WSX03 - Long term delivery strategy

Business plan 2025-2030

Wessex Water
YTL GROUP

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WSX03 – Long term delivery strategy

CONTENTS

This supporting document is part of Wessex Water's business plan for 2025-2030.

Please see WSX00 – Navigation document for where this document sits within our business plan submission.

More information can be found at wessexwater.co.uk

Executive Summary

Trust in the privatised water industry is low and the sector under scrutiny because of heightened public awareness and understandable concerns about sewage pollution, storm overflows and the health of our waterways. Against this backdrop, customers are experiencing a challenging domestic economic environment.

Wessex Water recognises that we need a sustainable system of water management that protects and sustains clean rivers and water sources, supplies high quality drinking water, and manages sewage for people, at a cost we can all afford. We are committed to investing in long-term solutions which are essential for a water future resilient to climate change and a growing population. This means working in collaboration with others and at a catchment level.

The solutions to the pressing environmental challenges we face will not be solved in isolation by Wessex Water or indeed any individual entity. Working in partnership with our customers, stakeholders, regulators, and our supply chain is the best way to identify and deliver solutions that are both cost-effective and sustainable.

Our Long-Term Delivery Strategy (LTDS) is a vital component to demonstrate how we will deliver an enhanced environment and excellent customer service out to 2050. Following an industry-wide review of companies' strategies, we have taken the opportunity to update our LTDS from the original version we submitted alongside our PR24 business plan in October 2023. In revising this document, we have taken full account of:

- Ofwat's final guidance on long term delivery strategies issued in April 2022 ('the Ofwat guidance').
- Feedback from Ofwat on our emerging strategy in spring 2023.
- Further specific feedback from Ofwat following our business plan submission.
- Revisions to our Water Resources Management Plan (WRMP), another long-term strategic planning framework which fully aligns with our revised LTDS.

The key changes to our LTDS are set out in Annex 1. We are grateful to both the economic and quality regulators for the opportunity to update this important document.

Setting ambition

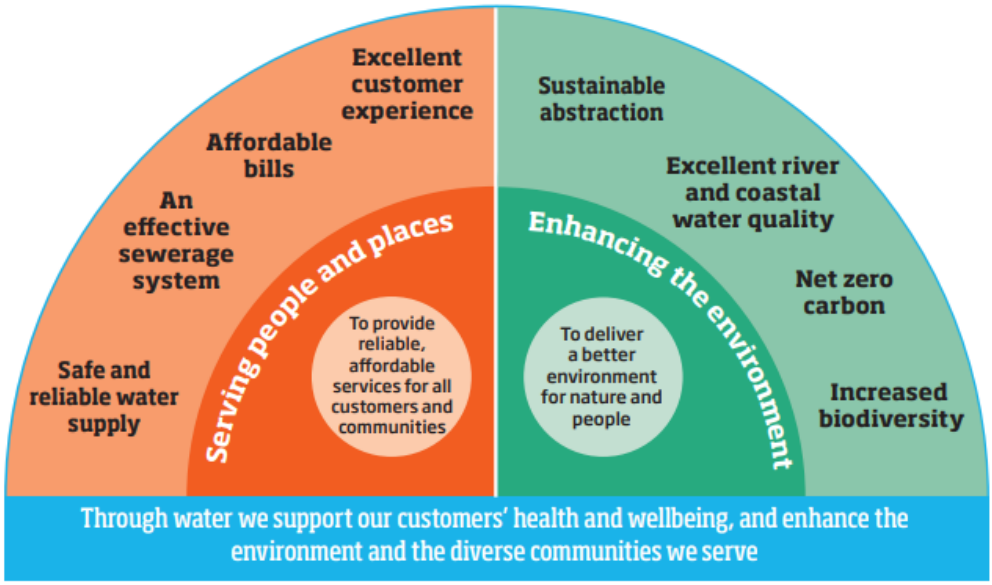
Our LTDS sets out what we intend to achieve over the next 25 years (ambition), and how we intend to do that (strategy). In developing our LTDS ambition, we have taken as a starting point our strategic direction statement (SDS) which presents our company vision and ambition though to 2050, and is already at the heart of Wessex's business-wide strategy. In our SDS we have committed to:

- Lead the water industry on the delivery of core services for customers, communities, and the environment, despite the steeply rising challenges involved in doing so.
- Raise the bar on what is considered leading performance, looking outside of the water industry for benchmarks and committing to even higher levels of service.
- Rise to changing societal expectations on the health of the water environment.
- Play our part in addressing wider societal and environmental challenges, which will take us into a new realm of environmental stewardship and leadership.

Our eight SDS outcomes are summarised in Figure 1 and supported by metrics that we believe are the key measures of an outcomes approach; one focused on the overall impact on customers, communities, and the environment, rather than a focus on specific output targets. These metrics have been used to develop long-term trajectories for common performance commitments for our LTDS.

Together, this establishes *what* we are seeking to achieve by 2050 in terms of delivering for customers, communities, and the environment.

Figure 1 – Wessex Water's eight outcomes



An *adaptive* strategy – core and alternative pathways

Our LTDS sets out how we intend to achieve our SDS ambition (and associated performance targets) under a range of scenarios or future 'states of the world'. This follows the principle of **adaptive planning** which, as set out in Ofwat's guidance, helps us to identify what enhancement investments are needed now, and what may be needed in future, but for which a decision point can be delayed until there is greater certainty about what is needed.

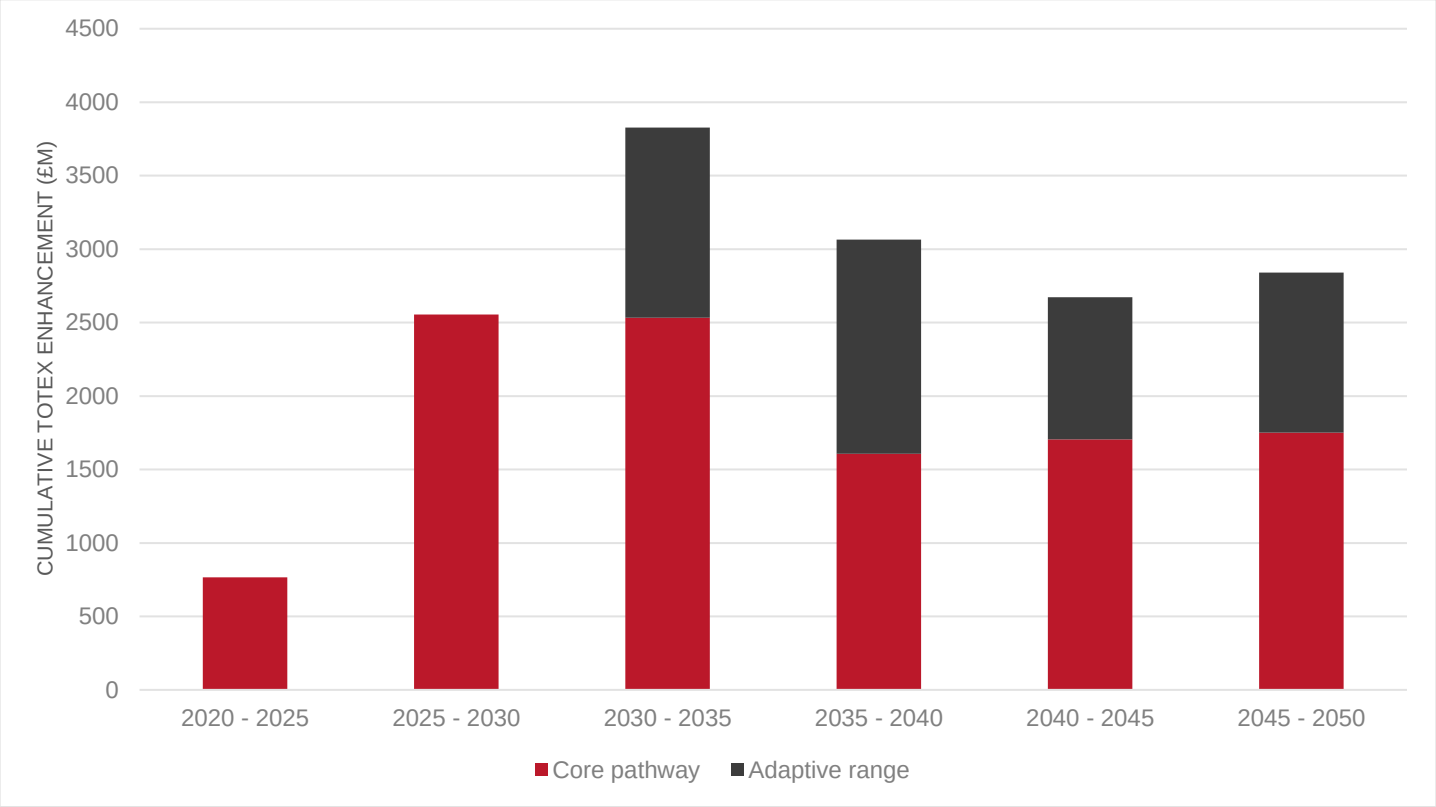
We have firstly developed a **core pathway** which captures all enhancement investment required to achieve our 2050 ambitions under a benign state of the world – taking account of the potential to make performance improvements from base expenditure. Where relevant, it also includes low regrets investment needed to keep alternative options open to be ready for all plausible future scenarios. This dictates our investment profile under the most favourable set of assumptions as to how the industry and wider world will progress through to 2050.

Overall, we estimate that we will require £10.2 billion in enhancement investment under the core pathway (in 2022/2023 prices) over the next 25 years to meet our long-term ambition.

We have then developed a set of **alternative pathways** to account for scenarios where the core pathway would be insufficient to meet our ambition, necessitating an expanded investment programme. We have based our alternative pathways primarily on Ofwat's set of **common reference scenarios** (demand, climate change, technology, and abstraction reduction), alongside one further scenario that affects our bioresources strategy (landbank availability), focusing on the most likely alternative scenarios to a benign future state of the world. In this way, our alternative pathways capture the most relevant alternative investment profiles we may be required to follow in future.

