.25 Northumbrian Water are considering a 'sensitivity scenario' that could be taken forwards in place of their WRMP24 Best Value Plan. This scenario would see the Yorkshire Water Transfer be replaced by a United Utilities Transfer. For further information on this 'sensitivity scenario' please see Section 6.4.

Figure 3.2: The Severn Thames Transfer strategic resource option

Source: United Utilities Revised Draft Water Resources Management Plan 2024 (June 2023)

3.3 Scoping Baseline Review

3.3.1 The Scoping Report included a review of current baseline information for environment and socioeconomics within the NW region. Furthermore, the specific assessments of each option provide a higher level of area-specific detail where each option is located. The baseline GIS used in the environmental assessments included buffers so close receptors (such as designated sites) and potential pathways are captured. Surface water catchments that could potentially be affected and that fall either partially, or wholly outside the WReN region and the Northumbrian Water supply area are shown in the Appendix D maps. These include:

- The Northumberland Rivers
- Tyne
- Wear
- Tees

3.3.2 The complete baseline information with supporting maps is presented in Appendix D, however the list below provides a summary of the conducted baseline for each of the SEA Directive topics.

- **Biodiversity, flora, and fauna** – The NW region overlaps with numerous sites designated and managed for their biodiversity values. This includes SACs and SPAs in the UK's national site network (previously part of the Natura 2000 network under the EU Habitats[19] and Birds[20] Directives), Ramsar sites (Wetlands of International Importance), SSSIs, NNRs and LNRs. MPAs and MCZs are also present along the coast of areas covered by the WRMP24. The WRMP24 region is rich in species and habitat diversity. Important biodiversity is present both within designated protected areas and priority habitats across the wider landscape including deciduous woodland, and wetland, coastal and estuarine habitats and species.
- **Soil –** The WReN region is a hub for agriculture with cereal and livestock grazing being the predominant type of farming. Agricultural land is classified on a scale of 1 to 5 where 1 is the highest quality and 5 is the lowest. The agricultural land classification of the region is predominantly Grade 3 followed by Grade 5, with pockets of urban and non-agricultural land. The North East of England has a significant number of landfill sites. Currently, there are approximately 96 authorised landfill sites across the NW region.
- **Water** – The Northumbrian Water supply region is a relatively wet area in the UK, with the average annual rainfall exceeding 1500mm and is classed as an area with no serious water stress[7]**.** The main rivers in the Northumbrian Water supply region are shown in in Appendix B4. There is one main RBD within the Northumbrian Water supply region: Northumbria. The entire NW supply area falls within the Northumbria River basin district. Within the Northumbria RBD, change to the natural flow and level of water, pollution from rural areas, pollution from abandoned mines, pollution from wastewater and pollution from towns, cities, and transport, as well as physical modifications, affect the highest proportions of water bodies.
- **Flood Risk –** The Northumbria RBD has over 2.78 million residents, with over 6,000 residents at high risk of flooding from rivers and the sea and over 13,000 also at risk from surface water flooding. There are no significant flood-risk areas identified in the Northumbria RBD during the Preliminary Flood Risk Assessment process.
- **Covid-19 Impacts on Water Demand** – data collated for this report indicate that demand and PCC were impacted by the Covid-19 pandemic. Namely, household demand increased, non-household demand decreased, with an overall increase of total demand. These impacts will continue to affect PCC and demand in the next few years with potential permanent changes. Quantitative models anticipate that the observed PCC increase could reduce to between 2-3% by 2025 compared to an estimated 4-5% for 2021/22.
- **Air** – Air quality in the Northumbrian water region is varied and there are certain areas with higher concentrations of air pollutants – likely associated with urbanisation, transport, or business activities. AQMAs are declared where the national air quality objectives are not being met[21]. There are seven AQMAs in the Northumbrian Water supply area.
- **Climatic Factors** – Current observations indicate that the UK is continuing to warm. In 2021, temperature records were set, including a high of 28.6°C and a new winter record of -23.0°C[22]. The decade 2010-2020 was on average 0.3°C warmer than the 1981-2010 climatic

[19] The Council of the European Communities (1992). Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. *Official Journal of the European Communities.* Available at: The Habitats Directive - Environment - European Commission (europa.eu).

[20] The European Parliament and the Council of the European Union (2009). Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds. *Official Journal of the European Union*. Available at: EUR-Lex - 32009L0147 - EN - EUR-Lex (europa.eu).

[21] Department for Environment, Food & Rural Affairs (2022) National Air Quality Objectives. Available at: https://uk-air.defra.gov.uk/assets/documents/National_air_quality_objectives.pdf

[22] Royal Meteorological Society (2021). State of the UK Climate. Available at: State of the UK Climate - Met Office

average and 0.9°C warmer than 1961-1990. Annual precipitation has increased across the UK in recent decades with 116% more rainfall in 2020 compared to the 1981-2010 average.

- **Historic environment –** The WReN is rich in heritage, with listed buildings, scheduled monuments, registered parks and gardens, and registered battlefields. Most Local Authorities within the region hold a HER, which is a database of archaeological sites, listed buildings and other historic buildings, and finds of historic objects. There are hundreds of entries on the HERs from churches and houses to roman coin finds and medieval finds. There is also potential for unidentified heritage assets and archaeological remains to be present within the region.
- **Landscape** – The landscape across the Northumbrian Water region is diverse; it is low and flat near the North Sea coast and increasingly mountainous toward the northwest. The region also has a striking stretch of coastline, including sandy beaches, sand dunes, rugged cliffs and isolated islands, and picturesque seaside villages. NCAs divide England's landscape into 159 distinct areas defined by a unique combination of aspects such as landscape, biodiversity, geodiversity and economic activity[23], and AONB are protected to conserve and enhance their natural beauty and distinctiveness[24]. There are 17 NCAs and two AONBs within the Northumbrian Water WRZ.
- **Population and Human Health** – Settlements in North East of England are diverse and range from large population centres such as Newcastle, Sunderland and Durham to small rural hamlets and seaside towns. Ethnicity in the region is predominately White British. There are much smaller proportions of Black, Asian, and Mixed ethnicities in the rural areas of the region compared to urban areas. The total population as determined by Northumberland County Council local authority is 319,030 (2017). The Office of National Statistics population projections (2016 based) predict that by 2033 the total population will increase by 18,970 people to a total of 338,000, an increase of 8.3% from 2017 estimates. The distribution of age amongst the population in the North East is similar to the UK average where 17.6% are aged 15 and under, 62.3% are between 16 and 64, and 20.1% are over 65. The average age is 41.6 years old, and the region has a total population of 2.4 million residents.
- **Economy** – the North East of England contributes around 6.7% of the total UK economy. GDP per head is £24,068 which is lower than the national UK average of £32,857. According to the Northumberland County Council, 8% of the county population live in areas within the 10% most deprived decile of the IMD 2019.
- **Material Assets** – The production industry dominates the employment sector across the North East region, which is in line with the rest of the UK. The Northumbrian Water supply region has an extensive transport network which connects people, places and services both within the region and beyond to support the regional and national economy. In the wider WReN region, the A1(M) runs north-south through the region whilst a number of key A roads (A1, A58, A69, A696, and the A19) cross the region, mostly travelling outwards from Newcastle upon Tyne. These main trunk routes are maintained by Highways England. A variety of other major roads run through the region, maintained by county council.
- **Resource Use and Waste** – In 2019/20 the total amount of local authority managed waste was 25.6 million tonnes. Eastern England managed 1.2 million tonnes of waste in 2019/20, with 36.2% of this collected waste sent for recycling, 56.9% sent to incineration, 5.6% sent to landfill and the remaining 1.2% fell within the 'other' category. The recycling rate for the

[23] Natural England (2014). National Character Area profiles. Available at: https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making

[24] Natural England (2017) Areas of outstanding natural beauty (AONB's): designation and management. Available at: https://www.gov.uk/guidance/areas-of-outstanding-natural-beauty-aonbs-designation-and-management

North East of England was the second lowest in the nation, with only London (30%) performing worse.

- **Natural Capital** – The Northumbrian Water WRZ contains a diverse range of Natural Capital stocks that provide a wealth of ecosystem services at national, regional, and local levels. It contains all eight broad habitat types within the UK's NEA, with farmland comprising the largest land cover type (47%), with grasslands (11.5%) and woodlands (9%) also making up a substantial portion of the land cover.

3.4 Future Baseline

3.4.1 The SEA Directive requires that "the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the Plan or Programme" is identified. Prediction of future trends is difficult because they depend on a wide range of global, national, and regional factors and decision making. However, after initial review, the following key trends have been identified, and are considered likely to continue, potentially resulting in changes to baseline conditions for the NW region:

- **Biodiversity, flora, and fauna** – habitats and species are likely to continue to be protected through European and UK legislation. England's wildlife habitats have become increasingly fragmented and isolated, leading to declines in the provision of some ecosystem services, and losses to species populations. Lawton (2010) recognises that future climate change, demographic change, economic growth, new technologies, societal preferences and changes in policy and regulatory environments may all have profound consequences[25]. However, new legislation such as The Environment Act 2021 is likely to continue protection of biodiversity by providing a framework for a legally binding target of net gain within the planning system.
- **Soil** – as the population increases, this is likely to lead to more development and thus brownfield land will be remediated and developed. Also, Greenfield land is likely to be at risk of development, leading to potential new soil quality issues. Additionally, there is potential for future loss of agricultural land through development pressures.
- **Water** – water quality is likely to continue to be maintained and improved through legislation such as the WFD, however there is potential for development pressures through brownfield remediation and greenfield development which could lead to water quality issues. Whilst the NW region is a relatively wet area in the UK and is currently classed as an area with no serious water stress, future economic and population growth could place pressure on the region's water resources and water dependent environments, especially during dry periods or drought. There is potential for an increased need for wastewater treatments as a result of WFD water quality standards combined with population increase.
- **Air Quality** – new development, economic growth and tourism may lead to increased car journeys and congestion within the area leading to localised air quality effects. Public transport improvements, national air quality targets and European emissions standards for new vehicles should contribute to reducing future air quality effects from motor vehicles.
- **Climatic factors** – the climate is expected to continue to change with annual average temperatures projected to increase, particularly in summer. Winters are projected to be wetter and summers drier. Climate change is projected to result in more extreme weather events, potentially causing or exacerbating periods of drought which alongside population and economic growth could impact water availability. Carbon and other GHG emissions will continue to be emitted, and given the energy intensity of wastewater treatment, and the building of additional water assets and infrastructure, water industry GHG emissions may

[25] Lawton (2010). Making Space for Nature: A review of England's Wildlife Sites and Ecological Network. Available at: https://webarchive.nationalarchives.gov.uk/ukgwa/20130402170324mp_/http:/archive.defra.gov.uk/environment/biodiversity/documents/201009space-for-nature.pdf

increase and further contribute to climate change. However, regulations and legislation will likely continue to promote the reduction in emissions through commitments to net zero. The water industry in the UK is aiming to become net zero by 2030[26].

- **Historic Environment** – Historic England recently reported that heritage assets at risk are decreasing. There are now 87 fewer heritage assets at risk than in 2018 with successes in buildings and structures and archaeology[27]. Historic assets will likely continue to be protected through European and UK legislation. However, development could put pressure on heritage assets and their setting.
- **Landscape** – changing and continued development will affect the quality and character of landscapes.
- **Population and human health** – water available for consumptive use may be affected by climate change whereby access to water is limited through more frequent droughts or floods. Population is projected to increase in the region and life expectancy is also higher than the nation average meaning that the numbers of elderly residents are likely to increase. As such, water demand will increase, and further pressure will be placed on water resources within the region.
- **Material assets** – regeneration and future investment and demand are likely to increase the number and quality of material assets such as housing, transport infrastructure, waste facilities, and community facilities.

[26] Water UK (2020), Water industry plans to reach net zero carbon by 2030. Available at: https://www.water.org.uk/news-item/water-industry-plans-to-reach-net-zero-carbon-by-2030/

[27] Historic England (2019). Heritage at Risk. Available at: https://historicengland.org.uk/advice/heritage-at-risk/findings/

3.5 Baseline Key Issues and Opportunities

SEA Topic	Key Issues	Opportunities
Biodiversity, Flora and Fauna	The NW region is rich in habitats and species diversity, and includes national and internationally designated sites including SSSIs, SPAs, SACs, Ramsar sites and MPAs/MCZs. Development of new water infrastructure can directly or indirectly affect designated and non-designated sites, habitats, and species through loss of land, disturbance, and damage. There is potential for the options within NW's WRMP24 to result in surface and/or groundwater pollution, which could have a negative impact on wildlife. Wetland and marsh habitat rely on water, NW's WRMP24 should ensure that it does not affect these areas through over abstraction and should look for opportunities to reduce abstraction pressure where cost effective and possible.	NW's WRMP24 will seek to avoid adverse impacts and reduce those that remain through design and mitigation. The options within the plan, and the plan itself, have potential to support the achievement of biodiversity net gain where possible. There are opportunities to improve the natural environment and biodiversity net gain through habitat creation or enhancement, support Nature Recovery Networks and Strategies, connectivity of ecological networks to increase species resilience and introduction of vegetation to slow run-off and reduce flood risk, amongst others.
Water	Phosphate and physical modifications are the most common pressures affecting the achievement of 'Good' status. The significant water management issues which are most common in affecting the achievement of 'Good' are pollution from wastewater, physical modifications, and pollution from town, cities, or rural areas. There is potential for the options within NW's WRMP24 to have a negative impact on water quality. Of particular importance are priority habitats such as chalk streams and rivers where low flows can potentially lead to the deterioration of ecological status. Areas of the NW region are at risk of flooding from both surface water and rivers and the sea. There is potential that the options within NW's WRMP24 could be affected by or contribute to an increased risk of flooding.	NW has the opportunity to improve the environment by leaving more water in the region's rivers, streams, and underground sources. It could also seek to provide overall improvements in water quality across the region. The options within NW's WRMP24 should avoid areas at high risk of flooding, where possible, except where the option may reduce the risk, and where appropriate, implement measures to reduce flood risk.
Soil	Agriculture has a dominant role in the landscape of NW's region. Agricultural land is predominantly of Grade 3 across the region, whilst a significant amount of Grade 5 is also present. The options within NW's WRMP24 (primarily the Yorkshire Water Transfer) could have the potential to result in a loss of agricultural land or a reduction in water availability for agricultural processes. There is also potential for soil contamination through the construction phase.	There are opportunities for the options to positively affect agriculture, for example working with farmers to implement options to increase raw water storage and supply.

SEA Topic	Key Issues	Opportunities
Air	Air quality in the region is varied. Generally, it is good, however there are some areas with higher concentrations of air pollutants, and some areas are designated as AQMAs. Air pollution sources include transport and industry. The options within NW's WRMP24 have the potential to impact air quality. This could include the generation of air pollutants from the construction phase, as well as from operation.	There is potential for NW's WRMP24 to mitigate any increases in air pollutants as a result of the options and improve air quality in the region.
Climatic Factors	The NW region is projected to have hotter and drier summers, and wetter and warmer winters, as well as more frequent short duration "extreme weather events" such as thunderstorms and heatwaves. There is potential that this could affect water availability through increases in periods of drought, as well as increased demand due to extreme events (i.e., heatwaves). There is also potential for options within the NW region to result in carbon emissions during the construction and operation phase which will further contribute to climate change.	NW has the opportunity to consider the impact of climate change within the option selection process. Measures to increase the resilience of the option to a changing climate could also be considered. The options should also consider the impact on climate change through the optioneering and design processes. NW has the opportunity to address the impacts of climate change on demand for water and how much is available to the environment, and to increase the region's resilience to severe drought and other extreme events and stresses.
Population, Communities and Human Health	There are approximately 320,000 people living within the NW region (as determined by Northumberland County Council local authority). Population is expected to grow which will likely place additional pressure on the water environment within the region. Economic growth and climate change will also add to this pressure. Health within the region is generally good. The options within NW's WRMP24 have the potential to result in temporary disturbance effects during the construction phase. There is also potential for impacts on the water or natural environment which could have impacts on recreation and wellbeing.	There is an opportunity for NW to engage with the local community. NW could also look to maximise opportunities for recreation through enhancing access and the condition of the water environment, greenspaces, or areas of the natural environment. Thus, improving the inclusivity of and connection to the local natural environment. NW also has the opportunity to ensure a resilient and reliable water supply for customers now and in the future, ensuring there is enough water for a growing population and to support economic growth. Ensure an economically sustainable water supply for customers. This may see the economic value of water increase and require a greater value to be assigned to water through increased charges and/ or seasonal water rates.
Historic Environment	The NW region is rich in heritage and contains many listed buildings, conservation areas, scheduled monuments, registered parks and gardens, registered battlefields, and non-designated heritage assets amongst others.	The options within NW's WRMP24 should consider the historic environment and minimise adverse effects, to: • Protect archaeology • Reduce effects on heritage assets and their setting

SEA Topic	Key Issues	Opportunities
Landscape	The NW region's landscape is diverse and there are important landscapes within the region, including 17 NCAs and two AONBs. There is potential for the options within NW's WRMP24 to have an impact on the landscape. This could include temporary construction effects and permanent effects associated with infrastructure which could affect visual amenity or the character of the area.	Consideration of the impacts of the landscape should be considered as part of the option development. There is potential for NW's WRMP24 to enhance the landscape. This may involve selecting certain materials or colours for the option or through planting or habitat creation.
Material Assets	The NW region contains important transport links which could be affected during construction works. NW's WRMP24 has the potential to increase the use of resources within the region and result in the generation of waste.	NW has the opportunity to consider the use of resources within the option development and reduce the use of energy, materials and prevent waste generation.

3.6 Scoping Consultation

3.6.1 Details of how the results of the consultation have been considered, alongside the results of the SEA assessment, are reported in this section of the Environmental Report.

3.6.2 Following the Scoping Report consultation period, all consultation responses were reviewed and considered as appropriate. A total of six comments were received, encompassing agreement with aspects of the proposed approach, sources to assist in its application, methodological questions and clarifications, and suggested modifications and enhancements to the proposed approach and SEA assessment framework.

3.6.3 Key themes arising from the Scoping Report consultation included:

- **Consistency between approaches,** that is aligning with, and where necessary building on/ refining, previous work and regional-level plans (including WReN's Integrated Environmental Assessment approach), as well as relevant guidance, planning and policy frameworks.
- **Coverage of a full range of socio-environmental issues including interactions and synergistic impacts** in both construction and operation, including but not limited to air quality, climate change, pollution, biodiversity, and aesthetic/character values.
- **Mitigating potential effects on the historic environment and heritage assets**, including designated and non-designated heritage sites, and recognising that some heritage assets may currently be unknown.
- **Representativeness** across locations, customers, and stakeholders, and engagement of experts including local groups and advisors.
- **Opportunities to have positive effects,** including in relation to biodiversity, responsible recreation and engagement with the natural and historic environments, climate resilience, and development of green infrastructure.

3.6.4 Where changes to the approach were suggested, these were considered in detail by the WRMP24 project team. Recommendations were incorporated based on factors such as:

- The extent to which they were already addressed by the SEA framework.
- Their specific applicability and relevance (including level of detail) to the purpose and scope of the WRMP.
- The feasibility of carrying out realistic and informative assessments.
- Proportionality in the context of the existing SEA framework for water resources planning.
- The significance of the expected effects on assessment results.

3.6.5 As part of the best practice approach to the SEA, an exercise was undertaken to review scoping consultation comments across all WRMPs. As a result of this process, adjustments were made to two proposed SEA objectives and assessment criteria following the responses to the Scoping Consultation Report for other WRMPs and therefore amendments have been applied here as part of an exercise in best practice. These changes are as follows:

- **Historic Environment** – SEA objective 18 was updated to reflect wording requested by Historic England, to 'To conserve/Protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting'.
- **Material Assets** – SEA objective 21 was updated to include green infrastructure based on consultation feedback from Natural England, and an additional two assessment questions/sub-themes were added, 'Will the option avoid negative impacts on existing green infrastructure?' and 'Will the option create opportunities for enhancing existing green infrastructure?'

3.6.6 Additionally, comments made by Historic England and Natural England in relation to the Essex and Suffolk WRMP were reviewed, and where possible, the Northumbrian WRMP Environmental Report has been updated in line with these comments as a best practice exercise.

3.7 Post-consultation SEA Framework

3.7.1 The full SEA assessment framework, with changes from the Scoping Report consultation incorporated, is shown in Table 3.2. Note the purpose of the assessment questions is to prompt consideration of specific issues when assessing effects related to each topic and objective.

3.7.2 The changes made to the SEA framework following the scoping consultation were not anticipated to significantly change the findings from previous SEA assessments in the WRMP24 region, for example relating to WReN strategic option assessments. Nevertheless, for confirmation and completeness, the WRMP24 environmental assessments reviewed the findings against the amended SEA objectives. The scoping report considered natural capital as a separate objective however due to the qualitative nature of the metric and its inclusion as a separate, stand-alone environmental assessment, it is not considered here. This aligns with the approach taken for other WRMPs.

Table 3.2: Post-consultation SEA Methodology Assessment Framework

SEA Topic	Proposed SEA Objectives	Assessment Questions/Sub-Themes
Biodiversity, flora, and fauna	1.1 To protect and enhance biodiversity, ecological functions, capacity, and habitat connectivity, including protecting designated sites and their qualifying features, priority species and priority habitats. 1.2 To provide opportunities for habitat creation or restoration and deliver a net benefit / BNG. 1.3 To avoid introducing or spreading and, where feasible, manage INNS. 1.4 To meet WFD objectives relating to biodiversity.	• Is the option likely to affect, directly or indirectly, the conservation status of any SPA, SACs, Ramsar sites, SSSI or locally designated sites in accordance with S28 of the Wildlife and Countryside Act and Habitats Regulations? • Will the option provide opportunities to enhance and provide climate change resilience of water dependent protected and priority sites, including Natura 2000 sites/ features? • Will the option meet the 25 Year Environment Plan objectives, Protected Site and Protected Species objectives relating to biodiversity? • Will the option protect and enhance aquatic habitats and species, including freshwater fisheries, chalk rivers and marine environment they are linked to? • Will the option affect the marine environment, habitats and species (including MCZs and MPAs)? • Is the option likely to affect ancient woodland, Section 41 of the NERC act habitats and species of principal importance for the purpose of conserving biodiversity? • Will the option affect any habitats that support legally protected species or species of conservation concern? • Is there potential for contribution to achieving 'favourable' conservation status, as defined by Natural England, or for creation of new priority habitats? • Is the option likely to have an impact on a current or future Nature Recovery

SEA Topic	Proposed SEA Objectives	Assessment Questions/Sub-Themes
		Network and Local Nature Recovery Strategies? • Are there any opportunities for habitat creation or restoration? • Will the option contribute to the loss or gain in habitat connectivity? • Is there a possibility for INNS to be spread/ introduced or for algal blooms to occur? • Is there an opportunity to improve biodiversity value through removal of INNS?
Soil	2.1 To protect geological and geomorphological features, and the functionality and quality of soils, including the protection of high-grade agricultural land.	• Will the option affect high grade agricultural land? • Will the option promote the efficient use of land? • Will the option prevent soil erosion and retain soil stocks as a natural resource? • Will the option promote soil health in the context of the local area? • Will the option involve use of brownfield or greenfield land? • Will the option prevent mineral sterilisation? • Will the option affect soil contamination or involve remediation? • Is the option likely to affect geodiversity, including SSSIs of geological importance? • Will the option prevent nutrient loading in water bodies?
Water	3.1 To reduce or manage flood risk, taking climate change into account.	• Is the option vulnerable to flood risk? • Will the option contribute to or reduce the risk of flooding? • Can the option help contribute to the mitigation of flood risk? (i.e., attenuation of flows through NFM, catchment storage etc.) (Flooding include fluvial, marine, surface and groundwater)
	3.2 To enhance or maintain the quality of surface and groundwater waterbodies.	• Will the option affect surface water quality or quantity? • Will the option affect ground water quality or quantity? • Is the option likely to contribute to or conflict with the achievement of WFD objectives?
	3.3 To enhance or maintain surface water flows and quantity and groundwater resources.	• Will the option affect bathing waters? • Will the option affect shellfish water protected areas? • Will the option affect chalk rivers and streams? • Will the option affect raw water quality? • Will the option reduce the flashy nature of surface waters?

