Appendix:
YKY26_WRMP Supply-Demand Enhancement Case
[Public]

YKY26_WRMP Supply-Demand Enhancement Case [Public]

YorkshireWater

Navigating this document

This Appendices document is separate to and supports the main business plan document.

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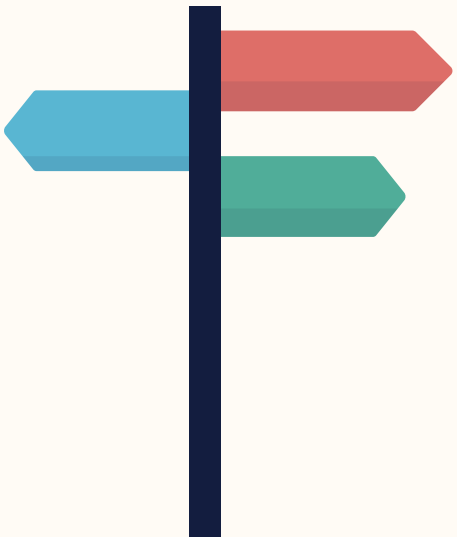
This icon can be clicked on to go to the main Yorkshire Water Business Plan document where more information can be found.

More detail on this subject can be found in **Chapter 8 Part 2: What our plan will deliver**



Contents

1. WRMP Supply-Demand Enhancement Case

1.1 Driver:

Water Resources Management Plan (WRMP)

1.1.1 Requested Investment:

Table 1.1: Supply-Demand Enhancement in AMP8

	£m	Table Line Ref.
Enhancement Expenditure Capex	149.333	CW3.41, CW3.44, CW3.47
Enhancement Expenditure Opex	66.966	CW3.42, CW3.45, CW3.48
Base Expenditure Capex		
DPC value	177.053[1]	SUP12
Total	**393.352**	

1.1.2 Associated Reporting lines in Data Tables:

Table 1.2: CW3 Reporting Lines

Line Number	Line Description
CW3.41	Supply-side improvements delivering benefits in 2025-2030; SDB capex
CW3.42	Supply-side improvements delivering benefits in 2025-2030; SDB opex
CW3.43	Supply-side improvements delivering benefits in 2025-2030; SDB totex
CW3.44	Demand-side improvements delivering benefits in 2025-2030 (excl leakage and metering); SDB capex
CW3.45	Demand-side improvements delivering benefits in 2025-2030 (excl leakage and metering); SDB opex
CW3.46	Demand-side improvements delivering benefits in 2025-2030 (excl leakage and metering); SDB totex
CW3.47	Leakage improvements delivering benefits in 2025-30
CW3.48	Leakage improvements delivering benefits in 2025-2030; SDB opex
CW3.49	Leakage improvements delivering benefits in 2025-2030; SDB totex

WRMP also has its own set of data tables – CW8.

1.1.3 High Level Driver description

The Water Resources Management Plan (WRMP) is a statutory requirement of Yorkshire Water under the Water Resources Act 1991. Water companies must prepare a new WRMP at least every five years and the plan must forecast forward by at least 25 years. WRMPs are prepared in line with Environment Agency guidelines and supporting detailed technical methodologies. The plan compares forecasts of future water supply – given pressures such as climate change

[1] This is the enhancement element of the DPC investment only

and the need to protect the environment – with future demand for water from customers, businesses and industry.

Where the plan forecasts that there may be a future deficit of supply, if demand plus headroom (headroom is an allowance to account for uncertainty within the forecasting process) exceeds supply, then the plan must set out actions to address that deficit. These actions may comprise supply-side actions such as making greater use of existing water supplies, bringing new sources in to supply or trading with third parties including neighbouring water companies. They may also include demand side actions such as reducing leakage from the supply network and working with customers to reduce their use of water.

Where appropriate, the plan must include regulatory and Government requirements or expectations, for example in relation to Environment Act targets to reduce demand, leakage reduction targets and requirements to reduce abstraction to protect the environment. Our plan is aligned with regional planning objectives and national ambition (as set of in the National Framework for Water Resources) and therefore there is direct alignment between our WRMP24 and the objectives of Water Resource North regional plan.

A number of significant changes in our external environment mean that our WRMP24 will be substantially different to previous recent plans as it includes the need for supply side options to address the supply demand imbalance as well as demand reduction as part of a twin track approach. Therefore, for AMP8, we are need to invest to improve our water supply capacity, along with investment to reduce customer demand (both non household and household) and leakage. In our metering enhancement case, we set out how we are improving our water efficiency and leakage reduction capabilities utilising smart metering. This document focusses on the water efficiency solutions and leakage investments which are additional to smart metering.

Read more about this at
Metering Enhancement Case

1.1.4 Our WRMP status

Our draft WRMP and supporting documents are available on our website. At the time of submitting the business plan, we are working towards completion of our revised draft WRMP (rdWRMP). Our preferred plan will be updated in our rdWRMP in Autumn 2023.

Read more about the draft WRMP at
Water Resources Management Plan

YW's draft WRMP24 was published in November 2022 and was subject to a consultation period. YW published their 'Statement of Response' (SofR) to the points raised in the consultation in July 2023. This signalled our intent to address the feedback we received and to incorporate this, where practicable, into our revised draft plan. The revised draft WRMP is in process, such that the final outputs are not available to fully inform our business plan. Therefore, as per the Ofwat guidance, we have based our business plan on our 'best view of our rdWRMP. This includes supply options as per the draft WRMP with updates to the demand components in alignment with the expectation that we use our best available data. We will reference relevant initiatives that have changed such as smart metering in both the tables and narrative. Following submission any changes to the draft numbers will be reconciled with the PR24 plan.

Read more about the Statement of Response at
Yorkshire Water Statement of Response to Draft WRMP24

1.2 Context for our WRMP

Our WRMP24 is developed in conjunction with other frameworks, plans and strategies created by Yorkshire Water and other external bodies, including our regulators.

We consider interconnections with other plans when building the supply and demand components of our WRMP, and in formulating the outputs. For example, local authority plans are used in compiling our demand forecast. External strategies, frameworks and regulatory objectives are considered in our environmental assessment of our supply and demand options (such as Local Nature Recovery Strategies, the Water Framework Directive and Habitats Regulations).

1.2.1 Our water supply system

We have a highly connected network that can transfer water around our supply area. We take water from reservoirs, rivers, and groundwater sources. In most years this provides sufficient flexibility for us to meet customer demand. However, in extreme dry weather, when demand is high and we receive much less rainfall than average, we need to enact measures set out in our Drought Plan (see drought section below for summary of our Level of Service).

Our WRMP24 aims to make us less reliant on drought measures in the future. For planning purposes, our supply system is split into water resource zones based on our network and our ability to transfer water within our own supply area.

Our WRMP24 considers the future needs in the two water resource zones, which are shown in Figure 1.1 and make up the Yorkshire Water area: These zones are the Grid Surface Water Zone (Grid SWZ), which includes over 99% of our customers, and the East Surface Water Zone (East SWZ), which is a small area covering Whitby and part of the North York Moors National Park.

Figure 1.1: Grid Surface Water Zone

Source: Yorkshire Water, Non-technical summary of dWRMP, Oct 2022, pg. 9.

1.2.2 The Government's 25 Year Environment Plan

The Government's 25 Year Environment Plan sets out the government's goals for improving the environment, within a generation, and leaving it in a better state than found. One of the key objectives includes 'improving at least three quarters of our waters to be close to their natural state as soon as is practicable', and to address the future water resource demands of both the water users and the environment for 25 years or more.

The publication of this 25 Year Environment Plan and subsequent passing of the Environment Act 2021, will lead to long term targets set across a range of areas including water. It also provisions for collaboration between water companies over water resources planning to be formalised through the regional planning process.

Included in the 25 Year Environmental Plan are new legally binding targets set for water demand reduction across the three measures of Leakage, Per Capita Consumption (PCC) (household (HH)) and Business Demand (non-household (NHH)).

1.2.3 National Framework for Water Resources

In 2020, the Environment Agency published a policy paper, '*Meeting our future water needs: a national framework for water resources'.* This sets out actions and ambitions for meeting the needs of all water users and for restoring, protecting and improving the water environment. The actions include a requirement for each of the five regional groups to produce an overarching regional plan for their area that would inform water companies' Water Resources Management Plans. The Regional Plan objectives, as set out in the National Framework, include:

- Reduce PCC to an average 110 litres of water per person per day by 2050 and drive down water use across all sectors.
- Halve leakage rates by 2050, compared to 2017/18 levels.
- Develop new supplies such as reservoirs, water reuse schemes and desalination plants as well as innovative cross-sector options that bring broader benefits.
- Move water to where it's needed through more transfers of different scales and lengths.
- Increase resilience to drought so that restrictions such as rota cuts and standpipes are needed no more than once every 500 years on average by the 2030s.
- Reduce the use of drought measures that have an impact on the environment.
- Proactively enhance the environment and increase ambition, particularly for protected and other sensitive species/habitats (also referred to as 'Environmental Destination').

1.2.4 The Yorkshire Water Drought Plan

Our Drought Plan complements our WRMP by setting out the actions we take when our area is approaching or in a drought. It describes how we enhance available supplies, manage customer demand and minimise the environmental impacts of our drought actions. The actions are linked to our levels of service for temporary use bans, drought permits or orders for increasing supplies or an essential use ban and for emergency drought actions (level 4 restrictions e.g., rota cuts).

Read more about our Drought Plan at
Yorkshire Water Drought Plan

For periods of dry weather, we will maintain the actions in our drought plan, but over the lifetime of the plan we will reduce our reliance on these measures moving from the most serious of measures being required once in every 200 years, to the most serious of measures being required once in every 500 years.

Our data shows that climate change is likely to already be having an impact on our water availability. In recent years we have experienced several periods of prolonged hot, dry weather (2018, 2020 and 2022) that have put our water supply system under stress. In the future, we expect to experience more severe droughts. We must ensure that we remain resilient to dry weather impacts. Existing initiatives, such as leakage reduction and our customer water saving programme will contribute to improving resilience.

Our WRMP aims to ensure our levels of service can be maintained or improved. WRMP24 shows we are not currently operating to the level of service for level 4 actions we stated in our drought plan. It sets out our plan to achieve this by no later than 2039. Our target levels of service for our two water resource zones are given below.

Figure 1.2: Target Levels of Service

Measure	Frequency
Level 1: Drought actions with minor environmental impacts and appeals for voluntary reductions in use	No limit
Level 2: Introduction of temporary use bans	No more than 1 in 25 years on average
Level 3: Supply-side drought permits / orders and non-essential use drought orders	No more than 1 in 80 years on average
Level 4: Emergency drought orders	1 in >500 years (This is an estimate of an exceptionally rare event)

Source: Yorkshire Water, Non-technical summary of dWRMP, Oct 2022, pg. 11.

1.2.5 The Yorkshire Water Drainage and Wastewater Management Plan

The Drainage and Wastewater Management Plan (DWMP) is the waste equivalent of the WRMP. The WRMP and DWMP follow the same time horizons and principles, to ensure resilient water and wastewater services now and in the future. Where appropriate, it is important that the two are considered together and complement each other when making business decisions.

Read more about the DWMP at
Yorkshire Water Drought and Wastewater Management Plan

At this stage there are no direct linkages between the interventions we plan to carry out in our WRMP and our DWMP, although there are important implications to consider in respect of customers' water consumption and disposal. In the future there will be potential to explore options that would result in direct alignment of the DWMP and the WRMP, such as the use of grey water or effluent reuse to offset potable water demand.

1.2.6 River Basin Management Plans

River Basin Management Plans (RBMPs)[2] set out the environmental objectives for the water environment and are the foundation for delivering the government's 25 Year Environment Plan 'clean and plentiful water' goal. Under the Water Framework Directive (WFD)[3] the Environment Agency must prepare a RBMP for each river basin, which includes the statutory environmental objectives and a summary of the programmes of measures required to achieve those objectives.

The WFD and associated legislation (notably the Habitats Regulations[4]) directly informs Yorkshire Water's programme of supply-side enhancements, ensuring that our surface and groundwater abstractions continue not to cause environmental damage or deterioration. In addition, we must consider the longer-term changes that we may need to make in the future beyond existing statutory requirements in support of our long-term Environmental Destination and through our adaptive, best value water resources plans.

Our Water Resources WINEP, which has been developed in consultation with the Environment Agency (and in the case of the Habitats Regulations, Natural England) sets out the actions that we must undertake to meet the environmental requirements. It includes a combination of investigations (to identify the relevant measures to deliver against the statutory obligations) and implementation schemes (where previous investigations or other drivers have identified the need for implementation through the WINEP). This has an ongoing, cyclical role in determining the extent and pace of changes to abstraction and the resulting impact on WRMP supply forecasts.

The WINEP also forms the basis for our interpretation of the Ofwat Common Reference Scenarios for abstraction reductions.

Read more about our this at
WINEP Enhancement Case

1.2.7 Water Resources North regional plan

Yorkshire Water is part of one of five national regional planning groups – the Water Resources North (WReN) Regional Planning Group.