To estimate additional investment requirements under each alternative pathway, as with our wider business planning process, we have used our company and industry best-practice to evaluate options and best value solutions. We estimate the total additional enhancement investment (for the worst-case combination of scenarios) could be up to £4.8 billion across 2030 – 2050, as shown in Figure 2 below.

Figure 2 – Core and alternative pathways: Total enhancement cost (£bn)



Some of the key drivers of additional investment requirements captured in our alternative pathways are as follows:

Raw water quality deterioration. Catchment management has allowed us to defer significant investment in our water treatment centres (WTCs) through working with farmers to reduce nitrates and pesticides entering drinking water sources. This low-regrets approach underpins our plans for 2025-30 – we intend to increase our catchment schemes in ten drinking water catchments. However, catchment management alone has not been enough at one of our sites to negate the need for an asset solution, and our PR24 plan now includes the requirement to build a nitrate removal plant. While we still believe that catchment management is the right approach to tackling raw water quality, as it addresses the issue at source rather than treating the issue later down the line, we have developed an alternative pathway to capture the investment implications if a wider range of asset solutions is to be required.

The need to further reduce the **impact of nutrients** on the environment. A significant part of our core pathway investment, particularly over 2025 – 2035, is in nutrient removal to address tightening regulatory standards. Under a future scenario with higher demand, we consider this may lead to a further tightening of regulatory requirements for nutrients levels, and so we have developed an alternative pathway to capture the resulting implications for our investment needs using both green and grey solutions (grey being the more traditional 'built asset' solutions such as chemical treatment, with green solutions covering options such as on-site wetlands as well as more catchment-based solutions).

A **loss of landbank** for sludge disposal. This would have a material impact on our ability to dispose of our sludge and require us to pursue alternative solutions. This could include the use of Advanced Thermal Conversion (ATC) technologies, which are currently at an early phase of development, but we will be seeking to explore these in partnership with other companies. Our 2025-2030 business plan therefore sees us scale up our current treatment approaches in a low regrets approach, with an alternative pathway to capture the resulting implications for our investment should we lose the ability to spread sludge to land (both with and without ATC technology availability).

Decision points and trigger points

A key insight provided by our LTDS relates to how investment and activities should be sequenced to achieve ambition and performance objectives in the best value way over the long term. It does this by setting out, for each alternative pathway, a decision point which determines the latest point in time at which we would need to decide to move to an alternative pathway. This will be dictated by the specific circumstances of each pathway, but the guiding principles are that (i) it should be deferred until we are confident that the relevant investments will be necessary to deliver our ambition; and (ii) deferring the decision even longer will risk us not meeting our 2050 ambition (and any interim performance and regulatory targets).

The trigger point then determines the point in time at which our enhancement investment profile deviates from the core pathway to follow the alternative pathway. These generally align with price review periods, as that is when funding allowances are determined. We explain our rationale for each trigger point in Chapter 3.

A clear understanding of decision points and trigger points will minimise the risk of aborted investments and stranded assets, and thereby ensures that our overall strategy maximises value for customers, communities, and the environment.

Foundations and rationale

In producing this LTDS we have built on the work of the Water Resources Management Plan (WRMP), Drainage and Wastewater Management Plan (DWMP), Water Industry National Environment Programme (WINEP) and wider PR24 planning activities, as well as BAU long term planning. Chapter 4 provides further detail on how our LTDS aligns with these other strategic planning frameworks. By bringing together all these frameworks in one place for the first time, the LTDS provides a holistic view of how we will meet all our obligations and achieve our company objectives for supply; waste; and other parts of the business, and a better understanding of how they interact with each other.

We have developed our LTDS around six major sub-strategy areas, to align with SDS our outcomes:

Safe and reliable water

(Water treatment and supply – section 3.5.1)

Excellent river and coastal water quality

(Wastewater programme – section 3.5.4)

Sustainable abstraction

(Water resources – section 3.5.2)

Bioresources activities associated with **net zero carbon** (section 3.5.5)

Effective sewerage system

(Sewerage networks – section 3.5.3)

Other activities focused on **net zero carbon** (section 3.5.6).

These areas comprise the bulk of our activities and investment requirements.

In developing our core and alternative pathways, we have made assumptions about **cost uncertainties**. Costs for solutions can change significantly even over a 5-year period for a myriad of reasons (e.g. changes in requirements; site conditions varying; supply chain cost pressures). Forecasting future uncertainties and the solutions that may resolve these situations, and their associated costs out to 2050, compounds this uncertainty. This LTDS has been

put together with our best view of costs and expectations we are able to deliver now, but we recognise this will inevitably change over the coming years.

As such, we consider our core and alternative pathways are best interpreted as an illustration of the *relative order of magnitude of investment requirements under different scenarios,* rather than as firm 25-year statements of need.

The remaining sections of this document detail how our core and alternative pathways have been created, taking on board Ofwat's requirements in its final guidance. Further detail on these pathways for each sub-strategy area, including decision and trigger points, are given in section 3.5. These have been developed and tested using our industry knowledge, options evaluation process and scenario forecasting to create a set of plausible and material pathways that we anticipate we may migrate between. They are not mutually exclusive – we may need to follow a number of these alternative pathways in the future.

How we've involved customers and how we have sought to ensure bills are affordable.

Although much of our investment is driven by legal or regulatory requirements, customers have also helped to shape our LTDS. We have reflected customer insights in two main ways – firstly, through their input into the SDS which underpins the long-term level of ambition in our LTDS (which in some areas goes above and beyond regulatory requirements); and secondly, through the additional research undertaken for PR24 which has provided further insight into more immediate priorities over the next 5-10 years, as well as the types of interventions that they consider most important. This is set out in more detail in Chapter 5.3. We have also engaged our PR24 Customer Challenge Group on the implications of our strategy.

Together, this means that our LTDS reflects customer views and priorities both about *what we will be achieving*, and *how we will get there.*

In developing our LTDS, we have also been mindful of **affordability** (which is a separate SDS aim in itself). While we need to make the investments necessary to achieve our 2050 ambition, we have sought to limit the impact on bills over the longer-term in the following ways:

- As with all our planning, we have developed our enhancement cost estimates to be robust and efficient and they have been subject to internal challenge and scrutiny (recognising there is inevitably more uncertainty about longer-term projections, as discussed above).

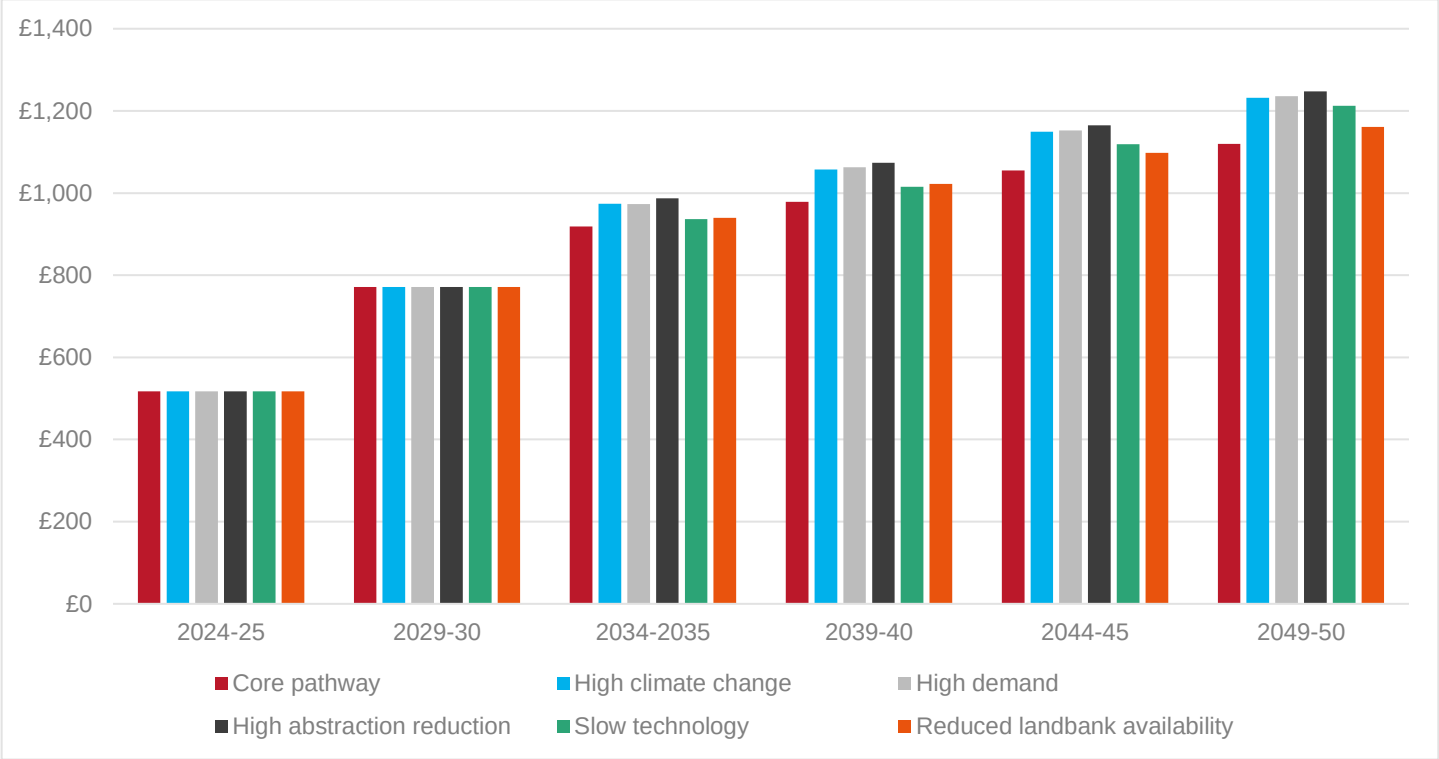
- We have challenged ourselves as to where we can deliver stretching performance from base expenditure, such that some aspects of our 2050 ambition will be delivered purely from efficiencies in the way that we carry out existing activities (e.g. operational and process improvements). This means that all pathways only capture the incremental enhancement investment that is genuinely unavoidable if we are to meet our 2050 ambition.