SEA Topic	Proposed SEA Objectives	Assessment Questions/Sub-Themes
		• Will the option slow the flow in upper catchments and reduce soil losses to river systems? • Will the option comply with flow targets?
	3.4 To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	• Does the option provide a reliable and sustainable water supply which meets changing demand? • Will the option protect and enhance the environmental resilience of the water environment to climate change, flood risk and drought? • Does the option reduce the presence of containments in waterbodies, and make more water available to the environment?
	3.5 To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	
Air	4.1 To reduce and minimise air emissions during construction and operation.	• Is the option in an AQMA? • Will the option affect local air quality?
Climatic Factors	5.1 To minimise or reduce embodied and operational carbon and greenhouse gas emissions.	• Will the option affect carbon or other greenhouse gas (GHG) emissions? • Is there potential for the option to incorporate climate mitigation measures to reduce its carbon footprint, such as lower embodied carbon or incorporating renewable energy? • Will the option affect carbon sequestration?
	5.2 To introduce climate mitigation where required and improve the climate resilience of assets and natural systems to the threats of climate change.	• Is the option vulnerable to climate change effects? • Does the option include climate resilience measures? • Will the option create catchment resilience to drought?
Landscape & Visual Amenity	6.1 To conserve, protect and enhance landscape and townscape character and visual amenity.	• Will the option have an effect on the character of the landscape, townscape or seascape, including tranquillity and views? • Will the option improve responsible access to the countryside? • Will the option create or improve green infrastructure which contributes to access to the landscape? • Will the option protect and enhance designated landscapes and features?
Historic Environment	7.1 To conserve, protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting	• Will the option affect designated or non-designated historic assets, sites and features? • Will the option affect the setting and/or significance of a historic asset? • Will the option affect archaeology (including unknown archaeology)? • Will the option affect heritage assets at risk?

SEA Topic	Proposed SEA Objectives	Assessment Questions/Sub-Themes
		• Will the option affect conservation areas or historic landscape/townscape areas? • Will the option alter the hydrological conditions of water-dependent heritage assets, including organic remains?
Population and Human Health	8.1 To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	• Does the option promote water efficiency and encourage a reduction in water consumption? • Will the option secure resilient water supplies for the health and wellbeing of customers? • Will the option allow for economic development?
	8.2 To secure resilient, high quality, sustainable and affordable water supplies over the long term for the health and wellbeing of the community.	• Will the option allow for economic diversity? • Will the option have an effect on active lifestyles, such as impacts on active travel through disruption to pedestrian and cycle routes?
	8.3 To increase responsible access and connect customers to the natural environment, provide education or information resources for the public.	• Will the option affect Public Rights of Way? • Will the option affect road or rail infrastructure? • Will the option minimise disturbance from noise, light, visual, and transport? • Will the local communities have been actively engaged to foster an inclusive environment and participate in decision making?
	8.4 To maintain and enhance the water environment for other users including recreation, tourism, and navigation.	• Will the option maintain or enhance tourism? • Does the option improve access to the natural environment for recreation, including those living within deprived areas? • Will the option have an effect on freshwater fisheries for recreational purposes? • Will the option have an effect on marine fisheries for recreational purposes?
Material Assets	9.1 To reduce, and make more efficient, the consumption of resources, and minimise the generation of waste.	• Will the option reuse existing infrastructure? • Will the option minimise the use of resources by allowing for incorporation of circular economy principles in the design? • Will the option reduce the production of waste?
	9.2 Avoid negative effects on built assets and infrastructure.	• Will the option affect built assets and infrastructure, including transport infrastructure? • Will the option avoid negative impacts on existing green infrastructure? • Will the option create opportunities for enhancing existing green infrastructure?

3.7.3 The SEA Objectives are the component of the SEA assessment framework against which likely significant effects on the environment are identified, described and evaluated. The SEA Objectives are accompanied by a list of assessment questions, which are used to assist those undertaking the assessment. The questions are presented such that it allows the assessor to retain a broad view of issues that are relevant to the SEA Objectives they are associated with. This is particularly useful where the framework is applied to different types of options. Table 3-2 above sets out the framework, including its SEA topics, SEA Objectives and assessment questions.

3.7.4 In addition to influencing the plan process, one of the outcomes of the SEA is to identify the likely significant effects of the plan. In the assessment of the WRMP24 the findings by SEA Objective are evaluated and assigned to one of four categories, which provide the rating of the scale of effect. The four ratings are identified as Major, Moderate, Minor and Neutral. Effects that are rated as **Major** or **Moderate** are classified as 'significant effects'.

3.7.5 The assessment rating is informed by the assessment questions for each SEA topic, as well as the context of the existing baseline. Effects are separated between construction and operation phases, where construction is considered to relate to *short*- and medium-term effects whereas operation is considered *long*-term effects. Within each of these, a rating is provided for positive effects and for negative effects. As such, every SEA objective considers whether likely significant effects will occur in relation to four distinct areas: Construction Negative, Construction Positive, Operation Negative, Operation Positive. This format of assessment helps to avoid trade-offs, by avoiding the potential 'cancelling out' of effects, which can occur when reporting an average in cases where both positive and negative effects are present.

3.7.6 The effects of each option were also assessed pre-mitigation and post-mitigation (residual effects). During the option assessment the post-mitigation (residual effects) assumed that all options would include standard environmental controls, often referred to as 'best practice'. The mitigation measures (which include measures which are standard environmental controls/best practice) are collated in Section 8 and provided in full in the SEA Assessment Matrices in Appendix K. The standard environmental controls that were assumed to apply to all options are set out below:

- No surface water (river) abstractions will be able to reduce the water levels below the minimum flow and level agreed for that river.
- Construction works will be undertaken according to existing good practice to manage impacts on site, such as dust creation, noise and vibration, and disturbance.
- Environment Agency Pollution Prevention Guidance will be followed during construction.
- Good practice construction management includes using construction environment management plans (CEMPs), construction and logistics plans (including construction traffic management plans (CTMPs), waste management plans, etc.
- Sites would be surveyed for species/habitats prior to construction. Non-native species would be identified, and methods/works put in place to avoid spreading them during construction.
- Construction sites situated in a flood zone will have appropriate plans in place to manage the site in the event of flooding, e.g. management of materials and/or equipment likely to cause pollution.
- Health of construction workers would be managed on site using good practice such as avoidance, or personal protective equipment. Where in-river working is proposed, the potential for the transmission of waterborne infectious diseases (e.g. Leptospirosis, Cyanobacteria, Gastro-intestinal illness, and Hepatitis A) during construction of the new infrastructure would be managed appropriately.

- Construction sites will be in adherence to the Considerate Contractor Scheme, including engagement with the local community.
- Construction methods to be used are sympathetic and reduce effects on the surrounding landscape e.g. suitable hoardings.
- Any required consents will be obtained prior to undertaking works, e.g. tree preservation orders, listed building consent.
- Safe access will be available for pedestrians, vehicles, bicycles, horses, etc. during construction. Any roads, footpaths, cycleways that are consented to be closed during construction will be re-instated to their original or better condition following completion of the works.
- The WFD assessment assumes that standard best practice construction measures and operational procedures are employed, meaning that some options are assumed to be compliant with the objectives of the WFD and require no further assessment.
- Where options involve disturbance of land for pipeline laying, the land will be restored to its original or better condition on completion of the works.
- Where options involve works crossing roads or Public Rights of Way, appropriate diversions and signage will be implemented, and roads/paths will be restored to their original or better conditions following completion of the works.
- Where options involve loss of agricultural land, NW's policy on compensation and land requisition will be followed.
- Options that use energy, either during construction and/or operation, will use the energy mix available at the time from the UK energy grid.

3.7.7 SEA Assessment Matrices for options within the BVP and alternative plans are provided in Appendix K: *SEA Assessment Matrices*. These matrices outline the above assessment and also provide and pre- and post-mitigation score, so the reader is able to determine the efficacy of mitigation.

3.7.8 Options that have been included within NW WRMP24 BVP are those which at this stage of option development have the lowest / acceptable environmental impacts. Any options with unacceptable environmental impacts were considered unfeasible. However, as detailed design progresses for the selected options and more information becomes available, if HRA or WFD compliance issues emerge, and identified mitigation is not considered sufficient, then previously rejected, alternative supply-side options would be re-visited.

4 Environmental Assessment Methodology

4.1 Introduction

4.1.1 As part of the WReN plan-making and WRMP development processes, NW undertook modelling to identify areas with a surplus or deficit of water supply. For areas with deficits, NW developed a range of options for maintaining the supply-demand balance. These fall into two broad categories:

- Demand management options – options that will reduce the demand for water such as installing smart meters, reducing leakage, and investing in water efficiency.
- Supply options – options that will provide a water supply to customers such as transfers, maximising existing resources, trading, tinkering, and new resources.

4.1.2 NW have been working with regional stakeholders and neighbouring water companies to identify the best options to include as part of the WReN Regional Plan and in the company's WRMP24. Initial modelling undertaken of potential supply and demand in the Northumbrian Water region had determined that there would be no deficit in the region. As a result, none of the five feasible supply options initially proposed by Northumbrian Water were planned to be taken forward for implementation as part of their WRMP24. As such, it was originally proposed that their WRMP24 would include just the Preferred package of demand management options and a transfer option which will take water from the Northumbrian Water Region to Yorkshire Water. However, as a result of updated modelling, Northumbrian Water have since proposed a sixth supply-side option that will be taken forwards – The 'Supplying Teesside Industrial Water' option. Further information and context on this option is provided below, as well as in Section 4.4. As such, Northumbrian Water's WRMP24 now includes their preferred package of demand management options, a Yorkshire Water transfer option, and the Supplying Teesside Industrial Water option.

4.1.3 Demand management options are likely to have the least significant environmental effects. A transfer to Yorkshire Water is also referenced here.

4.1.4 Table 4.1 below summarises the environmental assessments carried out for the WReN Regional Plan and NW WRMP24. The approach in Table 4.1 forms the basis of the relationship between environmental assessments carried out for WReN and WRMP24. However, it is recognised that the WRMP24 is a separate plan and must deliver its own compliance with regulatory requirements related to environmental assessments. This has led to some adjustments to the environmental assessment methodology applied for WRMP24.

4.1.5 Changes to the SEA Framework resulting from the Scoping Consultation feedback are outlined previously in Section 3. Furthermore, since the scoping consultation was submitted, some changes to the government guidance underpinning the Natural Capital and BNG assessment methodologies were announced. The approaches used for the WRMP24 options assessments were updated accordingly. The changes were as follows:

- Natural Capital – The approach for this assessment was informed by Defra's Enabling a Natural Capital Approach (ENCA)[28] guidance. In mid-2021 the valuations and calculation factors related to valuation of carbon in ENCA were updated.

[28] Department for Environment, Food & Rural Affairs (2020). Enabling a Natural Capital Approach (ENCA). Guidance for policy and decision makers to help them consider the value of a natural capital approach. Available at: Enabling a Natural Capital Approach (ENCA) - GOV.UK (www.gov.uk).

- BNG – In mid-2021 an updated version of Defra's BNG metric was issued, BNG 3.0.

4.1.6 Moreover, following an initial review of NCA and BNG assessments, it was decided that an additional minor change to the methodology should be incorporated. The mapping methodology for the NCA and BNG should be updated to account for the primary habitats that occur in the same location as, and are currently represented in the existing assessment by, active floodplain. More information on the NCA and BNG methodologies can be found in Appendix E.

4.1.7 NW also derived impacts on carbon outside of this IEA process. As the UK water section moves towards defining a pathway to net zero by 2030, further supplementary analysis will be required to assess the scheduling of options relative to the strategy for decarbonisation (e.g. energy and offsets). This process is running in parallel to the IEA, looking to quantify and cost the impact and capex and opex carbon using the government Business, Energy and Industrial Strategy's most recent valuations.

4.1.8 For consistency, these changes were applied to all options assessed as part of the WRMP24 SEA.

Table 4.1: Relationships between environmental assessments carried out for the WReN Regional Plan and NW WRMP24

Environment Assessment	Specific for WReN	Led by WReN with findings reviewed and applied to WRMP24	Specific for WRMP24
SEA	Likely significant environmental effects of Regional Plan as a whole and its alternative plans	Likely significant environmental effects of regional options (e.g. >10Ml/d)	Likely significant environmental effects of sub-regional options (<10Ml/d)
HRA	HR impacts of overall Regional Plan	HR impacts of regional options	HR impacts of sub-regional options
WFD	WFD impacts of overall Regional Plan	WFD impacts of regional options	WFD impacts of sub-regional options
NCA	Natural capital and ecosystem service consequences of overall Regional Plan	Natural capital and ecosystem service consequences of regional options	Natural capital and ecosystem service consequences of sub-regional options
BNG	BNG consequences of overall Regional Plan	BNG consequences of regional options	BNG consequences of sub-regional options
INNS	INNS impacts of overall Regional Plan	INNS impacts of regional options	INNS impacts of sub-regional options

4.1.9 The context and scope for the SEA and other Environmental Assessments forming part of the options appraisal are set out in Section 3 of this report. These assessments have both a temporal and geographical scope, and these are outlined, along with their potential limitations, below.

Temporal Scope

4.1.10 The temporal scale of effects was considered based on whether the effect would be permanent or temporary, and the duration of the effect for the entirety of the WRMP period including both construction and operational phases. The time horizon for the SEA is therefore same as that for WRMP24, i.e. to 2050. Where particular elements of the WRMP are time-related and relevant to the assessment, this will be identified.

4.1.11 For instance, assessments of option effects for both construction and operation are undertaken for defined timescales. For physical options, each option has a defined construction period in which potential effects are assessed. The Yorkshire Water transfer option (DV7a(vi)) doesn't have a defined construction period yet, however Yorkshire Water have stated that the option is not to be built until 2040. It will take considerable time to implement, with an assumed delivery time of 15 years including design, planning, and upgrades to supporting infrastructure. Operational phase effects are assessed (where possible) up to the end of the plan period which is 2099. Demand Management options, however, are assumed to have an operational phase for 75 years. Option timings, especially for construction, have been defined through Northumbrian

Water modelling their supply and deficit, and therefore options are planned to come on board as and when the modelling suggests they're needed. As WRMPs are required to be produced every five years, modelling will be repeated during each future WRMP cycle. If changes are required to the timeline of options, this will be identified at the next WRMP cycle. Similar environmental assessments are likely to be undertaken during future WRMP cycles, ensuring that positive and negative effects are regularly assessed, and the impact of changes to the WRMP24 Best Value Plan are understood.

Geographical Scope

4.1.12 Assessments of option effects were undertaken using current baseline information, forming an evidence base against which environmental issues or opportunities resulting from the WRMP24 can be predicted and assessed. Baseline information was collected for each SEA topic. NW WRMP24 covers a substantial geographical area, therefore the baseline is currently a high-level review of conditions within the WReN region. A baseline GIS was developed to facilitate undertaking the assessments and reporting. The baseline GIS included buffer zones of 500m, 2000m, 5000m, and 10000m to help categorise direct and indirect effects, i.e. within 500m being direct, and any designated sites or environmental constraints lying outside this zone potentially being indirectly affected. This differs for different types of specialist assessments. The methodology applied for each assessment is summarised in Section 4.3 and 4.6, and given in more detail in the corresponding Appendix. For physical options, geographical scope is easier to consider using these defined buffer zones. For Demand Management options, geographical scope is difficult to consider as these options have no footprints as specific locations of works for these options are not yet known. Therefore, the geographical scope of the assessment of the demand management options is considered to be the Northumbrian Water Region. Baseline information maps, showing the full spatial extent of environmental receptors located within and/or intersecting with Northumbrian Waters region are presented in Appendix D.

4.2 High Level Screening

Introduction

4.2.1 As a precursor to the SEA, high-level environmental screening (HLS) assessments were completed in January and February 2022 for the five feasible supply-side WRMP24 options initially proposed by Northumbrian Water. These were undertaken to highlight environmental risks and constraints at an early stage in the options development process, in accordance with UK Water Industry Research (UKWIR) guidance[29]. The environmental screening findings were used to inform rejection of options to avoid potentially significant environmental effects, and to identify suitable mitigation measures to be incorporated into option development. The results were also taken forward into the WRMP SEA and HRA assessments. No HLS or equivalent assessment was made available for the Yorkshire Water transfer (DV7a(vi)) option, and as such this option does not feature in this section of the WRMP24. Additionally, no HLS was undertaken for the DMO's as they have no physical footprint to assess. Northumbrian Water have since proposed a sixth supply-side option. Given that this option was proposed in March 2024, no HLS has been undertaken for the option. However, the option has been subject to Northumbrian Water's detailed options-level assessment approach, being assessed against the SEA objectives and other environmental assessments as appropriate, the results of which are presented in Section 5.

[29] UK Water Industry Research (UKWIR) (2012). Strategic Environmental Assessment and Habitats Regulations Assessment – Guidance for Water Resources Management Plans and Drought Plans. Available at: Strategic Environmental Assessment and Habitats Regulations Assessment - Guidance for Water Resources Management Plans and Drought Plans (ukwir.org)

Methodology

4.2.2 The screening was structured around the following key environmental topics which have the potential to be significantly affected:

- Ecology
- Historic Environment
- Water
- Landscape
- Community

4.2.3 The potential negative environmental effects on the designations/receptors listed in Table 4.2 were considered. Given the high-level nature of the screening, it was limited to national, European, and other regional and international designations/receptors. Local designations/receptors were considered later in the SEA process.

Table 4.2: Environmental Designations/ Receptors used in the High-Level Environmental Screening

Key Topic	Designations/Receptors	Sources
Ecology	SAC, SPA, Ramsar site, SSSI including geological SSSIs, NNR, Regionally Important Geological Site (RIGS), MPA (including MCZs, INNS)	GIS datasets available from data.gov.uk
Historic Environment	Listed Buildings, Conservation Areas, Scheduled Monuments, Archaeological Areas, Registered Battlefields, Registered Parks and Gardens, World Heritage Site, Protected Wreck Site	GIS datasets available from data.gov.uk
Water	River Basin Management Plan (RBMP) and WFD, river water quality and flow indicators, shellfish waters, bathing water	RBMP and WFD – Environment Agency website Shellfish and bathing waters – GIS datasets available from data.gov.uk
Landscape	AONB, National Character Area, National Parks, Ancient Woodland	GIS datasets available from data.gov.uk
Community	Agricultural land, Transport infrastructure (motorways, roads, national cycle routes, railway lines), overriding community benefit	GIS datasets available from data.gov.uk

4.2.4 GIS layers and data sourced from the websites referenced in Table 4.2 were used to map baseline information on the identified designations and receptors. Baseline maps were overlayed with the options locations map to identify where potential interactions and negative effects may occur as a result of each of the options being implemented.

4.2.5 Each option was screened using the scoring system presented in Table 4.3, the full high-level screening scoring methodology is within Appendix E. Along with the colour category, a risk narrative, high level mitigation measures, and how these were incorporated into the option development were provided as outputs from the high-level screening.

Table 4.3: High-Level Screening Scoring Definitions

Score	Definition
	Recommend rejecting option – major effects on designated features. Option would cause irreversible loss to a sensitive designated feature.
	Take option forward but further assessment and mitigation required – moderate effects on designated features. Option would cause loss of designated features but could be mitigated.
	Take option forward – minor/no effect on designated features.

Summary of Outcomes

4.2.6 The following section provides a summary of the high-level screening assessment outcomes for the five potential WRMP24 Supply Side options. For each option, a list of the features with red screening outcomes is provided. Tables containing all features with red and amber screening outcomes for each option, alongside a comment detailing the reason for the assigned score, can be found in Appendix J. Additionally, comments are also provided on proposed mitigation to reduce or neutralise effects where appropriate.

BOT-ABS-002

- Water (Ground) – Source Protection Zone
- Water (Surface) – Nitrate Vulnerable Zone

BOT-ABS-007

- Biodiversity, Flora and Fauna (Statutory Designations) – SACs / candidate SACs (cSAC) and SCIs
- Soils – Agricultural Land
- Water (Ground) – Source Protection Zone
- Water (Surface) – Flood Zone 3

BOT-TRA-001

- Biodiversity, Flora and Fauna (Statutory Designations) – SPAs / potential SPAs (pSPA)
- Biodiversity, Flora and Fauna (Statutory Designations) – SSSIs
- Biodiversity, Flora and Fauna (Habitats) – Ancient Woodland
- Biodiversity, Flora and Fauna (Habitats) – Priority Habitat
- Historic Environment – Scheduled Monument
- Water (Surface) – Flood Zone 3
- Water (Surface) – Nitrate Vulnerable Zone

BOT-TRA-002

- Biodiversity, Flora and Fauna (Statutory Designations) – SACs / candidate SACs (cSAC) and SCIs
- Biodiversity, Flora and Fauna (Statutory Designations) – SSSIs
- Biodiversity, Flora and Fauna (Habitats) – Priority Habitat
- Soils – Agricultural Land
- Water (Surface) – Flood Zone 3

BOT-TRA-004

- Biodiversity, Flora and Fauna (Habitats) – Priority Habitat
- Water (Ground) – Source Protection Zone
- Water (Surface) – Nitrate Vulnerable Zone

4.3 Options Level Assessment

4.3.1 NW's detailed options-level assessment approach is aligned with WReN's IEA process to meet regulator expectations around regional and water company planning, as well as to ensure consistency and efficiency in the assessment process.

4.3.2 Each option has been assessed against the Strategic Environmental Assessment (SEA) objectives using defined effect assessment and evaluation criteria based on relevant spatial

datasets and professional judgement. The assessment indicated whether the proposed option would help meet or prevent achievement of the SEA objectives. If it contributed to the SEA objectives, then it was considered a positive effect. If the option prevents the SEA objective being met, then it was considered a negative effect. The assessment focused on high-level issues as identified through the objectives, sub-objectives, and key receptors and assets. Note that it was not undertaken to the level of detail that an Environmental Impact Assessment (EIA) would be.

4.3.3 The assessment was split into construction effects and operational effects. An option may have both positive and negative effects under a SEA objective, and rather than combining these effects to cancel each other out, both positive and negative effects were reported separately.

4.3.4 The level of effect was assigned using a qualitative scale ranging from positive effects (minor, moderate, major) to negative effects (minor, moderate, major), with neutral used for no or negligible effects. A narrative justification was provided to support the assessment using this scale. The datasets used and descriptions of scale of effect are presented in Table 4.4. Please note that moderate or major effects

4.3.5 Assessments were undertaken on whole options i.e. all elements of an option that are dependent on each other, and not the individual parts. For example, the assessment of a reservoir option would have included the reservoir works themselves plus any works that are related to it such as transfers in/out and treatment.

4.3.6 Where there were several variations of an individual option, e.g. different transfer capacity, the assessment considered these variations and assessed them as part of the one whole option. Aspects of the option that may cause environmental harm were noted (e.g. if a particular variation might be more harmful these harms were reported to ensure no potential effects were missed).

4.3.7 Some key receptors and assets were only considered if there was a direct intersection (such as allotments and woodland), other key receptors and assets were considered within 500m of the option (works) location in the assessment. The exception to this was European and National ecological designated sites such as SPAs, SACs, Ramsar sites, and SSSIs, which were considered up to 2000m away.

4.3.8 The temporal scale of effects was considered based on whether it would be permanent or temporary, and the duration of the effect. Permanent changes were considered as those which are irreversible (e.g. land use change from woodland to development) or will last for the near future (e.g. noise from road traffic). Temporary effects were considered as those which are reversible and are generally related to construction (e.g. construction traffic).

4.3.9 Where potential negative effects were revealed, mitigation measures (measures to avoid, reduce or offset negative effects) were identified as part of the assessment process and fed back into iterative option development. Options with major and moderate negative effects were required to include appropriate mitigation or be flagged for rejection. Enhancement opportunities were also identified where the option could be used for the benefits of people and/or wildlife, e.g. reservoirs provide an opportunity to establish wetland habitats, or for recreational benefits.