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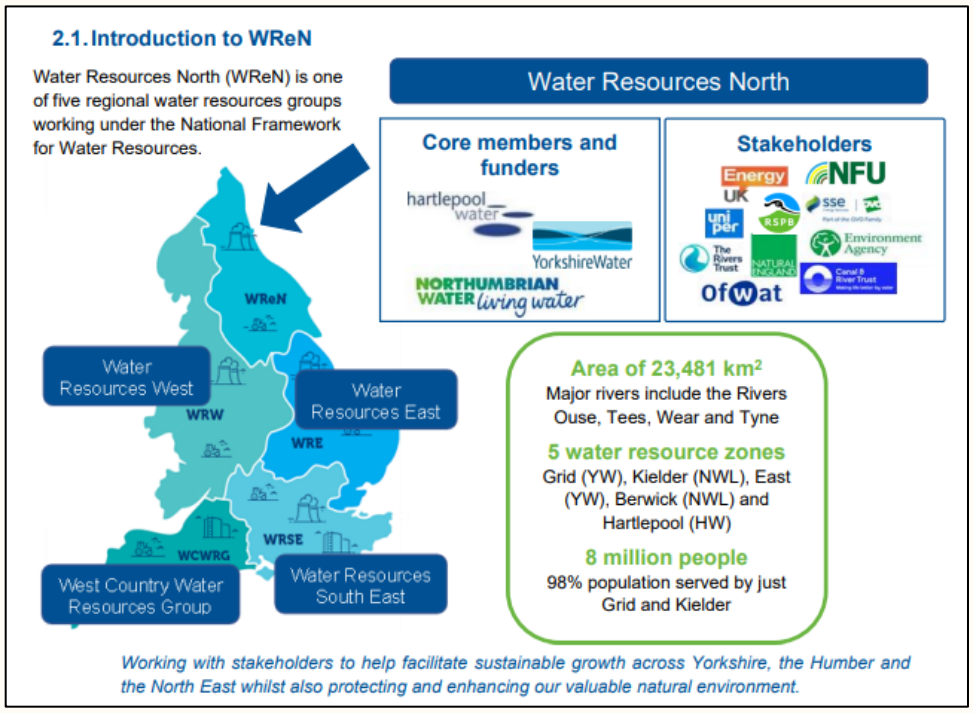
[2] Available from the Environment Agency at: https://www.gov.uk/guidance/river-basin-management-plans-updated-2022#view-river-basin-management-plans . Under the WFD Regulations, a river basin management plan must be developed for each river basin district and reviewed and updated every 6 years. These plans were updated December 2022. The plans will be reviewed and updated again by December 2027.
[3] The Water Environment (Water Framework Directive) (England & Wales) Regulations 2017
[4] Conservation of Habitats and Species Regulations 2017

Figure 1.3: WReN Planning Group



Source: WReN, please visit www.waterresourcesnorth.org/our-region/wren-regional-draft-plan/

WReN was assembled to oversee water resources planning at a regional scale for Yorkshire and the North East of England. The WReN regional group members include stakeholders with an interest in water resources in our region, including energy providers, agriculture, navigation, industry, water companies and representatives from key groups and trusts.

Yorkshire Water is producing the first WReN Regional Plan in partnership with Northumbrian Water (NWL), Hartlepool Water (HW) and the regional group members.[5] Regional water resource plans provide a process for water companies to plan for the long-term in collaboration with other abstractors in the same region. They aim to address the future water resource demands of both the water users and the environment for 25 years or more. This includes improving resilience to drought and contributing to national resilience through bulk transfers between regions, if these prove to be best value solutions.

Our WRMP24 has been developed in parallel to the WReN Regional Plan and the above objectives have been considered in our decision-making, at both a regional and company level to form our best value plan. The final solution of our plan is aligned with the WReN Regional Plan solution. We will continue to incorporate the National Framework objectives into future iterations of both plans as further information becomes available.

1.3 Need for investment

1.3.1 The Need for the Proposed Investment

The Water Industry Act 1991 sets a statutory requirement for water companies to produce and publish water resource management plans at least every five years. The government and its regulatory bodies (Environment Agency, Ofwat, Drinking Water Inspectorate and RAPID) provide guidelines, expectations, and directions that we must follow. In addition, there are numerous other well documented approaches and best practice guides that help us build individual components of the plan – for example, UKWIR methods for calculating water resources yield, and guidance on how to take a risk-based approach to planning.

Our work developing our draft WRMP has predicted a supply deficit in the Grid surface water zone from the beginning of AMP8. The fundamental need for investment set out in this case is to

[5] The WReN Regional Plan is available on the WReN webpage via this link https://www.waterresourcesnorth.org/. Further information on the Government's requirements of regional plans can be found via this link: https://www.gov.uk/government/publications/meeting-our-future-water-needs-a-nationalframework-for-water-resources.

ensure that we can provide a sufficient supply of wholesome water to meet customer demand over AMP8 and the coming decades.

1.3.1.1 Supply-demand balance

There are a number of challenges and emerging risks which have an impact on our supply-demand balance and our ability to provide a resilient water supply into the future. These are summarised below:

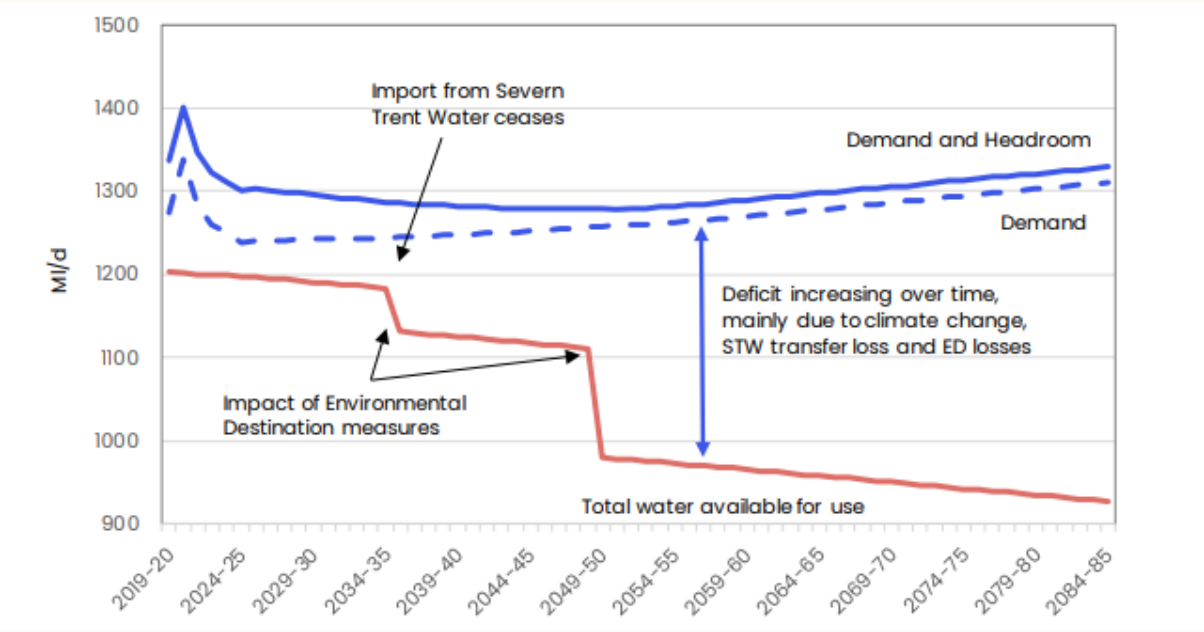
- Increasing risks from climate change reducing available supply, linked to UKCP18 (which has increased the impact in our region compared to WRMP19).
- Future license reductions to protect the environment.
- An increase in demand during dry weather.
- Extreme weather events - we have created a critical period scenario for our grid zone (Since producing our WRMP19 we have experienced extreme weather events in 2018 and 2022.)
- The Covid-19 pandemic in 2020 led to unprecedented demands that tested our supply system.

Once all the emerging risks were incorporated into our forecasts for supply and demand over a 60-year planning period, our WRMP24 indicated, in extreme dry years there is a risk of a supply-demand deficit throughout the planning period (2025 to 2085).

Due to new information since we prepared our WRMP19, our draft WRMP24 shows that our forecast deficit has grown across the short and longer term. At WRMP19 we had a deficit in the mid 2030's of 4 Ml/d rising to 34Ml/d by 2045. In the draft WRMP24, the deficit in 2025 in a 1 in 500-year scenario in the Grid zone is 105Ml/d and by 2050, it increases to 299Ml/d. Further work done to date on the revised draft WRMP plan suggests this could increase by a further 20Ml/d by 2050.

Figure 1.4 taken from our dWRMP shows the extent of the deficit.

Figure 1.4: Grid SWZ Baseline Forecast Supply-Demand Balance (DYAA)



Source: Yorkshire Water, dWRMP

The key drivers for the volume increase in deficit are shown in table 1.3, taken from our dWRMP, below.

Table 1.3: Summary of the Grid SWZ DYAA Deficit and Key Drivers of Changing Need over Time

^ Denotes the start and end of the Statutory 25-year planning period respectively

	2025 /26^	2030 /31	2035 /36	2040 /41	2044 /45	2049 /50^	2084 /85
Climate change reduction on supply (Ml/d)	41.67	48.81	56.61	63.56	69.62	77.31	134.16
Impact of terminating the STW transfer (Ml/d)	0	0	39.27	39.06	38.89	38.67	37.07
Environmental destination reduction (Ml/d)	0	0	11.28	11.28	11.28	141.20	137.16
Overall Grid SWZ dry year annual average deficit (Ml/d)	105.58	104.28	154.91	158.17	161.81	298.81	402.84

Source: Yorkshire Water, dWRMP, section 7c

1.3.1.2 Demand policy requirements

In the HM Government Environmental Plan 2023, Defra set out new statutory water demand targets as follows[6]:

Table 1.4: Statutory Targets

Water demand type	By 31 March 2038	By 31 March 2050
Leakage	37% reduction	50% reduction
PCC (household)	122 litres per person per day	110 litres per person per day
Business demand (non-household)	9% reduction	15% reduction

These targets have informed our PR24 performance commitments which include PCC, leakage and business demand. Business demand is a new performance commitment for PR24. The benefits from meeting these targets result in an improvement in our supply-demand balance and are part of our proposed investment for WRMP24.

To deliver the improvements listed above, enhancement investment is required in the following areas:

Leakage (additional activity to base maintenance)

Leakage is a key tool to reducing demand and improving resilience. Our revised WRMP is reviewing the leakage profile for achieving the 50%.

Yorkshire Water has committed to achieving the DEFRA target of 50% leakage reduction by 2050, which aligns with our Company ambition to reduce the water we take from the environment and associated carbon emissions to treat this water. Our customers have told us they want us to deliver more demand reduction in our WRMP focus groups.

As established through the PR19 CMA process, base funding will abate the upwards pressure on leakage levels from the National Rate of Rise (NRR), whereas enhancement investment will provide the solutions to drive down leakage. Our analysis found that if we keep our investment at levels consistent with AMP7, we will not be able achieve this 50% level of leakage reduction through our botex allowance. From AMP8, we need to start increasing our investment to build towards this target and that will require enhancement funding.

Business (NHH) demand (new activity)

[6] assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1168372/environmental-improvement-plan-2023.pdf page 105

In advance of the opening of the non-household market in April 2017, Yorkshire Water separated out its water efficiency services, and this was allocated to its NHH retail business Yorkshire Water Business Services which was subsequently sold. Since this time Yorkshire Water (wholesale) has carried out minimal activity on non-household water efficiency with the assumption that the competitive NHH retail market would deliver these services[7] – therefore there is no base funding for this activity.

A report by Economic Insight in 2022 found that there is a gap in water efficiency services[8] in the non-household market due to customers and retailers having a low willingness to pay for them. The report recommends that the willingness to pay gap be met by water companies to achieve the 9% reduction in demand and estimated the value to be £22m per annum nationally. We note, the Retailer Wholesaler Group – 'Water Efficiency Group' also recommends that non-household water efficiency is funded by water companies through the wholesale price control but all parties work together to incentivise NHH customers to improve their water efficiency.[9] Yorkshire Water considers its obligation to manage its water resources on behalf of customers (HH and NHH) and community means it should invest in meeting both the national water demand target and the supply-deficit forecast for AMP8.

Ofwat has also introduced a new business demand performance commitment, which is not a level of service delivered by companies within previous or current botex allowances. Enhancement funding is required for us to undertake new activities to deliver the required reduction in business demand.

PCC (additional activity to base maintenance)

Yorkshire Water have committed to achieving a PCC of 110l/h/d by 2050 as set out in EA's National Framework for Water Resources[10], which aligns with our Company ambition to reduce the water we take from the environment and associated carbon to treat this water. Our customers have told us they want us to deliver more demand reduction in our WRMP focus groups.

Yorkshire Water's PCC performance was industry leading across AMP6 and our performance has remained strong in AMP7. We out turned year 3 of AMP7 with the lowest PCC in the industry for both our in-year and 3-year rolling average performance.

However, if we are to achieve the national target of 110l/h/d we require enhancement funding to ensure our glidepath remains on track to 2050. The scope of activities within this case significantly grow the variety and scale of interventions planned to support PCC reduction during AMP8. We cannot deliver these interventions within the current botex allowance.

We need to expand the delivery of measures that we know to be effective and trial and implement new techniques to keep driving the incremental improvement in performance through to 2050 and to close the supply-demand deficit forecast for AMP8.

1.3.1.3 Supply options

Although the benefits from meeting the demand targets will reduce the supply demand deficit, they will not fully remove the forecast deficit and we must also manage some key drivers to ensure a resilient water supply into the future.

Due to the level and timing of the deficit, we will plan to a lower (1 in 200-year) level of drought resilience in the short to medium term. In our draft plan we moved to 1 in 500-year resilience in

[7] As set out in "Ofwat's review of the evidence base for retail competition and separation", page 66 and also www.open-water.org.uk/about-open-water/the-benefits/
[8] www.economic-insight.com/2022/06/14/increasing-water-efficiency-in-the-nhh-water-retail-market/
[9] mosl.co.uk/groups-and-forums/industry-groups-forums/retailer-wholesaler-group/rwg-water-efficiency-sub-group
[10] assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872759/National_Framework_for_water_resources_main_report.pdf

2039 and we are doing further sensitivity testing on when we would achieve the 1 in 500-year scenario in our revised plan.

Our plan also assumes a benefit of supply and demand drought measures (approximately 40Ml/d) and we are also carrying out further sensitivity on our reliance on these in our revised plan.

We have worked closely with the Environment Agency to understand where environmental pressures may reduce the amount of water available to us in the future. For WRMP24 this includes ensuring that the new, longer term, potential reductions in water availability – 'Environmental Destination' as described through the National Framework and reflected into the Water Resources North Regional Plan – have been considered in developing the adaptive pathways in our WRMP. The environmental destination will have a significant impact on our supply demand balance in 2040 (at draft this was 2050).