- We have profiled our investments in such a way as to smooth bill impacts over time (as far as possible). For example, we have deferred some investment to improve our performance on supply interruptions to 2035 and beyond, to achieve a smoother profile while still achieving the necessary performance improvement by 2050.

Figure 3 shows the average water and sewerage bill at the end of each price review period under our core pathway, and under the relevant alternative pathways that form each scenario in our LTDS. The bill impacts present a worst-case outcome for each scenario; in other words, we have taken the most pessimistic combination of alternative pathways. On the other hand, if two or more of the adverse scenarios materialise (e.g. high climate change and high demand), the bill impacts would be compounded.

The total average bill forecast in 2050 is £1,120 in the core pathway, with a smooth increase over time (albeit faster over the first 10 years) rather than short sharp shocks and erratic movements. The average bill under alternative pathways ranges between £1,161 (the reduced landbank availability scenario) and £1,248 (high abstraction reduction).

Figure 3 – Average bill forecasts under core and alternative pathways



We note that the 2025-26 to 2029-30 bill impacts will vary from those proposed in our PR24 business plan; for this chart we have followed the Ofwat guidance, whereas our business plan is based on more sophisticated financial modelling and reflects our proposed bill profile over this period.

The LTDS as a starting point.

The underpinning philosophy of long-term adaptive planning is to understand delivery pathways, decision points and triggers. As such, we should expect that our LTDS will naturally evolve over time.

We have already revised our LTDS once since it was originally developed and submitted in autumn 2023. This revision takes accounts of changes in the external environment that have already occurred since then (and some of our pathways and decision / trigger points have been amended accordingly). The investment profile under our core pathway has also been amended to reflect changes made to our PR24 business plan. Although these amendments have not fundamentally altered our strategy, which reflects that it is a long-term vision capturing uncertainties that in some areas will persist for many years, they ensure that our LTDS remains as up to date as possible and aligns with our 2025-2030 business plan.

Going forward, we intend to continuously **monitor and regularly report** on the LTDS, in particular on the likelihood of moving from our core pathway to alternative pathways as we approach the first set of decision points, and we obtain greater clarity about future states of the world. This will form part of our Annual Performance Review reporting cycle, and ensure we stay live to how our business is developing against the set of scenarios set out in this document. We will also report on our broader progress towards achieving our 2050 ambitions.

Our full monitoring and reporting strategy is set out in Section 3.6.

Furthermore, we also expect to undertake a wider review and update of the LTDS as part of the next price review. This coincides with several of our decision points particularly in respect of water resources, so is a natural time to undertake a wider review of the strategy.

In this way, our LTDS will be a ‘living’ document, one that is embedded in our organisational planning processes and central to future business plans and annual reporting. This document represents a starting point and springboard for the future.

Board Assurance

Our Board fully supports our approach to long-term stewardship. It challenges the management team to set an ambitious strategy across all aspects of the business and ensure that each individual element of delivery is aligned with that strategy. The Board therefore supports the concept of LTDS as one very similar to the approach it already takes, and it has been involved in shaping and refining its development from the outset.

Chapter 7 sets out an updated summary of our Board engagement, oversight and assurance process and activities, along with our Board assurance statement. As this revised version of our LTDS is an updated version of the original document that we published in October 2023, we have sought further assurance and engagement from our Board in respect of the changes made.

A full summary of the key changes to this LTDS, compared to the version originally published in October 2023, is detailed in **Annex 1.**

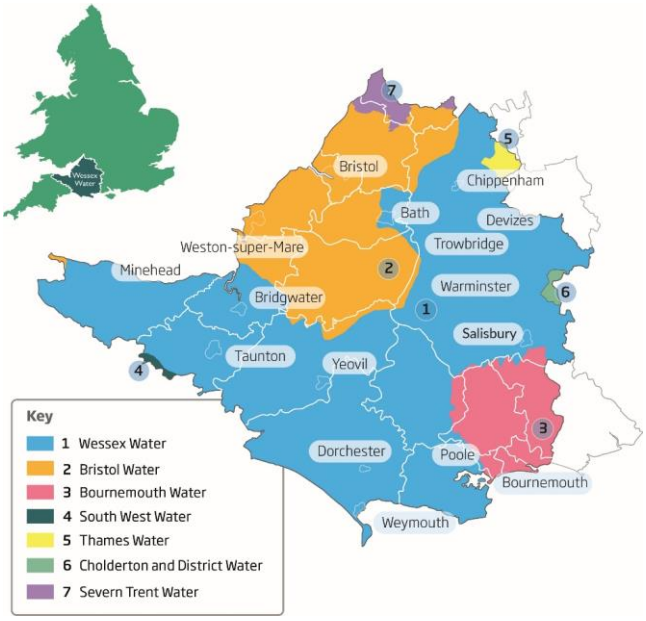
1. Introduction

1.1. Context and background

Wessex Water is the regional water and sewerage company for a large part of the South West of England. We have 2.8 million customers and around 3,000 employees (and work with over 10,000 contractors). Our water and sewerage network comprises more than 47,000km of water mains and sewers, and more than 3,000 treatment, storage, and pumping sites.

Figure below shows the region we serve. Although we are one of the smallest water and sewerage companies (WASCs), we have a region that covers large cities such as Bristol for sewerage services and Taunton, Poole and Bath for water and wastewater, alongside many small rural communities serving just a small number of properties. Our region contains 27% of the country's chalk streams; 11.5% of the country's sites of special scientific interest (SSSIs); areas of outstanding natural beauty (AONBs) covering 30% of our region; and many areas of special designation beyond this.

Figure 4 – The Wessex Water region

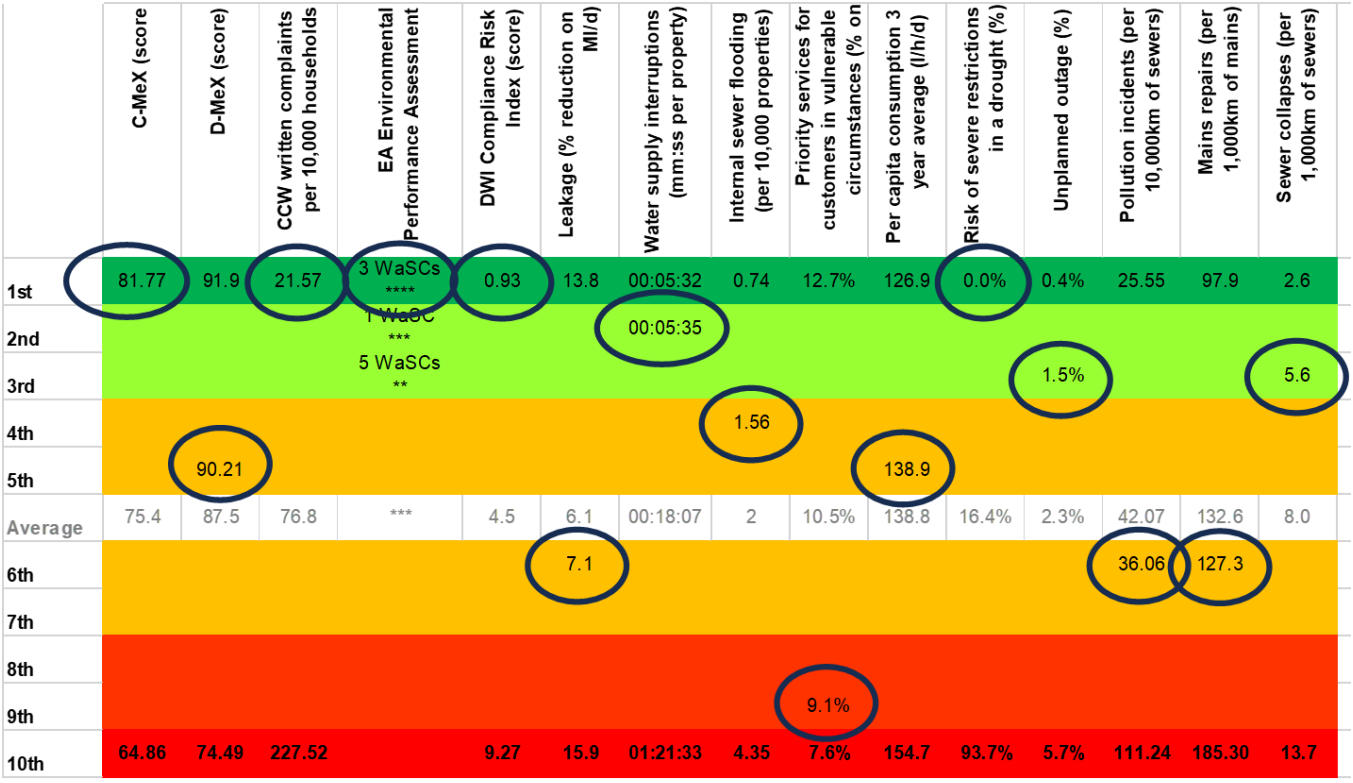


We have a clear vision for where we want to be as a company in the future, and what we expect to achieve. This is set out in our Strategic Direction Statement (SDS). Our overall mission is:

- To provide reliable, affordable services for all customers and communities
- To deliver a better environment for nature and people
- To be a great place to work for all.
- To be a trusted, financially strong company with fair investor returns.

We have a long history of delivering on this mission. This is reflected in our strong historical performance, where we have consistently met or exceeded industry targets, as well as delivering industry-leading performance in areas such as customer service, Compliance Risk Index and supply interruptions. Figure 5 below summarises our relative performance in the most recent financial year across a range of industry measures.

Figure 5 – Wessex Water comparative performance for 2023-24



Our strong track record has helped us to cultivate a trusted relationship with customers and regulators. This has allowed us to trial new and innovative methods of delivery, such as catchment permitting in the Bristol Avon in Asset Management Period 7 (AMP7). This followed a series of catchment management projects which we were the first company to introduce, firstly at our drinking water sites to safeguard our raw water sources, and more recently in Poole Harbour on the wastewater side.