4.3.10 The effects of each option were assessed pre-mitigation and post-mitigation (residual effects). It was assumed that all options would include standard environmental controls including:

- No surface water (river) abstractions will be able to reduce the water levels below the minimum flow levels agreed for that river.
- Constructions works will be undertaken according to existing best practice to manage effects on site, such as dust creation, noise and vibration, and disturbance.
- Environment Agency Pollution Prevention Guidance will be followed during construction.

- Best practice construction management includes using construction environment management plans (CEMPs), construction and logistics plans (including constructions traffic management plans (CTMPs), waste management plans, etc.).
- Sites would be surveyed for species/habitats prior to construction. Non-native species would be identified, and methods/works put in place to avoid spreading them during construction.
- Construction sites situated in a flood zone will have appropriate plans in place to manage the site in the event of flooding, e.g. management of materials and/or equipment likely to cause pollution.
- Construction health of workers would be managed on site using good practice such as avoidance, or personal protective equipment. Where in-river working is proposed, the potential for the transmission of waterborne infectious diseases (e.g. Leptospirosis, Cyanobacteria, Gastro-intestinal illness, and Hepatitis A) during construction of the new infrastructure would be managed appropriately.
- Construction sites will be in adherence to the Considerate Contractor Scheme, including engagement with the local community.
- Construction methods to be used are sympathetic and reduce effects on the surrounding landscape e.g. suitable hoardings.
- Any required consents will be obtained prior to undertaking works, e.g. tree preservation orders, listed building consent.
- Safe access will be available for pedestrians, vehicles, bicycles, horses, etc during construction. Any roads, footpaths, cycleways that are closed during construction will be re-instated to their original or better condition following completion of the works.
- The WFD assessment assumes that standard best practice construction measures and operational procedures are employed, meaning that some options are assumed to be compliant with the objectives of the WFD and require no further assessment.
- Where options involve disturbance of land for pipeline laying, the land will be restored to its original or better condition on completion of the works.
- Where options involve works crossing roads or public rights of way, appropriate diversions and signage will be implemented, and roads/paths will be restored to their original or better conditions following completion of the works.
- Where options involve loss of agricultural land, Northumbrian Water's policy on compensation, land requisition will be followed.
- Options that use energy, either during construction and/or operation, will use the energy mix available at the time from the UK energy grid.

4.3.11 The SEA process produced a series of four metrics for each option that summarise the output information. The four metrics were positive construction, negative construction, positive operation, and negative operation. These metrics fed into the BVP plan making and informed decisions on the options made.

4.3.12 Other assessments and studies being undertaken as part of the wider WRMP24 IEA were also used to inform the SEA options assessment. These are outlined in Section 4.6.

4.3.13 The full methodology for the SEA is outlined within Appendix A and the assessment information packs, detailing the assessment outcomes, are compiled within Appendix E. The full SEA assessment matrix for each option assessed is provided in Appendix K.

Table 4.4: SEA Datasets and Definitions of Scale

SEA Objective	Datasets/Key Themes	Effect		Description
Biodiversity, Flora, Fauna:	SPA SAC Ramsar site SSSIs MPA MCZ NNR LNR Priority habitats and species Non-designated sites Terrestrial, aquatic, and marine habitats, species and protected sites Green networks and corridors (e.g. foraging areas and commuting routes, migration routes, hibernation areas etc. at all scales)	**+++**	Major Positive	The option would result in a major enhancement on the quality of designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat quality and availability. The option would result in a major increase in the population of a priority species. Effects could be caused by beneficial changes in water flows/water quality, or large amounts of creation or enhancement of habitat, promoting a major increase in ecosystem structure and function. The option would result in a major reduction or management of INNS. The option delivers BNG of +30% The option contributes to addressing failure of WFD Good Ecological Status / Good Ecological Potential.
		++	Moderate Positive	The option would result in a moderate enhancement on the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat creation and enhancement measures. The option would result in a moderate increase in the population of a priority species. Effects could be caused by beneficial changes in water flows/water quality, or moderate amounts of creation or enhancement of habitat, promoting a moderate increase in ecosystem structure and function. The option would result in a moderate reduction or management of INNS. The option delivers BNG of +20% The option contributes to addressing failure of WFD Good Ecological Status / Good Ecological Potential.
		+	Minor Positive	The option would result in a minor enhancement of the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat creation and enhancement measures. The option would result in a minor increase in the population of a priority species. Effects could be caused by beneficial changes in water flows/water quality, or small amounts of creation or enhancement of habitat, promoting a minor increase in ecosystem structure and function. The option would result in a minor reduction or management of INNS. The option delivers BNG of +10%
		0	Neutral	The option would not result in any effects on designated or non-designated sites including habitats and/or species). It will not have an effect on INNS or BNG.
		-	Minor Negative	The option would result in a minor negative effect on the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation. The option would result in a minor decrease in the population of a priority species. Effects could be caused by detrimental changes in flows/water quality, or small losses or degradation of habitat leading to a minor loss of ecosystem structure and function. The option would result in a minor increase or spread of INNS. The option results in BNG loss of <10%
		--	Moderate Negative	The option would result in a moderate negative effect on the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation. The option would result in a moderate decrease in the population of a priority species. Effects could be caused by detrimental changes in flows/water quality, or moderate loss or degradation of habitat leading to a moderate loss of ecosystem structure and function.

SEA Objective	Datasets/Key Themes	Effect		Description
				The options would result in a moderate increase or spread of INNS. The option results in BNG loss of 10% to 20% The option results in the likely deterioration of WFD 70 classification
		---	Major Negative	The option would result in a major negative effect on the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation. The option would result in a major decrease in the population of a priority species. Effects could be caused by detrimental changes in flows/water quality, or large losses or degradation of habitat leading to a major loss of ecosystem structure and function. The option results in BNG loss of 20% or more The option would result in a major increase or spread of INNS. The option results in the deterioration of WFD classification.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
Soil:	Agricultural Land Classification Landfill sites – authorised and historic	+++	Major Positive	The option would result in a major enhancement on the quality of soils through the implementation of remediation or other measures.
		++	Moderate Positive	The option would result in a moderate enhancement on the quality of soils through the implementation of remediation or other measures.
		+	Minor Positive	The option is located on a brownfield site and has no effect on soils or existing land use. The option results in the remediation of contaminated land.
		0	Neutral	The option would not result in any effects on soils or land use.
		-	Minor Negative	The option is not located on a brownfield site and/or results in a minor loss of best and most versatile agricultural land or is in conflict with existing land use. The option results in land contamination.
		--	Moderate Negative	The option will result in a moderate loss of best and most versatile agricultural land or is in substantial conflict with existing land use. The option results in land contamination
		---	Major Negative	The option will result in a major loss of best and most versatile agricultural land or is in substantial conflict with existing land use. The option results in land contamination.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
Water:	Environment Agency Flood Defences Environment Agency Main Rivers Flood Zones 2 and 3 Surface Water Features WFD River Waterbody	+++	Major Positive	The option results in addressing failure of WFD Good Ecological Status / Good Ecological Potential. The option would result in a major improvement to flood risk. The option would result in a major improvements in water efficiency, reduces demand and improves resilience.
		++	Moderate Positive	The option achieves savings through demand management and does not require abstraction to achieve yield. The option contributes to addressing failure of WFD Good Ecological Status / Good Ecological Potential. The option would result in a moderate improvement to flood risk. The option would result in a moderate improvements in water efficiency, reduces demand and improves resilience.

SEA Objective	Datasets/Key Themes	Effect	Description	
	Catchments WFD River Waterbodies Cycle 2 Bathing Waters (for desal options) Shellfish Waters (desal options) Source Protection Zones WFD Groundwater bodies	+	Minor Positive	The option achieves savings through demand management and does not require abstraction to achieve yield. The option would result in a minor improvement to flood risk. The option would result in a minor improvements in water efficiency, reduces demand and improves resilience.
		0	Neutral	The option would have no discernible effect on river flows or surface/coastal water quality or on groundwater quality or levels. The option would not have an effect on or be affected by flood risk.
		-	Minor Negative	The option would result in minor decreases in river flows. River and/or coastal water quality may be affected and lead to short term or intermittent effects on receptors (e.g. designated habitats, protected species or recreational users of rivers and the coastline) that could not be avoided but could be mitigated. The option would result in minor decreases in groundwater quality or levels. The option is located in Flood Zone 2. The option would result in minor decreases in water efficiency, increases demand and reduces resilience.
		--	Moderate Negative	The option would result in moderate decreases in river flows. River and/or coastal water quality may be affected and lead to long term or continuous effects on receptors (e.g. designated habitats, protected species or recreational users of rivers and the coastline) that could not reasonably be mitigated. The option results in the likely deterioration of WFD classification. The option would result in moderate decreases in groundwater quality or levels. The option is located in Flood Zone 3. The option would result in moderate decreases in water efficiency, increases demand and reduces resilience.
		---	Major Negative	The option would result in major decreases in river flows. River and/or coastal water quality may be affected and lead to long term or continuous effects on receptors (e.g. designated habitats, protected species or recreational users of rivers and the coastline) that could not reasonably be mitigated. The option results in the deterioration of WFD classification. The option would result in major decreases in groundwater quality or levels. The option is located in Flood Zone 2 or 3 and further contributes to flood risk. The option would result in major decreases in water efficiency, increases demand and reduces resilience.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
Air:	Air Quality Management Areas Air quality monitoring sites	+++	Major Positive	The option would result in a major enhancement of the air quality within one or more AQMAs.
		++	Moderate Positive	The option would result in a moderate enhancement of the air quality within one or more AQMAs.
		+	Minor Positive	The option would result in an enhancement of the air quality.
		0	Neutral	The option would not result in any effects on Air Quality and AQMAs.
		-	Minor Negative	The option would result in a decrease of the air quality.

SEA Objective	Datasets/Key Themes	Effect	Description	
		--	Moderate Negative	The option would result in a decrease of the air quality within one or more AQMAs.
		---	Major Negative	The option would result in a major decrease in the air quality within one or more AQMAs.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
Climate Factors:	Option Carbon data UKCP18 climate data Sea level rise projections	+++	Major Positive	The option will generate significant additional zero carbon energy that can be fed back into the grid/reduce carbon emissions The option will increase resilience/decrease vulnerability to climate change effects. The option will reduce operational carbon emissions by more than 1,000 tonnes CO_2e/year
		++	Moderate Positive	The option will increase resilience/decrease vulnerability to climate change effects. The option will reduce operational carbon emissions by between 100 and 1,000 tonnes CO_2e/year
		+	Minor Positive	The option will increase resilience/decrease vulnerability to climate change effects. The option will reduce operational carbon emissions by up to 100 CO_2e/year
		0	Neutral	The option would have no discernible effect on greenhouse gas emissions, nor would the option increase resilience/decrease vulnerability to climate change effects.
		-	Minor Negative	The option will have a minor impact on resilience/decrease vulnerability to climate change effects. The option will generate carbon emissions of between 100 and 500 tonnes CO_2e during construction. The option will generate operational carbon emissions of between 100 and 500 tonnes CO_2e/year.
		--	Moderate Negative	The option will have a moderate impact on resilience/significantly decrease vulnerability to climate change effects. The option will generate carbon emissions of greater than of between 500 and 1000 tonnes CO2e during construction. The option will generate operational carbon emissions of between 500 and 1000 CO_2e/year.
		---	Major Negative	The option will have a major impact on resilience/significantly decrease vulnerability to climate change effects. The option will generate carbon emissions of greater than 1,000 tonnes CO_2e during construction. The option will generate operational carbon emissions of more than 1,000 tonnes CO_2e/year.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
Landscape:	Areas of Outstanding Natural Beauty National Character Areas Green Belt land National Park	+++	Major Positive	The option results in new, above ground infrastructure that significantly enhances the local landscape, townscape or seascape.
		++	Moderate Positive	The option results in new, above ground infrastructure that has a moderate positive effect on the local landscape, townscape or seascape.
		+	Minor Positive	The option results in new, above ground infrastructure that has a minor positive effect on the local landscape, townscape or seascape.
		0	Neutral	The option would not result in any effects on the local landscape, townscape or seascape.

SEA Objective	Datasets/Key Themes	Effect	Description	
		-	Minor Negative	The option results in new, above ground infrastructure that has a minor negative effect on the local landscape, townscape or seascape.
		--	Moderate Negative	The option would have a moderate negative effect on a designated landscape or feature (i.e. significant visually intrusive infrastructure) whose effects could not be reasonably mitigated. The option results in new, above ground infrastructure that has a moderate negative effect on the local landscape, townscape or seascape.
		---	Major Negative	The option would have a negative effect on a designated landscape or feature (i.e. significant visually intrusive infrastructure) whose effects could not be reasonably mitigated. The option results in new, above ground infrastructure that has a major negative effect on the local landscape, townscape or seascape.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
Historic Environment	Listed buildings: - Grade I listed structures - Grade II* listed structures - Grade II listed structures Registered Parks and Gardens: - Grade I Registered Parks and Gardens - Grade II* Registered Parks and Gardens - Grade II Registered Parks and Gardens Protected Wrecks Registered Battlefields Scheduled Monuments Conservation Areas World Heritage Sites	+++	Major Positive	The option will result in enhancements to designated heritage assets and/or their setting, fully realising the significance and value of the asset, such as: - Securing repairs or improvements to heritage assets, especially those identified in the Historic England Buildings/Monuments at Risk Register; - Improving interpretation and public access to important heritage assets.
		++	Moderate Positive	The option will result in enhancements to designated heritage assets and/or their setting. Improving interpretation and public access to important heritage assets.
		+	Minor Positive	The option will result in enhancements to non-designated heritage assets and/or their setting.
		0	Neutral	The option will have no effect on cultural heritage assets or archaeology.
		-	Minor Negative	The option will result in the loss of significance of undesignated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected. There will be limited damage to known, undesignated archaeology important sites with a consequent loss of significance only partly mitigated by archaeological investigation.
		--	Moderate Negative	The option will result in the loss of significance of undesignated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected. The option will diminish of significance of designated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected.
		---	Major Negative	The option will diminish the significance of designated heritage assets and/or their setting such as: - Demolition or further deterioration in the condition of designated heritage assets especially those identified in the Historic England Buildings/Monuments at Risk Register. - Loss of public access to important heritage assets and lack of appropriate interpretation. - There will be major damage to known, designated archaeology important sites with a consequent loss of significance only partly mitigated by archaeological investigation.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.

SEA Objective	Datasets/Key Themes	Effect	Description	
Population, Human Health	Noise action important area Indices of Multiple Deprivation 2015 Functional site: - Schools - Medical facilities OS Greenspace dataset: - Allotments - Bowling green - Cemetery - Golf course - Sports facility - Play space - Playing field - Public park or garden - Religious grounds - Tennis courts Natural England – Country Parks National Parks Section 15 open access areas CRoW S4 Conclusive Registered Common Land	+++	Major Positive	The option leads to major positive effect on the health of local communities and will ensure that surface water and bathing water quality is maintained within statutory limits. The option creates new, and significantly enhances existing, recreational facilities, publicly accessible greenspace and/or tourism within the operational area.
		++	Moderate Positive	The option leads to positive effect on the health of local communities and will ensure that surface water and bathing water quality is maintained within statutory limits. The option enhances existing, recreational facilities, publicly accessible greenspace and/or tourism within the operational area.
		+	Minor Positive	The option has a temporary positive effect on the health of local communities and will ensure that surface water and bathing water quality is maintained within statutory limits.
		0	Neutral	The option would not result in any effects on human health and existing recreational facilities and/or tourism.
		-	Minor Negative	The option has a temporary effect on human health (e.g. noise or air quality). The option reduces the availability and quality of existing recreational facilities and/or tourism within the operational area.
		--	Moderate Negative	The option results in the permanent removal of existing recreational facilities, publicly accessible greenspace and/or tourism within the operational area.
		---	Major Negative	The option has a significant long-term effect on human health (e.g. noise or air quality). The option results in the removal of existing recreational facilities, publicly accessible greenspace and/or tourism within the operational area.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
Material Assets	Transport: - Major roads – A roads - Major roads motorway - Railway line - National cycle route - National trails	+++	Major Positive	The option will re-use or recycle substantial quantities of waste materials and any new infrastructure will incorporate substantial sustainable design measures and materials. There will be no increase in energy consumption. The option involves reducing leakage from the supply network or is a water efficiency option with a yield of >5 Ml/d.
		++	Moderate Positive	The option will re-use or recycle moderate quantities of waste materials and any new infrastructure will incorporate some sustainable design measures and materials. There will be no increase in energy consumption. The option involves reducing leakage from the supply network or is a water efficiency option with a yield of <5 Ml/d.
		+	Minor Positive	The option will re-use or recycle a limited quantity of waste materials and any new infrastructure will incorporate some limited sustainable design measures and materials. There will be no increase in energy consumption. The option involves reducing leakage from the supply network or is a water efficiency option with a yield of <5 Ml/d.

SEA Objective	Datasets/Key Themes	Effect	Description	
		0	Neutral	The option would not result in any effects on material assets.
		-	Minor Negative	The option will require new infrastructure with only limited opportunities for the re-use or recycling of waste materials. There are limited opportunities for sustainable design or the use of sustainable materials. The option results in a minor increase in energy consumption with no renewable energy options. The option results in a minor disruption on built assets and infrastructure, including transport.
		--	Moderate Negative	The option will require new infrastructure with only limited opportunities for the re-use or recycling of waste materials. The option results in a moderate increase in energy consumption with no renewable energy options. The option results in a moderate disruption on built assets and infrastructure, including transport links.
		---	Major Negative	The option will require significant new infrastructure that cannot be provided through the re-use or recycling of waste materials. There are no opportunities for sustainable design or the use of sustainable materials. The option results in a major increase in energy consumption with no renewable energy options. The option results in a major disruption on built assets and infrastructure, including transport links.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.

4.4 Programme Appraisal

4.4.1 None of the five feasible supply options initially proposed by Northumbrian Water are being taken forward as part of their WRMP. Modelling had demonstrated that at the time there was no anticipated supply deficit for the NW Region. As such, only a demand management package in addition to a transfer to Yorkshire Water were planned to be implemented.

4.4.2 Northumbrian Water have since proposed a sixth supply-side option that will be taken forwards – The 'Supplying Teesside Industrial Water' option. Northumbrian Water are forecasting a significant increase in raw water demand (up to 180 Ml/d) from 2026. In order to supply this increased demand, they have proposed bringing the existing, but currently unused Low Worsall RWPS on the Tees back into use, installing Eel Regs compliant eel screens and increasing abstraction licences back up to 2016 levels (150 Ml/d peak, 86 Ml/d annual average). This option also involves increasing the existing Blackwell abstraction licence to historic pre-2016 volumes (58,075 Ml/yr, 159 Ml/d).

4.4.3 For context to the need for the 'Supplying Teesside Industrial Water' option, industrial (raw water) demand on Teesside used to be circa 200 Ml/d in the early 2000's. Since then, the demand has significantly reduced to the current level of 70 Ml/d. As a result of this decline, the Low Worsall abstraction licence was reduced from 268 Ml/d to 150 Ml/d (85 Ml/d annual average) in 2016. In 2016, the Blackwell abstraction licence was also reduced from 58,075 Ml per year (159 Ml/d) to 41,975 Ml per year (115 Ml/d). The Low Worsall licence was further amended to 150 Ml/d (30 Ml/d annual average) in 2016. In 2019, Northumbrian Water stopped using Low Worsall.

4.4.4 Given the limited number of options forming Northumbrian Water's WRMP24, Best Value Planning was not undertaken, however a 'Programme Level Appraisal', including cumulative effects assessment for the DMO preferred scenario, the Supplying Teesside Industrial Water option and the Yorkshire Water transfer option, as well as high-level consideration of the potential cumulative effects resulting from the sensitivity scenario, has been done. The Yorkshire Water option has been included in this report for completeness. The programme level appraisal covering the Yorkshire Water transfer is covered in Yorkshire Water´s WRMP.

4.4.5 Table 5.2 and Table 5.3 summarise the results of the SEA for the options assessed for potential inclusion in the NW WRMP24, these include the Supplying Teesside Industrial Water option and the Yorkshire Water transfer option. The tables show the scores allocated for each option against the objectives outlined in Table 3.2, using the scoring system outlined in Table 4.2. Residual post-mitigation scores are displayed, and both the positive and negative scores have been shown rather than an amalgamation of the two scores. The full SEA assessment spreadsheets for all options considered for inclusion in Northumbrian Water's WRMP24 are available in Appendix K.

4.5 Effects Outside the WRMP Boundary

4.5.1 The Scoping Report defined the Northumbrian Water operational area as the core study area for the SEA. The SEA also identifies effects outside of the core study area where these may occur as a result of the effects originating within the study area, or where they may occur when the effects of the WRMP combine with effects from plans or projects in neighbouring water company areas. The horizon for the SEA is the same as that for WRMP24, i.e. to 2050. Where particular elements of the WRMP are time-related and relevant to the assessment, this will be identified. Where individual effects are likely to persist over a long period or benefits are not likely to accrue for a long period following the intervention, these short, medium and long-term effects are noted in the description of the effect on a particular SEA objective.

4.5.2 As outlined above, there is potential for programmes and plans in the NW WRMP to have effects outside the direct plan region. For example, options that transfer water between other regions and options close to the boundary could affect change in adjacent areas. As such, our GIS data base included a buffer around the plan area so that additional receptors (such as designated sites) could be captured in the assessments. The buffers were applied based on the WRMP24 options and expected impact pathways.

4.5.3 Options both wholly and partially covered by the Northumbrian Water region were included in the assessments. For those options only partially within the region, the whole option was assessed using GIS data with suitable coverage. Baseline information maps, showing the full spatial extent of environmental receptors located within and/or intersecting with Northumbrian Waters region are presented in Appendix D.

4.5.4 Additionally, a transfer to the Yorkshire Water WRZ has been referenced here, as mentioned in Section 2.3. An SEA for this option has been made available. The assessment was undertaken by Yorkshire Water using a different SEA Framework to the one introduced in Section 3.6, however the information has been applied to the NW SEA Framework to ensure consistency. Additionally, the results of three other environmental assessments for the Yorkshire Water option have been made available at the time of writing, these are outlined below, but include: WFD, HRA, and BNG.

4.6 Other Environmental Assessments (WFD, HRA, NCA, BNG, INNS)

4.6.1 Whilst the SEA has been undertaken for all of the supply-side and demand management options, other environmental assessments have only been undertaken for the six supply-side options as appropriate, for example NCA and BNG can only be undertaken where there is proposed land use change associated with the option. A summary of the results of each of these assessments can be found in Section 5. Further detail for each SEA is provided in appendices E and K, and in the corresponding appendices for each type of environmental assessment.

WFD

4.6.2 The WFD assessment is a statutory requirement in its own right, but also feeds into the SEA objective on water quality. The regional plan option level WFD assessments followed the All Company Working Group (ACWG) WFD Assessment Guidelines which includes a Level I Basic Screening for Impact and a Level 2 Detailed Screening for Impact. The regional plan Level 1 and Level 2 WFD assessments will be reviewed and updated if required. The WFD process will be applied to any new options in line with the ACWG guidelines and WReN WFD method statement[30]. A Level 1 WFD assessment has been made available at the time of writing for the Yorkshire Water transfer option included in the Best Value Plan, see Section 5.7 for a summary of the assessment. Assessment outcomes for the five supply-side options initially considered, as well as the new Supplying Teesside Industrial Water supply-side option, can be found in the discipline appendix, Appendix G.

HRA

4.6.3 HRA is also a statutory requirement in its own right, but also feeds into the SEA biodiversity objective on designated sites. The stages of HRA include the Test of Likely Significance (ToLS), Appropriate Assessment (AA) (if required from the ToLS), and Consideration of Alternatives (should AA findings conclude effects on site integrity cannot be adequately mitigated). The assessment was undertaken in accordance with the Appropriate Assessment – Guidance on the

[30] WReN, 2022, Webpage - Document Library. Available from: https://www.waterresourcesnorth.org/about-us/document-library/

use of Habitats Regulations Assessment[31], as well as the Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans[32].

The results of the HRA assessment will feed back into the SEA process under the biodiversity objective. A Level 2 HRA assessment has been made available at the time of writing for the Yorkshire Water transfer option included in the Best Value Plan, see Section 5.7 for a summary of the assessment. Assessment outcomes for the five supply-side options initially considered, as well as the new Supplying Teesside Industrial Water supply-side option, can be found in the discipline appendix, Appendix F.