In addition, Severn Trent Water is ceasing a transfer of raw water it currently provides to our South Yorkshire area. The transfer is planned to cease by 2035 and poses a risk to the security of supply in South Yorkshire.

These two key risks must be addressed from AMP8 onwards, as these existing water sources are unlikely to be available in the future. These losses must be offset by new supplies, as they cannot be offset through demand reduction alone. Therefore, new, or augmented supply options are required from early in AMP8 to reduce the risk to supply and close the deficit in the short, medium, and long term.

1.3.2 The Scale and Timing of the Investment

Our preferred plan includes solutions that reduce demand and increase supply. The scale of these investments is summarised in the cost table split into themes. As noted previously, we are in the process of addressing feedback on our draft WRMP and reviewing our scenarios and projects with the new information. Our current position includes supply options as at draft WRMP but with some change to the timing of key solutions and additional options for demand. Enhancement costs are summarised in themes in Table 1.4.

We have included metering costs for completeness as the data collected will be an enabler for demand reduction, but there is a separate metering enhancement case which details the associated investment.

Table 1.5: Changes in Cost between dWRMP and PR24

Category	dWRMP inflated Totex (£m)	PR24 Submission post inflation Totex (£m)	Comment
Leakage	23.49	23.49	No Change
PCC/Water Efficiency	16.24	19.24	Scale of water efficiency activities increased plus line includes drought options at £3m Note: costs incorrectly grouped with supply-side improvements in CW3 and will be resolved in next data table iteration
Business Demand	0.00	18.08	Activity now included to meet the 15% reduction in business demand by 2050
Supply Side improvements	233.17	155.49	No overall change The difference is components for delivery via a DPC route in PR24 submission
Total Without metering	**272.9**	**216.30**	
Metering related to WRMP	11.55	75.20	Yorkshire Water has undertaken additional optioneering and best value evaluation. As a result, the speed of our Smart Metering ambition has accelerated, from a 3 AMP programme at draft, to a largely 1 AMP programme. A full assessment of the technology change costs has been completed to achieve the transformation to realise the benefits from Smart Metering, resulting in increased costs. Strategy summary: enabling the additional demand reduction benefits from Smart meters in AMP8, by replacing end of life AMR meters, across the whole region. Note: CW3 and the total metering enhancement case totals £134.01m. The costs included in the table are a proportion of this in line with WRMP guidance
Total Including WRMP enhancement metering	**284.45**	**291.50**	

1.3.2.1 Demand-side options

To achieve the long-term targets for demand reduction across leakage, business demand and PCC, Yorkshire Water has created an optimised glidepath to achieve each of these targets built up from multiple intervention options, to deliver a plan year-on-year through to 2050. The PR24 plan is delivering the first 5 years of performance improvement and will have clearly defined interim targets against our long-term strategic goals. Delaying the investment in any of the demand areas would result in either:

- not achieving the required supply demand resilience within the planning period
- delaying progress against the long-term targets, creating a higher risk plan to require greater improvements per AMP for the remainder of the plan.

For AMP8 the enhancement investment will be used to reduce demand across the water distribution system: trunk mains, DMAs, supply pipes and customer usage. The activities included in this enhancement case are summarised below:

Table 1.6: Demand Reduction Activities

Demand reduction initiative	Description of activities for enhancement funding
Business demand	All activities are new for AMP8: • Non-household targeted media campaign • Business water audit visits • Subsidised retrofits of rainwater harvesting for large users • Retailer and non-household customer incentives
PCC/ Water efficiency	We will undertake more: • Installations of pressure reducing valves across our network • Customer water efficiency home audits and device retrofits • Engagement with customers as part of our water efficiency education programme (both online and in-person)
Leakage Reduction	We will undertake more: • Network Pressure Management (Pressure reducing valves) - aiming to achieve an average AZNP of ~35 Meters head, through additional and more advanced pressure management methods • Above ground Pressure Management (pumps)- aiming to achieve an average AZNP of ~35 Meters head, through additional and more advanced pump management methods • Active Leakage Control- adopting advanced analytics & digital twins to better target leakage, reducing burst run time. • Installations of permanent acoustic loggers – increasing coverage of population by ~10%, to have better awareness of where new bursts are occurring

For more detail on our chosen solution, please refer to ‘our preferred plan’ within our best option for customers' section.

Smart metering is a key enabler of our demand reduction

Smart metering has a range of direct benefits as detailed in the metering enhancement case and on supporting the reduction in the supply-demand deficit. The data derived from Smart metering enables better targeting, strategy development and benefits monitoring of the Business Demand and PCC interventions within this enhancement case. Making the investment more effective at delivering the required outcomes.

Not all metering investment informs our WRMP. We can only have reasonable certainty that we can realise the benefits from the aspects of the metering programme that are within our control. For example, while we will target education of the benefits of smart meters, we cannot guarantee we will receive the forecast number of meter optant requests. Where we are driving meter upgrades on installation, we assessed that £75m of the metering programme will also support our WRMP.

We note that our demand reductions improvements in this enhancement case are exclusive of the reductions we identified separately from our smart metering activities, which are described in our metering enhancement case. That is, the total benefit for PCC, Leakage and NHH business demand in this case can be aggregate with the benefits from the enhancement requirements in the smart metering enhancement case – the benefits do not overlap. All benefits help us reduce the supply-demand deficit.

1.3.2.2 Supply-side

There are some key changes which need to be highlighted in this section.

Our bulk transfer agreement with Severn Trent Water is ending[11]

[11] Yorkshire Water, dWRMP24 full technical report, pg 29.

From 2035, we will no longer have access to an import transfer of a raw water (approximately 50Ml/d) from the Derwent Valley reservoirs in the Severn Trent Water supply area to a single water treatment works in the south of our area. [12]

Our modelling shows it is possible to make up a proportion of the loss through redeployment of other sources via our conjunctive use system, but only 8Mld. In a dry year, the loss could be 39Mld on average but during peak demand it could be up to 60Mld. In order to replace this source, we will invest in a new treatment works and associated treated water transfer.

Abstraction reduction on the river Derwent

Our review of the national Environmental Destination Scenarios through the regional planning process identified a potentially large reduction in abstraction from the lower Yorkshire River Derwent. In our draft plan, we stated these reductions would be effective from 2050; however, following feedback from regulators on our dWRMP we have brought forward the assumed reduction date to 2040. This will enable the licence reduction to be met earlier in the WRMP planning period and also aligns with regional (WReN) and Northumbrian Water's WRMP.

Draft WRMP overview

Our draft WRMP set out investment covering seven new supply schemes starting in the first five years of the plan (2025-30) which provide a combined benefit of 273Ml/d on beneficial completion by the end of 2075. In peak periods this benefit may be greater (290Ml/d) as two of the options have been designed to provide a greater benefit at peak times. Further peak benefits may be possible and will be considered when we carry out impact assessments, before applying to the Environment Agency for new abstraction permits.

The first phase of this is investment in a new water treatment works (alongside an existing water treatment works in York, which will be retained) to treat water from an existing permitted abstraction that we have on the river Ouse). The second phase delivers a new internal connection from this new treatment works to South Yorkshire, which will also provide additional resilience to the York area. Both the new WTW and the internal connection will be available from 2035 onwards, when the transfer is scheduled to terminate.

The seven schemes are:

Table 1.7: Proposed Supply-Side Schemes

Scheme	Scheme cost (£m)*
East Yorkshire Groundwater option 2	6.3
River Aire abstraction	52.4
River Ouse licence transfer	0.06
Magnesium Limestone new groundwater supply	7.5
Sherwood Sandstone & Magnesium Limestone Boreholes Option 2	26.50
Sherwood Sandstone support to grid	62.8
New WTW (York) (to be delivered through DPC)	0.00
Total	**155.5**

*Note: Numbers are rounded

[12] For more information, please see section 1.4.5 of our draft WRMP24, but briefly: due to the needs identified by STW in its own WRMP24, it is currently considered unlikely that the transfer would continue.

1.3.3 Interactions with Base Expenditure

Across the demand-side and supply-side aspects of our WRMP, we set out our full required costs in data table CW8. We confirm we have excluded base funding from our enhancement funding requests in CW3.

1.3.3.1 Demand-side

Business Demand

Business demand (NHH) reduction is a new performance commitment and has not previously been funded. Previous water efficiency activity with business customers was deemed to be a retail value added services activity and was separated away from the wholesale business at the start of the NHH retail market opening in April 2017. As such there is not interaction with wholesale base expenditure.

PCC

We have received base funding for addressing PCC previously to achieve incremental improvements in customer water efficiency, circa £400K per annum. We confirm the enhancement funding requested in this case for activities is additional to that ~£400k. Yorkshire Water is the industry leader for PCC, with base investment funding initiatives to maintain that position, with enhancement funded initiatives driving further water efficiency beyond current performance.

Leakage

Leakage is an established performance commitment and attracts base expenditure. Yorkshire Water utilises base expenditure to address the Natural Rate of Rise (NRR) which is the volume of leakage required to be addressed to maintain a static leakage performance. The table below shows the NRR for Yorkshire Water as independently assessed by RPS in an industry recognised consistent calculation. We will utilise our base funding to address the forecast NRR levels.

Table 1.8: Forecast NRRt levels

	Yearly Total NRR for the Company (Ml/year)						
Operational Area	**2016/17**	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**
Company Total	306.8	338.7	369.4	318.4	442.9	368.8	464.1

As such there is an interaction with base investment every year to achieve the overall outcome. Yorkshire Water have put forward a significant base investment for water mains renewal in AMP8, to replace a total of 0.66% of the network each year. This activity is subject to a cost adjustment claim and does derive a leakage benefit, which has been included in the WRMP leakage reduction plan and Performance Commitment targets.

We confirm the additional activities under this enhancement case are to drive down leakage rather than address the NRR and therefore interact but do not duplicate base funding.

Demand side related to base metering investment

Base funding provides 51.3% of the metering programme investment and covers the costs to replace end of life AMR meters. We have submitted a cost adjustment claim for additional base funding for the exchange of ~1.4 million customer meters.

We confirm we have not included any base metering costs in this enhancement case. Our metering enhancement case explains the funding request for the incremental cost different between AMR and AMI meter installations.

Both data from AMR meters and improved data from AMI meters is an enabler for the programme of work for demand reduction in this enhancement case.

1.3.3.2 Supply side

Our supply side options have no direct interaction with base funding. We have not requested funding for capital maintenance and other ongoing base investment in water supply assets that are key to providing resilience and maintaining our existing deployable output and production capacity.

1.3.4 Activities Funded in Previous Price Reviews

We confirm this case has no overlap with schemes funded in previous price reviews. Consistent with Ofwat's guidance and approach in previous AMPs, we request enhancement funding for developing and implementing new schemes to meet our supply-demand deficit that have not had funding allocated in previous price reviews.

1.3.5 Long-Term Delivery Strategy alignment

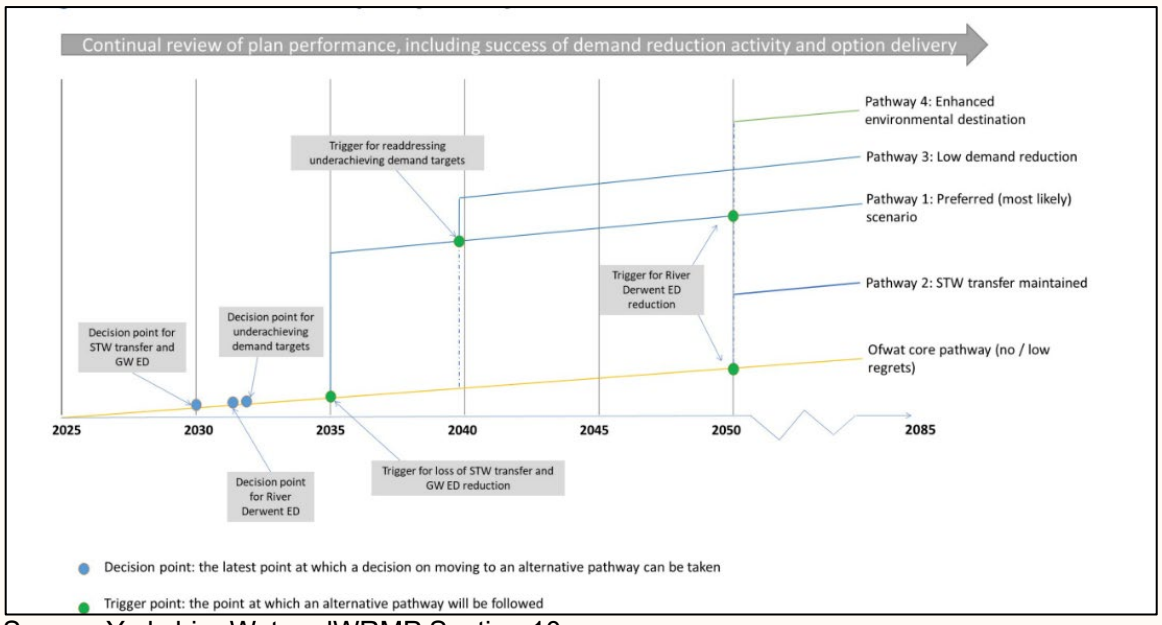
Under Ofwat's PR24 guidance, our adaptive planning for the Long-Term Delivery Strategy is structured around four primary enhancement investment areas, each of which is underpinned by one or more strategic planning areas (see table below).

		Outcome					
Investment area	**Strategic planning area**	**Secure, safe, clean water supplies**	**First-class customer service**	**Bills everyone can afford**	**Modern and resilient infrastructure**	**Net zero carbon emissions**	**A healthy, natural environment**
Clean water	Water industry natural environment programme (clean)						
	Water resources management plan						
	Drinking water quality						
Wastewater	Water industry natural environment programme (waste)						
	Drainage and wastewater management plan						
	Bioresources						
Resilience	Clean water resilience						
	Clean water security						
	Wastewater resilience						
	Wastewater security						
	Living with Water						
Net zero	Carbon and energy						

Under the WRMP process, we have created alternative pathways by stress testing our best value plan to the WRMP common reference scenarios. Not all the common reference scenarios are showing a deficit and for others, the deficit is smaller than the baseline. This means no additional options are required beyond those included in our preferred plan. However, these alternative futures can still change our plan and result in planned interventions not being required.