However, maintaining high standards of service provision – both customer and environmental – will not be without its challenges. As customer, regulator, and government expectations and requirements increase, all amidst a cost-of-living crisis, we as a company and an industry will need to work with all these parties as well as our wider partners to deliver requirements in a more collaborative, outcomes-focused approach.

1.2. Developing the LTDS

Against this context, we have developed our first long-term delivery strategy (LTDS) to support our PR24 business planning process. The LTDS sets our 5-year business plan in the context of a 25-year long-term delivery strategy, setting out the long-term outcomes we intend to deliver; how we will deliver them in a range of plausible futures; and how our PR24 business plan puts us on the right path to achieving these long-term outcomes.

In developing our strategy, we have:

- Reflected on the **specific circumstances of our region**. For instance, the abundance of chalk streams in our region means that river health is a particularly important outcome for us, and places particular importance on nutrient removal activities to ensure that our ambition in this area is met.

- Reflected on our **current performance relative to our ambition**. In some areas, we are well-placed to achieve our ambition based on improving and refining existing base activities, whereas other areas require

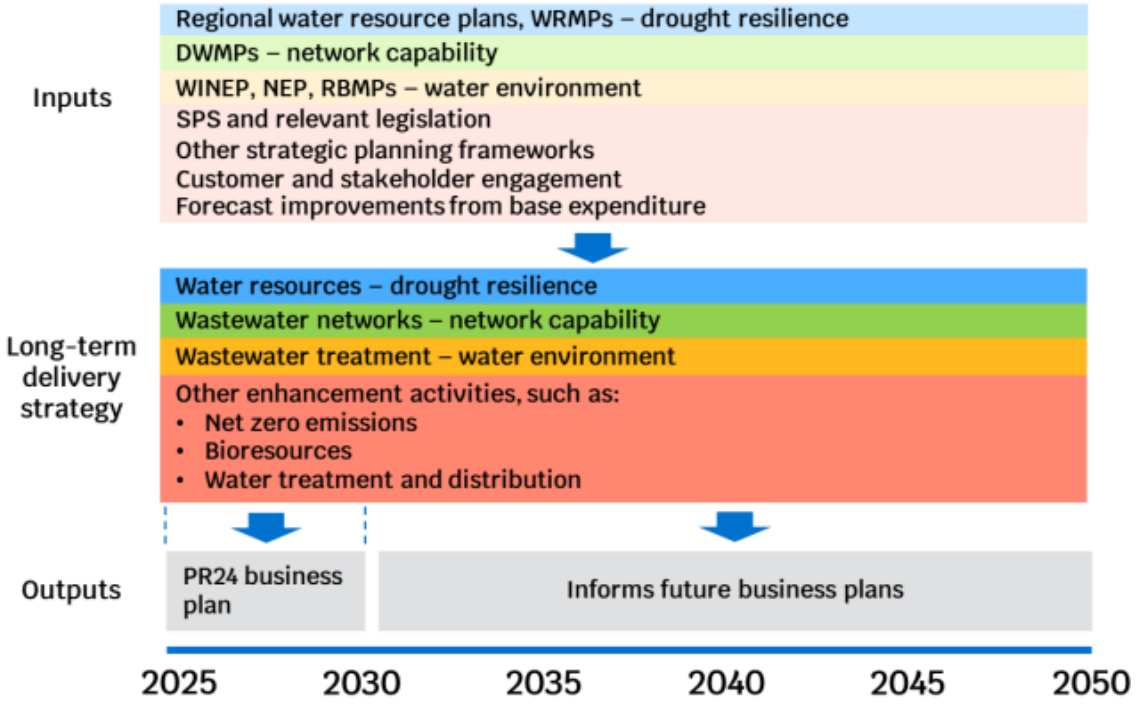
us to develop a more complex adaptive planning process, and to commit additional enhancement expenditure in future, to ensure ambition is met.

- Drawn on **existing planning frameworks** including the Water Resources Management Plan (WRMP) and Drainage and Wastewater Management Plan (DWMP). We also draw on our SDS, which (as explained above) sets the basis for our long-term ambitions, and on customer and stakeholder engagement on their future priorities.

- Reflected **Ofwat's final methodology guidance** which sets out clear requirements for both the inputs to companies' LTDS, and what the strategy itself should cover.

This process is summarised in Figure 6 below (from Ofwat's guidance).

Figure 6 – Key inputs and outputs of a long-term delivery strategy



1.3. Contents and structure

The rest of this document sets out how we have developed our LTDS in accordance with the process described above. It is structured as per Ofwat's final methodology guidance:

- We firstly set out our long-term **ambitions**. This underpins *where we want to be* as a company by 2050.
- We then present our **strategy** for achieving this ambition, followed by the **rationale and foundations** underpinning this strategy. Together, these sections demonstrate *how we intend to get there*.
- Our Board owns and is accountable for our long-term strategy. We have engaged our Board in the development of our LTDS, and we have set out our **assurance activities** in this regard.

Additionally, we also explain how we have **responded to Ofwat's feedback** on our emerging LTDS and our original submission in October 2023, which has led to changes to some areas of our LTDS.

Table 1 below summarises the structure of our LTDS.

Table 1 – Structure of our LTDS

	Requirement	Location
Ambition	Set out our ambition	Section 2.3-2.4
	How our ambition has been developed	Section 2.2
Strategy	Test how company ambition can be met in different future scenarios, including the common reference scenarios.	Section 3.3
	Set out a clear narrative for how the company expects to achieve the ambition and vision.	Chapter 3
	Set out low regret enhancement expenditure required in the core pathway.	Section 3.2
	Set out the 'higher regret' enhancements in the alternative pathways.	Section 3.4, 3.5
	Demonstrate alignment with WRMP and DWMP and 'most likely' approach is shown as alternative pathway (if not core pathway).	Section 3.5.2 Section 3.5.3
	Monitoring approach is in place (the metrics, frequency of reporting).	Section 3.6
Rationale	Scenario identification and development	Section 4.1
	How options are identified	Section 4.1
	Why the strategy is best value	Section 4.1
	How sequencing has been considered	Section 4.1
	Decision points are clear and trigger points identified.	Section 3.5
	Impact on bills set out for core and alternative pathways.	Section 4.4
	Impact on affordability and fairness between current and future customers, including evidence that customers consider the forecast bill impacts of the strategy to be acceptable	Section 4.4
Foundations	Clearly set out the assumptions underpinning the strategy	Section 5.1
	Set out the areas with the greatest uncertainty	Section 5.1
	The improvements in performance that are expected from base expenditure.	Section 5.2
	How customers have been engaged with to inform the design of the long-term strategies How customers and stakeholders have been engaged and their priorities taken into account when developing core pathway.	Section 5.3
Ofwat feedback	Address the Ofwat company specific and industry-wide feedback.	Chapter 6
Board Assurance	The company Board should provide an assurance statement that meets the criteria set out in Ofwat's final guidance.	Chapter 7

2. Ambition

2.1. Introduction

The starting point for an LTDS is a clear articulation of what the company would like to achieve over the next 25 years. As set out in the Executive Summary, our strategic direction statement (SDS) presents our vision and ambition though to 2050, and is already at the heart of Wessex's business-wide strategy. We have therefore used our SDS as the basis for our LTDS ambition.

In the rest of this chapter, we briefly summarise our SDS. We then explain how we have translated our SDS ambition into a set of long-term outcomes that underpin our LTDS.

2.2. Strategic Direction Statement

Our SDS sets out exactly how we intend to stretch ourselves over the coming 25 years. It was last revised in 2021, following extensive consultation involving over 1,700 customers and stakeholders plus the Wessex Water Services Limited Board. It identifies eight outcomes that we are committed to delivering by 2050, along with a specific aim for each of them. These are summarised in Figure 7 below.

Figure 7 – The eight outcomes of Wessex Water by 2050

Outcome	Aim
Safe and reliable water supply	100% quality compliance, always Zero interruptions of longer than three hours
An effective sewerage system	Halve the impact of sewer flooding
Affordable bills	Zero water poverty
Great customer experience	Be a top 10 customer service provider in the UK
Sustainable abstraction	Never harm the health of the water environment through our abstraction
Great river and coastal water quality	To restore the quality of our rivers and coastal waters
Net zero carbon	Be a net zero carbon business by 2040
Increased biodiversity	Double our contribution to the region's biodiversity

These outcomes correspond to the top half of our overall SDS summary in Figure 1. They were co-created with customers and stakeholders, based on extensive research undertaken during the development of the SDS. As such, these outcomes reflect our customers' and stakeholders' priorities for the long-term direction and ambition of our company. Furthermore, in considering how to achieve the outcomes, and in particular the timing of investments required to do so, we have taken account of more recent customer research conducted as part of the PR24 business plan process. This is discussed in more detail in Section 5.3.

On top of this, our SDS also commits to:

- Continuing to lead the water industry on the delivery of core services for customers, communities, and the environment, despite the steeply rising challenges involved in doing so.
- Raising the bar on what is considered leading performance, looking outside of the water industry for benchmarks and committing to even higher levels of service.
- Playing our part in addressing wider societal and environmental challenges, which will take us into a new realm of environmental stewardship and leadership.

2.3. Long-term outcomes

These eight SDS outcome areas set out above can be mapped to Ofwat's common performance commitments that it sets at each price review. For instance, our outcome of achieving sustainable abstraction will in practice be delivered in part through achieving sufficient reductions in per capita water consumption (PCC), business demand and leakage. As such, we can develop a set of targets for these performance commitments that supports our SDS ambition. This helps to provides a clear set of metrics that we can use to identify the required investments that we will build our LTDS around.

We have therefore developed a set of 2050 performance targets that encompass our ambition for this LTDS. These are set out in Table 2 below – with the full profiles presented at the end of this chapter.