NCA

4.6.4 The NCA undertaken for the WRMP24 options assessment involved defining and developing the natural capital baseline using open-source data as described in NECR285[33] to generate a natural capital account of the stocks within the region. An NCA was undertaken for each feasible option that included assessments across the option footprint and zone of influence. The impact on natural capital stocks was reported for each option quantitatively. Reporting for each option included a summary of the existing baseline of natural capital stocks likely to be impacted by the option, the stocks likely to be present during construction of the option, and the stocks likely to be present post-construction of the option. The results of the assessment of natural capital stocks were reported in total losses and gains within each option's zone of influence. The WReN NCA's assessments aligned with Defra's ENCA guidance, and as noted previously, this guidance was updated in 2021. This same assessment approach was undertaken for the NW WRMP24 options.

4.6.5 The results of the change in natural capital stocks informed the assessment against the eight ecosystem services listed below. During the initial phase of the NCA, all eight ecosystem services listed were reviewed and scoped-in or -out due to the geographical or socio-economic context of the option and its zone of influence. Five ecosystem services were monetised and the results of the assessment were reported as a discreet monetary figure, water purification and water regulation were assessed qualitatively, and biodiversity was assessed via the biodiversity net gain assessment. The outputs of the NCA were compared to the pre-construction provision of impacted services to assess the impact of the options. The ecosystem services used to assess the impact on natural capital included:

- Carbon sequestration (climate regulation)
- Natural hazard management
- Water purification
- Water regulation
- Biodiversity and habitats *assessed separately through biodiversity net gain
- Air pollutant removal
- Recreation & amenity value
- Food production

4.6.6 Options that consist of work undertaken on made ground, or hardstanding, and that require no new land take have been scoped-out for the NCA. No NCA assessment has been made

[31] UK Government (2019), Appropriate Assessment – Guidance on the use of Habitats Regulations Assessment. Available from: https://www.gov.uk/guidance/appropriate-assessment

[32] UKWIR (2021), Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans, (21/WR/02/15), 287p

[33] Natural England, 2020. National Natural Capital Atlas: Mapping Indicators (NECR285). Available from: http://publications.naturalengland.org.uk/publication/4578000601612288

available at the time of writing for the Yorkshire Water transfer option included in the Best Value Plan. Assessment outcomes for the five supply-side options initially considered can be found in the discipline appendix, Appendix H. Note that the NCA assessment for the Supplying Teesside Industrial Water option, included in the Best Value Plan, has been scoped-out as the proposed works will be undertaken within existing hardstanding and therefore is not anticipated to impact natural capital stocks.

BNG

4.6.7 Biodiversity net gain or net loss must be considered at both the option and programme level. Each option should look to secure biodiversity net gain if required and any mitigation should be included in the option cost. The Environment Agency supplementary guidance[34] states that if there would be a significant additional cost for an option to get significant extra benefit, this could be included as a separate option for consideration. Options that consist of work undertaken on made ground, or hardstanding, and that require no new land take have been scoped-out for the BNG assessment.

4.6.8 As part of the WRMP24 options assessment, a biodiversity baseline was developed using open-source data sets of habitat inventories alongside a series of assumptions and assessed broadly in line with the Defra and Natural England's Biodiversity Metric 3.0[35]. The biodiversity baseline was aligned with the natural capital baseline for each option and used to identify the biodiversity units for the habitats identified within the footprint and zone of influence for each option prior to construction. The post construction land use and associated habitats, including agreed mitigation, was used to estimate the post development biodiversity score and predicted biodiversity units for each option. A BNG assessment has been made available at the time of writing for the Yorkshire Water transfer option included in the Best Value Plan, see Section 5.7 for a summary of the assessment. Assessment outcomes for the five supply-side options initially considered can be found in the same discipline appendix as that of NCA results, Appendix H. The BNG assessment for the Supplying Teesside Industrial Water option, included in the Best Value Plan, has been scoped-out as the proposed works will be undertaken within existing hardstanding and therefore is unlikely to impact upon any existing habitats.

INNS

4.6.9 The tasks in the INNS assessment include: i) identify species present, ii) identify relevant pathways, iii) identify specific source pathway receptors, iv) assessment of risks. It will follow the approach set out in the WReN INNS method statement[19] aligning with the EA's most recently published methodology for risk assessment of SROs.

4.6.10 The results of the INNS assessment will feed back into the SEA process under the biodiversity objective. For those assets or raw water transfer scenarios determined as high risk for the potential spread of INNS, a mitigation options appraisal will be conducted. This will involve reviewing known mitigation technologies and determining their effectiveness with regard to species type, transmission pathway and feasibility. No INNS assessment has been made available at the time of writing for the Yorkshire Water transfer option included in the Best Value Plan. However, the option description provided confirms that the water will be partially treated at source to remove the risk of INNS through the provision of a new sub-potable WTW, before then being transferred to Yorkshire Water's Elvington WTW (York) where it will then be further treated. Assessment outcomes for the five supply-side options initially considered, as well as

[34] Environment Agency 2020. Water resources planning guideline supplementary guidance – Environment and society in decision-making.

[35] Defra, Natural England 2019. The Biodiversity Metric 3.0. Available online: https://webarchive.nationalarchives.gov.uk/ukgwa/20230901103658/https://publications.naturalengland.org.uk/publication/5850908674228224

the new Supplying Teesside Industrial Water supply-side option, can be found in the discipline appendix, Appendix I.

4.7 Influencing the Development of the WReN Regional Plan

4.7.1 The options put forward as part of NW's WRMP24 support development of the WReN Regional Plan by providing opportunities to address strategic water resource management issues.

4.7.2 As previously outlined in this section, the WRMP24 environmental assessment methodology was underpinned by WReN's IEA approach, for consistency and efficiency in the assessment process.

4.7.3 WReN completed an initial draft regional water resource management plan (Regional Plan) in early 2022 and will publish the final plan alongside the final WRMPs of its constituent companies. This will be based on water service areas in the three WReN core companies Northumbrian Water, Yorkshire Water, and Hartlepool Water. Development and selection of options for inclusion in the Regional Plan may be informed by the NW WRMP24 environmental assessment process outlined previously in this Section.

5 Options Assessment

5.1 Introduction

5.1.1 Modelling previously undertaken of potential supply and demand in the Northumbrian Water region had determined that there would be no deficit in the region. As a result, none of the five feasible supply options initially proposed by Northumbrian Water were planned to be taken forward for implementation as part of their WRMP24. As such, it was originally proposed that their WRMP24 would include just the Preferred package of demand management options and a transfer option which will take water from the Northumbrian Water Region to Yorkshire Water. However, as a result of updated modelling, Northumbrian Water have since proposed a sixth supply-side option that will be taken forwards – The 'Supplying Teesside Industrial Water' option. Further information and context on this option is provided below, as well as in Section 4.4. As such, Northumbrian Water's WRMP24 now includes their preferred package of demand management options, a Yorkshire Water transfer option, and the Supplying Teesside Industrial Water option.

5.1.2 For completeness, the transfer to Yorkshire Water (referenced in their WRMP as DV7a(vi)) is reported below. The NW WRMP has also considered inter-region options including the export of raw water directly from Kielder reservoir to United Utilities reservoirs in the North West of England. This export has been considered at a high level by NW as a 'sensitivity scenario' but is not included in either WReN's plan or as part of either United Utilities' or Northumbrian Water's Best Value Plan for this WRMP24.

5.1.3 The options which were investigated as part of the NW WRMP24 decision making process are reported on below.

5.2 NW WRMP24 Option Types

5.2.1 The options considered for the NW WRMP24 include both supply-side and demand management options.

Potential supply options

5.2.2 All the supply option types that were initially considered include:

- **Abstraction Borehole –** borehole options involve the creation of a new borehole or the re-installation of an old disused borehole in order to abstract more water for the area. The option would also normally involve a pipeline to allow the additional water to enter the supply.
- **Transfers –** transfers usually involve water being piped from one WRZ to another, or from one water company to another. However, they can also be a component of another option type such as a desalination plant. They will transfer water from the new asset to a suitable delivery point.

Potential demand management options

5.2.3 The demand management option types that were considered include:

- **Metering consumption reduction** – involves reducing water consumption by installing meters in currently unmeasured properties. It can include compulsory metering for household and non-household uses, smart metering, and other metering such as optant metering.

- **Other consumption reduction** – involves reducing household and non-household consumption in ways other than metering.
- **Tariffs/fees** - introduction of special fees, changes to existing measured tariffs, introduction of special tariffs for specific users.
- **Water recycling** - rainwater harvesting / grey water reuse for new or existing household and non-household.
- **Water efficiency measures** - water use audit and inspection, awareness campaigns, sponsoring water efficiency enabling activities by others, home visits to reduce plumbing losses, and the promotion of water saving devices.
- **Loss reduction** – involves reducing distribution system leakage, including service reservoir losses and trunk main leakage, as well as reducing customer supply pipe leakage. Leakage reduction options include capital investments to both the company-side and customer-side assets and operational improvements and policy changes. Examples include pressure management, mains renewal, increasing efficiency of active leakage control, etc. Customer supply pipe leakage reduction typically includes increased customer engagement/education or incentives to repair their supply pipes between the distribution main and the property.
- **Non-household water efficiency activity** – comprises thirteen water efficiency options within six categories:
  - Information Provision – Customer side leakage education, customer specific alerts, and free water efficiency assessment.
  - Infrastructure and Leak Investigation – Leak Investigation, rain/greywater re-use, find & fix leaky loos, toilet replacements, and landscaping redesign.
  - Water Efficiency Solutions for Domestic-Type Use – domestic use self-serve, and individual tailored audits.
  - Water Efficiency Solutions for Mixed-Type Use – Free water efficiency visit.
  - Water Efficiency Consultancy for Industry – This option will start with the highest water users and work downward in order to better understand water use in industry, identify areas where water is not being used efficiently, and provide suggestions and solutions to reduce water waste.
  - Golf Course Water Efficiency – Supporting golf courses to use water more efficiently through introducing rainwater harvesting and other smart irrigation solutions to reduce consumption of potable use, supplying courses with an irrigation audit where options are explored to reduce their consumption, and undertaking water saving visits for clubs and hospitality venues.

5.2.4 NW's Best Value Plan includes Demand Management Options (DMOs) that will meet government aspirations including a preferred option package to reduce leakage by 55% by 2050[36]; an enhanced optant smart metering programme where all existing meters will be replaced with smart meters by 2035; and a water efficiency programme which with our smart metering programme, should achieve a per capita consumption (PCC) of 110l per person per day by 2050. The DMO packages also comprise a non-household (NHH) water efficiency target reduction of 9% by 2037/8. These options increase actual headroom in the Berwick WRZ and address the baseline deficit in the Kielder WRZ. All options were assessed as part of the integrated environmental assessment, with DMO-Low (unchanged from previous), DMO-High (unchanged from previous), and DMO-Preferred assessed with 55% leakage reduction alongside the previous 'medium' package metering and water efficiency measures. Reductions in leakage by 2050 will help to further reduce abstraction.

[36] Implementing a 55% reduction in leakage in our Northumbrian region by 2050, together with a 40% reduction in our Essex & Suffolk area, where current leakage rates are already industry leading, will allow us, when taking both supply areas together, to meet the government aspiration of a 50% reduction in leakage by 2050.

5.3 Supply options: overview and descriptions

5.3.1 Initially, five supply-side options went through the full suite of environmental assessments including three transfers and two borehole abstractions, followed by the new Supplying Teesside Industrial Water supply-side option. All options are described in Table 5.1.

Table 5.1: Supply option overview – Northumbrian Water WRMP24

Option name	Description overview
BOT-TRA-001	Transfer (10 Ml/d) from Warkworth WTW to Spring Hill Service Reservoir. Transfer length approximately 56.7 km. Tunnelling (micro-tunnelling/horizontal directional drilling) highly likely to be required as the route crosses one railway, three major roads (A1068, A1 (twice)), six minor roads (B1340, B6347, B1341, B6349, B6353, B6525), 15 named rivers (River Coquet, Grange Burn, River Aln, Kittycarter Burn, Switcherdean Burn, Waren Burn, Chuckbridge Burn, Warenton Dean, Belford Burn, Middleton Burn, Kettle Burn, County Burn, Fenwick Burn, South Low, Allerdeanmill Burn), and numerous drainage channels.

BOT-TRA-002	Transfer (2 Ml/d) from Hedgeley Service Reservoir to New Scots Quarry Service Reservoir, with chemical dosing located at Hedgeley SR.
	Transfer length approximately 13.7 km. Tunnelling (micro-tunnelling/horizontal directional drilling) potentially required as the route crosses one minor road (B6346), four rivers (River Breamish, Roddam Burn, Lilburn Bank, Wooler Water), and four drainage channels. The route follows the A697 road for a considerable length as elevation constraints result in this being the best route.
	Option also requires reinforcement of existing network to support increased flow rates. The impact of this will be determined through network modelling which will be carried out in Phase 3.
	The results of network modelling have identified multiple changes to the existing network:
	• Twinning of existing crossing to provide resilience.
	  ○ Railway crossing nr. Warkworth WTW.
	  ○ A1 at Alnwick.
	  ○ River Aln west of Alnwick.
	• Pipe reinforcement (laying new pipe next to existing pipe and using both).
	  ○ Section NW of Alnwick.
	  ○ From A697/B6354 junction to River Till crossing (west).
	  ○ River Till crossing (east) to Ford PS.
	• Pipe replacement between Milfield and A697/B6354 junction.

BOT-TRA-004	Transfer (10 Ml/d) from Wooler to Murton WTW Makes use of existing pipes from Wooler to Milfield. Pipe replacement required from Milfield to A697/B6354 junction. Pipe reinforcement required between A697/B6354 junction and River Till crossing (West), and between River Till crossing (east) and Ford PS. New pipeline from Ford to Murton WTW. Transfer length approximately 9.66 km. Tunnelling (micro-tunnelling/horizontal directional drilling) potentially required as the route crosses one minor road (B6354), two named rivers (Dean Burn, Allerdeanmill Burn), and one drainage channel.
BOT-ABS-002	Abstraction (10 Ml/d DO) from a new borehole in Duddo, transfer in new pipeline to Felkington Mains, transfer using existing pipelines to discharge to Murton WTW. New transfer pipeline length approximately 2.1 km. Tunnelling (micro-tunnelling/horizontal directional drilling) unlikely to be required as route follows the road B6354. Pipe replacement will be required between Thornton and Murton.
BOT-ABS-007	Recommission/refurbishment of a disconnected borehole (10 Ml/d DO) in Fowberry. Transfer from Fowberry to new Wooler WTW through existing mains. No network

Option name	Description overview
	reinforcement required. Only new pipe is the connection between the mains and the WTW, approximate length of 320m. Environmental mitigation: use of existing infrastructure with no need for network reinforcement. Use of new Wooler WTW (currently under construction).
DMO-High	This option includes compulsory Metering by 2035 and 50% leakage reduction by 2050. It also includes a high impact water efficiency plan comprising 12 household water efficiency options within five categories (Water Use Audit and Inspection, Advice and Information on Leakage Detection and Fixing Techniques, Water Efficiency Enabling Activities, Promotion of Water Saving Devices, and Targeted Water Conservation Information (advice on appliance water usage). The DMO-High package targets a NHH water efficiency reduction of 9% by 2037/8.
DMO-Preferred	This option includes Option 2 Metering Smart by 2035 and 55% leakage reduction by 2050. It also includes a Medium impact water efficiency plan comprising 12 household water efficiency options within five categories (Water Use Audit and Inspection, Advice and Information on Leakage Detection and Fixing Techniques, Water Efficiency Enabling Activities, Promotion of Water Saving Devices, and Targeted Water Conservation Information (advice on appliance water usage). The DMO-Preferred package targets a NHH water efficiency reduction of 9% by 2037/8
DMO-Low	This option includes low metering, AMI Smart metering (3 AMP - 15 year roll-out from 2020) and 30% leakage reduction by 2050. It also includes a Low impact water efficiency plan comprising six household water efficiency options within three categories (Water Use Audit and Inspection, Advice and Information on Leakage Detection and Fixing Techniques, and Targeted Water Conservation Information (advice on appliance water usage)). The DMO-Low package targets a NHH water efficiency reduction of 9% by 2037/8.
DV7a(vi)	This scheme involves the transfer of 140 Ml/d of partially treated water from the NW abstraction point at Blackwell on the Tees to Yorkshire Water's Elvington WTW (York) via a new 85km pipeline. The scheme would require use of the NW Kielder (Tyne to Tees) link, and comprises abstraction and associated pumping infrastructure, new water treatment infrastructure at Blackwell (for partial treatment), a new 1200mm 85km pipeline with booster station along route, and upgrades to the existing treatment stream at Elvington WTW. The scheme is expected to be operational by 2040, providing its first year of benefit within the Best Value Plan following a 15-year construction phase.
Supplying Teesside Industrial Water	This option involves bringing the existing but currently unused Low Worsall RWPS on the Tees back into use, installing Eel Regs compliant eel screens at Low Worsall RPWS and increasing abstraction licences at Low Worsall RWPS back up to 2016 levels and at Blackwell RWPS back up to historic (pre-2016) levels. In order to supply the increased raw water demand, the Blackwell licence is proposed to be increased to pre 2016 volumes (58,075 Ml/yr, 159 Ml/d) along with installing eel screens (assume Hydrolox eel exclusion screens) at Low Worsall and increasing the licence to 2016 volumes (150Ml/d peak, 85Ml/d annual average).

5.4 IEA Assessment Results

5.4.1 The following environmental assessments were undertaken on each option developed for potential inclusion in the WRMP:

- SEA
- HRA
- WFD
- BNG
- NCA

- INNS

Table 5.2: Summary of Construction Phase SEA Results

		Topic																				
		Biodiversity				Soil	Water					Air	Climatic Factors		Landscape	Historic Environment	Population and Human Health				Material Assets	
Option	**Effect**	**1.1**	**1.2**	**1.3**	**1.4**	**2.1**	**3.1**	**3.2**	**3.3**	**3.4**	**3.5**	**4.1**	**5.1**	**5.2**	**6.1**	**7.1**	**8.1**	**8.2**	**8.3**	**8.4**	**9.1**	**9.2**
BOT-ABS-002	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
	Negative	-	0	0	0	0	-	-	0	0	0	-	-	0	-	-	-	0	-	-	-	-
BOT-ABS-007	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
	Negative	--	-	0	0	0	-	0	0	0	0	-	-	0	-	-	-	0	-	-	-	-
BOT-TRA-001	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
	Negative	-	-	0	0	0	-	0	0	0	0	-	-	0	-	-	-	0	0	-	-	-
BOT-TRA-002	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
	Negative	-	--	0	0	0	-	0	0	0	0	-	-	0	-	-	-	0	0	-	-	-
BOT-TRA-004	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
	Negative	-	-	0	0	0	-	0	0	0	0	-	-	0	-	-	-	0	0	-	-	-
Supplying Teesside Industrial Water	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Negative	0	0	0	0	0	0	0	0	0	0	-	-	0	-	-	0	0	0	-	-	0
DMO-Preferred	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Negative	-	0	0	-	-	0	-	-	0	0	-	-	0	-	-	-	0	0	0	-	-
DMO-High	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Negative	-	0	0	-	-	0	-	-	0	0	-	-	0	-	-	-	0	0	0	-	-

Topic

		Biodiversity				Soil	Water					Air	Climatic Factors		Landscape	Historic Environment	Population and Human Health				Material Assets	
Option	**Effect**	**1.1**	**1.2**	**1.3**	**1.4**	**2.1**	**3.1**	**3.2**	**3.3**	**3.4**	**3.5**	**4.1**	**5.1**	**5.2**	**6.1**	**7.1**	**8.1**	**8.2**	**8.3**	**8.4**	**9.1**	**9.2**
DMO-Low	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Negative	0	0	0	0	-	0	0	0	0	0	-	-	0	-	-	-	0	0	0	-	-

Table 5.3: Summary of Operational Phase SEA Results

		Topic																				
		Biodiversity				Soil	Water					Air	Climatic Factors		Landscape	Historic Environment	Population and Human Health				Material Assets	
Option	**Effect**	**1.1**	**1.2**	**1.3**	**1.4**	**2.1**	**3.1**	**3.2**	**3.3**	**3.4**	**3.5**	**4.1**	**5.1**	**5.2**	**6.1**	**7.1**	**8.1**	**8.2**	**8.3**	**8.4**	**9.1**	**9.2**
BOT-ABS-002	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0
	Negative	-	0	0	0	0	--	-	0	--	-	0	-	-	0	0	0	0	0	0	0	0
BOT-ABS-007	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0
	Negative	-	0	0	-	0	0	0	0	--	-	0	-	-	0	0	0	0	0	0	0	0
BOT-TRA-001	Positive	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	+	0	0	0
	Negative	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0
BOT-TRA-002	Positive	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	+	0	0	0
	Negative	-	0	0	-	0	0	0	0	-	0	0	-	0	0	0	0	0	0	0	0	0
BOT-TRA-004	Positive	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	+	0	0	0
	Negative	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0
Supplying Teesside Industrial Water	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0
	Negative	-	0	--	-	0	0	-	0	-	-	0	-	0	0	0	0	0	0	0	0	0
DMO-Preferred	Positive	+	+	0	+	0	0	+	+	+	+	0	+	++	++	0	+	++	++	0	0	0
	Negative	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DMO-High	Positive	++	++	0	++	0	0	++	++	+++	+++	0	+	++	++	0	++	+++	+++	0	0	0
	Negative	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Topic

		Biodiversity				Soil	Water					Air	Climatic Factors		Landscape	Historic Environment	Population and Human Health				Material Assets	
Option	**Effect**	**1.1**	**1.2**	**1.3**	**1.4**	**2.1**	**3.1**	**3.2**	**3.3**	**3.4**	**3.5**	**4.1**	**5.1**	**5.2**	**6.1**	**7.1**	**8.1**	**8.2**	**8.3**	**8.4**	**9.1**	**9.2**
DMO-Low	Positive	0	0	0	0	0	0	0	+	+	+	0	+	+	0	0	+	+	+	0	0	0
	Negative	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Yorkshire Water Transfer

5.4.2 As referred to in Section 2.3, a Yorkshire Water transfer option (DV7a(vi)) has been included in the WRMP and has been assessed by Yorkshire Water using a similar SEA framework. The NW SEA Framework has been applied to this option based on the Northumbrian Water SEA objectives as outlined in Table 3.2, using the scoring system presented in Table 4.2. They are included here for reference and comparison to the Berwick Upon Tweed options assessed, however are also included in the Yorkshire Water WRMP24 Environmental Report. The results of assessments have been provided by Yorkshire Water and have been utilised here to present a complete assessment.

Table 5.4: Yorkshire Water Transfer SEA Results

		Biodiversity				Soil	Water					Air	Climatic Factors		Landscape	Historic Environment	Population and Human Health				Material Assets	
Option	**Effect**	**1.1**	**1.2**	**1.3**	**1.4**	**2.1**	**3.1**	**3.2**	**3.3**	**3.4**	**3.5**	**4.1**	**5.1**	**5.2**	**6.1**	**7.1**	**8.1**	**8.2**	**8.3**	**8.4**	**9.1**	**9.2**
Construction																						
DV7a(vi)	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Negative	---	-	-	0	---	-	0	0	0	0	--	0	0	--	--	--	0	0	--	0	-
Operation																						
DV7a(vi)	Positive	0	++	0	0	0	0	0	0	0	0	0	0	+++	0	0	+++	0	0	0	0	0
	Negative	0	0	0	-	0	0	-	-	-	0	0	---	0	0	0	0	0	0	0	---	0

5.5 Summary of SEAs

5.5.1 The full SEA assessment spreadsheets for all options considered for inclusion in Northumbrian Water's WRMP24 are available in Appendix K. Below, summaries of the SEA results are provided for Northumbrian Water's supply side and demand management options, as well as the Yorkshire Water transfer option.