To prepare for the alternative futures we have created potential pathways and explain these in section 10 of our dWRMP and they represented in Figure 1.6 shown below.

Figure 1.5: WRMP24 Core Adaptive Pathways



Source: Yorkshire Water, dWRMP Section 10

To ensure that our 25-year LTDS water resource strategy core pathway represents best value as defined in Ofwat's LTDS guidance, we have applied our LTDS methodology to the WRMP core pathway. The core pathway presented in the LTDS document therefore represents the minimum required interventions to ensure potential risks are mitigated and build resilience to future drought events. The sections below detail how our core pathway has been identified, selected, and sequenced to deliver best value.

1.3.5.1 Alternative Pathway 2: Our most likely WRMP pathway

Our 'most likely' pathway within our draft WRMP contains provision for improving the environment as part of the government's 25-year environment plan, achieved through specific reductions in abstraction. This would require the introduction of the Tees to York transfer – a transfer from Northumbrian Water to Yorkshire Water – coupled with a reduction in abstraction on the river Derwent to reduce abstraction and comply with Common Standards Monitoring Guidance (CSMG), which sets long-term flow targets for protected areas. Such a reduction in abstraction aligns with abstraction reductions under the BAU+ environmental destination scenario in the WRMP guidance, although we note that under a high Ofwat common reference scenario (Abstraction reductions) further investment also may potentially be required in the very long-term, outside the 25-year planning horizon.

Under this alternative pathway, we would require additional WRMP enhancement expenditure to deliver supply-side improvements in AMP12. Given the uncertainty associated with the abstraction reductions and solutions that will be required, we have presented these costs as an alternative pathway rather than as part of our core pathway as, at this point, we do not consider it to represent no- or low-regret expenditure.

Our decision to move to this alternative pathway would be made following completion of environmental investigation work on the river Derwent in collaboration with all relevant stakeholders and regulators to define the solution in more detail. These investigations would feed into a decision point in 2032 as part of the draft water resource management plan for that planning cycle. This will also allow Yorkshire Water further time to expand the feasible option portfolio to affirm the best-value solution to meet these longer-term drivers. The pathway would subsequently be triggered in 2049/50, which is the date at which we assume our abstraction licence will be reduced and the CSMG target will be applied. Note, however, that our trigger point is likely to be amended following publication of our revised draft WRMP.

Our core pathways at revised draft will include the backfill options for the Severn Trent Transfer in 2035 as, since draft it has been confirmed that this transfer will cease.

Within the LTDS, Ofwat expects companies to present their 'most likely' pathway from their WRMPs as an alternative pathway-where this is not the same as the core pathway. This is to show where the activities required to meet the dWRMP24 'most likely' scenarios diverge from the core pathway.

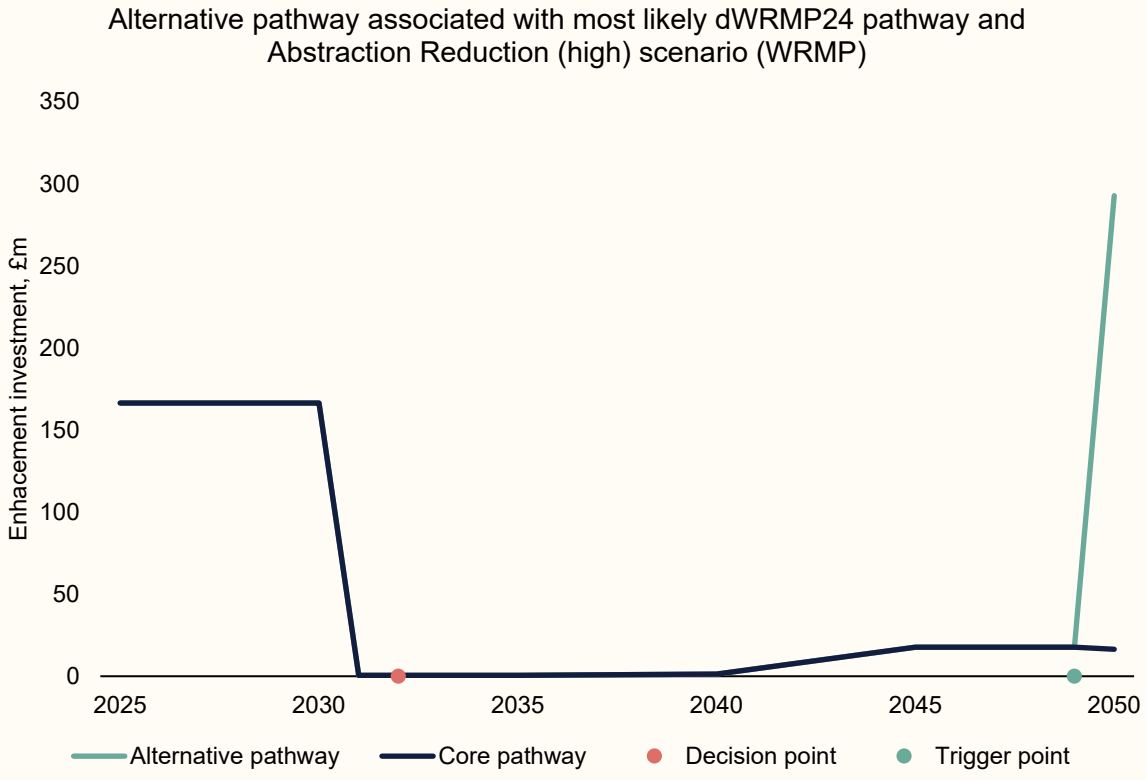
1.3.5.2 Alternative pathway foundations

The figure below illustrates the AMP-by-AMP anticipated enhancement expenditure of our draft WRMP 'most likely' pathway in comparison to the AMP-by-AMP LTDS core pathway for all LS3 data lines attributed to the water resources strategic planning area.

This figure demonstrates that our WRMP most-likely pathway diverges from our LTDS core pathway at the start of AMP 12. The divergence reflects how the WRMP most-likely pathway brings in the Tees to Yorkshire transfer, a transfer of Northumbrian Water to Yorkshire Water. This is because to deliver the environmental destination plan, YWS needs to meet the Common Standards Monitoring Guidance (CSMG). This is government guidance that sets flow targets for European protected areas and will impact YWS as there will be a licence reduction on the river Derwent by 2050. Through introducing a transfer, we will be able to meet these requirements whilst continuing to deliver our services to our customers in the long-term.

The alternative pathway we expect to follow to respond to Ofwat's adverse abstraction scenario is the same as our 'most-likely' DWMP pathway. The figure below illustrates the AMP-by-AMP anticipated enhancement expenditure of our WRMP 'most likely' pathway in comparison to the AMP-by-AMP core pathway enhancement expenditure across all lines that are highly impacted by Ofwat's adverse abstraction scenario within the Water Resource Strategy planning area. In addition, we have included the decision and trigger points specific to the abstraction scenario. We expect to decide on whether we will need to follow the most-likely pathway in 2032 following the completion of the environmental investigation work being conducted on the river Derwent to look at what is needed to meet legislative expectations. Having determined as a business whether we need to prepare for the circumstances of Ofwat's adverse abstraction scenario, we anticipate the pathway will be tiggered in 2049, as this when CSMG will be introduced. It is important to note that the trigger point might be revised following the rdWRMP as we are reviewing our environmental investigation plans.

Figure 1.6: WRMP- Most-likely Pathway



As noted previously, our core pathway presented in our LTDS differs from that in our draft WRMP 'preferred' or 'most likely'. Our preferred WRMP includes additional expenditure to meet long-term environmental destination requirements by 2050, but these have not been included in

our core pathway due to uncertainty around the solutions and abstraction reductions that will be required. However, we have presented these costs as alternative pathways.

Read more about out LTDS at
Long Term Delivery Strategy

1.3.6 Customer Support

Customer research was carried out as part of the WRMP process. Given the complexity of the WRMP, the research was necessarily relatively high level. However, it demonstrated broad customer understanding of the potential risks to water supply into the future, particularly in respect of climate change, and broad customer support of Yorkshire Water's approach to WRMP. Customers expect Yorkshire Water to play its part in securing water supply resilience, and this should include reducing leakage alongside other options. Read about our WRMP research here.

Customer engagement for our WRMP24 started early, as part of our work through the Water Resources North Regional Plan, and in partnership with Northumbrian Water and Hartlepool Water. The Water Resources North engagement built on the significant work that all companies had carried out for PR19, in recognition that our understanding of, and the evidence base for, customer preferences and opinions is not starting from 'zero'. The key conclusions taken from research carried out to inform PR19 were:

- A reliable supply of safe drinking water is a top priority across the Water Resources North region. However, affordability considerations lead to a preference for maintaining and protecting existing performance; where there is willingness to pay for improvements, water service tends to be lower valued than wastewater driven issues.
- Reducing leakage and environmental improvements are generally seen as more important than level of service (e.g., customer use restrictions). Level of service is typically seen as a low priority, although this may in part be caused by the infrequency of experiencing such events; the duration of events (when they occur) is probably more important than the frequency.
- In a number of areas (e.g., drought resilience) customers support meeting only the minimum levels or regulatory standards. Little research was completed at PR19 specifically around water trading or drought permits / orders (related to environmental destination). This helped to inform additional research carried out for the Water Resources North Regional Plan.

Building on the existing knowledge from previous research, Yorkshire Water, Northumbrian Water and Hartlepool Water collaborated to carry out further customer research at the Water Resources North regional scale. This comprised deliberative research across 16 representative customer groups, each meeting twice over a period of a week. These groups comprised a mix of existing household customers, future customers and citizens, as well as a range of non-household customers. The non-household sessions were held with a mixture of water dependent businesses (e.g., farmers) and non-water dependent businesses. Whilst this type of approach typically engages a lower number of customers than quantitative survey approaches, it benefits from a much greater dialogue and opportunity for those involved to really understand the nuances of water resources management. This allows for more informed feedback on customer priorities for future plans, especially where topics are relatively complex or multi-faceted.

Although the research was carried out at a Water Resources North regional level, it was completed in such a way as to allow disaggregation of the research results by water company, allowing each of the water companies to understand the preferences of their own customers, within the overarching Water Resources North picture. The key focus areas for the research were:

- Defining a 'best value plan' (linked to Regional Plan and WRMP objectives and metrics)
- Environmental Destination
- Water trading
- Opinions on option types

When exploring best-value planning, the research identified themes that were consistent with PR19 research outcomes. In terms of objectives, the strongest level of support was for 'creating a plan that is affordable and sustainable over the long term', 'meeting future public water supply drought resilience' and 'contributing to the Government's ambition in the 25-year environmental plan'.

With regards to the plan metrics, customers were asked to rank these in order of importance. This highlighted that leakage, drought resilience (reliable supplies) and cost (affordability) have the strongest customer focus, with a range of environmental and social considerations (and per capita consumption) sitting in the mid rank. Interestingly, customers didn't place great importance on option deliverability, or on option type, indicating that achieving the desired outcome is more important than how those outcomes are achieved.
Overall, the following key messages were observed:

- Customers, citizens and non-household customers are unaware of current or potential water scarcity within the Water Resources North region.
- Water Resources North WRMP objectives gained support, although a focus on education was felt to be potentially missing.
- Customers, citizens and non-household customers were open to the idea of water trading as long as there were no adverse effects on their supply, and recipient companies don't use it as the 'easy option' which could lead to greater inefficiencies (proxy for leakage).
- Timescales for targets were perceived as being too far in the future. Customers want to see shorter timelines (5-10 years) even if this is progress against a long-term goal.
- Given the importance of water resources and ensuring an improved environment, there was a general willingness to pay a small increase in bills for investment against targets as long as water companies are transparent about this.
- Support was also evident for the environmental ambition, with the general consensus being that abstraction should be reduced, and the last resort.

Since the Water Resources North customer engagement work was completed, we have carried out further research with Yorkshire Water's customers to help inform our approach to PR24 and long-term strategies. The most recent results from this research were made available in September 2022 and they are broadly consistent with what customers told us through the Water Resources North engagement programme. Specifically:

- The research highlights that customers consider that the highest priority for Yorkshire Water remains 'providing a continuous supply of water that is safe to drink', just as it was when this research was carried out in 2017. 'Keeping bills affordable for all' was second in importance for the majority of customers which is a significant change from the 2017 study. Additionally, once again, customers see the importance of YW 'preventing sewage entering homes and businesses'.
- Customers also place a high level of importance on Yorkshire Water protecting water quality and water bodies in the wider environment. Specifically, preventing pollution from sewage pipes, reducing the release of untreated sewage mixed with rainwater and ensuring water is treated to a high standard to protect rivers and beaches are all priorities identified as being of above average importance to both HH and NHH customers.
- Previously, these are some of the priorities that customers are most likely to say they'd be willing to pay more to fund. However, a key theme throughout all stages of the research was the 'cost of living crisis' and it's very clear that both HH and NHH customers anticipate challenging financial times in the near future.

Our WRMP24 takes on board the research that we have undertaken and the priorities that customers have identified, notably in how we have developed the metrics that we have used for our best value planning process. WRMP24 describes how we will ensure that we continue to have sufficient water to supply our customers, in the face of climate change, population growth and environmental pressures. This plan ensures that we will continue to provide our customers with a secure water supply that meets demand both now and in the future. Full details of our engagement with customers for Water Resources North's Regional Plan and, by extension, WRMP24 are provided in our customer research repository here.