- In some cases, this mapping exercise is straightforward because the SDS outcome area is explicitly supported by a specific aim which is already covered by a performance commitment (e.g. halving sewer flooding).

- In other areas, this has been informed by statutory and regulatory targets. For instance, the Government has set out a series of targets for leakage and PCC that it considers necessary to achieve sustainable abstraction, and which we have already taken account of in our WRMP planning activities. This can be used to set 2050 performance commitment targets for our LTDS.

- Furthermore, because these performance commitments are set to deliver our SDS ambition, which has been informed by and co-created with stakeholders and customers, these targets and delivery trajectories themselves reflect customers' priorities.

We note that there are no specific performance commitments associated with two SDS outcome areas: **affordable bills** and **great customer experience**[1]. As such, Table 2 covers the remaining six outcome areas. We have considered the impact of our LTDS on customer bills in Chapter 4, as affordability is a vital part of the LTDS. We have also set out in Chapter 3 our long-term ambition in respect of customer experience – principally to maintain our top position on the water industry measures of customer experience – and our strategy for achieving this.

[1] Customer experience is measured by the C-Mex score, but Ofwat's final methodology guidance states that the LTDS should include all PR24 common performance commitments, except those based on compliance (such as compliance risk index*)* or relative performance (such as C-Mex).

Table 2 – 2050 performance commitment targets

SDS outcome area	SDS aim(s)	Relevant performance commitment	Target in 2050
Safe and reliable water	Zero supply interruptions of longer than 3 hours	Water supply interruptions	Zero interruptions over 3 hours
		Customer contacts about water quality	0.72 per 1,000 population
	100% quality compliance	Unplanned outage	5.02%
		Mains repairs	159 per 1,000km of mains
Effective sewerage system	Halve the impact of sewer flooding.	Internal sewer flooding	0.66 incidents per 10,000 connections
		External sewer flooding	8.25 incidents per 10,000 connections
		Storm overflows	Average of fewer than 10 spills per overflow on average
		Sewer collapses	9.78 per 1,000km of sewers
Sustainable abstraction	100% compliance with abstraction licences	Leakage	50% reduction on 2017/18 baseline, equivalent to 38.3 Ml/d
		Per capita consumption	110 l/h/day
		Business demand	15% reduction on 2019/20 baseline, (equivalent to 69.3 Ml/d)
Great river and coastal water quality	Zero pollution incidents	Total pollution incidents	0
		Serious pollution incidents	0
	Restore the quality of our rivers and coastal waters	Bathing water quality	83.2%
		River water quality (phosphorus)	81.3% reduction in phosphorus removed
Increased biodiversity	Double our contribution to	Biodiversity	2.21 BUs per 100km^2 of land in the company's area

	the region's biodiversity		
Net zero carbon	Operational net zero by 2030 Net zero business by 2040	Operational greenhouse gas emissions (water)	0 tonnes
		Operational greenhouse gas emissions (wastewater)	0 tonnes

We provide further commentary below on how we have derived these performance commitment targets. We note there are two sub-strategy areas (effective sewerage and net zero carbon) where our LTDS targets reflect specific aspects of our SDS aims, rather than the full suite of objectives. There is also one area (biodiversity) where our LTDS ambition goes above and beyond the SDS. The reasons for this are explained in more detail below (and in Section 4.3).

Safe and reliable water supply

The key performance commitment target underpinning reliable water is supply interruptions. Our 2050 performance commitment target directly reflects our SDS ambition to achieve zero interruptions of longer than 3 hours.

We intend to maintain forecast end-of-AMP8 performance for unplanned outage, which we consider is consistent with our SDS ambition for safe and reliable water. This is because we can tolerate this level of unplanned outage while still ensuring a reliable supply of water (due to our network configuration).

We intend to achieve a reduction in customer contacts of more than 25% from today's levels to 2050, which will be achieved by maintaining and improving our overall performance in respect of supplying safe and reliable water to our customers.

Finally, our performance commitment target for mains repairs is based on maintaining and improving the asset health of our below-ground water mains network, which is key to achieving this SDS aim. We forecast an increase in mains repairs from today's levels, to achieve leakage reduction (discussed below) and the reduction in customer contacts about water quality. We forecast this will stabilise at the end of the 25-year period at around 159 per 1,000kms.

Effective sewerage system

Our sewer flooding targets directly reflect our SDS aim to halve the impact of sewer flooding by 2050.

Our 2050 target for reducing storm overflow discharges is based on the Government's Storm Overflow Discharge Reduction Plan (SODRP). This aims to improve storm overflow performances to an average of ten spills per year or fewer, so that storm overflows do not cause adverse ecological harm. Accordingly, our 2050 target is to achieve no more than 8.9 spills on average per overflow. This assumes that all storm overflows will be improved to less than 10

discharges per year, and, where impacting a sensitive environment, a lower threshold will be met[2]. This will address the major harm arising from the operation of storm overflows.

We note that our SDS sets out our ambition to eliminate the discharge of untreated sewage from storm overflows. Our more recent research, conducted in the development of our PR24 business plan, shows strong customer support for investment in reducing storm overflows, but also that affordability has been flagged as a major concern. Given the significant cost of eliminating discharges from all storm overflows, particularly in light of the specific challenges we face in our region to improve overflows (see Section 2.5 below), we have not explicitly developed our LTDS around this SDS aim. The government's own research showed that the cost of eliminating storm overflows exceeded the benefits and did not align with their aspiration to reduce carbon emissions. This research informed the level of ambition set out in the SODRP, which our LTDS aligns with.

Our long-term performance commitment target for sewer collapses has a rising trajectory. This is because we have a large asset stock which we forecast will continue to deteriorate based on forecast levels of base maintenance expenditure, and even if we matched replacement investment rates to the rate of deterioration it would still take decades of investment to slow down the rising trajectory. However, taken in the round, we consider a gradual rise in incidences of collapses can be managed and will not prevent us achieving our aim of an effective sewerage system.

Sustainable abstraction

Our performance commitment targets directly reflect the main government targets from the 2023 Environmental Improvement Plan and Defra's Plan for Water. These support Defra's water demand target set under the Environment Act 2021 to reduce the use of public water supply in England per head of population (DI) by 20% from 2019-20 levels by 2037-38, the ultimate aim of which is to secure sustainable abstraction.

These targets are discussed in more detail in our PR24 business plan document WSX12 - Water resources strategy and investment and our WRMP. Achieving these regulatory targets will meet our SDS ambition in this area in respect of compliance with abstraction licences.

Great coastal and river quality

Our performance commitment targets for pollution incidents directly reflect our SDS ambition to eliminate pollutions from our network.

Our performance commitment targets for bathing water quality and river water quality are the result of modelling work undertaken to understand the phosphorous load removals that would be required to restore the quality of our rivers and coastal waters and mitigate our impact on these water bodies, as well as meeting regulatory requirements in this area. We consider that achieving the improvements set out in Table 2 will allow us to achieve our SDS ambition in this area.

Increased biodiversity

Our SDS ambition is to double our contribution to the region's biodiversity by 2050. This is equivalent to the creation of an additional 2,000 biodiversity units (or BUs) at target condition[3], baselined against AMP7 delivery. Our

[2] This also includes an adjustment for monitoring downtime, in line with the performance commitment definition. Our event duration monitoring is available for 98% of the time, so we have added 2 to the reported average discharge count.
[3] 'Target condition' refers to the predicted biological condition of a given habitat after sufficient time ('time to target condition') has elapsed to achieve this condition. 'Time to target condition' is prescribed by the Statutory Biodiversity Metric and varies depending on habitat type, starting condition and target condition.

Biodiversity Action Plan (BAP), published since our SDS, builds on this and sets out a plan to improve or create habitat on our landholding which will achieve a minimum of 5,000 biodiversity units by 2050.

To achieve this, we are forecasting that we will create an additional 383 'as seen' BUs by 2050 (ultimately achieving 549BU at target condition) *on our nominated land.* This 'as seen' increase is equivalent to 2.21 BU per 100km^2 of company area by 2050 – reflecting Ofwat's performance commitment definition for biodiversity[4]. This is based on modelling of the available increase in BUs of the habitats on nominated land.

In addition, we are also planning significant work to improve biodiversity on our wider (non-nominated) landholding and on third-party land. This approach avoids the inefficiency that would arise from delivering a performance commitment over many small and geographically dispersed sites. This will lead to the creation of further BUs not captured by a performance commitment target, but which contribute to our broader biodiversity aims.

Taken together, we currently forecast that our biodiversity initiatives on our nominated and non-nominated will lead to a more than doubling of BUs (at target condition) by 2050, and will therefore deliver on our overall SDS aim as well as supporting our enhanced ambition as set out in our BAP.

Net zero carbon

Our SDS ambition is to achieve net zero operational carbon emissions by 2030. As explained in our business plan document WSX23 - Our route to net zero, we intend to achieve this in AMP8 through a reduction in emissions complemented by offsetting the residual emissions forecast in 2030 (which is likely to be unavoidable even with full pursuit of the options available to us).

Our long-term performance commitment targets for operational water and wastewater GHG directly reflect the UK government's 2050 net zero target, as well as the interim targets for 2035 of a 78% cut in UK emissions by 2035[5]. Consistent with Ofwat's guidance, we have used these government targets to develop our longer-term strategy to further reduce operational GHG emissions beyond 2030. As set out in Table 2, we are forecasting to achieve 0 operational tonnes for water and wastewater by 2050, though this assumes retention of biomethane certificates that are currently sold. Without using this netting-off approach, we estimate there would be some residual wastewater process emissions of around 12,348 tonnes by 2050. We have presented our performance commitment trajectory in Table 3 excluding the retention of biomethane certificates.

Our SDS also sets out an aim to achieve net zero total carbon emissions by 2040 at the latest. This includes our operational emissions plus emissions linked to construction materials and consumables (including those related to our supply chain emissions). While we remain committed to this corporate ambition, our LTDS focuses on how we will achieve and exceed our aims in respect of *operational emissions* specifically, as there is greater certainty over the activities needed to achieve this, and the impacts of different scenarios on doing so. We expect to expand our sub-strategy and update our LTDS accordingly as our plans for fully decarbonising embodied carbon develop, and as the decarbonisation trajectories of key supply chain sectors become clearer. This could align with the implementation of a specific performance commitment for embodied carbon as part of the next price review.