Summary of SEA of Berwick Upon Tweed Supply Side Options

Construction

5.5.2 During the construction phase, most of the options are not anticipated to result in significant residual effects to the SEA objectives. Only BOT-ABS-007 and BOT-TRA-002 result in moderate negative effects to biodiversity objectives. These are as a result of potential construction phase effects on designated sites and to habitats required to deliver BNG. Other effects during the construction phase are considered to be minor and therefore not significant.

5.5.3 During construction, there are not anticipated to be any significant positive environmental effects. There are potential minor positive effects related to increased employment opportunities during the construction phases however this is not deemed to be significant.

Operation

5.5.4 During the operational phase, there are considered to be moderate, and therefore significant, residual negative effects to water and biodiversity objectives for BOT-ABS-002, and to water objectives for BOT-ABS-007. This is associated with changes to abstraction activities and outfall for existing water sources in the region, as well as to potential changes in the water table, resulting in likely negative effects on designated sites and their qualifying features.

5.5.5 During operation, there are anticipated to be no significant residual positive effects to SEA objectives. Any residual positive effects during the operation phase are considered to be minor, and therefore not significant. All options will have minor positive effects on population and human health, while TRA-001, 001 and 004 also have minor positive effects on water objectives.

Summary of SEA of Yorkshire Water Option

Construction

5.5.6 During the construction phase, there are considered to be a number of major and moderate, and therefore significant, residual negative effects posed by the Yorkshire Water option (DV7a(vi)) to biodiversity, soil, air quality, landscape, historic environment, and population and human health SEA objectives. These are as a result of the proposed pipelines close proximity to designated sites, its required temporary land take within a large quantity of greenfield, best and most versatile agricultural land, and a small quantity of Agricultural Land Classification Grade 2 (land of medium to high value), its anticipated temporary adverse effects on local air quality in surrounding urban areas and its potential to cause nuisance from noise, dust and vibration as a result of construction and vehicle movements, its proximity to AONB, scheduled monuments and numerous listed buildings in which there is potential for temporary adverse construction effects on the setting of these designations coming from construction activities and vehicle movements, its

temporary disruption to a range of recreational facilities, and its significant use of materials. Any other residual negative effects are considered to be minor, and therefore not significant.

5.5.7 During construction, there are not anticipated to be any significant residual positive effects to SEA objectives. There is also anticipated to be no minor positive effects.

Operation

5.5.8 During the operational phase, there are considered to be major, and therefore significant, residual negative effects posed by the Yorkshire Water option (DV7a(vi)) to climatic factors and material assets SEA objectives. These are as a result of the proposed pipelines significant use of materials and the large quantity of embodied carbon emissions associated with this, as well as from carbon emissions associated with anticipated HGV movements and construction activities, and from electricity requirements required for pumping during operation. Any other residual negative effects are considered to be minor, and therefore not significant.

5.5.9 During operation, there are anticipated to be major and moderate, and therefore significant, residual positive effects to biodiversity, climatic factors, and population and human health SEA objectives. These are as a result of potential beneficial opportunities for areas of habitat affected by construction through compensatory planting and habitat enhancement, in particular grassland and woodland habitat local to the scheme, the proposed pipeline helping to secure a supply-demand balance over the next 25 years, thus helping to maintain essential public water supplies and therefore help maintain public health and well-being, as well as improved resilience to the threats of climate change. No minor positive effects are anticipated.

Summary of SEA of Northumbrian Water Demand Management Options

Construction

5.5.10 During the construction phase, there are considered to be no significant residual negative effects to SEA objectives as a result of all three demand management option scenarios. Any residual negative effects during the construction phase are considered to be minor, and therefore not significant. The DMO-Preferred option scenario (the preferred option included in the Best Value Plan), and the DMO-High option scenario were assessed as having minor negative effects to objectives in all SEA topics, with the DMO-Low option scenario having minor negative effects to objectives in all SEA topic apart from water.

5.5.11 During construction, none of the demand management option scenarios were considered to have significant residual positive effects to SEA objectives. Additionally, no minor positive effects were anticipated.

Operation

5.5.12 During the operational phase, none of the demand management option scenarios were considered to have significant residual negative effects to SEA objectives. Additionally, no minor negative effects were anticipated.

5.5.13 During operation, there are anticipated to be significant residual positive effects to water and population and human health SEA objectives as a result of all three demand management option scenarios, with DMO-Preferred and DMO-High also having

significant residual positive effects to climatic factors objectives. The DMO-High option was also assessed as having potential residual positive effects to landscape objectives. Positive effects are generally associated with improved water efficiency and leakage works, resulting in lower water demand, and therefore less extraction of water from natural environments for human consumption. This could, for example, increase resilience of water supplies and natural systems to droughts, help to enhance or maintain surface water quality, flows and quantity, as well as providing other significant positive effects. Through improved water efficiency, and leakage reduction of 55% by 2050, the DMO-Preferred scenario is anticipated to yield an annual water saving of 52,246.1 Ml for the year 2074/75 (143.14 Ml/d average). The DMO-High scenario (improved water efficiency and 50% leakage reduction by 2050) is anticipated to yield an annual water saving of 63,919.1 Ml for the year 2074/75 (183.34 Ml/d average). The DMO-Low scenario (improved water efficiency and 30% leakage reduction by 2050) is anticipated to yield an annual water saving of 30,324.2 Ml for the year 2074/75 (83.08 Ml/d average).

Summary of SEA of Supplying Teesside Industrial Water Option

Construction

5.5.14 During the construction phase, there are considered to be no significant residual negative or positive effects to SEA objectives as a result of the Supplying Teesside Industrial Water Option. Minor adverse effects were identified for six objectives during the construction phase, further details can be found in Appendix K.

Operation

5.5.15 During the operation phase potential significant residual negative effects were identified for the objective ‘To avoid spreading and, where required, manage invasive and non-native species (INNS)’ due the physical transfer of untreated water between two locations. No other significant residual adverse effects were identified. Positive effects were identified for securing resilient water supplies for the health and wellbeing of customers. Potential minor adverse effects were identified for the option Supplying Teesside Industrial Water due to the risks associated with increased abstraction on the potential for effects on water quality, biodiversity and the natural systems resilience to drought.

5.6 Summary of other Environmental Assessments

5.6.1 In addition to the SEA, other environmental assessments were undertaken for the five feasible supply-side options initially proposed by Northumbrian Water. The Supplying Teesside Industrial Water option has also been subject to other environmental assessments where appropriate. NCA and BNG assessments have been scoped-out for this option, explanations for this can be found in paragraphs 4.6.6 and 4.6.8 respectively. The results of the other environmental assessments are summarised below. Demand management options have not been subjected to further assessments owing to the limited information and lack of physical footprint at this stage. Information relating to the Yorkshire Water option for HRA, WFD and BNG assessments has also been included in Section 5.7. At the time of writing, no INNS or NCA assessments were made available for the Yorkshire Water option.

HRA

Table 5.5: HRA ToLS Results

Option ID	Option Name	Sites with Potential Likely Significant Effects (approx. distance)
BOT-ABS-002	**New Borehole at Duddo**	Potential for likely significant effects concluded for River Tweed SAC and Tweed Estuary SAC due to changes to water flow, contamination, and biological disturbance during operation. No likely significant effects were concluded for the other seven sites.
BOT-ABS-007	**Fosberry Borehole Abstraction**	Potential for likely significant effects concluded for the River Tweed SAC, due to changes to water flow, contamination, and biological disturbance during operation. No likely significant effects were concluded for the other four sites.
BOT-TRA-001	**Warkworth WTW to Berwick Upon Tweed Transfer**	Potential for likely significant effects concluded for Northumberland Marine SPA. Lindisfarne Ramsar, Northumberland Coast SPA, Berwickshire & North Northumberland Coast SAC, North Northumberland Dunes SAC, and Lindisfarne SPA, due to the proximity of machinery causing anthropogenic and biological disturbance during the construction phase, as well as potential contamination and changes to the water table. No likely significant effects were concluded for the other eight sites.
BOT-TRA-002	**Warkworth Network to Berwick Upon Tweed Transfer**	Potential for likely significant effects concluded for the River Tweed SAC and Northumberland Marine SPA SAC, due to contamination and the proximity of machinery causing anthropogenic and biological disturbance during the construction phase, and changes to the water table during operation. No likely significant effects were concluded for the other 10 sites.
BOT-TRA-004	**Watchlaw to Murton Transfer**	Potential for likely significant effects concluded for the River Tweed SAC, due to contamination and biological disturbance during operation. No likely significant effects were concluded for the other nine sites.
Supplying Teesside Industrial Water	**Supplying Teesside Industrial Water**	The Stage 1 HRA ToLS identified potential for likely significant effects for the Teesmouth and Cleveland Coast SPA and Ramsar sites, due to the proposed intake locations being hydrologically connected to the sites via the River Tees. Level 2 AA determined that both sites are considered sufficiently distant that it is considered unlikely that any activities associated with construction phase will result in likely significant effects on the habitat site or its qualifying features. During operation there is the potential for adverse effects on both sites due to the increase in water abstraction, however, it is considered that with adherence to the proposed mitigation, the proposed works associated with the option are not expected to have adverse effects on the overall Habitats Sites integrity and/or its qualifying features

WFD

Table 5.6: WFD Assessment Results

Option ID	Option Name	Waterbodies requiring further WFD Assessment
BOT-ABS-002	**New Borehole at Duddo**	Two waterbodies - GB102021073050:Till from Glen to River Tweed; GB40302G703700:Till Fell Sandstone (GW)
BOT-ABS-007	**Fosberry Borehole Abstraction**	Two waterbodies - GB102021073042:Till from Roddam Burn to Glen; GB40302G703700:Till Fell Sandstone (GW)
BOT-TRA-001	**Warkworth WTW to Berwick Upon Tweed Transfer**	Three waterbodies - GB510302203000:COQUET; GB103022076693:Coquet from Forest Burn to Tidal Limit;

Option ID	Option Name	Waterbodies requiring further WFD Assessment
		GB40302G700200:Northumberland Carboniferous Limestone and Coal Measures (GW)
BOT-TRA-002	**Warkworth Network to Berwick Upon Tweed Transfer**	Six waterbodies - GB103022076693:Coquet from Forest Burn to Tidal Limit; GB103022076350:Aln from Edlingham Burn to Tidal Limit; GB102021073041:Till from Linhope Burn to Roddam Burn; GB102021072860:Roddam Burn; GB102021072900:Lilburn Burn; GB102021072930:Wooler Water from Harthope Burn to Till; GB103021073260:North Low from Source to Berrington Burn
BOT-TRA-004	**Watchlaw to Murton Transfer**	One waterbody - GB103021073260:North Low from Source to Berrington Burn
Supplying Teesside Industrial Water	**Supplying Teesside Industrial Water**	Three waterbodies - GB103025072595: Tees from Skerne to Tidal Limit; GB103025072190: Tees from River Greta to River Skerne; GB510302509900: TEES

BNG

Table 5.7: BNG Assessment Results

Option ID	Option Name	BNG Score
BOT-ABS-002	New Borehole at Duddo	-7.84%
BOT-ABS-007	Fosberry Borehole Abstraction	-3.50%
BOT-TRA-001	Warkworth WTW to Berwick Upon Tweed Transfer	-13.11%
BOT-TRA-002	Warkworth Network to Berwick Upon Tweed Transfer	-19.11%
BOT-TRA-004	Watchlaw to Murton Transfer	-9.49%

NCA

Table 5.8: NCA Assessment Results

Option ID	Natural Capital	Ecosystem Services
BOT-ABS-002	-£353.35	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction effects include the release of CO_2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. Permanent loss of arable stocks due to option construction hence loss of associated ecosystem services expected.
BOT-ABS-007	£0.00	The option is likely to generate the temporary loss of natural capital stocks during construction. However, habitat is expected to be reinstated/compensated to pre-construction conditions following best practice technique, and there will likely be no permanent impact to the provision of ecosystem services.
BOT-TRA-001	-£4555.02	The option is likely to generate the loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction effects include the release of CO_2

Option ID	Natural Capital	Ecosystem Services
		due to habitat clearance, loss of natural hazard management and a reduction in water purification. There is no change anticipated to water flow regulation. Permanent loss of arable stocks, pastoral stocks and ancient woodland due to option construction hence loss of associated ecosystem services expected.
BOT-TRA-002	-£7,509.10	The option is likely to generate the loss of natural capital stocks during construction. However, most habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction effects include the release of CO_2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. There is no change anticipated to water flow regulation. Permanent loss of arable and pastoral stocks and woodland stocks due to option construction hence loss of associated ecosystem services expected.
BOT-TRA-004	-£728.38	The option is likely to generate the loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction effects include the release of CO_2 due to habitat clearance, loss of natural hazard management, a reduction in food production services, and a reduction in water purification. There is no change anticipated to water flow regulation. Permanent loss of arable stocks and ancient woodland expected to result in a permanent reduction in the associated ecosystem services.

INNS

Table 5.9: INNS Assessment Results

Risk Score	Options
1 = Very Low	BOT-ABS-002, BOT-ABS-007, BOT-TRA-001, BOT-TRA-002, BOT-TRA-004,
2 = Low	No options
3 = Low	No options
4 = Moderate	No options
5 = High	Supplying Teesside Industrial Water
6 = High	No options

5.7 Summary of Yorkshire Water Option other Environmental Assessments

HRA

Table 5.10: HRA Assessment Results

Option ID	Option Name	Sites with Potential Likely Significant Effects (approx. distance)
DV7a(vi)	**Tees to Elvington Pipeline – NW import**	Potential for likely significant effects concluded for Lower Derwent Valley SPA, Lower Derwent Valley SAC, Lower Derwent Valley Ramsar, and River Derwent SAC due to changes to water flow,

Option ID	Option Name	Sites with Potential Likely Significant Effects (approx. distance)
		contamination, and biological disturbance during construction. No likely significant effects were concluded for the other five sites assessed.

WFD

Table 5.11: WFD Assessment Results

Option ID	Option Name	Waterbodies requiring further WFD Assessment
DV7a(vi)	**Tees to Elvington Pipeline – NW import**	None – WFD Assessment found that if assumed best practice construction techniques were implemented, there would be no risk to WFD compliance as a result of construction activities.

BNG

Table 5.12: BNG Assessment Results

Option ID	Option Name	BNG Score
DV7a(vi)	**Tees to Elvington Pipeline – NW import**	-100%

6 Assessment of the WRMP

6.1 Overview of Best Value Planning

6.1.1 Northumbrian Water have used an Economics of Balancing Supply and Demand (EBSD) optimiser morel to develop their Best Value Plan. The EBSD model considers the supply-demand balance for each water resource zone at annual timesteps and selects options to address deficits based on a cost per ml/d and the earliest available date of supply for relevant options. This tool does not consider other monetised criteria such as carbon or other societal and environmental impacts and benefits. As such the model results represent a least-cost plan with no optimisation.

6.1.2 The aim of Best Value Planning is to determine whether the inclusion of further monetised and non-monetised criteria would identify a plan that delivers the best value, defined by the WRPG as ‘one that considers factors alongside economic cost and seeks to achieve an outcome that increases the overall benefit to customers, the wider environment and overall society’. For further information on this process see section 2.2.

6.1.3 An assessment of the performance of the proposed options against the environmental best value plan metrics – has been undertaken, as well an assessment of potential cumulative effects. Additionally, a high-level consideration of the potential cumulative effects resulting from the sensitivity scenario has been done.

6.1.4 Northumbrian Water have set the following objectives to be achieved through their Best Value Plan:

- Achieve a secure, resilient, and sustainable supply of water for their customers, moving to a 1 in 500 level of resilience by 2049/50;
- Protect and enhance the environment, ensuring their abstractions are sustainable both in the short and long term;
- Reduce leakage from their network and from customer’s homes, contributing to a national target of 55% reduction from 2017/18 levels by 2049/50.
- Reduce customer demand to 110l/head/day by 2049/50.
- For all their meters to be smart meters by 2035.

6.2 Integration of SEA into Best Value Planning

6.2.1 Northumbrian Water’s Best Value Planning approach incorporated eight metrics generated by the environmental assessment process. These metrices were selected to show how options contribute to certain topics, as specified by Northumbrian Water. The metrics enabled the environment to be directly considered in analysis and selection of portfolios/programmes of options at an early stage in the planning process. For incorporation of the environmental assessments into Best Value Planning, it was assumed that recommended mitigation measures will be applied.

6.2.2 In conjunction with Mott MacDonald (SEA Consultants), Northumbrian Water developed an integrated approach to programme modelling for this WRMP. In line with guidance, it is important to ensure that the SEA effectively influences the decision-making process of the Northumbrian Water WRMP24. The SEA results, alongside selected other assessment

results were utilised to create metrics to support the Best Value Planning modelling. The values for each metric were determined using the SE scores, with minor amounting to +/- 1, moderate amounting to +/- 4 and major amounting to +/- 8. These scores were input to the modelling alongside other metrics to guide WRMP decision making.

Table 6.1: Best Value Planning Environmental Metrics

Best Value Criteria Description	How Will It Be Measured	SEA Objective(S)
Biodiversity Net Gain	Change in biodiversity units.	SEA Topic: Biodiversity, Objective: To provide opportunities for habitat creation or restoration and deliver a net benefit / BNG (qualitative)
Biodiversity Impact	Qualitative assessments based on SEA objectives relating to impacts to protected sites and species.	SEA Topic: Biodiversity, Objective: To protect designated sites and their qualifying features; To meet WFD objectives relating to biodiversity.
Natural Capital	Monetised (£NPV) impact of the option on natural capital e.g., change to land use, recreation.	NCA Monetised Value from NCA Assessment.
Flood Risk Management (Non-drought Resilience)	Qualitative assessment based on SEA objective to reduce and manage flood risk.	SEA Topic: Water, Objective: To reduce or manage flood risk, taking climate change into account.
Multi-abstractor Benefit	Qualitative assessment based on SEA objectives to maintain or improve the quality of waterbodies and to avoid adverse impact on surface and groundwater levels and flows.	SEA Topic: Water, Objective: To enhance or maintain surface water quality, flows and quantity; To enhance or maintain groundwater quality and resources; To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans; To increase water efficiency and increase resilience of water supplies and natural systems to droughts. SEA Topic: Climatic Factors, Objective: To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.
Human and Social Well-being	SEA Objectives associated with human and social well-being.	SEA Topic: Air, Objective: To reduce and minimise air emissions during construction and operation. SEA Topic: Population and Human Health, Objective: To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing; To secure resilient water supplies for the health and wellbeing of customers; To increase access and connect customers to the natura; environment, provide education or information resources for the public; Maintain and enhance tourism and recreation.
Remaining SEA Objectives	Remaining SEA Objectives not covered in metrics accounted for above.	SEA Topic: Soil, Objective: To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity. SEA Topic: Climatic Factors, Objective: To minimise/reduce embodied and operational carbon emissions. SEA Topic: Landscape, Objective: To conserve, protect and enhance landscape and townscape character and visual amenity.

Best Value Criteria Description	How Will It Be Measured	SEA Objective(S)
		SEA Topic: Historic Environment: To conserve/protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting. SEA Topic: Materials Assets, Objective: Minimise resource use and waste production; Avoid negative effects on built infrastructure.

6.3 WRMP24 Best Value Plan

6.3.1 Modelling previously undertaken of potential supply and demand in the Northumbrian Water region had determined that the would be no deficit in the region. As a result, none of the five feasible supply options initially proposed by Northumbrian Water were planned to be taken forward for implementation as part of their WRMP24. Only the preferred NW demand management option (DMO-Preferred) and the Yorkshire Water transfer option (DV7a(vi)) were to be progressed for implementation. However, as a result of updated modelling, Northumbrian Water have since proposed a sixth supply-side option that will be taken forwards as part of their WRMP24 – The 'Supplying Teesside Industrial Water' option. Further information and context on this option is available in Section 4.4. All three of the options forming this WRMP have been individually assessed in Section 5, however the Yorkshire Water option has been assessed by Yorkshire Water and made available for the purposes of this report. A summary of the SEAs for these options is provided in Section 5.5. Northumbrian Water's WRMP24 Best Value Plan is set out in Table 6.2.

Table 6.2: Options Forming the WRMP24 Best Value Plan

Option name	Description overview
DMO-Preferred	This option includes Option 2 Metering Smart by 2035 and 55% leakage reduction by 2050. It also includes a Medium impact water efficiency plan comprising 12 household water efficiency options within five categories (Water Use Audit and Inspection, Advice and Information on Leakage Detection and Fixing Techniques, Water Efficiency Enabling Activities, Promotion of Water Saving Devices, and Targeted Water Conservation Information (advice on appliance water usage). The option targets a NHH water efficiency reduction of 9% by 2037/8.
DV7a(vi)	This scheme involves the transfer of 140 Ml/d of partially treated water from the NW abstraction point at Blackwell on the Tees to Yorkshire Water's Elvington WTW (York) via a new 85km pipeline. The scheme would require use of the NW Kielder (Tyne to Tees) link, and comprises abstraction and associated pumping infrastructure, new water treatment infrastructure at Blackwell (for partial treatment), a new 1200mm 85km pipeline with booster station along route, and upgrades to the existing treatment stream at Elvington WTW. The scheme is expected to be operational by 2040, providing its first year of benefit within the Best Value Plan following a 15-year construction phase.
Supplying Teesside Industrial Water	This option involves bringing the existing but currently unused Low Worsall RWPS on the Tees back into use, installing Eel Regs compliant eel screens at Low Worsall RPWS and increasing abstraction licences at Low Worsall RWPS back up to 2016 levels and at Blackwell RWPS back up to historic (pre-2016) levels. In order to supply the increased raw water demand, the Blackwell licence is proposed to be increased to pre 2016 volumes (58,075 Ml/yr, 159 Ml/d) along with installing eel screens (assume Hydrolox eel exclusion screens) at Low Worsall and increasing the licence to 2016 volumes (150Ml/d peak, 85Ml/d annual average).

6.4 Cumulative Effects Assessment (Intra-Plan Effects)

Introduction

6.4.1 In order to appropriately consider the effects of the NW WRMP, it is important to not only consider the options in isolation, but also consider how the options might interact and combine to yield positive or negative effects on the SEA objectives. The methodology for approaching a cumulative assessment for the proposed Best Value Plan and reasonable alternatives is presented in this section alongside the results of the assessment. The effects of the Best Value Plan and reasonable alternatives have also been considered in combination with other projects, plans and programmes in the Northumbria Region. The methodology for this assessment along with the results can be found in this Section.

Methodology

6.4.2 The options which make up the Best Value Plan and the reasonable alternatives were reviewed as a whole plan against the SEA objectives. This approach is considered to be an efficient and proportionate approach to the cumulative effects assessment, which is cognisant of the work being undertaken for the Regional Plan and other WRMPs. There is no standard approach to the assessment of interrelationships between effects. Effects are very rarely additive, but rather a collection of effects on a receptor that need to be drawn together. Consideration also needs to be given to the potential for 'synergistic' effects whereby different types of effects to a receptor may interact together and increase their effect.

6.4.3 A receptor-based approach to the assessment of interrelationships between effects is set out below:

- Step 1: Identify receptor types (e.g. community, ecological habitat or species, a heritage asset, landscape or natural feature, waterbody or watercourse) and geographical locations.
- Step 2: Identify receptors and their geographical location.
- Step 3: Screen out receptors where there is no potential for interrelationships between effects or temporal overlap of effects, or where effects are anticipated to be negligible.
- Step 4: Assess interrelationships between effects at remaining receptors and report on a receptor basis (within geographical areas) appropriate to the effects identified.

6.4.4 Where more than one option is considered to a have a residual (post-mitigation) effect on an SEA objective (positive or negative), these options are assessed against the criteria to determine whether they would result in more significant effects. Temporal and spatial dimensions of the proposed options are considered and where options are located in close proximity to one another or are to be delivered with overlapping timescales, they are considered to have potential cumulative effects. For certain SEA objectives, environmental receptors, which are used to indicate an effect on a particular SEA objective (for example designated sites for Biodiversity objectives), are then considered to determine whether more than one option would have an effect on a receptor. Professional judgement, following the SEA framework, is used to determine the significance of the effects identified; neutral, minor, moderate or major positive or negative. A narrative explaining the selection will accompany the score.