We sought feedback on our draft WRMP and are working to address this in our revised WRMP. In particular we heard:

- **Demand management:** Stakeholders asked us to consider a clear, more granular plan including options for household and non-household efficiency and demonstrate how we ensure the best value in our plan.
- **Environment and Environmental Assessment:** Some requested further clarity in such things as the spatial extent of Strategic Environmental Assessment (SEA) area, and the assumptions and limitations concerning mitigation measures. Others were concerned with the environmental issues at a more strategic level.
- **Timing of Key Projects:** Representations from the Environment Agency (EA) and Natural England (NE) questioned the timing of the river Derwent abstractions reductions suggesting that the licence reduction date of 2050 was too far in the future.
- **Options Development:** Feedback that our dWRMP24 contained a limited number of supply options and that we should review the timing of these and associated risk for delivery.
- **Communication:** Feedback that the Non-Technical Statement could be more customer-friendly and asked us to consider more visual and adapted approaches. We will review our NTS and ensure we provide a customer friendly and accessible document with visual aids to support the narrative.

Please refer to our Statement of Response to see all representations.

Read more about this at
dWRMP

1.3.7 Factors Outside of Management Control

The investment for WRMP24 is driven by several factors outside of management control as outlined in the ‘need for proposed investment’ section. Key drivers are drought resilience, climate change and future abstraction reductions as well as changes to statutory demand reduction targets and Performance Commitments.

The purpose of the WRMP is to meet population and business growth with sufficient supply across future scenarios through adaptive planning. The approach taken in our WRMP is to invest in a range of sustainable demand reduction options which can be optimised to provide a best value plan and delay the need for expensive supply options which may also have a higher environmental and carbon impact. A focus on demand reduction options is also a priority for our customers.

We have been proactive in applying key lessons learned from AMP7 on the delivery of demand reduction options, and feedback from the draft WRMP consultation process has been useful in developing improvements in our revised draft plan.

This includes significant work on the development of demand options which enable a granular and tailored approach to demand reduction as across a number of activities. This approach supports in mitigating the risk to not achieving the forecast reduction in the plan across demand activities. A monitoring plan with triggers will support timely and proactive decision making in moving to alternative pathways therefore preventing the need for unnecessary investment or equally exposure to the risk of not meeting supplies by investing in options too late.

We highlight the evolving government policy for water labelling and the wider environmental legislation in relation to the development of new build homes and their level of water efficiency. In both cases, we are reliant on government intervention to establish new regulations that will deliver the estimated demand reduction benefits. If this does not deliver benefits in line with our forecasts, we will meet that supply-demand gap through alternative methods.

Further sensitivity testing is ongoing to establish options around the timing of meeting the resilience levels for a 1 in 200-year event and a 1 in 500-year event over time to understand the impact on risk and costs to customers.

Where supply options are selected the time to benefit has been reviewed and considered to ensure the options will provide resilience at the right time, without creating risk or unnecessary surplus supply ahead of requirements – which would result in additional cost to customers. We have committed to undertaking an optioneering programme for supply options to widen the current options for our revised dWRMP, seeking further innovation and potential for efficiencies and reviewing opportunities to work with other parties and stakeholders. This options review will consider future scenarios and feed into the planning process for WMRP29.

1.4 Best Option for Customers

WRMPs must forecast supply and demand over at least the statutory minimum period of 25 years. Our WRMP24 produces a forecast over a 60-year planning period. The focus of the plan is the first 25 years, and how we will close any deficits in this period. By planning beyond 60 years we include greater uncertainties, and the longer-term risks may influence our plan in the short term to ensure it is flexible to alternative futures.

As with all long-term water resources problems, there is inherent uncertainty in the forecasts, for example, the level of future climate change impacts. Whilst we account for supply-demand component uncertainties in the target headroom allowance, we also undertake specific testing of alternative supply-demand balance scenarios. This longer-term risk is partly linked to the environmental destination risk to the river Derwent. We shall review the critical period in future WRMPs when the longer-term risks are more certain.

We have followed the Owat guidance to complete our own plan testing, which uses the 'Ofwat Common Reference Scenarios' for the purpose of testing sensitivity around our baseline position. The key scenario areas, which much be tested individually, are:

- Climate change – representing higher and lower impacts than our baseline.
- Technology – reflecting different scenarios of pace for smart metering implementation, which may influence investment.
- Demand – reflecting different positions on government policy on future water labelling and building regulations, and different future population growth.
- Environment – meeting defined short-term regulatory commitments only (low), or higher levels of environmental destination (enhanced).

Figure 1.8 below summarises the structure of our scenario testing around our WRMP baseline, which allows us to understand the sensitivities of our supply-demand position and how this may impact future investment needs and required solutions.

Figure 1.7: YW's Scenario Testing Framework – Baseline Vs Ofwat Common Reference Scenarios

Scenario	WRMP Baseline (least cost)	High CC	Low CC	High ED	Low ED	No ED	High Demand	Low Demand	High Technology	Low Technology	Core scenario
Climate	BL	H	L	BL	BL	BL	BL	BL	BL	BL	BL
Technology	none	none	none	none	none	none	none	none	H	L	FP
Demand	H	H	H	H	H	H	H	L	H	H	H
Environment	BL	BL	BL	H	L	none	BL	BL	BL	BL	L
LoS	1 in 500	1 in 500	1 in 500	1 in 500	1 in 500	1 in 500	1 in 500	1 in 500	1 in 500	1 in 500	1 in 200 to 2030s
Drought measures	none	none	none	none	none	none	none	none	none	none	To 2030s
STW transfer	Cease	Cease	Cease	Cease	Cease	Cease	Cease	Cease	Cease	Cease	Maintain

Source: Yorkshire Water, dWRMP Section 7

Table 1.9: Scenarios

Scenario			
Climate change	H=RCP8.5	BL=RCP6	L=RCP2.6
Technology	H=smart metering by 2035	L=smart metering by 2045	FP=smart metering by 2040
Demand	H=Housing plan P, no water labelling	L=ONS 18, water labelling included	-
Environment	H=enhanced	BL=BAU+	L=WINEP (current)

Key
BL = Baseline
FP = Final Plan
H = High Ofwat common reference scenario
L = Low Ofwat common reference scenario

Of note is Ofwat's concept of a 'core scenario', which reflects no or low regret investment for work needed to tackle short-term requirements, investments required in both benign and adverse scenarios, and across a wide range of plausible scenarios. The Core scenario also includes investment that is needed to keep future options open (for example, enabling works for a potential future scheme), or is required to minimise the cost of future options. These concepts are important when it comes to selecting the investments, particularly in the early part of the planning period.

1.4.1 Options Considered

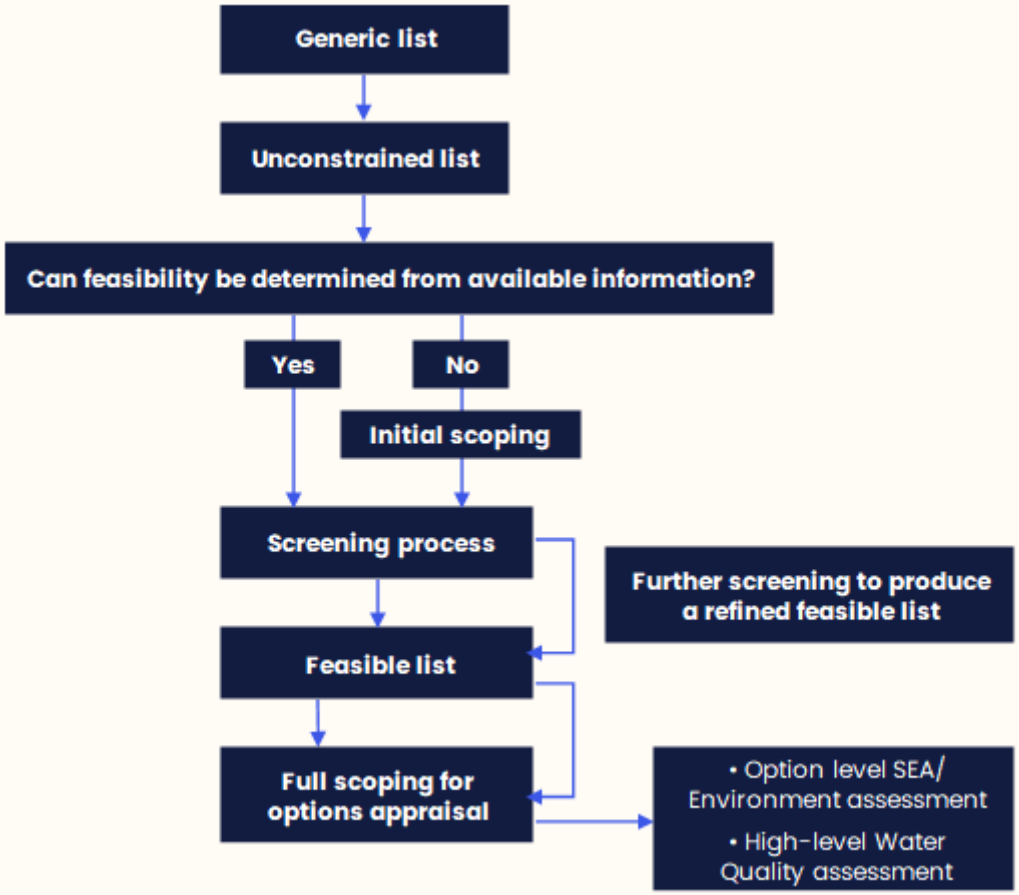
The WRMP process sets out the options considered and the approach to assessing those options to determine the most optimal forward plan.

To select an appropriate solution to the deficit we consider the types of options available and determine which are feasible for the risks we need to address. This is the options appraisal part of our decision-making process. We then carry out a best value plan decision-making assessment to determine the combination of feasible options that we include in our WRMP as the best value solution to the deficit.

To begin with we list unconstrained options that are feasible and have potential to meet the deficit in the Grid SWZ. We then determine the costs and impacts of each feasible option. This includes quantifying the capital, operating, carbon, environmental and social costs to produce six capitals data at an individual option level. A Strategic Environmental Assessment (supported by a WFD and HRA assessment where applicable) of all feasible options was carried out.

The process for optimisation is shown below.

Figure 1.8: Optimisation Process



1.4.1.1 Unconstrained options

Yorkshire Water enlisted support from RPS to conduct a review of all available HH and NHH demand reduction options together with associated industry benchmarked costs and benefits. Yorkshire Water have delivered a leakage reduction programme in AMP7 delivering 9% to date and targeting 15% leakage reduction by 2025. The unit costs derived through the leakage programme delivery were utilised as the starting cost benefit ratio of the WRMP plan. RPS were utilised to benchmark the unit costs Yorkshire Water provided and they modelled the expected increase in cost as solutions provide diminishing returns. These intervention cost curves were used to provide multiple leakage interventions to be optimised and selected within the plan.
To resolve the long-term supply-demand deficit identified in the WMRP and the new demand reduction targets for leakage, PCC and business demand (NHH), we considered a longlist of unconstrained options. The available demand options are as follows:

Leakage

- Roll out of smart meters including multi-channel engagement platform to both Household customers, Non-household customers and Retailers
- The adoption of additional metering policies, such as Enhanced DMO or compulsory Change of Occupancy Metering.
- Mains Renewal to reduce background leakage and reduce burst frequency
- New pressure management- the creation of new pressure managed areas, to reduce background leakage and burst rates
- Maturation of Pressure management controls- Installation of more complex pressure reducing valve control mechanisms such as modulators and critical point pressure monitoring feedback loops
- Above ground pressure management- advanced pump control and “boost to reduce” pressure management schemes

- Active Leakage control
- Intensive Leakage control, such as proactive DMA sweeps using lift & shift equipment
- DMA optimisation – reducing the size of DMAs to improve efficiency in targeting and finding leakage
- Permanent Acoustic logging- utilising devices to listen for leakage on the network
- High Tec ALC- Utilisation of increase levels of sensing and AI/ digital twins to improve leakage understanding and targeting
- Increase trunk main metering
- Increased trunk main acoustic logging through hydrophones

Business Demand

- Roll out of smart meters including multi-channel engagement platform to non-household customers and retailers
- Water efficiency visits which will conduct audits at non-household premises and fix leaking toilets and fit water saving devices
- Water efficiency incentives which will provide an incentive payment to retailers and or non-household customers who implement water efficiency solutions
- Media campaigns to influence customer behaviour
- New tariffs to influence customer behaviour
- Rainwater harvesting and grey water recycling retrofits for businesses
- Water storage tanks for large and agricultural businesses

PCC

- Roll out of smart meters including multi-channel engagement platform to household customers
- Water efficiency visits which will conduct audits at household premises and fix leaking toilets and fit water saving devices
- Water efficiency incentives which will provide an incentive payment to householders or communities who implement water efficiency solutions
- Media campaigns to nudge customer behaviour
- New tariffs to influence customer behaviour
- Rainwater harvesting and grey water recycling retrofits for households
- Developers installing rainwater harvesting on new builds

The supply options that are available to us and have been considered within the development of our plan include:

- **New groundwater sources**. Require abstraction permissions to be granted by the Environment Agency.
- **Ground water enhancement**. Greater use of existing resources that we are already permitted to abstract.
- **New surface water sources**. Require abstraction permissions to be granted by the Environment Agency.
- **Surface water enhancement**. Greater use of existing resources that we are already permitted to abstract.
- **Aquifer recharge**. Discharge water to groundwater when the water is not needed in supply and conserve for when it is needed.
- **Bulk supply** transfer (import water from another water company).
- **Conjunctive use**/new internal transfers.
- **Desalination/tidal abstraction**. Options available to water companies for WRMP24 also include planning to an alternative drought risk scenario and implementing drought measures that can temporarily restrict water use or increase available supplies during dry weather. In the short term, we will be required to rely on these actions whilst we are implementing the demand reduction and increased supply options needed to make us resilient to a 1 in 500-year drought event.

Appendix A.1 of our dWRMP sets out our unconstrained list of options.