[4] For further information on the biodiversity performance commitment definition, please see Section 1.6 of WSX47 – Outcomes tables commentary.
[5] See page 59 of Ofwat's guidance and page 5 of Ofwat's January 2022 net zero position paper. We have interpreted the interim target as reducing our own emissions by 78% from 1990 levels.

Summary

Together, the 2050 performance commitments set out in Table 2 form the starting point for the rest of our LTDS. We have developed our strategy around a set of core and alternative pathways that will achieve these ambitious outcome targets under a range of plausible future states of the world.

In Chapter 3, we articulate the key investments we have identified as necessary to deliver these performance commitments, framing our PR24 business plan for 2025-30 in the context of our longer-term ambitions. These enhancement investment profiles are also set out in our PR24 business plan data tables (LS3 and LS4).

It is important to note that our LTDS cannot accurately estimate the cost of every activity that would be required to meet these targets. We have therefore based this LTDS and its ambition on, where possible, known changes that are likely to impact us alongside the requirements set out in the common reference scenarios (demand, technology, climate change and abstraction reductions). These form the basis of our alternative pathways as they will have a material effect on our activities over the next 25-years. As we move through this period, our understanding of the base and enhancement investment required to meet these targets will naturally evolve and be refined.

2.4. Full performance commitment trajectories

As explained above, our full performance commitment forecasts to meet our 2050 targets are detailed in Table 3 below. These are consistent with achieving the 2050 targets set out in Table 2.

Table 3 – Performance commitment profiles out to 2050

Performance commitment	Unit	Performance level forecast per year												
		2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2039-40	2044-45	2049-50
Water supply interruptions	mm:ss	05:00	05:00	05:00	05:00	05:00	05:00	05:00	05:00	05:00	05:00	03:00	01:30	00:00
Customer contacts about water quality	Number per 1,000 population	1.00	0.98	0.96	0.94	0.92	0.91	0.90	0.89	0.88	0.87	0.82	0.77	0.72
Internal sewer flooding	Number of incidents per 10,000km	1.31	1.29	1.24	1.20	1.16	1.13	1.11	1.08	1.06	1.03	0.91	0.78	0.66
External sewer flooding	Number of incidents per 10,000km	16.14	15.35	14.58	13.81	13.07	12.83	12.58	12.34	12.10	11.86	10.66	9.46	8.25
Biodiversity	Biodiversity units	0.00	0.00	0.00	0.00	0.17	0.17	0.17	0.17	0.26	0.26	0.53	1.44	2.21
Operational greenhouse gas emissions (water)*	Tonnes	31,109	30,776	30,607	30,413	30,281	14,431	12,680	11,463	9,926	5,080	2,060	258	0
Operational greenhouse gas emissions (wastewater)*	Tonnes	119,531	118,290	115,893	112,670	107,159	78,078	73,056	68,716	63,828	53,481	29,124	16,393	12,348
Leakage	%age reduction	11.3%	15.5%	17.6%	18.6%	19.8%	21.4%	23.4%	25.8%	28.1%	30.4%	37.6%	43.6%	49.6%

Leakage – three-year average	Ml/d	61.1	60.5	59.7	58.8	57.9	56.1	54.4	52.7	51.0	49.3	44.9	40.5	36.1
Leakage – in-year figure	Ml/d	65.0	61.9	60.4	59.7	58.8	57.6	56.1	54.4	52.7	51.0	45.8	41.4	37.0
Per capita consumption	%age reduction	0.7%	-0.2%	0.9%	2.1%	3.3%	4.6%	6.1%	7.8%	9.5%	11.2%	18.1%	21.3%	23.6%
PCC – three year average	l/h/d	138.4	136.6	134.9	133.2	131.6	129.5	127.0	124.7	122.4	120.3	111.8	107.8	104.7
PCC – in year figure	l/h/d	136.8	138.0	136.6	134.9	133.2	131.5	129.4	127.1	124.7	122.4	112.9	108.5	105.3
Business demand	%age reduction	2.8%	3.3%	4.3%	5.9%	7.4%	8.7%	9.8%	10.6%	11.4%	12.2%	15.2%	15.3%	15.4%
Business demand – three year average	Ml/d	79.5	78.2	76.8	75.6	74.4	73.6	73.0	72.3	71.7	71.1	69.2	69.1	69.1
Business demand – in year figure	Ml/d	79.3	78.9	78.2	76.8	75.6	74.5	73.7	72.9	72.3	71.7	69.2	69.2	69.1
Total pollution incidents	Incidents per 10,000km of sewer	31.19	26.79	22.51	17.95	13.68	13.00	12.31	11.63	10.94	10.26	6.84	3.42	0.00
Serious pollution incidents	Number of incidents	1	1	1	1	1	1	1	1	1	1	1	1	0
Bathing water quality	% compliance	80.6%	80.6%	80.6%	80.6%	80.6%	81.2%	81.2%	83.2%	83.2%	83.2%	83.2%	83.2%	83.2%

River water quality (phosphorus)	%age reduction in phosphorus	56.35%	56.35%	57.03%	60.07%	61.44%	75.36%	75.36%	75.36%	77.33%	81.31%	81.31%	81.31%	81.31%
Storm overflows	Average number of spills per overflows	23.50	23.50	22.76	22.00	20.00	19.00	19.00	18.58	17.57	15.87	11.63	9.59	8.91
Mains repairs	Number of repairs per 1,000km of mains	152.0	151.6	151.2	150.8	150.4	152.0	152.9	153.7	154.6	155.4	157.5	158.3	158.5
Unplanned outage	% of peak week production capacity	5.02%	5.02%	5.02%	5.02%	5.02%	5.02%	5.02%	5.02%	5.02%	5.02%	5.02%	5.02%	5.02%
Sewer collapses	Number of collapses per 1,000km of sewer	6.21	6.09	5.97	5.85	5.75	5.75	5.75	5.75	5.75	5.75	7.35	8.47	9.79

* Fall in emissions between 2029-30 and 2030-31 is partly a function of moving from the fixed grid electricity emissions factor to the likely emissions factor for 2030-31 onwards, which is based on DESNZ forecasts.

2.5. Challenges and opportunities in meeting level of ambition

Ofwat's guidance states that company ambition should also reflect the specific challenges the company faces; the areas of strength that companies expect to build on, as well as areas where the company is working to improve performance.

In broad terms, we have been a top performance for safe and reliable water, having been industry-leading in both CRI and supply interruptions in recent years. We therefore approach this area from a position of strength and that is why we have set a very high level of ambition in this area (100% compliance and zero supply interruptions over three hours).

In other areas, we face certain challenges. For example, in respect of sewerage:

- The Government has set stretching targets for storm overflow reductions via its SODRP. This frontloads action in particularly important and sensitive areas including designated bathing waters and high priority ecological sites such as Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SAC) and chalk streams. The Wessex Water region has a high proportion of these sensitive environments.

- Furthermore, inundation from groundwater of foul sewers in the Wessex region is problematic because we have chalk geology in the southeast, mudstone geology in the north-west and fluvial inundation of the Somerset Levels and Moors during wet winters. This makes the issue of groundwater-induced overflows particularly pertinent here.

Our performance commitment target in this area reflects a high level of ambition, taking account of the adverse circumstances and the particular challenges we face to reduce absolute levels of harm from storm overflows relative to other companies, and the associated expenditure (and customer bill impact) that would be required to meet a given performance commitment.

Meanwhile, over 50% of our region has some form of environmental designation, with more than 40% of our region – proportionally more than any other English water company – falling within a nutrient sensitive catchment. Watercourses and land holdings in these areas are required to meet higher environmental standards. Our level of ambition in the river and coastal water quality reflects these higher standards.

These opportunities and challenges are also reflected in the profile of investment in our core pathway, which is set out in the next chapter. This shows that the most significant investment will be needed in the wastewater and sewerage areas (i.e. to achieve our ambition for effective sewerage and great coastal and river quality), where we face challenges and higher environmental standards, compared to those areas where (e.g. safe and reliable water) we are starting from a particular position of strength.

They also affect the specific solutions we propose, e.g. using innovative nature-based wetland solutions to treat groundwater inundation, rather than traditional solutions more suited to typical overflows.

We expand on these considerations in the rest of this document, as we discuss our strategy to meet the level of ambition presented here.

3. Strategy

This chapter summarises our LTDS for the period 2025 to 2050, building on our long-term ambition as set out in Chapter 2. We firstly provide an overview of our approach to developing our strategy, explaining how we have developed our core pathway and alternative pathways by way of reference to Ofwat's final guidance on long term delivery strategies ("Ofwat's guidance") and the common reference scenarios set out within that guidance. We then present these pathways and the key strategic investments they comprise.

3.1. Overview

Our strategy is underpinned by six sub-strategy areas, which are aligned with our SDS outcomes as set out in Table 4 below. These are the areas of our business which we consider are most likely to be affected by future uncertainty, and for which adaptive planning is therefore most relevant. Together, they cover five of our eight outcome areas and represent the bulk of our activities that are needed to achieve the ambition that we have set out in Chapter 2.

Table 4 – Summary of sub-strategy areas considered in LTDS

SDS Outcome	Sub-strategy	Covers:
Safe and reliable water supply	Water treatment and supply	Lead reduction, nitrate management, mains replacement, customer contacts about water quality
Sustainable abstraction	Water resources	Supply-demand balance activities
An effective sewerage system	Sewerage network	Storm overflows*, pumping stations, flood resilience, surface water management
Great river and coastal water quality	Wastewater treatment	WRC capacity, bathing water quality, river and coastal water quality (particularly nutrients)
Net zero carbon	Bioresources	Sludge capacity and treatment
Net zero carbon	Greenhouse gas emissions	Emissions reduction from wastewater network

*Storm overflows also affects river and coastal water quality but has been considered under the sewerage sub-strategy.