Results

Best Value Plan

6.4.5 Table 6.3 provides a summary of the outcomes of the intra-plan cumulative effects assessment for the Best Value Plan during construction. Table 6.4 provides a narrative explaining the potential for possible cumulative effects during construction, as identified in Table 6.3. This approach is then repeated in Table 6.5 and Table 6.6 for potential cumulative effects during operation.

Table 6.3: Best Value Plan SEA Cumulative Effects During Construction Summary

		SEA Topic																				
		Biodiversity				Soil	Water					Air	Climatic Factors		Landscape	Historic Environment	Population and Human Health				Material Assets	
Option	**Effect**	**1.1**	**1.2**	**1.3**	**1.4**	**2.1**	**3.1**	**3.2**	**3.3**	**3.4**	**3.5**	**4.1**	**5.1**	**5.2**	**6.1**	**7.1**	**8.1**	**8.2**	**8.3**	**8.4**	**9.1**	**9.2**
DMO-Preferred	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Negative	-	0	0	-	-	0	-	-	0	0	-	-	0	-	-	-	0	0	0	-	-
DV7a(vi)	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Negative	---	-	-	0	---	-	0	0	0	0	--	-	0	--	--	--	0	0	--	0	-
Supplying Teesside Industrial Water	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Negative	0	0	0	0	0	0	0	0	0	0	-	-	0	-	-	0	0	0	-	-	0
Potential Cumulative Effects		--	N/A	N/A	N/A	--	N/A	N/A	N/A	N/A	N/A	-	-	N/A	-	-	-	N/A	N/A	-	-	-

Table 6.4: Best Value Plan SEA Cumulative Effects During Construction Narratives

SEA Topic	SEA Objective	Cumulative Narrative
Biodiversity	To protect designated sites and their qualifying features	Both options, DMO Preferred and DV7a(vi) pose potential effects to designated sites and their qualifying features during construction. At its closest extent, the DV7a(vi) option runs within 60m of the Lower Derwent Valley SPA, SAC, and Ramsar and the River Derwent SAC, and within 300m of the Strensall Common SAC. There are several other designated sites within 1km of the option, as well as 16 areas of ancient woodland, 5 of which are in close proximity (100m). During construction there is a risk of disturbance to these sites and their qualifying features. HRA screening concluded likely significant effects on four sites prior to mitigation: Lower Derwent Valley SPA, SAC, and Ramsar, and River Derwent SAC. In addition, the construction of the pipeline may have adverse effects towards a limited number of priority habitat areas, which would be intersected, including good quality semi-improved grassland habitats. Whilst specific locations are unknown, the DMO-Preferred option has potential for negative effects during construction where activities required to resolve leakage issues could run in close proximity to / intersect with designated sites. Cumulative effects could arise where works for each option coincide, or from where they occur one after another within a short period of time and at the same location. The Lower Derwent Valley and River Derwent receptors identified for the DV7a(vi) option fall outside of the Northumbrian Water Region and therefore are not considered to geographically interact with the DMO preferred option. Other identified receptors for the DV7a(vi) option, such as ancient woodland and priority habitat, could still fall within the Northumbrian Water Region, and thus potential cumulative effects can't be ruled out, and should be subject to further investigation. Therefore, it is anticipated that there could be potential moderate/minor residual cumulative effects.
Soil	To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	Both options, DMO Preferred and DV7a(vi) pose potential effects to soil and land during construction. The DV7a(vi) option will require temporary land take within a large quantity of greenfield, as well as best and most versatile agricultural land. In addition, there are five historic landfill sites within 1km of the proposed route, of which the Old Brickyard site is in close proximity (100m). During construction there is a potential land contamination risk. Whilst specific locations are unknown, the DMO preferred option has potential for negative effects during construction where activities required to resolve leakage issues could disturb topsoil and contaminated material. Although effects for both options are considered temporary, cumulative effects could arise where works for each option coincide, or from where they occur one after another within a short period of time and at the same location. Therefore, it is anticipated that there could be potential moderate/minor residual cumulative effects.
Air	To reduce and minimise air emissions during construction and operation.	All three options pose potential effects to air quality during construction. For the DV7a(vi) option and Supplying Teesside Industrial Water option, construction and vehicle movements associated

SEA Topic	SEA Objective	Cumulative Narrative
		with the construction phase would generate emissions and dust for a limited duration. Although there are no AQMAs within 3km of either scheme, adverse effects are anticipated on local air quality in surrounding urban areas to the pipeline route. Whilst specific locations are unknown, the DMO-Preferred option has potential for negative effects during construction where activities required to resolve leakage issues could have moderate negative effects. Cumulative effects during construction could arise where works for each option coincide, or from where they occur one after another within a short period of time and at the same location. Therefore, it is anticipated that there could be potential moderate/minor residual cumulative effects.
Climatic Factors	To minimise/reduce embodied and operational carbon emissions	Both options, DMO Preferred and Supplying Teesside Industrial Water pose effects during construction due to resource use and associated carbon emissions. A minor residual cumulative effect is envisaged.
Landscape	To conserve, protect and enhance landscape and townscape character and visual amenity.	All three options pose potential effects to landscape character and visual amenity during construction. A small area of the proposed DV7a(vi) option passes within 1km of the Howardian Hills AONB. The setting of this AONB could be impacted by increased HGV movements during construction, however effects will be temporary. Whilst specific locations are unknown, the DMO-Preferred option has potential for negative effects during construction where activities required to resolve leakage issues could have moderate negative effects on landscape. Cumulative effects could arise where works for each option coincide, or from where they occur one after another within a short period of time and at the same location. Therefore, it is anticipated that there could be potential moderate/minor residual cumulative effects.
Historic Environment	To conserve/protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting.	All three options pose potential effects to historic environment during construction. The DV7a(vi) option has 15 scheduled monuments and numerous listed buildings within 1km of the scheme construction, of which two listed buildings are located in close proximity (100m), the Supplying Teesside Industrial Water option is likewise in proximity to listed buildings. Construction activities could cause adverse effects on the setting of these designations. In addition, excavation could affect any unknown buried assets. Whilst specific locations are unknown, the DMO-Preferred option has potential for negative effects during construction where activities required to resolve leakage issues could have moderate negative effects on historic environment. Cumulative effects could arise where works for each option coincide, or from where they occur one after another within a short period of time and at the same location. Therefore, it is anticipated that there could be potential moderate/minor residual cumulative effects.
Population and Human Health	To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	All three options pose potential effects to the health and wellbeing of the local community during construction. There are areas where the DV7a(vi) option will come in proximity to a number of residential areas. Construction has the potential for some temporary adverse effects, such as nuisance from noise, dust and vibration. Whilst specific locations are unknown, the DMO-Preferred

SEA Topic	SEA Objective	Cumulative Narrative
		option has potential for negative effects during construction where activities required to resolve leakage issues could have negative effects on the health and wellbeing of surrounding communities. Although effects for all three options are considered temporary, cumulative effects could arise where works for each option coincide, or from where they occur one after another within a short period of time and at the same location. Therefore, it is anticipated that there could be potential moderate/minor residual cumulative effects.
Population and Human Health	Maintain and enhance tourism and recreation	Both options, DV7a(vi) and Supplying Teesside Industrial Water pose effects during construction tourism and recreation. Given the scale of the Dv7a(vi) option, construction activity will have a temporary adverse impact on informal recreation fur to temporary disruption to a range of recreational facilities, such as playing fields, golf courses, sports facilities, play spaces, public paths and rights of way (PRoW). The proposed pipeline also intersects the national cycle network at multiple points. The Supplying Teesside Industrial Water option may also pose some temporary effects on recreation. Angling and other water-based activities may particularly be affected. Whilst effects from both options will be minimised where possible through mitigation, it is anticipated that there could still be potential minor residual cumulative effects.
Material Assets	Minimise resource use and waste production	Both options, DMO Preferred and Supplying Teesside Industrial Water require new infrastructure to be built, thus consuming resources and generating waste during construction. A minor residual cumulative effect is envisaged.
Material Assets	Avoid negative effects on built assets and infrastructure.	Both DMO Preferred and DV7a(vi) pose potential effects to built assets and infrastructure during construction. The DV7a(vi) option crosses railway lines, a major road and the National Cycle Network. There is likely to be temporary effects during construction due to disruption for users, as well as some disruption to the local traffic network. Whilst specific locations are unknown, the DMO-Preferred option has potential for negative effects during construction where activities required to resolve leakage issues could have moderate negative effects on built assets and infrastructure if roads need to be closed or roadworks put in place. Although effects for both options are considered temporary, cumulative effects could arise where works for each option coincide, or from where they occur one after another within a short period of time and at the same location. Therefore, it is anticipated that there could be potential moderate/minor residual cumulative effects.

Table 6.5: Best Value Plan SEA Cumulative Effects During Operation Summary

		SEA Topic																				
		Biodiversity				Soil	Water					Air	Climatic Factors		Landscape	Historic Environment	Population and Human Health				Material Assets	
Option	**Effect**	**1.1**	**1.2**	**1.3**	**1.4**	**2.1**	**3.1**	**3.2**	**3.3**	**3.4**	**3.5**	**4.1**	**5.1**	**5.2**	**6.1**	**7.1**	**8.1**	**8.2**	**8.3**	**8.4**	**9.1**	**9.2**
DMO-Preferred	Positive	++	+	0	+	0	0	++	++	++	+++	0	+	++	++	0	++	++	++	0	0	0
	Negative	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DV7a(vi)	Positive	0	++	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	+++	0	0	0	0
	Negative	0	0	0	-	0	0	-	-	-	0	0	---	0	0	0	0	0	0	0	---	0
Supplying Teesside Industrial Water	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0
	Negative	-	0	--	-	0	0	-	0	-	-	0	-	0	0	0	0	0	0	0	0	0
	Cumulative	N/A	+	N/A	-	N/A	N/A	-	N/A	-	N/A	N/A	--	++	N/A	N/A	N/A	++	N/A	N/A	N/A	N/A

Table 6.6: Best Value Plan SEA Cumulative Effects During Operation Narratives

SEA Topic	SEA Objective	Cumulative Narrative
Biodiversity	To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers	Both options, DMO Preferred and DV7a(vi) pose potential positive effects to biodiversity, priority species and vulnerable habitats during operation. The DV7a(vi) option will provide opportunities for compensatory planting and habitat enhancement in response to the loss of an estimated 988 biodiversity units that would be lost during construction. The DMO-Preferred option will help to improve water efficiency through leakage works, consequently helping to keep more water within the natural environment. This could have a positive effect on biodiversity and vulnerable habitats within the Northumbrian Water region. Cumulative effects could arise where both options coincide, or from where they occur one after another within a short period of time and at the same location. Therefore, it is anticipated that there could be potential moderate/minor residual cumulative effects.
Biodiversity	To meet WFD objectives relating to biodiversity	Both options, Dv7a(vi) and Supplying Teesside Industrial Water pose potential effects to WFD objectives relating to biodiversity. Whilst the DV7a(vi) WFD Phase 1 assessment results identified no risk to compliance, flow reductions as a result of the option are significant and may impact aquatic habitats. The option would reduce many of the moderate flows to the maintained flow condition, potentially leasing to deterioration in biological status elements. Therefore, there are still risks for ecology during operation. As a result, the overall assessment of WFD Regulations for this option is considered to be uncertain. The WFD assessment also found that there is unlikely to be deterioration in water quality that would impact the biological elements as a result of reduced water quality. For the Supplying Teesside Industrial water option, WFD Phase 1 assessment determined that two river water bodies and one transitional water body required further assessment. Following Level 2 WFD assessment, potential adverse impacts (impacts score 2) to biological quality elements (invertebrates and macrophytes and phytobenthic), hydro morphological supporting elements (hydrological regime and mitigation measures assessment) and physicochemical quality elements (ammonia, dissolved oxygen, pH and phosphate). Given the above information, cumulative effects could arise as both the DV7a(vi) and Supplying Teesside Industrial Water options pose a risk to biological elements. Therefore, it is anticipated that there could be potential minor residual cumulative effects.
Water	To enhance or maintain surface water quality, flows and quantity.	Both options, Dv7a(vi) and Supplying Teesside Industrial Water pose potential effects to surface water quality, flows and quantity. Whilst WFD assessment concluded that there is unlikely to be deterioration in water quality in the Tees from River Great to River Skerne WFD water body as a result of the DV7a(vi) option, approximately 13.5km of the proposed pipeline route intersects

SEA Topic	SEA Objective	Cumulative Narrative
		source protection zones 2 and 3. As a result, potential negative effects could occur from this option to surface water during operation. For the Supplying Teesside Industrial Water option, Level 2 WFD assessment for the Tees from River Greta to River Skerne water body identified potential adverse impacts due to the proposed increase in licence of the surface water abstraction (Blackwell). Level 2 WFD assessment also identified potential adverse impacts for the Tees from Skerne to Tidal Limit water body due to the proposed reinstatement of the surface water abstraction at Lower Worsall and the increase in licence at the Blackwell abstraction in the upstream water body. Further assessment is still required to ensure identified flow requirements downstream of the abstraction location are still met under scheme. Given the above information, cumulative effects could arise as both the DV7a(vi) and Supplying Teesside Industrial Water options pose a risk to surface water flows and quantity. Therefore, it is anticipated that there could be potential minor residual cumulative effect.
Water	To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	Both options, Dv7a(vi) and Supplying Teesside Industrial Water pose potential effects to WFD objectives and supporting the achievement of environmental objectives set out in River Basin Management Plans. Based on flows at the nearby Tees and Broken Scar flow gauge, the DV7a(vi) abstraction would be a reduction in Q95 by 76% and Q70 flows by 32%. These flow reductions are significant and may impact aquatic habitats. The option will reduce many of the moderate flows to the maintained flow condition which would potentially lead to deterioration in biological status elements. However, WFD assessment found that there is unlikely to be deterioration in water quality that would impact the biological elements as a result of reduced water quality. For the Supplying Teesside Industrial Water option, Level 2 WFD assessment for the Tees from River Greta to River Skerne water body identified potential adverse impacts due to the proposed increase in licence of the surface water abstraction (Blackwell). Level 2 WFD assessment also identified potential adverse impacts for the Tees from Skerne to Tidal Limit water body due to the proposed reinstatement of the surface water abstraction at Lower Worsall and the increase in licence at the Blackwell abstraction in the upstream water body. Given the above information, cumulative effects could arise as both the DV7a(vi) and Supplying Teesside Industrial Water options pose a potential risk to WFD and River Basin Management Plan objectives. Therefore, it is anticipated that there could be potential minor residual cumulative effects.
Climatic Factors	To minimise/reduce embodied and operational carbon emissions	Both options, Dv7a(vi) and Supplying Teesside Industrial Water require new infrastructure to be built. During operation, new infrastructure will produce carbon emissions where electricity will be required for pumping, and where further material inputs are required for regular maintenance. Therefore, it is anticipated that there could be potential minor residual cumulative effects.

SEA Topic	SEA Objective	Cumulative Narrative
Climatic Factors	To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	Both options, DMO Preferred and DV7a(vi) pose potential positive effects to the climate resilience of assets and natural systems during operation. The DV7a(vi) option will contribute 80/Ml/d, helping to secure a supply-demand balance over the next 25 years, improving resilience to the threats of climate change. The DMO-Preferred option will help to improve water efficiency through leakage works, thus improving the resilience of assets to water scarcity, and also resulting in less water being extracted from the environment for human consumption. Positive cumulative effects will occur as both options will contribute to improving the climate resilience of assets and natural systems within the area. Therefore, it is anticipated that there will be potential moderate/minor residual cumulative effects.
Population and Human Health	To secure resilient water supplies for the health and wellbeing of customers.	All three options pose potential positive effects to securing resilient water supplies for the health and wellbeing of customers. The DV7a(vi) option will transfer sub-potable (partially treated) water, thus minimising the risk of INNS and disease transmission during operation. This will help to secure resilient water supplies for the health and wellbeing of customers. Supplying Teesside Industrial Water will assist in meeting the increase in the demand of raw water, the Blackwell licence is proposed to be increased to 159 Ml/d with the Low Worsall licence increasing to 150Ml/d peak, 85Ml/d annual average. The DMO-Preferred option will help to make the overall management network more resilient as it will help to reduce water demand, thus reducing the future pressure on existing assets to supply demand, and also reducing the need for more supply options required in the future. Positive cumulative effects will occur as both options will contribute to securing resilient water supplies for the health and wellbeing of customers. Therefore, it is anticipated that there will be potential moderate/minor residual cumulative effects.

Summary of other Environmental Assessment

6.4.6 The Preferred Demand Management option has not been subjected to further assessments owing to the limited information and lack of physical footprint known at this stage. As a result, no specific information on cumulative effects in relation to the findings of HRA, WFD, and other environmental assessments, can be reported at this stage. Once more detailed information is provided for the Demand Management option, further assessments are to be carried out where deemed appropriate.

6.5 Sensitivity Scenarios

6.5.1 As part of the WRMP24, Northumbrian Water have considered a 'sensitivity scenario' that could be taken forwards in place of the Best Value Plan.

6.5.2 This scenario proposes a change to the Best Value Plan, with the Yorkshire Water Transfer being replaced by a United Utilities Transfer (with the earliest available delivery date of 2040). This option (WR812c) has been assessed as one of the 89 revised feasible supply options identified as part of the preparation of United Utilities' WRMP24 for the Strategic Resource Zone. The SEA for this option can be found in Table 5.2 of United Utilities' WRMP24 SEA Environmental Report[37]. For a summary of anticipated construction and operational effects see Section 5.2 of the aforementioned report, specifically from paragraph 5.2.2 to paragraph 5.2.43. Whilst this option is unlikely to be selected for progression, a summary of its anticipated key issues, as well as its potential for intra-plan cumulative effects with the Best Value Plan DMO, is included in this report for completeness.

6.5.3 Given the extent of pipeline works that would be required for this option, significant potential negative effects were identified during construction across 13 of United Utilities 17 SEA categories: Biodiversity; Sustainable Natural Resources; Soils, Geodiversity and Land Use; Flood Risk; Air Quality; Greenhouse Gas Emissions; Climate Resilience; Economy; Tourism and Recreation; Human Health and Well-being; Waste and Resource Use; Cultural Heritage; and Landscape.

6.5.4 This means that there are potential cumulative negative effects between the United Utilities Transfer and the Best Value Plan DMO for objectives across all seven of the SEA Topics as set out in this report. However, as specific locations for works associated with leakage reduction for the DMO are not yet known, no detailed assessment of cumulative effects can be made at this stage. Instead, the potential for cumulative effects can only be highlighted for further investigation should the option be progressed, and when more detailed option engineering becomes available. As such, cumulative effects might occur where activities required to resolve leakage issues could coincide geographically with construction of the United Utilities Transfer, or from where they could occur one after another within a short period of time and at the same location. Based on the SEA results for both options proposed in this scenario, the key issues are likely to centre around Biodiversity and Soil, however potential cumulative effects in the other identified areas could still be significant, and so should not excluded from future environmental assessments when specific locations of

[37] United Utilities (2023), *Revised Draft Water Resources Management Plan 2024 Strategic Environmental Assessment, Environmental Report,* Available online at: https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/wrmp24-drafts/revised-draft-wrmp24-sea-redacted.pdf

works are known at a later stage. Additionally, construction phase timeframes will also need to be established at a later stage if the option is to be progressed to assess for any overlap and potential mitigation measures that would need to be put in place.

6.5.5 Northumbrian Water are investigating a further scenario that would see an increase in the volume and frequency of water transferred from the Tyne to the Tees in the future. Their AMP8 WINEP investigation will include modelling that will determine what the potential changes might be. This will depend on future overall levels of demand on the Tees (whether from NW domestic demand, Teesside industrial demand and / or the transfer to Yorkshire Water) and will consider whether any increase in demand could potentially have any impacts on the Tyne and the Tees. This scenario will be assessed jointly by Northumbrian Water and Yorkshire Water as part of the wider Tees to Yorkshire transfer SRO assessment work.

6.6 Cumulative Effects with other Plans, Programmes and Projects (Inter-Plan Effects)

Introduction

6.6.1 Whilst there is no standard approach to the assessment of cumulative effects in conjunction with other plans programmes and projects, the Planning Inspectorate has issued Advice Note Seventeen, which provides useful guidance. This guidance has been taken into account in developing a proportionate approach to assessing cumulative effects for this Environmental Report.

6.6.2 The cumulative effects of the Yorkshire Water transfer option (DV7a(vi)), in-combination with other options considered as part of Yorkshire Water's Best Value Plan and other plans programmes and projects, is considered to be reported in the Environmental Report published by Yorkshire Water as part of their WRMP24 and is touched on lightly below.

6.6.3 A two-stage approach was taken to determine the Inter-Plan Effects:

6.6.4 **Step 1** – A strategic cumulative assessment of the interactions with other policies, plans and programmes which is applicable across theWRMP24.

6.6.5 **Step 2** – A plan based cumulative effects assessment. The plans, programmes and strategic projects considered in this review were:

- Large existing and emerging Local Plan allocations.
- NSIPs listed on the Planning Inspectorate's Website.
- Hybrid Bills.
- Transport and Works Act Orders for large-scale transport infrastructure.
- Minerals and waste applications, including for landfill and energy from waste projects.

Step 1 Methodology

6.6.6 Step 1 comprised a strategic review across other water company WRMP24s, it also included a review of other companies Drought Plans (where applicable) to identify the potential cumulative effects. The RBMPs were also reviewed to identify the potential for any cumulative effects.

Step 2 Methodology

6.6.7 The WRMP should develop an approach, based on the steps set out below, which is appropriate for the maturity of the scheme and scale of development, and provide justification for the approach taken. The first step will be to identify the other plans and developments that will be considered. Given the nature and scale of the Best Value Plan for NW WRMP24, an inter-plan cumulative effects assessment will be needed. The list of developments and plans considered will need to be proportionate to the level of detailed engineering information known at the time. Due to the nature and scale of the preferred demand management option (DMO-Preferred), specific locations of works associated with leakage reduction are not yet known. As a result, only a high-level overview of potential inter-plan cumulative effects arising as a result of the Best Value Plan in-combination with other plans, programmes and projects can be undertaken at this stage. Consequently, this cumulative effects assessment only considers Nationally Significant Infrastructure Projects and Local Plans at a high-level.

6.6.8 Once the WRMP is progressed, and specific locations of leakage works and their design information becomes available, a more detailed inter-plan cumulative effects assessment is to be undertaken. This should consider a greater range of developments and plans, and could include:

- Large existing and emerging Local Plan allocations e.g., 500 or more dwellings.
- Projects on the Planning Inspectorate's Programme of Projects.
- Hybrid Bills e.g., High Speed 2 (HS2) Phase One.
- Transport and Works Act Orders for large-scale transport infrastructure.
- Minerals and waste applications, including for landfill and energy from waste.
- Major planning applications made under the Town and Country Planning Act (1990).

6.6.9 Once the list of other plans and developments to assess has been identified, a schedule will be developed providing information for each development including location information, planning status, and programme for construction/operation, if known, to determine if there is an overlap in temporal scope. This schedule will be mapped against the proposed options being considered to determine where there is potential for in-combination effects between the proposed plans and other plans, projects and programmes listed above. This will allow the potential for cumulative effects of two or more developments by virtue of overlaps in temporal or geographical scope or due to the scale and nature of the 'other development'/receiving environment, and whether these could require additional mitigation. The intention is to identify interactions of construction and/or operational effects between developments. This information is not being collected to inform route and/or site selection decisions.

Results

Step 1: Regional Plans, Other WRMPs, Drought Plans, Drainage Plans and RBMPs

6.6.10 TheWRMP24 supports several local, regional, and national plans and projects. It will have a direct link to water resources and water supply plans and policies, for example in Local Plans. The development of the WRMP24 has taken future population growth into account and as such will support Local Plan policies on growth, housing and development. It will also have additional direct links to plans that relate to health and well-being, housing, and the environment.

6.6.11 Further direct links are possible with other water company's plans and strategies, particularly where water trading and transfers cross water company boundaries, for example the Yorkshire Water Option Yorkshire Water transfer option (DV7a(vi))). The coordination of both mitigation and monitoring activities will need to be undertaken where multiple water companies are responsible for the delivery of a particular option or scheme. The WReN Regional Plan has undertaken a cumulative effects assessment, specifically covering its own intra-plan cumulative effects between the Regional Plan schemes and inter-plan cumulative effects with other Regional Plans and projects; this is considered to be in line with WRPG expectations to seek to manage interactions between WRMP and Regional body plan making activities.