1.4.2 Cost-Benefit Appraisal

Sections 8 and 9 of our dWRMP sets out our options appraisal approach from development to assessment, covering both supply and demand solution types. The non-monetised environmental, social and carbon impacts of each option have been considered in a Strategic Environmental Assessment (SEA) covered in section 8.5 of the dWRMP. It considers both adverse and beneficial potential environmental and social effects of feasible options and identifies the cumulative effects of a supply-demand solution. Biodiversity Net Gain (BNG) has also been incorporated into the SEA framework through the inclusion of a specific SEA objective.

1.4.2.1 Feasible options

The options included in the feasible list were assessed through desktop studies. We collated all the available information to create a scope of the option details, including location of resource, treatment requirements, pipeline routes, land purchase assumptions and pumping capacity. This information is used to create option specific cost elements and passed on to our Costing Team who derive the costs from our cost models. Each feasible option and the relevant cost elements are entered into our Decision Making Framework optimisation model. Our cost models are linked to our optimisation model, and this ensures that the WRMP feasible options are based on the latest cost model data and inflation is applied regularly. For more on our Decision Making Framework, please refer to section 6.2 in the Introduction to Enhancement cases appendix.

Read more about this at
Introduction to Enhancement Cases

For WRMP24 we have carried out a second screening on the feasible options. The options that were constrained out at this stage are included in Appendix A.2 as feasible options and noted as screened out at second screening. This was to ensure the options that were taken through to the best value plan were deliverable and appropriate for closing the deficit.

Appendix A.2 of the dWRMP sets out our analysis of feasible options for supply and demand. Section 10.4 sets out the SEA outputs of the preferred solution.

1.4.2.2 Demand optimisation since dWRMP

Since our dWRMP, we have progressed our demand optimisation process significantly through the use of multiple options across each with individual costs and benefits to allow for an optimum glidepath across the planning period. The process is iterative and starts with unconstrained options as described to allow the model to select from a wide range of demand options to meet the statutory targets for Leakage, PCC and business demand (NHH) reduction long-term targets as a minimum and close the deficit as far as possible.

Ensuring targets are met is a key stage in the process and the contribution to demand reduction from meeting these allow further optimisation of the wide range of supply options to achieve the overall supply/demand resilience requirement. We have optimised the attainment of the targets This has then been optimised with the wider supply side portfolio to achieve the overall supply/demand resilience requirement.

Once complete, we will then be able to rationalise our supply options for the revised dWRMP. Where we can find greater demand savings, we will be able to reduce the supply capacity required or defer supply augmentations.

1.4.2.3 Plan reconciliations

A key component during the development of the regional plans was the reconciliation process, which was devised to ensure alignment of strategic resource options (SROs) between regional planning groups.

As the regional plans and WRMPs were developed and supply-demand surplus and deficit information became available, the regional groups were able to create solutions that included bulk transfer options based on the needs and transfer capacity of each region. At each reconciliation phase, regions tested the impact that transfer positions (as a donor or recipient) had on their plans. They also considered how the reconciliation position could change under different supply-demand balance scenarios to test the resilience of the position. The output of

the reconciliation process was an agreed transfer position across the regions that would feed into each of the company WRMPs.

Regional Plan reconciliation process in practice for WReN

WReN's transfer options included potential exports to Water Resources West (WRW) that could be provided by either YW or Northumbrian Water (NWL). During the reconciliation process, these options were not selected as part of WRW's solution in either its core plan or any adaptive pathways. Furthermore, phase 3 of the reconciliation process identified that the existing transfer between WRW and WReN would cease. This is a key strategic import to the YW supply area. The other potential for a regional transfer between WReN and a neighbouring region is with Water Resources East (WRE). However, although options for a WReN (YW) to WRE (Anglian Water) transfer were identified, they were not classed as feasible. Although Anglian Water has a deficit in its WRMP24, the area of need is not geographically close the YW supply area but is much further south. A bulk transfer solution was therefore considered infeasible on cost grounds (both construction and operation), due to the distances involved. As we progressed through the reconciliation stages it also became apparent that Yorkshire Water's supply–demand balance risks meant that any trades with Anglian Water were limited by the future water availability.

Ceasing the Severn Trent Water transfer to Yorkshire Water

The existing transfer from Severn Trent Water (STW) in WRW to Yorkshire Water has a transfer agreement in place until 2084 and includes a clause for either party to terminate the agreement in 2035, provided noticed is given no later than 2030. WRW's feasible options include an option to cease or reduce the existing transfer, and the option has been selected in the majority of WRW Regional Plan scenario solutions (which are aligned with STW's WRMP scenario solutions).

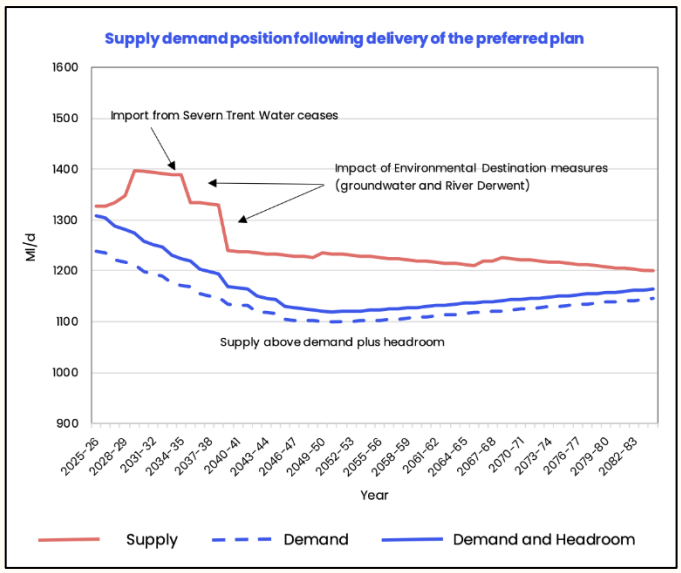
Yorkshire Water and STW have been developing a Strategic Resource Option (SRO) that would increase the reservoir capacity in the STW supply area, with potential to meet STW's needs and allow the transfer to Yorkshire to be maintained. However, during the third round of the reconciliation process, WRW's options appraisal concluded STW would be required to both stop the transfer and increase its reservoir capacity to meet its own supply–demand balance deficit. This results in the need for the development of the backfill option of a new water treatment works and transfer within the Yorkshire region as part of the preferred pan and core pathway.

1.4.2.4 Our preferred plan

We are continuing to refine our plan for the revised draft WRMP, which is due to be submitted in autumn 2023. The preferred plan set out below refers to supply options consistent with the dWRMP and we have noted there are changes to the timing of some supply options. The demand options have been updated to describe the latest available data for inclusion in our PR24 plan.

The chart below shows the supply-demand position through time, and the benefits associated with the delivery of the preferred plan.

Figure 1.9: Supply-Demand Position Through Time



Solutions for demand reduction

Leakage

As mentioned previously, the base maintenance investment in leakage will resolve the natural rate of rise which for YW for the 7-year average (2016/17 - 2022/23) is 372.72 Ml/d. This amount of leakage activity will maintain a zero-improvement position. The enhancement investment in this case will provide leakage reduction above and beyond the NRR.

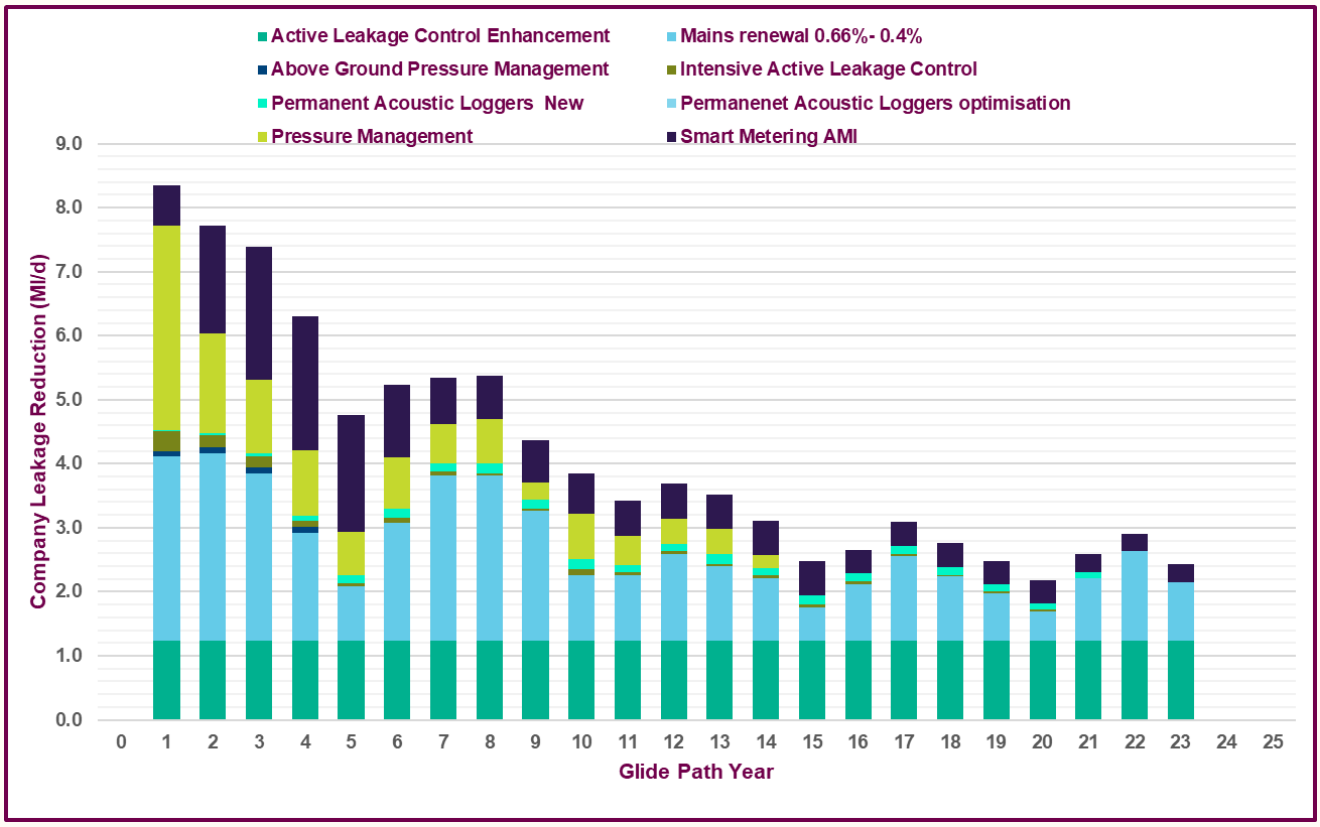
Our options appraisal concluded that we need to go beyond base and deliver an additional 14.22 Ml/d of leakage reduction by 2030, through the interventions in this enhancement case. The longer-term plan will deliver ~44.74 Ml/d by 2050.

The enhancement case will fund a varied programme of activities, which are a mix of expansions to existing scale or volume of activity, as well adopting new innovative solutions which have been delivered as successful Proof of Concepts (PoCs) through AMP7.
Our preferred plan includes sufficient leakage interventions to achieve the 50% reduction. The breakdown of leakage options to achieve this is an optimised glidepath and will be included in the best value plan alongside PCC, business demand reduction and supply side options to close the long-term deficit.

The process undertaken to establish the leakage strategy, considered options to deliver between 30-60% leakage reduction. These options were built up from intervention blocks which had a defined cost benefit for increments of leakage reduction activity. The optimisation process allowed for the selection of combinations of the solutions to derive the lowest cost solution, common reference scenarios and also to constrain certain investment options into the delivery plan, where the best value to Yorkshire Water customers would realise benefit outside of just leakage (smart metering and mains renewal for instance have benefit across a range of performance areas, and would not have been selected to the same extent if Demand reduction alone was the only factor considered). This optimisation occurred in both internal systems and within the industry best practice software solution SoLow provided by RPS.

Our preferred plan and interventions by year is shown below, and will achieve a 50% leakage reduction, using an optimised blend of solutions, across the 25-year plan. The optimised plan is more ambitious in terms of Ml/d reduction from the baseline per year at the beginning of the plan, with Pressure Management, Mains Renewal, Active Leakage Control and Smart Metering providing the largest volume of leakage reduction benefit. Table 1.10 below sets out what we will achieve through enhancement activities: Please note Smart metering has a separate metering enhancement case and Mains renewal is base funded with an associated Cost Adjustment Claim.

Figure 1.10: Interventions by Year



PCC

The base investment in PCC would result in a reduction of 2.7l/h/d by 2030, due to the initiatives which we already invest in (free water saving devices and new meter optants) and the ongoing technological benefits and the benefit of the initiatives we have trialled in the current AMP.

Our options appraisal concluded through increased interventions we can deliver an additional 3.1l/h/d (excluding Smart metering benefits) of consumption reduction by 2030. The longer-term plan will deliver ~19.5l/h/d by 2050.

Yorkshire Water engaged RPS to conduct a thorough review of all available HH options which could be applied between 2025-2050 to help close the long-term supply demand deficit, provide a resilient supply of water for customers today and in the future, and deliver our long-term PCC target.

We reviewed HH demand reduction initiative benefits from a range of sources, making use of previously published work as well as RPS industry data. These were used in conjunction with Yorkshire Water data to produce cost benefit profiles for all HH initiatives as specified by Yorkshire Water. RPS ensured that where values from research were used, they were both referenced and appropriate for application within Yorkshire Water. RPS used their industry expertise to review all assumptions, savings, and costs to ensure they were realistic and achievable.

The options were reviewed to assess their deliverability and value for money which resulted in some options being rejected. The options we believe are deliverable and represent good value for money require enhancement funding and cover a varied programme of activities to collaborate with HH customers to reduce PCC:

Table 1.10: Proposed HH Initiative Costs and Benefits

Initiative	AMP8 Total Cost (£m) excluding inflation	AMP8 Total Cost (£m) including inflation	AMP8 Total Benefit (Ml/d)	AMP8 Total Benefit (l/h/d)
HH Media Campaign	2.500	2.623	1.14	0.2
HH Water Efficiency Visits	7.727	8.110	2.71	0.5
HH Flow Regulators	5.108	5.361	7.71	1.6
Water Efficiency Education Programme	0.140	0.146	3.96	0.8
TOTAL	**15.475**	**16.240**	**15.52**	**3.1**

This step change in water use includes conducting a HH media campaign, installing flow regulators, conducting water efficiency home audits and expanding our education program to include school water efficiency visits.