As explained in Chapter 2, while there are no specific performance commitments associated with **affordable bills** and **great customer experience,** affordability and the needs and preferences of our customers have been a central consideration when developing this LTDS.

In respect of **biodiversity**, while this is an SDS outcome and therefore highly relevant to our LTDS, our assessment indicates that long-term investments in biodiversity would not be materially different under any of the common reference scenarios, and so our core pathway is likely to capture the investment profile up to 2050 under a range of plausible futures. As such, at this stage, we have not developed any alternative pathways in these areas. This may change in future as more becomes known about new challenges and opportunities for these sub-strategy areas. If this is the case, our LTDs will evolve to reflect this.

Our approach to developing and tracking our strategy is summarised in Figure 8 below.

Figure 8 – Approach to developing long-term delivery strategy

- We firstly identified the **core pathway**, which sets out the package of no and low-regrets enhancement investments to achieve the SDS ambitions and associated performance commitments set out in Chapter 2, i.e. investment that would be required under a benign state of the world. Additionally, it includes investment that is required to ensure we are ready for all plausible future scenarios, to keep all future options open. We present the core pathway for each sub-strategy set out above, and as well as investment in other areas (such as biodiversity).

- For each sub-strategy area, we then considered how our ability to achieve our 2050 ambitions would be affected under **different scenarios representing more challenging ('adverse') states of the world**. Under these scenarios, the investments set out under our core pathway may not be sufficient to achieve our ambitions, and we would have to make additional or different investments in certain circumstances to keep us to track to deliver our SDS.

  Our assessment has focused on Ofwat's common reference scenarios: demand; climate change; technology; and abstraction reduction. These are broadly defined in Section 4.2 of Ofwat's guidance, and we have used this as the basis for assessing their impact for each sub-strategy. However, we have included one further scenario: reduced future landbank availability. This is because we consider it is particularly relevant to the success of our **bioresources strategy**, and there is a credible alternative pathway that would be needed under an adverse scenario where landbank availability is more restricted. This is discussed in more detail later in this chapter.

- We then assessed, for each sub-strategy, whether our ability to meet our ambition would be materially different under each of these scenarios. Where there would be a material impact, we have developed one or more **alternative pathways** for each sub-strategy which capture the additional investments that would be required to ensure that we can continue to deliver on out ambitions under these states of the world. For instance, the additional investment associated with the key wastewater treatment activities that would be required under a high climate change scenario, to keep us on track to meet the relevant SDS outcomes in this area, would form one of the alternative pathways for the wastewater treatment sub-strategy.

  Taken across all sub-strategies, these pathways form the set of plausible and material pathways that we anticipate we may migrate between as we approach 2050.

- Once an LTDS is in place, it is important that we **monitor and report** on how each of the relevant scenarios develop, so that our future investment adequately reflects the future state of the world that materialises; in other words, we adapt our approach based on the strategy set out to keep us on track to meet our 2050 ambitions. We set out our monitoring and reporting approach at the end of this chapter.

The rest of this chapter sets out in more detail each of these steps in the development of our strategy.

3.2. Core Pathway

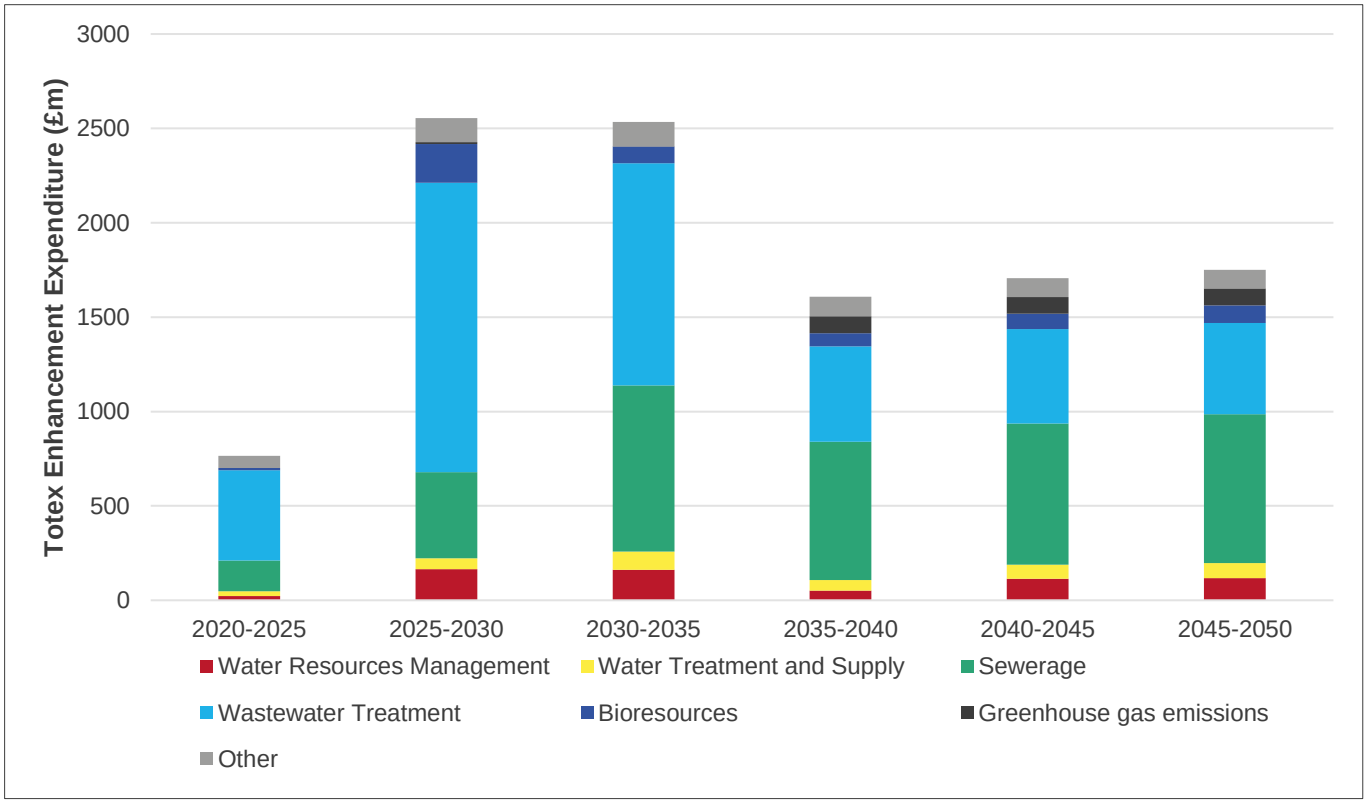
Our core pathway has been developed based on Section 3.3.2 of Ofwat's guidance. As explained above, it sets out the package of no and low-regrets investments across all sub-strategy areas that would be required to meet our SDS ambitions and performance commitments set out in Chapter 2, under a benign state of the world – including investment that is required to ensure we are ready for all plausible future scenarios.

As set out in Ofwat's guidance, a benign state of the world encompasses the low reference scenarios for climate change, demand and abstraction, and the faster reference scenario for technology. This is because faster technological developments are likely to reduce costs compared to slower developments. The specific assumptions we have used across all the common reference scenarios to identify what core pathway investments would be required (e.g. exactly what is meant by a "low" scenario for climate change) are set out in more detail in Section 3.3.

For the purposes of developing our core pathway, we have assumed that we will be funded on an ongoing basis for the level of base expenditure that we have proposed in our PR24 business plan. We have then taken account of expected improvements in performance from base expenditure over this period, for instance due to operational improvements, such that additional enhancement expenditure is only included where it is required to meet a particular SDS outcome by 2050. In other words, it identifies the incremental enhancement expenditure necessary to deliver on our ambition. This is discussed in more detail in Chapter 5.

On this basis, the total estimated enhancement requirement under our core pathway across the 2020 – 2030 period is £10.9 billion **(£10.2 billion** from 2025 onwards), as shown in Figure 9 below.

Figure 9 – Historical and projected totex enhancement expenditure per AMP as part of the core pathway



Other investments capture all other enhancement schemes we expect to undertake to meet our overall SDS ambitions that do not fall into one of our key six sub-strategy areas. This includes activities such as biodiversity and conservation; wetland creation; investigations; and resilience / SEMD activities.

The key investments included in our core pathway are summarised in Table 5 below and set out in more detail in section 3.5 (for each sub-strategy). The core pathway is dominated by investments to meet statutory or regulatory requirements, reflecting that our SDS aims and associated 2050 targets have been developed with these requirements in mind. However, there are some investments which are more 'discretionary' in the sense that they are required to deliver our specific company ambition, over and above any existing requirements, to meet customer and stakeholder expectations. We have included these investments the core pathway as we consider it important that the total package of investments delivers our full LTDS ambitions under a benign scenario. Nevertheless, for completeness, we have distinguished in Table 5 between these types of investment – though given customers' and regulators' expectations for improved performance, many of these investments are unlikely to be discretionary in practice as they will likely be required to meet more stretching targets over time.