Drought Plans

6.6.12 Water company Drought Plans set out the range of demand management and supply augmentation measures that the company may need to implement during drought conditions to maintain essential water supplies to its customers. The measures include water use restrictions (Temporary Use Bans and Drought Orders to further restrict non-essential water use) as well as Drought Permit or Drought Order options to temporarily authorise amendments to abstraction licence conditions to enable more water to be abstracted during drought from water sources.

6.6.13 The WRMP24 options proposed are linked to both Northumbrian Water's Drought Plan, as well as those of neighbouring water companies as the measures contained in each plan act in-combination to provide a resilient water supply to customers in the region and safeguard the provision of essential water supplies in drought conditions.

6.6.14 The WRMP24 includes schemes to provide greater resilience to severe drought conditions by ensuring that, despite significant growth in demand for water, there is sufficient reliable water provision available to sustain essential water supplies during a severe drought that may only occur on average once in every 500 years. The Supplying Teesside Industrial Water scheme is complemented by a very substantial programme of demand management measures designed to reduce the scale of future growth in demand.

6.6.15 A cumulative beneficial effect is identified as the demand management measures in water company Drought Plans will have beneficial effects on the water environment in-combination with the extensive demand management programmes included in the WRMP24. This is achieved by reducing the pressure on water resources in periods of prolonged dry weather when river flows, and groundwater levels are below normal. This would further enhance the positive effects identified for the water, biodiversity, population and human health SEA objectives, and also highlights the importance of the timing of drought resilience. Cumulative negative effects are also identified during the implementation of the drought management measures, particularly related to aspects such as hosepipe bans and availability of water for recreation.

6.6.16 In terms of geographic location, both the positive and negative cumulative effects may occur in catchments where the Drought Plans are put in place, particularly if this occurs at a time before adequate supply-side options have been introduced. Drought Plans are required to be updated every five years by water companies.

Neighbouring Water Companies WRMP24s and Drought Plans

6.6.17 A review of other water company WRMP24s was undertaken to identify potential interactions with the NW WRMP24. In addition, the WReN Regional Plan concluded that the cumulative

effects of options within the region are less likely to be of an immediate proximity in nature, but instead relate to inter-relationships along a river, within a groundwater body, or in an estuarine / marine environment. The effects are more likely to emerge from the combined operation of options, as abstractions and discharges from proposed new supply options between one, or more, plans.

6.6.18 A cumulative neutral effect is identified for the wider array of SEA objectives aside from biodiversity and water, due to the greater distance that will exist between new supply options contained in other Regional Plans and those set out in the WReN Regional Plan.

Step 2: Cumulative Effects Associated with Programmes and Strategic

6.6.19 All NSIPs are listed on the Planning Inspectorate website[38]. At the time of writing, there are 13 projects located within the Northumbrian Water region at various stages. These are detailed in Table 6.7.

6.6.20 Due to the nature of the preferred demand management option (DMO-Preferred), it is possible for potential cumulative effects with all of these NSIPs, as they are all within the potential zone of influence of the option. The DMO-Preferred option includes 55% leakage reduction by 2050 across the Northumbrian Water region. Whilst specific locations are not yet known, works associated with leakage reduction could coincide with the construction and/or operation of these NSIPs, thus posing potential cumulative effects. Although this only provides a high-level overview of potential cumulative effects with NSIPs at this stage, it does however flag key projects that should be monitored for progress and considered throughout the lifespan of the option, so that potential cumulative effects can be assessed when specific locations of works are known at a later stage. Construction phase timeframes will also need to be established at a later stage to assess for any overlap. There is also potential for leakage works to coincide with developments outlined in Local Plans, however until specific locations are known no further assessment of potential cumulative effects can be made. It is anticipated that cumulative effects could be reduced and/or minimised through appropriate scheduling of construction works so as to avoid any concurrent or consecutive works.

6.6.21 Given the proposed works for the Supplying Teesside Industrial Water option, it is considered that significant cumulative effects for this option with the identified NSIPs are unlikely. All new infrastructure proposed as part of the Supplying Teesside Industrial Water option is to be built within the existing Low Worsall RWPS. All other aspects of the option involve reinstatement of existing infrastructure and/or increases in operational abstraction. As such, it is considered that there is no potential for spatial overlap between the option and the identified NSIPs. There is potential for cumulative effects from increased carbon emissions across the region as a result of their construction and operation. Additionally, there is potential for cumulative effects to occur should construction works associated with the option and the identified NSIPs coincide, however if any effects should arise, then they are likely to be minor, relating to short-term/temporary nuisances. It is expected that any cumulative effects will be reduced and/or minimised through appropriate mitigation.

6.6.22 The cumulative effects of the Yorkshire Water transfer option (DV7a(vi)), in-combination with other plans, programmes and projects, is considered to be reported in the Environmental Report published by Yorkshire Water as part of their WRMP.

[38] https://infrastructure.planninginspectorate.gov.uk/projects/

Table 6.7: NSIPs within the Northumbrian Water Region

Name	Description	Developer	Stage
A1 in Northumberland – Morpeth to Ellingham	Thirteen miles of upgrades to dual the carriageway linking Morpeth and Alnwick bypasses with the dual carriageway near Ellingham, to create a continuous dual carriageway from Newcastle to Ellingham. The A1 Morpeth to Ellingham is one project seeking to widen two sections of the A1 single carriageway to dual carriageway, consisting of: A1 Morpeth to Felton – upgrade approximately eight miles of the A1 between Morpeth and Felton to dual carriageway standard, and A1 Alnwick to Ellingham – upgrade approximately five miles of the A1 between Alnwick and Ellingham to dual carriageway standard.	Highways England	Decision
Morpeth Northern Bypass	Construction of a single carriageway 3.8km long extending from Whorral Bank on the A197, to the northeast of Morpeth, westward to the A1 trunk road to include separate cycleway/footway, new at-grade roundabout to be created at the intersection of the bypass with the existing A192 at Lane End. A new standard grade separated junction with slip roads and a dumbbell roundabout arrangement, to provide 'all movements' access to the A1 trunk road and a link to St. Leonard's Lane. Construction of new bridges at Cotting Burn, How Burn and Kater Dene.	Northumberland County Council	Decided
Port Blyth New Biomass Plant	RES, Port Blyth in Northumberland, 99.9 MW	North Blyth Energy Ltd	Decided
A19 Downhill Lane Junction Improvement	The project is to significantly enhance the capacity of the junction between the A19 and A1290 in Sunderland/South Tyneside, supporting local plans for an International Advanced Manufacturing Park (IAMP) to the north of the existing Nissan plant. It involves the construction of a new bridge to the south of the existing (A1290) bridge across the A19. Together with the existing bridge this will form a more traditional roundabout layout above the A19. New slip roads will connect the A19 to the south. To the north, link roads will tie into the proposed Testos junction Improvement.	Highways England	Decided
International Advanced Manufacturing Park Two (IAMP TWO)	IAMP TWO will be a development that comprises uses which fall within the Infrastructure Planning (Business or Commercial Projects) Regulations 2013 (SI No. 3221), namely industrial processes, storage or distribution uses, office and research and development floorspace. In addition, IAMP TWO will also include but not be limited to integral, ancillary and associated development including: retail; road, cycle, footpath and public transport infrastructure; utilities; landscaping space, environmental mitigation / habitat; training and serviced offices. The IAMP is proposed to be located on land to the north of the existing Nissan site, to the west of the A19 and to the south of the A184.	Sunderland City Council and South Tyneside Council	Withdrawn
A1 Birtley to Coal House Improvement Scheme	The scheme is 6.5 km in length and will consist of online widening of the A1 south of Gateshead to four lanes between junction 65 and 67 on the southbound carriageway and three lanes with lane gain/drop between junctions on northbound carriageway to provide additional capacity. The scheme will also include the off-line replacement of Allerdene Railway	Highways England	Decided

Name	Description	Developer	Stage
	Bridge immediately south of the existing structure to tie into the existing structure at Junction 67 Coal House.		
A66 Northern Trans-Pennine Project	The project comprises the improvement of the A66 between the M6 at Penrith and the A1(M) at Scotch Corner. The existing route is 80km in length and intermittently dualled with approximately 30km of single carriageway, within six separate sections. The scheme comprises upgrades to the existing single carriageway sections of the road to dual carriageway. The scheme also includes junction improvements, minor improvements to the existing dual carriageway sections of the A66. On completion, the project will result in an 80km route with two lanes in both directions. This will improve journey time, safety and connectivity.	National Highways	Recommendation
Byers Gill Solar	The project consists of a proposed solar farm with over 50MW capacity, Solar photo voltaic modules and associated mounting structures, inverters, transformers, switch gear and control equipment, a substation, energy storage equipment and under-ground on and off-site cabling.	JBM Solar	Pre Application
Lighthouse Green Fuels Project	A 'waste-to-sustainable aviation fuel' facility with on-site generating station capacity of up to 150 MW. The facility will treat a combination of commercial & industrial waste, refuse derived fuel (domestic waste) and solid recovered fuel and convert it to various energy-related products, including sustainable aviation fuel and naphtha.	Lighthouse Green Fuels Limited	Pre Application
H2 Teesside	A hydrogen production plant of up to 1,200 megawatt thermal capacity; hydrogen distribution pipelines; an air separation unit or oxygen supply pipeline; carbon dioxide capture and compression facilities and a connection to the Northern Endurance Partnership infrastructure (also known as Net Zero Teesside); a natural gas supply connection; other gas pipelines; an electricity grid connection; water supply and treatment infrastructure; wastewater treatment and disposal infrastructure; and other utilities connections, telecommunications and other associated and ancillary infrastructure.	H2 Teesside Limited	Pre Application
York Potash Harbour Facilities Order	The installation of wharf/jetty facilities with two ship loaders capable of loading bulk dry material at a rate of 12, tons per annum (dry weight). Associated dredging operations to create berth. Associated storage building with conveyor to wharf/jetty. Including a materials handling facility (if not located at Wilton) served by a pipeline (the subject of a separate application) and conveyor to storage building and jetty.	York Potash Ltd	Decided
The Net Zero Teesside Project	A full chain carbon capture, utilisation and storage ('CCUS') project, comprising a CO_2 gathering network, including CO_2 pipeline connections from industrial facilities on Teesside to transport the captured CO_2 (including the connections under the tidal River Tees); a combined cycle gas turbine ('CCGT') electricity generating station with an abated capacity circa 850 gigawatts output (gross), cooling water, gas and electricity grid connections and CO_2 capture; a CO_2 gathering/booster station to receive the captured CO_2	Net Zero Teesside Power Limited "NZT Power" and Net Zero North SEA Storage Limited "NZNS Storage"	Decision

Name	Description	Developer	Stage
	from the gathering network and CCGT generating station; and the onshore section of a CO_2 transport pipeline for the onward transport of the captured CO_2 to a suitable offshore geological storage site in the North Sea.		
Tees CCPP	A gas fired combined cycle gas turbine (CCGT) power station with a maximum generating capacity of up to 1,700 Mwe (TBC). The project will utilise existing Gas and National Grid connections.	Sembcorp Utilities (UK) Limited	Decided

Local Plans

6.6.23 Local Plans are relatively high-level policy documents and, whilst they identify potential areas for future development and zones for particular activities, the certainty of developments, the precise spatial location, and their timing, make it difficult to identify any specific potential cumulative effects. Cumulative effects would only arise if the timing of the works required by the WRMP scheme were to coincide or run consecutively with developments outlined in Local Plans.

6.6.24 As discussed previously, specific locations are not yet known for works associated with the DMO-Preferred option. There is potential for leakage works to coincide with developments outlined in Local Plans, however until specific locations are known for the developments no further assessment of potential cumulative effects can be made. This also applies for potential cumulative effects with these unknown development locations, with the Supplying Teesside Option. It is anticipated that cumulative effects could be reduced and/or minimised through appropriate scheduling of construction works so as to avoid any concurrent or consecutive works. The cumulative effects of the Yorkshire Water transfer option (DV7a(vi)), in-combination with other plans, programmes and projects, is considered to be reported in the Environmental Report published by Yorkshire Water as part of their WRMP.

Sensitivity Scenarios

6.6.25 The sensitivity scenario outlined in section 6.5, is not considered to have any different inter-plan cumulative effects beyond those noted for the Best Value Plan.

6.7 Final Plan Justification

6.7.1 Northumbrian Water have developed an efficient Best Value Plan using a best practice decision making process involving EBSD cost modelling and multi-criteria assessment. The investment that Ofwat allows for these plans will help to continue to provide essential services long into the future. Northumbrian Water recognises that there is a lot more that water companies need to do in the future than has been delivered in the past, meaning that much larger investments are required across all areas of their business. As a result, they have developed these plans with their customers in mind to manage the impact on customer bills while making sure there will be enough water in the region in the future.

6.7.2 Northumbrian Water believe that this Best Value plan delivers its objectives and meets government expectations as set out in section 2.2 of this report. For further information on Northumbrian Water's justification for the Best Value Plan see the main NW WRMP24 Report.

7 Mitigation measures and enhancement opportunities

7.1 Mitigation and Enhancement Measures

7.1.1 Mitigation and enhancement measures were suggested as part of the SEA options assessment process and are recorded in the assessment tables in Appendix K. The outcome of the assessments (reported in Sections 5 and 6) are the residual effects, which means that it is assumed that the identified mitigation has been applied (to the option) and the reported effects are those that remain. It is noted that the HRA Appropriate Assessment and WFD Level 2 assessment – within Appendix F – HRA, and Appendix G – WFD, respectively, for specific supply-side options contain additional description of mitigation relevant to the focus of those assessments, which can be found in the relevant Sections of those documents.

7.1.2 The identified mitigation generally falls into two categories. The first is primary (or embedded) mitigation; generally, actions that are taken to avoid impacts occurring by incorporating them into the options development process. For example, pipeline re-routing and directional drilling to avoid significant effects on designated sites and heritage assets. Incorporation of these measures at this early strategic stage will help deliver a WRMP that benefits the environment and reduces the risk of significant negative effects and cost-prohibitive mitigation measures further down the line during detailed design of specific options.

7.1.3 The second type of mitigation is secondary (or reductive) mitigation. This is where an impact cannot be avoided, and the focus is on reducing the impacts or providing some form of compensations. For example, using renewable energy to reduce carbon emissions. Additional actions such as further investigations and risk assessments can also form and lead to actions which are secondary mitigation.

7.1.4 How the secondary mitigation is secured will depend on the type of mitigation and the consenting route. For some projects, Environmental Impact Assessments (EIAs) will require a systematic review of impacts and the appropriate mitigation. The actions to mitigate the impacts will be identified and documented, for example, in a Construction Environmental Management Plan. Statutory stakeholders such as the Environment Agency, Natural England and Historic England will also seek to secure mitigation, through engagement in the consenting process, with the local planning authority and/or public inspectorate. The granting of consent will include the mitigation (for example, a schedule of commitments, planning conditions, etc.) and Northumbrian Water will be required to discharge those requirements.

7.1.5 Mitigation and enhancement measures specific to each option are presented within the relevant SEA matrix in Appendix K. In addition to this, mitigation measures identified within the more in-depth Level 2 assessments undertaken under the HRA and WFD processes for the supply-side options as appropriate are available within Appendix F – HRA, and Appendix G – WFD, respectively. This information has informed the identification of significant effects presented in Sections 5 and 6.

7.1.6 The HRA Appropriate Assessment secondary mitigation measures may include but are not limited to: biosecurity measures to ensure appropriate removal and/or management control of INNS at source; the use of directional drilling at watercourses of specified sizes; completion of further studies including hydrological modelling of the abstraction on specified rivers; pre-

construction surveys for breeding or resting species within the Zol; and reinstatement of habitats that have been disturbed during construction.

7.1.7 The WFD Level 2 assessment secondary mitigation measures may include but are not limited to: fish and eel screening; adjustment of abstraction conditions to limit changes to hydrological regime; use of licence capping; creation of habitat refuges; and sealing of shafts to ensure minimal groundwater egress after construction.

7.1.8 The reported significant effects in those sections (and in Section 5 and 6) are post-mitigation (residual) effects of the SEA findings and have assumed relevant and applicable mitigation measures are incorporated. As the mitigation measures identified below have been considered in the option assessment process, they all contribute to reducing effects that have been identified as a result of the options comprising the WRMP.

7.1.9 Out of the options forming this WRMP, measures for Northumbrian Water's preferred demand management package and the Supplying Teesside Industrial Water option have been collated into a register, which is included in the WRMP, these measures have also been collated into a register (see Table 7.1). Northumbrian Water are committed to delivering all mitigation measures identified by the SEA and other environmental assessments.

7.1.10 Note that the selected options are those which at this stage of option development have the lowest / acceptable environmental impacts. Any options with unacceptable environmental impacts were considered unfeasible. However, as detailed design progresses for the selected options and more information becomes available, if environmental compliance issues emerge, and identified mitigation is not considered sufficient, or mitigation is unlikely to sufficiently mitigate significant effects than previously rejected, alternative supply-side options would be re-visited.

7.2 Yorkshire Water Option

7.2.1 For their WRMP24, Yorkshire Water have engaged with neighbouring water companies to consider bulk transfer options as part of the regional planning process. New exports and imports were discussed with Northumbrian Water (NW), United Utilities (UU), Anglian Water (AWS) and Severn Trent Water (STW). Through the regional planning process, only one bulk transfer from NW was considered feasible. Yorkshire Water's discussion with NW identified options to import water from the River Tees, with variations on how the water could be transferred (transfer volumes varied from 15 Ml/d to 140 Ml/d). Yorkshire Water's preferred plan includes a new transfer from NW: DV7a(vi) Tees to York Pipeline – NW import 140 Ml/D option. The transfer will require significant additional assets and infrastructure alongside support from Kielder Water operated by NW. It will require a new electricity supply to be connected to a large pumping station in the northeast, an additional rising main pump at the pumping station, a new sub-potable WTW at source to remove the INNS risks, and a new main to Yorkshire Water's York WTW where further treatment capacity will also need to be installed. Yorkshire Water will provide funding for all additional infrastructure requirements.

7.2.2 To select an appropriate solution to their deficit, Yorkshire Water have undertaken an options appraisal process to consider the types of options available to them, and to determine which are feasible for the risks they need to address. Yorkshire Water produced a list of unconstrained options – options that could technically be used to meet the deficit. They then assessed this list to understand which options were technically feasible and thus should be developed further. If an option was determined to not be deliverable it was constrained out, leaving Yorkshire Water with a 'constrained' or 'feasible' list of options.

7.2.3 Yorkshire Water have investigated options to replace their existing STW to YW raw water transfer from the Derwent Valley Reservoirs. They identified a total of 18 unconstrained alternative options to the STW transfer, out of which only five were determined to be feasible, including the River Tees bulk transfer from NW (see Table 8.2 of Yorkshire Water's Draft WRMP24 for a full list of the unconstrained alternative options).

7.2.4 All options included in the feasible list and their associated assets, infrastructure and operating elements were then assessed through desktop studies to determine their costs and impacts. This included quantifying the capital, operating, carbon, environmental and social costs at an individual option level. This information was used to create option specific cost elements for entry into Yorkshire Water's Decision-Making Framework optimisation model.

7.2.5 The optimiser model was run with all feasible options that had passed the screening, and thus were available for selection. In total, Yorkshire Water produced 26 optimised runs. The runs included three variations of the option to transfer water from the River Tees as a new bulk transfer from Northumbrian Water (NW) to their York area. The option was selected in 22 of 26 preliminary runs, with 14 of these selections being the DV7a(vi) Tees to York Pipeline – NW import 140 Ml/D option.

7.2.6 Yorkshire Water used the outputs of their optimisation runs to create a portfolio of supply options for consideration in their preferred plan. The portfolio was used to create candidate solution programmes to be considered as the best value plan. Table 9.5 in their WRMP24 lists all the options included in their portfolio and provides a high-level SEA assessment summary.

7.2.7 The options included in the portfolio were then assessed to identify any risks that would make the option benefit unsustainable over the longer term or any environmental impacts that made the option less favourable than the alternatives. A number of risks were highlighted by the SEA assessment, and it was recognised that further investigation of supply options would be needed if they were to be included in the final solution.

7.2.8 The DV7a(vi) option appeared in six out of Yorkshire Water's seven adaptive pathway options, including their Preferred Plan. It does not appear in the Ofwat core pathway as this alternative outcome would negate the need for the option.

7.2.9 For the DV7a (vi) option, major adverse impacts are anticipated in relation to biodiversity, material assets and resource use, protection and enhancement of geology/soil quality, and minimisation of greenhouse gas emissions.

7.2.10 Consideration of mitigation measures is an integral part of the SEA process. Yorkshire Water's SEA appraisals have been based on residual impacts that are likely to remain after the implementation of reasonable mitigation. Where appropriate, the SEA has identified additional mitigation measures that may be required, either during the construction phase or operational phase. These mitigation measures will be further defined during the more detailed design stages of the schemes as they come forward to implementation. Mitigation measures will be discussed as appropriate with environmental regulators, planning authorities and other statutory and non-statutory stakeholders.

7.2.11 For the DV7a (vi) option, uncertain impacts associated with multiple WFD water bodies have been identified. Further investigations will need to be carried out to confirm these impacts further and to determine whether the option would be WFD compliant. Detailed scheme design will also need to consider risks which have been identified in relation to historical landfills, heritage assets and an AONB. Yorkshire Water will need to consider environmental and social impacts and how to mitigate the effects, such as achieving a 10% biodiversity net gain where

planning permissions are required and reducing operational carbon to align with net zero targets. Further work will be required to support licence applications and planning permissions. Water quality data must be collated, and treatment practices scoped to satisfy regulatory requirements.

7.2.12 The DV7a (vi) option does not have a defined construction period yet, however Yorkshire Water have stated that the option is not to be built until 2040. As such, Yorkshire Water will have sufficient time to further assess the option. As design activity increases and the project moves through the design process, more detailed and targeted mitigation measures will be identified as appropriate.

7.2.13 Appropriate monitoring has also been identified in the SEA to track any potential environmental effects during implementation of the options, which will in turn trigger deployment of suitable and practicable mitigation measures. Prior to implementation, Yorkshire Water will review the specific requirements for environmental monitoring in consultation with the EA, Natural England, and English Heritage, as appropriate.

7.3 Tyne to Tees – Additional Supply

7.3.1 Please note, that as outlined in Section 6.5.5 Northumbrian Water are investigating options that would see an increase in the volume and frequency of water transferred from the Tyne to the Tees in the future. Their AMP8 WINEP investigation will include modelling that will determine what the potential changes might be. This will depend on future overall levels of demand on the Tees (whether from NW domestic demand, Teesside industrial demand and / or the transfer to Yorkshire Water) and will consider whether any increase in demand could potentially have any impacts on the Tyne and the Tees. This scenario will be assessed jointly by Northumbrian Water and Yorkshire Water as part of the wider Tees to Yorkshire transfer SRO assessment work.