We have also conducted a benchmarked review of these options with other companies and are confident on their deliverability and value for money.

Business demand

Our options appraisal concluded we could deliver a reduction of 1.68Ml/d (excluding smart metering benefits) by 2030. The longer-term plan will deliver ~38.42Ml/d by 2050. Business demand reduction is a new performance commitment commencing in AMP8, so no base funding has been previously assigned to this performance commitment.

We engaged RPS to research and documented NHH demand reduction initiative benefits from a range of sources globally, making use of previously published work as well as RPS industry data. Yorkshire Water reviewed available NHH options which could be applied between 2025-2050 to help close the long-term supply demand deficit, provide a resilient supply of water for customers today and in the future, and deliver our long-term business demand target.

Theis external information was used in conjunction with Yorkshire Water data to produce cost benefit profiles for all NHH initiatives. RPS ensured that where values from research were used, they were both referenced and appropriate for application within Yorkshire Water. RPS used their industry expertise to review all assumptions, savings, and costs to ensure they were realistic and achievable.

The options we believe are deliverable and represent good value for money require enhancement funding and cover a varied programme of activities to collaborate with NHH customers and retailers to reduce business demand:

Table 1.11: Proposed NHH Initiative Costs and Benefits

Initiative	AMP8 Total Cost (£m) excluding inflation	AMP8 Total Cost (£m) including inflation	AMP8 Total Benefit (Ml/d)	Initiative
NHH Media Campaign	2.500	2.623	0.78	NHH Media Campaign
NHH Business Water Efficiency Visits	0.952	0.999	0.09	NHH Business Water Efficiency Visits

Water Efficiency Incentive Scheme	13.680	14.357	0.27	Water Efficiency Incentive Scheme
Subsidies Rainwater Harvesting for Large Users	0.096	0.101	0.54	Subsidies Rainwater Harvesting for Large Users
TOTAL	**17.228**	**18.080**	**1.68**	**TOTAL**

This step change in water use includes conducting a NHH media campaign, completing water efficiency business audits, establishing an incentive scheme to encourage NHH customers to reduce their consumption and subsidising retrofits of rainwater harvesting for large business users.

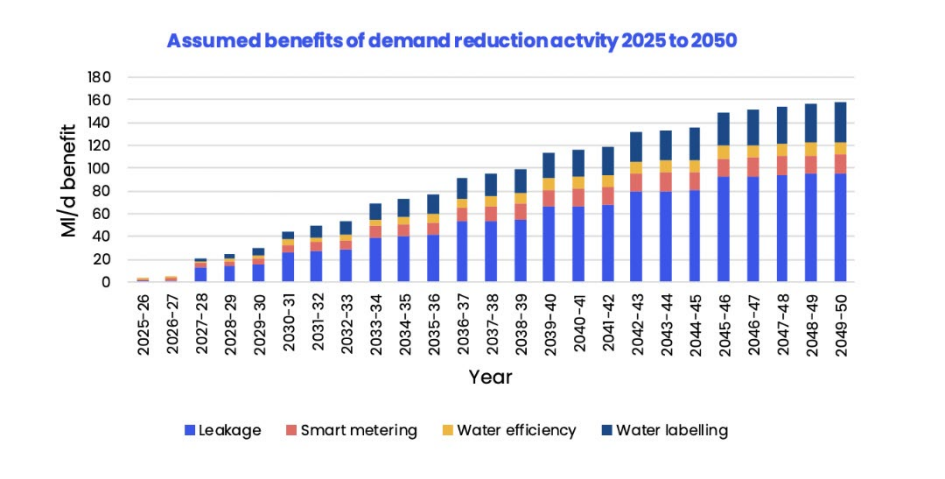
We have also conducted a benchmarked review of these options with other companies and are confident on their deliverability and value for money.

Smart metering as an enabler

As outlined in the metering enhancement case, Smart metering will deliver an additional demand reduction benefit of 21.96 ML/d on top of the demand reduction outcomes discussed in this enhancement case. The additional benefits from Smart Metering will benefit all the demand side PC's. The enhancement for PCC, NHH Demand and leakage, is to deliver challenging targets above the level of benefit delivered by Smart metering and above the level of reduction achievable through base funding. Smart metering has a relationship with the additional demand reduction interventions, as the smart meter data will enhance our ability to effectively target our water efficiency interventions and track which customer cohorts have the highest benefit success rate.

In total, our WRMP24 demand reduction ambition aims to achieve an increased benefit of approximately 160Ml/d between 2025 and 2050 (shown in Figure 1.11 below). The largest proportion of this (95Ml/d) reduction will be from our additional effort to lower leakage levels across our network. Our smart metering and water efficiency activity will contribute 31Ml/d and the government initiative on the labelling of white goods, 39Ml/d. These actions will benefit both our zones.

Figure 1.11: Assumed Benefits



Source: Yorkshire Water, Non-technical summary to the dWRMP24

Supply options

Our options for increasing available supply are a combination of increasing use of existing available resources and introducing new supplies into our grid network. The full list is set out under 'The scale and timing of investment'. They include options for importing new supplies from Northumbrian Water in the form of a transfer from the river Tees, supported by Kielder reservoir. We continue to work collaboratively with Northumbrian Water on the validation and development of this transfer option.

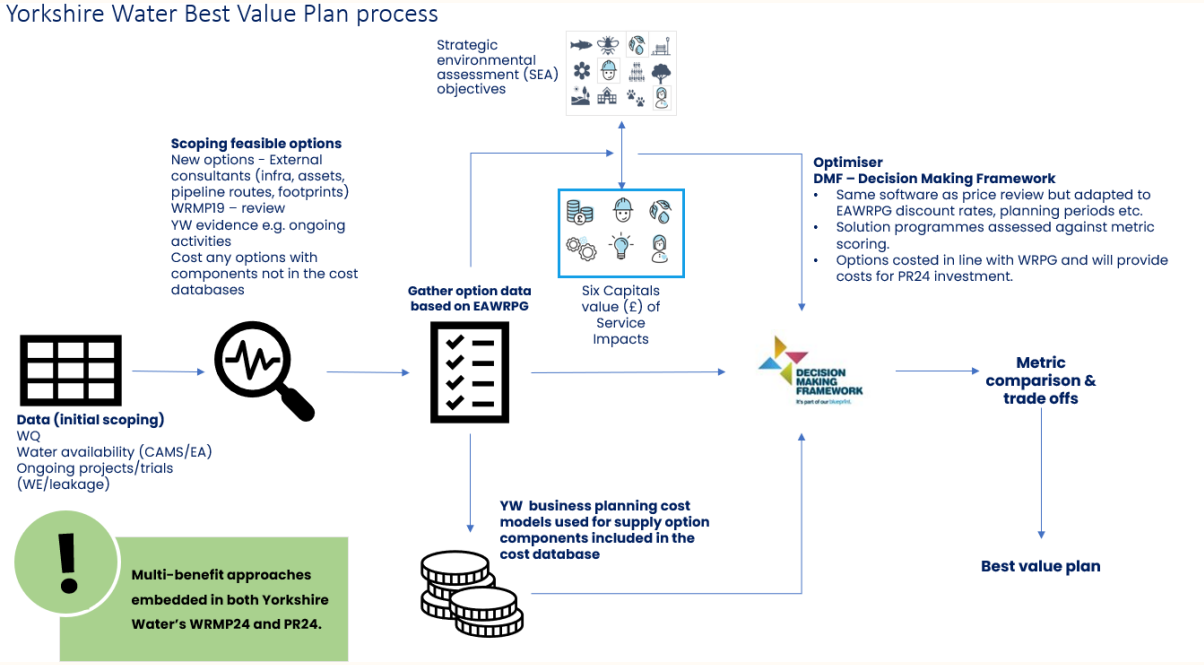
As is required in the National Planning Guidelines, we have considered a scenario where having closed the deficit in our plan, we would export water to neighbouring water companies. At this point in time, these options have not been selected in other companies' preferred plans. Subject to future surplus, we will continue to work with others through the Regional Planning groups to assess this option for the future.

1.4.3 Best Value Analysis (Six Capitals)

As part of our decision-making process, we compare the costs and benefits of several potential solutions (combinations of feasible options known as candidate solutions) before selecting the solution we put forward in our WRMP. Initially we create solution programmes using an optimisation model, which we refer to as our Decision-Making Framework (DMF).

We input cost and benefit information for all our feasible options into our DMF model and use it to optimise a solution to the baseline dry year annual average and critical period scenarios. The impacts and benefits of each option are monetised to represent the six capitals. The capitals represent valuable assets that can be impacted by our activities and for our WRMP we can use the capitals to measure the impacts of our options. The process is shown below:

Figure 1.12: YW Best Value Plan Process



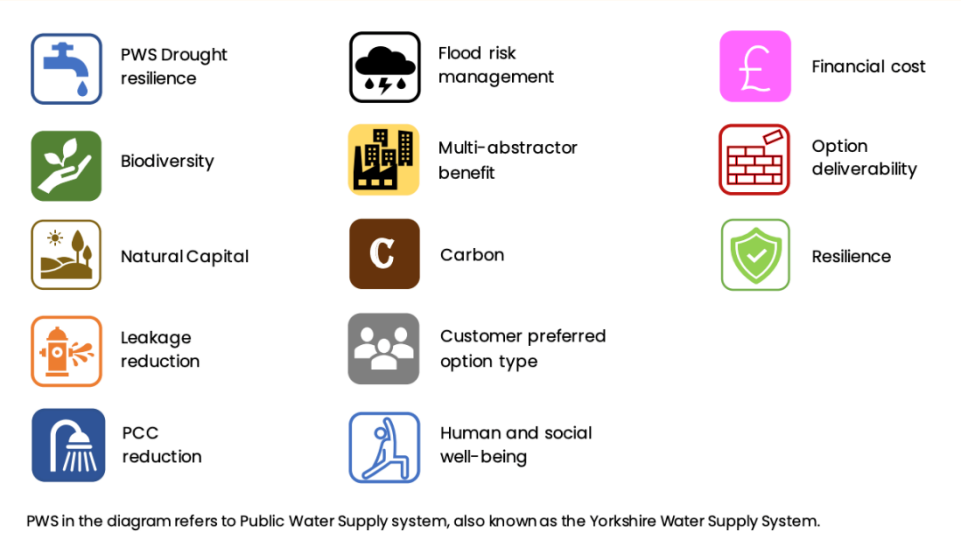
To meet all the identified needs associated with water resources management planning, we have assessed the risks and benefits of the optimised solution programmes and created candidate best value plan solutions that achieve all the wider objectives. The optimised and candidate solution programmes are compared against pre-defined 'best value' metrics to assess which can be considered a best value plan.

Each candidate solution and the least cost plan is compared against the best value metrics. We have adopted the best value metrics used in the WReN regional plan, with the addition of a resilience metric that is company specific to Yorkshire Water. The WReN metrics were presented to customers as part of regional plan focus group sessions and to the WReN stakeholder steering group. The aim was to seek customer and key stakeholder views and to understand the relative valuation of the metrics.

The resilience metrics are based on the Yorkshire Water Supply System Strategy output. The Water Supply System Strategy process was primarily developed for our Price Review 2024 (PR24) Business Plan to meet non-WRMP needs, but during its development it has identified WRMP related needs and options, which have been carried through into WRMP24. Our best value metrics are measured using a variety of units such as net present value costs, biodiversity net-gain units and tonnes of carbon dioxide and illustrated in the diagram below. Others are qualitative metrics such as customer preferences and resilience. To compare the solution programmes against each other, the metrics are 'normalised' to a comparative scale between 0

and 100, where 100 is the most optimum score of an individual metric across all the solution programmes considered.

Figure 1.13: Resilience Metrics



We used our DMF model to produce optimised solutions programmes based on:

- Cost represented by the financial capital and calculated using the criteria specified by the regulatory guidelines.
- Carbon impact represented by our carbon capital, which monetises the carbon dioxide emissions for building and operating the supply and demand options.
- Social and natural capital impacts represented by monetised values of both the positive and negative impacts of the options.
- All six capitals.

1.4.4 Impact Quantification

1.4.4.1 Demand-side

Stretching performance improvements across the demand side options have been included within the performance commitment incentive regime. The attainment of these outcomes is dependent upon enhancement funding to continue the transformational change in performance to a new frontier as outlined in the table below:

Table 1.12: PC Targets

	Baseline performance (AMP7 Outturn)	25/26	26/27	27/28	28/29	29/30	Total improvement
Leakage 3-year average rolling Ml/d	272.1	263.0	255.2	245.9	236.7	229.0	43.1 Ml/d
PCC 3-year average rolling l/h/d	124.9	124.9	123.9	123.1	122.4	121.7	3.2 l/h/d
Business Demand 3 year rolling average Ml/d	275.8	274.8	274.1	273.0	271.7	270.4	5.4 Ml/d

1.4.4.2 Supply side

We have considered how water quality may change in the future, and how we will need to invest in a range of solutions to ensure that we do not compromise on the quality of water supplied to customers.

We decided which near-term options to include in the preferred programme after assessing the environmental impacts of the new supply options and the resilience benefits. Our WRMP is subject to a strategic environmental assessment (SEA) and, where applicable, Water Framework Directive (WFD) and Habitats Regulation Assessments (HRA). Our SEA, WFD and HRA assessments influence our decision on which combination of options to include in the preferred plan and highlight any major impacts that could be a risk to the delivery of the schemes.

The preferred solution results in a reduced environmental impact overall by increasing the volume of demand reduction and decreasing the number of new supply options compared to the optimised solutions. This improves the deliverability of our plan: However, we cannot avoid environmental impacts completely and environmental impact assessments and mitigation strategies will be developed during the implementation of the schemes.

During the delivery of our new supply options, we will be required by legislation to deliver a 10% biodiversity net gain if our schemes impact on land (e.g.new sites or pipelines) and are required to support our operational carbon net zero ambition. We will address these objectives when we deliver the schemes and endeavour to reduce the impacts as much as possible. However, the nature of the schemes is likely to require biodiversity and carbon offsetting to achieve the objectives.

1.4.5 Cost and Benefit Uncertainties

1.4.5.1 Supply-side

We model supply availability using our WRAPsim water resource simulation model. This model takes account of constraints in our supply system and historic inflows and calculates how much water can be supplied, whilst maintaining resilience with a system response that does not require level 4 drought restrictions 7 such as rota cuts more than 1 year in 500. We also maintain a level of service of no more than a 1.25% risk of drought permits or orders 8 and 4% risk of a temporary use ban in each year (one drought permit every 80 years on average and one temporary use ban per 25 years on average) in both resource zones.

We take account of temporary reductions to resource and treatment availability in our planning. This is known as outage and can be unplanned, such as pollution events reducing water quality to an untreatable level, or unplanned events, such as asset maintenance or refurbishment. We reduce deployable output to allow for outages in our supply-demand balance calculations. Water loss also occurs during the process of abstracting, treating, and putting water into supply. In addition to outage adjustments, we include an allowance for process losses as this also reduces the deployable output. We allow for uncertainty within our supply and demand forecasts through a target headroom approach.

We then undertook stress testing against the WRMP and Ofwat’s common reference scenarios to test our plan against the known risks that could trigger a material change to our plan. Refer to section 9.6 of our dWRMP for the scenarios.

1.4.5.2 Demand-side

<u>Leakage</u>

Calculating leakage is a complex methodology with many factors contributing to the overall outcome in reported leakage. Leakage reductions through the proposed schemes have been calculated using either extrapolations of benefits from existing known business initiatives, or utilising Industry best practice methodologies, such as for the benefit of pressure management. Yorkshire Water has a monitoring framework in place, to track the cost benefits of the existing leakage improvement programme. This will be expanded to the interventions for AMP8 and will inform the requirements to reoptimize the investment programme utilising a different blend of solutions, if significant variation from planned costs and benefits occurs. This will be underpinned by the WRMP adaptive pathway monitoring approach.

PCC and Business Demand (NHH)

Uncertainty in the accuracy of the costs were mitigated by enlisting support from RPS, a recognised expert in the industry who have provided similar reviews for other water companies through the WRMP and PR24 process. With this insight they have significant, knowledge, experience and access to industry benchmarking for costs and benefits.

We will deliver the HH and NHH demand reduction program ensuring best value by benchmarking against other companies and where appropriate working in collaboration with external partners with expertise in this area.

We will continually monitor cost and benefits throughout the AMP to ensure we provide the best value for our customers and delivering on our long-term objectives for PCC and business demand (NHH) reduction. A monitoring programme will be put in place in line with the adaptive pathway monitoring regime, to assess the impact of interventions, and allow for moving to a different blend of solutions if the cost benefit ratio of interventions is adverse to plan.

We are managing uncertainty around Environmental Destination

The National Framework for Water Resources sets out the size of the challenge of achieving long-term water resources and environmental resilience. As required through the regional planning framework, regional groups have begun to investigate these future environmental water needs and to identify actions that may be required to achieve their long-term 'Environmental Destination'.

Under the Environmental Destination driver we are required to look beyond our existing statutory requirements and develop a clearer picture of future environmental needs. Through the regional planning framework and supported by our programme of WINEP investigations, we will develop the evidence base to support the decisions we make through our adaptive pathways.

At this stage, our WINEP investigations have not identified any changes to abstraction licences that would materially affect the supply forecast. However, for ongoing investigations which will not be completed prior to WRMP24, or where new investigations are planned for the 2025-30 period, our adaptive plan makes allowance for the uncertainty in the outcomes of these investigations.

Reductions in deployable output linked to Environmental Destination vary by scenario and range from 6Ml/d to 288 Ml/d by 2050 at draft but these will change at revised draft ranging from 6 Ml/d to 180Ml/d. Accordingly, we created an alternative pathway to represent an enhanced environmental destination scenario.

1.4.6 Customer Views

For information on customers views relating to supply and demand, including information on how we have involved them in building solution options, see our 'Customer Support' section above.

1.4.7 Third Party Funding

There are no third party funding opportunities associated with the WRMP. Fulfilment of WRMP needs is an obligation on water companies so it would be expected that water companies would fund such activity.

1.4.8 Direct Procurement for Customers (DPC)

We propose a DPC approach for one scheme – New WTW (York).

For more information on the process followed and the cases that were ultimately judged as suitable for DPC please see section 6.3 in Introduction to Enhancement Cases.

Read more about this at
Introduction to Enhancement Cases

1.5 Cost Efficiency

1.5.1 Option Costs

This section outlines how our overall approach to cost estimation and cost efficiency, as outlined in section 7.3 in Introduction to Enhancement Cases, has been applied to this enhancement case. Table 1.1 at the beginning of this document summarises the costs associated with this enhancement case:

Cost estimate for our preferred option

Refer to section 'the scale and timing of investment' for our costs for each demand reduction initiative and our supply-side schemes. In addition, we also provide further detail under 'our preferred plan'

Our costing estimate has been developed using our Unit Cost Database (UCD) and our Enterprise Data Analytics processes. Further details on how we have applied these tools to develop cost estimates are provided in section 7.3. Key assumptions used to create cost estimates for this enhancement case are discussed below. Chapter 9 of the dWRMP describes out costing approach in detail. The dWRMP describes the methods we have used to determine the best value solutions for our options.

As outlined earlier in this case, schemes and demand reduction activities were identified through the dWRMP process through consultation with the Environment Agency and Defra. We then worked through a detailed optioneering process to identify solutions available.

In some instances, we have been able to build our costs for some demand reduction activities using a known programme of leakage initiatives which are extensions to projects already delivered by Yorkshire Water. Many of the interventions have frameworks in place, which have been used to establish the cost of delivery. These unit costs have been benchmarked using third parties and the cost curve for each intervention been applied with third party assurance using industry leading analytics and methodology by RPS.

Where no suitable cost models were identified in our Unit Cost Database, we utilised information held in the national water industry costing database where applicable (TR61 v14). Adjustments are required to this data to account for differences in methodology and to account for Yorkshire Water design costs.

1.5.2 Efficient Cost Estimates

The introduction to our enhancement cases outlines our approach to cost efficiency in enhancement cases, and how our internal process and delivery decisions are designed with efficiency in mind. This section outlines the application of this approach to this specific enhancement case.

We also cross checked our costs against information held in the national water industry costing database where applicable (TR61 v14).

In selecting our preferred plan, we have used a multi criteria approach to produce a best value plan. This approach creates several alternative plans for closing a deficit and scores each plan against metrics that represent a range of key decision-making criteria for meeting water resource planning objectives. The principal objective of our Water Resource Management Plan is to close the supply-demand deficit and provide a sustainable and secure supply of water to our customers. Additional objectives include ensuring costs are efficient and that we maximise the wider benefits of the plan by considering the environmental and social impacts associated with water supply and delivering supply-demand solutions. The objectives are often conflicting, and we must balance the impacts to create a best value plan that may not be optimum for each individual metric but is the most optimal plan when all objectives are considered collectively.

1.5.3 Need for enhancement model adjustment

We recognise that Ofwat will attempt where possible to develop econometric models for supply demand balance investment at PR24. We do not have any specific reason to believe that an adjustment to these models would be required, but without a view of these models ahead of submission development of a case for an adjustment is not possible.

We note that supply/demand interventions are very company specific, so whilst simple cost/benefit models can be created the specific costs efficiencies in £/Ml can be limited by the availability of interventions in individual company reasons. We ask that Ofwat carefully considers any reasons that companies may be outliers in costs in respect of the models rather than automatically attributing these to relative efficiency/inefficiency.

We recommend that a deep dive assessment is used to complement any modelling approach and to ensure that differences between modelled allowances are reflective of efficient unit rates rather than differences in available solutions to address deficits in the region.

1.6 External Assurance

Turner and Townsend were appointed to provide external assurance on Yorkshire Water's PR24 dWRMP submission with their overall approach to assurance based around 2 stage audits looking at methodology and data.

For information on Assurance please see section 7.4 in Introduction to Enhancement Cases.

1.7 Customer Protection

For information on the methodology we have used and the central assumptions we have applied for our Price Control Deliverables (PCDs) please see section 8.2 in Introduction to Enhancement Cases.

We reviewed our forecast enhancement totex and found we met the 1% materiality threshold for PCDWW11. Our enhancement totex for PCC and business demand reduction, and for leakage do not meet the materiality threshold for PCDW9 and PCDW10 respectively. Accordingly, we propose to protect customers from the under or non-delivery of our WRMP supply-side schemes.

We also considered whether additional customer protection mechanisms were in existence or should be introduced to complement the PCD.

1.7.1 Price Control Deliverable (PCD)

We set out our PCD parameters and payment rates in the following tables.

PCD Delivery Expectation	
Description	Investing in new and growing existing water supply options to meet forecast supply-demand deficit for the company's region under its Water Resources Management Plan (WRMP). The company will deliver six schemes to increase its water available for use (WAFU) by 64.8 Ml/day by 31 March 2030. The schemes include options increase supply through a range of: • water transfers • water abstraction • groundwater supplies, and • boreholes.
Output measurement and reporting	Number of schemes completed, reported to zero decimal places. The company will also report on the WAFU at the beneficial completion of each scheme. The company will report in parallel with the APR.
Assurance	The company must commission an independent, third-party assurer, with a duty of care to Ofwat, to assure, to our satisfaction, that the conditions below have been met and the outputs of the scheme set out below have been delivered.
Conditions on Scheme	The company may substitute schemes where agreed with Defra through the regular reporting on its WRMP and the schemes deliver equivalent WAFU benefit. Currently planned schemes are: 1. East Yorkshire Groundwater option 2 2. River Aire abstraction 3. River Ouse licence transfer

	4. Magnesium Limestone new groundwater supply 5. Sherwood Sandstone and Magnesium Limestone Boreholes Option 2 6. Sherwood Sandstone support to grid.

We have set our delivery profile to recognise the dates where the WRMP supply-side are forecast to yield benefits for customers, consistent with our dWRMP preferred plan.

We have excluded the new Water Treatment Works (York) scheme from the PCD because that will be delivered through Direct Procurement for Customers (DPC) and not through funding direct to Yorkshire Water. We will work with Ofwat through the DPC process and contracting with the successful bidder for the delivering that scheme and associated benefits for customers.

1.7.1.1 Forecast deliverables

Table 1.13: PCD Deliverables

Deliverable	Unit	Forecast Deliverables				
		2025/26	2026/27	2027/28	2028/29	2029/30
Supply schemes	number (cumul)	2	2	5	6	6

Consistent with Ofwat's guidance, we have forecast the benefits of the enhancement investment for customers.

1.7.1.2 Forecast benefits

Table 1.14: Forecast Benefits

Benefit measure	Unit	Forecast Benefits				
		2025/26	2026/27	2027/28	2028/29	2029/30
WAFU benefits	Ml/day (cumul)	39.5	39.5	49.8	64.8	64.8

We propose a custom PCD payment rate for each named supply scheme. We have not proposed per WAFU because of the variation in scheme solutions and costs for each ML/d. We set out the relevant unit payments in the table below.

1.7.1.3 PCD payment rate

Table 1.15: Proposed Payment Rate

Scheme	Scheme cost (£m)
East Yorkshire Groundwater option 2	6.30
River Aire abstraction	52.44
River Ouse licence transfer	0.06
Magnesium Limestone new groundwater supply	7.53
Sherwood Sandstone & Magnesium Limestone Boreholes Option 2	26.49
Sherwood Sandstone support to grid	62.82
Total (not including DPC scheme)	155.64

Note: rounding

1.7.2 Annualised Outcome Delivery Incentives

There is no performance commitment or ODI impact for this enhancement totex.

1.7.3 Annualised time delivery incentive

We consider a time delivery incentive is not appropriate. Although the enhancement spend is material, there is continual oversight of the company's WRMP and subsequent implementation from Defra. We are unable to amend our programme or pass certain milestones without appropriate approvals. Although these are established processes, there are a series of factors that change our schedule under the WRMP in any given AMP.

A key input to our programme is the results from investigations under WINEP, such as possible abstractions. We usually complete these investigations on time and to specification except for two scenarios: 1) we receive inconclusive evidence and need further investigation or 2) weather conditions prevent us from the required sampling and monitoring. In both instances, we will bear the cost of rescheduling or extending our investigations programmes and are therefore incentivised to keep to our programme schedule and hence regulatory deadlines.

Similarly, we have developed a monitoring plan and trigger points to assess whether our demand reduction initiatives are developing the expected benefits. For example, we need to identify whether our business demand activities are delivering higher or lower benefits than forecast. We must adapt to new information both in terms of scheme selection and timeline for delivery to ensure we bring forward or push back investment where it is most appropriate. As mentioned above, abstractions are a key part of our plan and there are open decision remaining on levels of abstraction reductions for our regions. Similarly, we may start the construction of a new borehole but find yields are too low and therefore need to find an alternative site.

Where we are required to re-plan and re-prioritise, we will bear these costs while we determine and agree the best solution forward with Defra. Accordingly, we are incentivised to reduce delays and the associated costs. Each delay will also put pressure on our supply-demand balance and our resilience and medium-term impacts of extending our deficit may lead to increases in unplanned outage or water supply interruptions.

We consider that where new information shows we no longer need a scheme in AMP8, the price control deliverable enables us to return the funds to customers.

1.7.4 Third Party Funding or Delivery Arrangements

There is no third party funding. We have excluded forecast DPC costs from the customer protection, so the PCD only reflects funding provided to Yorkshire Water. We have no third party funding associated with the delivery of this case.