Table 7.1: Proposed Mitigation Measures

SEA Topic	SEA Objective(s)	Mitigation
Biodiversity, flora and fauna	1.1 To protect designated sites and their qualifying features. 1.2 To protect and enhance biodiversity, priority species and vulnerable habitats such as chalk rivers. 1.3 To avoid spreading and, where required, manage INNS. 1.4 To meet WFD objectives relating to biodiversity.	A programme of works should be established as early as possible to enable any investigations, surveys and mitigation to be established and give sufficient time for consultation with relevant bodies. The programme should consider any seasonal constraints to avoid adverse effects on sensitive receptors (e.g. breeding birds). Ensure best practicable means to prevent loss of habitat during leakage works. Use of access shafts (or similar) for leakage works, and trenchless/directional drilling pipeline installation methods, to be used to avoid ecologically sensitive locations. Best practice mitigation methods during construction to minimise disturbance effects and habitat loss, i.e., creating a narrow corridor during construction in vulnerable habitats for undertaking leakage works to minimise exposure and protect tree roots**.** Any disturbed habitat will be reinstated to a better condition upon completion, and compensatory habitat is to be considered to replace damaged or lost habitat that can't be reinstated. Construction site layouts, if required for leakage works, must be planned so that machinery and dust causing activities are located away from receptors, as far as is reasonably possible. In addition, careful consideration of the timing of construction activities is needed, as well as on the use of lighting. Measures to reduce noise effects on species (e.g. birds) and residential receptors; including acoustic housing of generators, acoustic cladding surrounding construction site, appropriate siting of plant machinery and silencers or mufflers to be fitted to machinery where possible. Best practice mitigation methods to prevent the spread of INNS, i.e., wash work boots on site after conducting leakage works, as well as the appropriate implementation of other pollution prevention measures. Ecology surveys may be needed to determine the effects and mitigation that will be required as a result of leakage resolution works. Further studies are required, including hydrological modelling of the abstraction on the River Tees, in order to prevent adverse effects on site integrity. This will include the identification of appropriate environmental flows as appropriate. Ensure identified flow requirements downstream of abstraction location are compliant with potential appropriate compensation flow to be considered if necessary. The operational limits of the transfer will be constrained by the updated Northumbria River Basin Management Plan (RBMP) — the principal safeguard related to river basin management. RBMPs set the legally binding, locally specific, environmental objectives that underpin water regulation (such as permitting) and planning activities.

SEA Topic	SEA Objective(s)	Mitigation
		A plan for improving existing habitats downstream of the abstraction as well as increasing habitat suitability in the Teesmouth (proposing new habitats along the coast and enhancing its connection to the shore) should be taken into consideration. this new/enhanced habitat would not only function as a fish refuge, but also as a support for this site's qualifying bird species.
Soil	2.1 To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	Undertake further assessment of environmental effects when more detail is known regarding the leakage resolution works required. Not a designed option as specific locations of leakage works are noy yet known, however construction phase mitigation to be implemented to reduce potential damage to agricultural land, as well as reinstatement if any land is required during construction. There is not anticipated to be any requirement for land take associated with leakage resolution, however temporary loss, where required, should be on non-best and most versatile (BMV) land where possible, and only on BMV land where there are no other alternatives. The reinstatement or reprovision of land will be required post-completion of leakage works, meaning that long term residual effects on agricultural soils as a result of pipeline construction are unlikely. Best practice construction techniques are to be implemented to prevent the disturbance of contaminated material.
Water	3.1 To reduce or manage flood risk, taking climate change into account. 3.2 To enhance or maintain surface water quality, flows and quantity. 3.3 To enhance or maintain groundwater quality and resources. 3.4 To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans. 3.5 To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	Undertake further assessment of environmental effects when more detail is known regarding the leakage resolution works required. Best practice measures to be implemented to reduce the impact on flooding during the construction phase (leakage works), however the risk still remains during construction, meaning short term flood risk effects may remain. Best practice methods during construction to reduce contamination of surface waters and groundwater i.e., creating an access channel/shaft, a clear work area boundary, and use of trenchless/directional drilling pipeline installation methods. Pollution prevention measures are to be implemented. With mitigation, residual construction effects are considered negligible. A Flood Risk Assessment is to be undertaken and above-ground infrastructure will be designed to be flood resilient. Floodplain compensation may be required. Mitigation is proposed in the form of ensuring identified flow requirements downstream of abstraction location (127Ml/d /s of Blackwell) are still met under scheme and if not, appropriate compensation flow is required, perhaps through increased contribution from the Tyne Tees tunnel.
Air	4.1 To reduce and minimise air emissions during construction and operation.	Undertake further assessment of environmental effects when more detail is known regarding the leakage resolution works required.

SEA Topic	SEA Objective(s)	Mitigation
		Best practice mitigation measures implemented during construction to minimise air pollution. Consider shift of employee fleet to electric vehicles to lessen impact from maintenance, audit, and installation visits, however short-term air quality effects may remain. Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transport. Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is reasonably possible. Ensure all vehicles switch off engines when stationary – no idling vehicles. Ensure water suppression is used during demolition, excavation and other earth-moving operations. Any demolitions or concrete breakout to be undertaken in suitable weather conditions i.e. avoiding windy conditions.
Climatic Factors	5.1 To minimise/reduce embodied and operational carbon emissions. 5.2 To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	Undertake further assessment of environmental effects when more detail is known regarding the leakage resolution works required. Best practice mitigation measures implemented during construction. Consider shift of employee fleet to electric vehicles to lessen impact from maintenance, audit, and installation visits. Construction traffic resulting from road closures and/or diversions for works associated with leakage reduction to be monitored, and a traffic/travel plan could be drawn up to ensure that vehicular emissions are avoided where possible. The use of renewables for the energy supply during construction will be investigated, as well as the use of materials with lower embodied carbon. The sustainable use of water should be ensured to reduce the vulnerability of the local environment.
Landscape	6.1 To conserve, protect and enhance landscape and townscape character and visual amenity.	Undertake further assessment of environmental effects when more detail is known regarding the leakage resolution works required. Best practice measures are to be implemented to minimise effects during construction (leakage works), although temporary effects during construction may remain. Measures will be incorporated to reduce landscape and visual impact of construction (leakage works), such as through avoiding unnecessary tree and vegetation removal. Any affected land is to be reinstated upon completion, meaning that with appropriate mitigation no residual effects are likely to remain during operation.
Historic Environment	7.1 To conserve/Protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting.	Undertake further assessment of environmental effects through the design development and consenting process, which may include Environmental Impact Assessment. Best practice measures to be implemented to protect designated and non-designated heritage assets and their settings, likely minimising effects during construction (leakage works). Where possible, registered parks and gardens are to be avoided, however if this is not possible then careful

SEA Topic	SEA Objective(s)	Mitigation
		construction and reinstatement to its original condition with no detrimental effect on the character, appearance, or design is required. Further work is likely to be required to determine the significance of effect, depending on the presence or absence of buried archaeology. Residual effects may remain due to the potential loss of archaeological remains. Archaeological investigations should be carried out prior to commencing construction and the findings will inform detailed mitigation, which will be agreed with the relevant authorities.
Population and Human Health	8.1 To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing. 8.2 To secure resilient water supplies for the health and wellbeing of customers. 8.3 To increase access and connect customers to the natural environment, provide education or information resources for the public. 8.4 Maintain and enhance tourism and recreation.	Undertake further assessment of environmental effects through the design development and consenting process, which may include Environmental Impact Assessment. Best practice mitigation measures e.g. noise, air quality and traffic management to be implemented to minimise effects during construction (leakage works). Where possible, avoid works near to the most sensitive health receptors. Plan construction traffic movements to avoid routes with sensitive receptors and avoid peak traffic hours. The direct land take of recreational sites will be avoided where possible, and any land affected is to be reinstated to at least original condition.
Material Assets	9.1 Minimise resource use and waste production. 9.2 Avoid negative effects on built assets and infrastructure.	Undertake further assessment of environmental effects through the design development and consenting process, which may include Environmental Impact Assessment. Ensure best practice methods to reduce waste through accurate planning for metering and leakage work areas. Production of a waste management plan which details what waste will be generated by the scheme as well as highlight opportunities for reuse or recycling of materials. Minimise waste generation and adopt the waste hierarchy process. Best practice measures including a Traffic Management Plan to be implemented to minimise disturbance during construction (leakage works). However, minor, and temporary effects are likely to still occur.

8 Monitoring Proposals

8.1 Monitoring Proposals

8.1.1 Monitoring the negative effects of implementing the WRMP is an essential on-going element of the SEA process. Monitoring helps ensure that the identified SEA objectives are being achieved and allows for early identification of unforeseen adverse effects and thus appropriate remedial action can be taken. Monitoring will be an important requirement to measure performance and ensure the WRMP is being successfully implemented. Monitoring is required to track environmental effects to show whether they arise as anticipated in the SEA appraisal, to help identify any adverse effects and trigger deployment of any of the mitigation measures. The DCLG guidance states that it is inappropriate to monitor everything, but that monitoring proposals should be focused on the following areas:

- Identify potential breaches of international, national, or local legislation, recognised guidelines, or standards.
- Actions which may give rise to irreversible damage, with a view to identifying trends before such damage occurs.
- Where there was any uncertainty in the SEA and where monitoring would enable prevention or mitigation measures to be taken.

8.1.2 Across both options included in the Best Value Plan, negative effects and/or uncertainty were identified for all SEA topics. Whilst key monitoring parameters should focus on those areas with more significant anticipated environmental risks, all anticipated risks, including minor risks, should be accounted for within the monitoring programme where it is practicable to do so. Any site-specific monitoring requirements for options included within the Best Value Plan will be developed during the planning process, if required for the demand management options, closer to the time of implementation. Table 8.1 presents the SEA monitoring proposals for the WRMP. The indicators have been adapted to those developed as part of the SEA Framework in Table 3.2. Indicators have also been chosen to record the potential benefits that the WRMP achieves.

8.1.3 These monitoring recommendations are based on the Best Value Plan as outlined in this report. As options are brought forward for development, further requirements may be set out in planning applications, or in any Northumbrian Water voluntary best-practice monitoring plans accompanying scheme development. Monitoring proposals are to be discussed with relevant key regulatory bodies and stakeholders. Northumbrian Water should agree monitoring activities that will be proportionate to the anticipated environmental risks, including their geographical and temporal scope, with the Environment Agency, Natural England, and any other affected third parties. Monitoring proposals for the Yorkshire Water transfer option (DV7a(vi)) are considered to be reported in the Environmental Report published by Yorkshire Water as part of their WRMP.

Table 8.1: Monitoring Proposals

SEA Objective	Indicators	Timescale
To protect designated sites and their qualifying features.	Area (ha) and number of statutory and non-statutory ecological sites what will be harmed or lost to WRMP options SSSI monitoring	Annually
To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers.	Area of blue and green infrastructure created	Annually

SEA Objective	Indicators	Timescale
	% of habitat creation or existing habitat enhancement	
To avoid spreading and, where required, manage INNS.	% of INNS risks mitigated	During construction
To meet WFD objectives relating to biodiversity.	Ecological status of water bodies	Annually
To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	Area of agricultural land (by grade) lost to WRMP options	Annually
To reduce or manage flood risk, taking climate change into account.	% of flood risks noted in FRA for projects mitigated	During construction
To enhance or maintain surface water quality, flows and quantity.	Chemical status of water bodies	Annually
To enhance or maintain groundwater quality and resources.	Number of geological sites affected Groundwater quality testing	Annually
To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	Achievements against WFD objectives	Annually
To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	Number of supply disruptions per annum	Annually
To reduce and minimise air emissions during construction and operation.	Local air quality monitoring	During construction
To minimise/reduce embodied and operational carbon emissions	Reduction of greenhouse gas emissions per Ml/d Energy use from new operations and change in energy use per Ml/d % energy supplied by renewable sources Reduction of operational and capital carbon emissions Number of options that utilise existing infrastructure Volume of waste generated Waste disposal method by %	Annually
To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	% of climate risks mitigated	Annually
To conserve, protect and enhance landscape and townscape character and visual amenity.	Number of WRMP options including additional landscaping	Annually
To conserve/Protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting.	Number of historic assets damaged by a WRMP option Number of historic assets enhanced by options	Annually
To maintain and enhance the health and wellbeing of the local	Number of complaints	During construction phases

SEA Objective	Indicators	Timescale
community, including economic and social wellbeing.		
To secure resilient water supplies for the health and wellbeing of customers.	% of people with deficits for each WRMP	Annually
To increase access and connect customers to the natural environment, provide education or information resources for the public.	Number of PRoW closures or diversions Number, type, and area of community assets created Km of new footpath/cycleway created	During construction phases Every five years
Maintain and enhance tourism and recreation	Number of tourism assets created	Annually
Minimise resource use and waste production	% of A-Rated, recycled, reused material used in infrastructure options Number of options that utilise existing infrastructure Volume of waste generated Waste disposal method by %	Annually
Avoid negative effects on built assets and infrastructure	Number of complaints Number of road closures or diversions	During construction

8.2 Links to other tiers of Plans, Programmes, and the Project Level

8.2.1 The WRMP and its options have been assessed at a high strategic level. The options that form the WRMP (the Demand Management Option) are unlikely to be subject to the formal planning process and are unlikely to require an Environmental Impact Assessment under the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (as amended). However, they may need to be considered as part of cumulative and in-combination effects assessments for other WRMPs, in particular that of the Yorkshire Water transfer option (DV7a(vi)) included in this WRMP and the Yorkshire Water WRMP. Requirements for EIA will be determined on an option by option basis. As part of this process more detailed option specific mitigation measures will be developed.

8.2.2 The WRMPs support several local, regional, and national plans and programmes. It will have a direct link to water resources and water supply plans and policies, for example in Local Plans. The development of WRMP has taken future population growth into account and as such will support Local Plan policies on housing and development. The WRMP will also have indirect links to plans relating to health and well-being, housing, and the environment.

8.2.3 Links are possible with other water company's plans and strategies, particularly where water trading and transfers cross water company boundaries. A Yorkshire Water transfer is proposed which would link Northumbrian Water Region to the Yorkshire Water Region. These options are reported on in this Environmental Report however the Yorkshire Water will have its own WRMP and it is anticipated that cumulative effects will be reported there. Yorkshire Water's WRMP24 is also summarised in Section 3.2. The WRMPs cover the 25-year period from 2020 to 2045. The options considered here may be included in the WReN programme. The WReN Programme is a long-term water resources strategy to 2100. The purpose of the WReN programme is to develop a reliable, affordable, and sustainable system of water supply in the North of England which is resilient to the effects of climate change, growth, and multi-season drought. The WRMP is aligned with the WReN preliminary regional strategy.

9 Consultation and Next Steps

9.1 SEA Summary

Summary of Berwick Upon Tweed Supply Side Options SEA

Construction

9.1.1 During the construction phase, most of the options are not anticipated to result in significant residual effects to the SEA objectives. Only BOT-ABS-007 and BOT-TRA-002 result in moderate negative effects to biodiversity objectives. These are as a result of potential construction phase effects on Natura 2000s sites and to habitats required to deliver BNG. Other effects during the construction phase are considered to be minor and therefore no significant.

9.1.2 During construction, there are not anticipated to be any significant positive environmental effects. There are potential minor positive effects related to increased employment opportunities during the construction phases however this is not deemed to be significant.

Operation

9.1.3 During the operational phase, there are considered to be moderate, and therefore significant, residual negative effects to water and biodiversity objectives for BOT-ABS-002, and to water objectives for BOT-ABS-007. This is associated with changes to abstraction activities and outfall for existing water sources in the region, as well as to potential changes in the water table, resulting in likely negative effects on designated sites and their qualifying features.

9.1.4 During operation, there are anticipated to be no significant residual positive effects to SEA objectives. Any residual positive effects during the operation phase are considered to be minor, and therefore not significant. All options will have minor positive effects on population and human health, while TRA-001, 001 and 004 also have minor positive effects on water objectives.

Summary of Yorkshire Water Option SEA

Construction

9.1.5 During the construction phase, there are considered to be a number of major and moderate, and therefore significant, residual negative effects posed by the Yorkshire Water option (DV7a(vi)) to biodiversity, soil, air quality, landscape, historic environment, and population and human health SEA objectives. These are as a result of the proposed pipelines close proximity to designated sites, its required temporary land take within a large quantity of greenfield, best and most versatile agricultural land, and a small quantity of Agricultural Land Classification Grade 2 (land of medium to high value), its anticipated temporary adverse effects on local air quality in surrounding urban areas and its potential to cause nuisance from noise, dust and vibration as a result of construction and vehicle movements, its proximity to AONB, scheduled monuments and numerous listed buildings in which there is potential for temporary adverse construction effects on the setting of these designations coming from construction activities and vehicle movements, its temporary disruption to a range of recreational facilities, and its significant use of materials. Any other residual negative effects are considered to be minor, and therefore not significant.

9.1.6 During construction, there are not anticipated to be any significant residual positive effects to SEA objectives. There is also anticipated to be no minor positive effects.

Operation

9.1.7 During the operational phase, there are considered to be major, and therefore significant, residual negative effects posed by the Yorkshire Water option (DV7a(vi)) to climatic factors and material assets SEA objectives. These are as a result of the proposed pipelines significant use of materials and the large quantity of embodied carbon emissions associated with this, as well as from carbon emissions associated with anticipated HGV movements and construction activities, and from electricity requirements required for pumping during operation. Any other residual negative effects are considered to be minor, and therefore not significant.

9.1.8 During operation, there are anticipated to be major and moderate, and therefore significant, residual positive effects to biodiversity, climatic factors, and population and human health SEA objectives. These are as a result of potential beneficial opportunities for areas of habitat affected by construction through compensatory planting and habitat enhancement, in particular grassland and woodland habitat local to the scheme, the proposed pipeline helping to secure a supply-demand balance over the next 25 years, thus helping to maintain essential public water supplies and therefore help maintain public health and well0being, as well as improved resilience to the threats of climate change. No minor positive effects are anticipated.

Summary of Northumbrian Water Demand Management Options SEA

Construction

9.1.9 During the construction phase, there are considered to be no significant residual negative effects to SEA objectives as a result of all three demand management option scenarios. Any residual negative effects during the construction phase are considered to be minor, and therefore not significant. The DMO-Preferred option scenario (the preferred option included in the Best Value Plan), and the DMO-High option scenario were assessed as having minor negative effects to objectives in all SEA topics, with the DMO-Low option scenario having minor negative effects to objectives in all SEA topic apart from water.

9.1.10 During construction, none of the demand management option scenarios were considered to have significant residual positive effects to SEA objectives. Additionally, no minor positive effects were anticipated.

Operation

9.1.11 During the operational phase, none of the demand management option scenarios were considered to have significant residual negative effects to SEA objectives. Additionally, no minor negative effects were anticipated.

9.1.12 During operation, there are anticipated to be significant residual positive effects to water and population and human health SEA objectives as a result of all three demand management option scenarios, with DMO-Preferred and DMO-High also having significant residual positive effects to climatic factors objectives. The DMO-High option was also assessed as having potential residual positive effects to landscape objectives. Positive effects are generally associated with improved water efficiency and leakage works, resulting in lower water demand, and therefore less extraction of water from natural environments for human consumption. This could, for example, increase resilience of water supplies and natural systems to droughts, help to enhance or maintain surface water quality, flows and quantity, as well as providing other significant positive effects. Through improved water efficiency, and leakage reduction of 55% by 2050, the DMO-Preferred scenario is anticipated to yield an annual water saving of 52,246.1 Ml for the year 2074/75 (143.14 Ml/d average). The DMO-High scenario (improved water efficiency and 50% leakage reduction by 2050) is anticipated to yield an annual water saving of 63,919.1 Ml for the year 2074/75 (183.34 Ml/d average). The DMO-Low scenario (improved water

efficiency and 30% leakage reduction by 2050) is anticipated to yield an annual water saving of 30,324.2 Ml for the year 2074/75 (83.08 Ml/d average).

Summary of SEA of Supplying Teesside Industrial Water Option

Construction

9.1.13 During the construction phase, there are considered to be no significant residual negative or positive effects to SEA objectives as a result of the Supplying Teesside Industrial Water Option. Minor adverse effects were identified for six objectives during the construction phase, further details can be found in Appendix K.

Operation

9.1.14 During the operation phase, potential significant residual negative effects were identified for the objective 'To avoid spreading and, where required, manage invasive and non-native species (INNS)' due the physical transfer of untreated water between two locations. No other significant residual adverse effects were identified. Positive effects were identified for securing resilient water supplies for the health and wellbeing of customers. Potential minor adverse effects were identified for the option Supplying Teesside Industrial Water due to increased abstraction and the risks for effects on water quality, biodiversity and the natural systems resilience to drought. Further details can be found in Appendix K.

9.2 Conclusion

9.2.1 Water companies have a statutory obligation to produce a WRMP which sets out how a company intends to maintain the balance between supply and demand for water over a minimum 25-year period. To meet this statutory obligation, Northumbrian Water have followed the Water Resource Planning Guideline to produce their WRMP24, a management plan that efficiently delivers resilient, sustainable water resources for customers and the environment, both now and in the long-term, within the Northumbrian Water region.

9.2.2 This report is the Environmental Report prepared specifically for the NW WRMP24 to meet legislative requirements at a national and international level and provides details for WRMP24 including a plans and programmes review, baseline information, and key issues and opportunities specific to the Northumbria Region, included in the Scoping Report. The SEA and other environmental assessment process assesses the effects of certain plans and programmes prepared for water management plans and options on the environment and sets the framework for development consents. The SEA also works to inform the decision-making process through the identification and assessment of significant and cumulative effects a plan or programme may have on the environment. The SEA process is conducted at a strategic level and enables consultation on the potential effects of a plan with a wide range of stakeholders. The options initially considered as part of the Northumbrian Water WRMP24 are presented in Section 5. They included both supply-side and demand management options, and where appropriate, were subject to the full suite of environmental assessment as outlined in Section 4. The results of these assessments are presented in Section 5, including a summary of SEA results split by anticipated construction and operational effects for each option considered, as well summaries of specific environmental assessments, such as HRA, WFD, and BNG.

9.2.3 In producing their WRMP24, Northumbrian Water undertook a Baseline Supply Forecast. This forecast confirmed the amount of Water Available For Use (WAFU) in Ml/d in each of their WRZ across the planning period. This was then compared against forecast demand to present a supply demand balance. Following this approach, Northumbrian Water initially forecasted final plan supply surpluses in both their WRZs, therefore confirming at the time that there was no need to identify, develop and appraise new physical supply options as part of this WRMP. As a

result, it was initially proposed that only the preferred demand management package and the Yorkshire Water transfer option (DV7a(vi) would be taken forward as part of Northumbrian Water's Best Value Plan. However, as a result of updated modelling, NW have since proposed a new supply-side option to be taken forwards as part of their Best Value Plan – The 'Supplying Teesside Industrial Water' option. As such, Northumbrian Water's final WRMP24 now includes their preferred demand management package of demand management options, a Yorkshire Water transfer option, and the Supplying Teesside Industrial Water option. The Best Value Plan is outlined in Section 6, and is also assessed for potential cumulative effects. Additionally, section 6 details Northumbrian Water's final plan justification for their Best Value Plan and summarises how the plan meets its objectives and government expectations.

Potential intra-plan cumulative effects during construction were identified to seven SEA Topics: Biodiversity, Soil, Air, Landscape, Historic Environment, Population and Human Health, and Material Assets. Potential intra-plan cumulative effects during operation were identified to four SEA Topics: Biodiversity, Water, Climatic Factors, and Population and Human Health. Intra-plan cumulative narratives are provided in Table 6.4 and Table 6.6. These provide a high-level assessment of how cumulative effects may arise for each SEA Objective flagged as having potential cumulative effects.

Potential inter-plan cumulative effects have been identified where possible. A two-step approach was taken, with the methodology and results of each step available in Section 6.6.

9.3 Next Steps and Consultation

9.3.1 A draft version of the SEA Environmental Report was published for consultation, with the consultation period running from 18 November 2022 to 24 February 2023. Following the closure of the consultation period, all consultation responses were reviewed and considered, and the SEA Environmental Report was updated where appropriate to reflect these comments, as well as any proposed changes to the WRMP24.

9.3.2 Consequently, a revised version of the SEA Environmental Report was issued for the next stage of the WRMP process alongside the revised WRMP24 and Northumbrian Water's Statement of Response in July 2023.

9.3.3 Following the inclusion of the new Supplying Teesside Industrial Water option, the SEA Environmental Report has been updated in April 2024 for issue alongside the final WRMP24 and Northumbrian Water's Statement of Response.

9.3.4 Following adoption of the WRMP24, a Post-Adoption statement will be produced which outlines how the SEA process has influenced the development of WRMP, how consultation comments were taken into consideration and how the WRMP will be monitored. This summary will provide enough information to make it clear how the NW WRMP24 was influenced as a result of the SEA process and consultation.

9.3.5 Stage E 'Monitoring implementation of the plan' of the SEA process will be carried out by Northumbrian Water. It is likely that monitoring of the WRMP24 will be incorporated with the annual monitoring process. Monitoring proposals will be developed as part of the SEA process and presented in the SEA Environmental Report.

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