Table 5 – Summary of core pathway investments

Sub-strategy	Key statutory / regulatory-driven investments	Other investments to meet ambition	Totex (£ million)	Proportion statutory / regulatory driven
Water treatment and supply	Investment over AMP8 and AMP9 in nitrate removal (to address Reg 28 Notice) and catchment management to address raw water quality deterioration	Investment in lead pipe replacement Investment in deployment of network sensors / repair teams and equipment to improve supply interruptions	392	31%
Water resources	Smart metering rollout over AMP8 and AMP9 to achieve Defra DI targets by 2037. Additional leakage reduction and water efficiency activities to keep us on track to meet Defra leakage, household consumption and business demand targets for sustainable abstraction by 2050. Design / development work to keep future strategic resource options open (but not the cost of implementing these options) – essential so we can adapt plans in future		631	100%
Sewerage	Large storm overflow improvement programme to achieve Government SODRP targets which are incorporated into the Environment Act WINEP drivers – including new screens, surface water management and infiltration management	Investments to further reduce internal / external sewer flooding risk and pollutions	3,768	88%
Wastewater treatment	Investment primarily in grey solutions to meet Environment Act 2037 targets in relation to nutrient removal (but no further assumption on phosphorous and nitrogen removal beyond this). Investment for increased chemical permits. Investment in growth at sewage treatment works – required to meet discharge compliance permits.	Expected investment for more bathing waters being designated across future AMPs.	4,678	87%

	Investment in flow monitoring / continuous water quality monitoring, the latter to meet 2021 Environment Act targets.			
Bioresources	Investments to facilitate the expansion of liming and digestion to manage increased sludge volumes	Investments in odour and nuisance control	547	65%
Greenhouse gas emissions	Investments in EV and nitrous oxide emissions reduction to meet Government net zero targets		278	99%
Other	WINEP investigations expenditure Investments to meet INNS / eels and fish passes requirements. Resilience and SEMD investments to meet DWI and other requirements.	Investments associated with 25-year plan. Investments to meet biodiversity objectives in SDS and BAP Other resilience activities required to maintain and improve business continuity across all areas. Investments in data and AI technology to support other areas.	622	78%
Overall	-		**10,917**	**85%**

Statutory / regulatory-driven investments based on work carried out for our PR24 Affordability and Acceptability Testing, but amended where relevant to reflect that our LTDS must achieve all longer-term targets whereas our AAT work considered investments to meet legal requirements by 2030.

The data tables LS3 and LS4 present the specific enhancement profiles for individual areas between 2025 and 2050. When aggregated by sub-strategy, these correspond to Figure 9 above.

Figure 9 and Table 5 show that the major investments are likely to be in the sewerage and wastewater treatment areas. It also shows that, particularly for water resources and wastewater treatment, there is a peak of investment during AMP8 and AMP9 which means that the core pathway increases to 2035, before declining to a much lower level of enhancement spend between AMP10 and AMP12.

- In the case of water resources, this is primarily driven by abstraction licence targets in the middle of the next decade which are requiring us to undertake a significant amount of demand management activity over the next ten years (such as completing our smart metering rollout by the end of AMP9).

- In the case of wastewater treatment, this is driven by the existence of Environment Act targets driving major nutrients upgrades by 2037, which creates the need for a step change in investment over the next two AMPs. Total expenditure in AMP8 is slightly higher than AMP9, which reflects that we are no longer proposing to defer some upgrades from AMP8 into AMP9 that have a 2030 regulatory date.

We recognise that our core pathway is likely to change as we move through the 2025-2030 period and refine the forecast costs of meeting SDS outcomes and associated performance commitments. The existing core pathway for this LTDS is based on our best view of costs and requirements at this point in time, and has focused on the major enhancement investments that are likely to be necessary. As part of the price review process and our monitoring / reporting of the LTDS, we would expect to refine and update the core pathway as appropriate.

3.3. Scenario development

For each sub-strategy area, we have considered how our ability to achieve our 2050 ambitions would be affected under different scenarios representing more challenging ('adverse') states of the world. Under these scenarios, the investments set out under our core pathway above may not be sufficient to achieve our ambitions, and we would have to make additional or different investments to keep us on track to deliver our SDS.

Common reference scenarios

Our assessment has focused on Ofwat's common reference scenarios: demand; climate change; technology; and abstraction reduction. These are broadly defined in Section 4.2 of Ofwat's guidance and have been identified as they capture some of the most significant potential impacts on longer-term investment needs. The specific assumptions used for each common reference scenario are set out in Table 6 and have been used as the basis for assessing their impact on each sub-strategy. Most of the assumptions are taken directly from Ofwat's guidance, but we have included some further assumptions for the technology scenario that we consider are relevant to the development of our strategy[6]. These assumptions are based on our own understanding of the availability of specific technologies through our involvement in industry networks and discussions with suppliers and solution providers, as well as informed by internal discussion in groups such as our Board-level Environment and Public Health Committee and our Innovation Forum. It also reflects Ofwat's guidance that companies should consider a wide range of technological developments when forming their strategies.

As explained above, the core pathway is based on the assumptions for a benign state of the world, with the assumptions for more adverse states of the world governing the identification of alternative pathways.

Table 6 – Summary of common reference scenario assumptions

Common reference scenario	Assumptions for benign state of world Used to develop *core* pathway	Assumptions for adverse state of world Used to develop alternative pathway *where relevant to a sub-strategy*
Demand	Population, property, and occupancy forecasts derived from ONS – equivalent to 96k new properties between 2025 and 2050. Introduction of scheme to label water-using products (as per Water UK study on PCC reduction)	Population, property, and occupancy forecasts derived from local authority – equivalent to 136k new properties between 2025 and 2050.
Climate change	UKCP18 probabilistic projections, Representative Concentration Pathway (RCP) 2.6, 50th percentile probability level[7] Equivalent to a 1.6°C temp. rise by 2100	UKCP18 probabilistic projections, RCP8.5, 50th percentile probability level Equivalent to a 4.3°C temp. rise by 2100

[6] We have not included every assumption for the technology scenarios included in Ofwat's guidance – only those which we consider have the potential to materially affect our strategy.
[7] See: ukcp18-guidance---representative-concentration-pathways.pdf (metoffice.gov.uk).

Technology	Low-emission HGVs *available,* and small to medium vehicles commonplace, by 2030 Zero carbon grid electricity from 2035 Nitrous oxide prevention / conversion fully demonstrated and deployable from 2035 Smart meter penetration by 2035 Lead pipe re-lining technology developed and available by 2035. Network sensor technology available to monitor supply interruptions. Efficacy of wetlands technology in treating storm discharges demonstrated by 2030. ATC technology available to assist with biosolids disposal	Low-emission HGVs *available,* and small to medium vehicles full decarbonised, by 2040 Zero carbon grid electricity from 2035 Nitrous oxide prevention / conversion fully demonstrated and deployable from 2040 Smart meter penetration by 2045 No new lead re-lining technology No new network sensor technology available Wetlands technology not accepted as viable solution for treating discharges before 2035. ATC technology trials unsuccessful in demonstrating commercial viability of biosolids disposal.
Abstraction reduction	Current legal requirements for abstraction reductions up to 2050.	Environment Agency's 'enhanced' scenario for abstraction reductions up to 2050.

Additional scenarios

Besides the common reference scenarios set out above, we have also considered additional, 'locally-specific' scenarios which may be particularly relevant to achieving our SDS ambition, and which should therefore be considered as part of our strategy. We did this as follows:

- We firstly undertook discussions with internal subject matter experts to consider the key factors affecting our ability to meet our SDS ambition in each area. We also considered the likelihood of these factors coming to fruition between now and 2050.
- For the most likely factors, we then considered the extent to which they are covered by the existing common reference scenarios. In doing so, we focused in particular on factors which may affect our strategy to a greater degree than other companies, due to our specific circumstances.

In our original LTDS, submitted last October, this exercise produced a shortlist of additional factors which we considered were relevant scenarios for our strategy. This included: (i) regulatory change; and (ii) ambition. Having reviewed our LTDS in light of Ofwat's feedback, we now consider that these factors should not be positioned as additional scenarios against which to test our core pathway.

- In respect of regulatory change, this is unlikely to be specific to our circumstances. Furthermore, regulatory change is also likely to be a product of some of the common reference scenarios; in other words, a high climate change scenario may lead to a resulting change in regulations to combat these impacts. As such, the impact of regulatory change, where relevant, can to some extent be reflected by considering the common reference scenarios. This is explained in more detail in Section 5.1.
- We also identified ambition as a relevant scenario for the sewerage sub-strategy. However, we consider that it is more appropriate that all pathways in this sub-strategy deliver the same level of ambition, albeit in different ways. This is explained further in Section 5.3.

We consider that streamlining our scenario identification in this way makes for a clearer LTDS that focuses on the most important and most likely states of the world.

The result of this exercise is that we included one further scenario in our LTDS: **reduced future landbank availability** (see text box below). This is because we consider it is particularly relevant to the success of our bioresources strategy, and there is a credible alternative pathway that would be needed under an adverse scenario where landbank availability is more restricted. We consider there to be a plausible scenario that landbank availability will decrease to 50% by 2035, and 0% by 2050. Our scenario is built around these assumptions.

We note there is a possibility of landbank closure sooner than 2035, potentially during AMP8. This is equivalent to the scenario 5 discussed below We have not developed an alternative pathway around this scenario, particularly as it would require changes to our PR24 business plan and therefore involve a trigger point occurring before 2030. However, we discuss the potential implications of this in Section 4.2 (scenario testing).

Locally-specific scenario: Landbank availability

The most immediate risk to our bioresources operation is presented by the prospect of new regulatory requirements that either reduce or remove landbank access before we have deployed an alternative technology at sufficient scale.

The water industry and farming community are still adapting to changes recently introduced by the Farming Rules for Water (FRfW). Further regulatory changes are being considered by the EA, and the current plan is to revoke the longstanding framework of the Sludge (Use in Agriculture) Regulations 1989 and including these operations under the Environmental Permitting (England and Wales) Regulations (EPR) 2016 in the lead-up to PR29 or PR34.

There are also concerns around potential hazards associated with emerging contaminants and how these may affect the disposal of biosolids to land. In addition, biosolids to land remains subject to its acceptability by customers. Conversely, the demand for biosolids and other digestate to land has increased as a consequence of increasing mineral and fossil fertiliser costs. Likewise, recent increases in gas prices has created more interest in developing biomethane plants to process manure and other organic waste, thus taking some pressure off the landbank.

The UK water utilities jointly commissioned a study by Grieve Strategic & ADAS to look at a number of potential scenarios of minimal to maximum regulatory change for biosolids to land and determine its impact on the landbank (required and available area). The conclusion of this study is that at a national level there is sufficient agricultural land to recycle all biosolids in Scenarios 1 to 3, but insufficient agricultural land in Scenarios 4 and 5. This means that companies will be competing for the same landbank in certain regions in Scenarios 4 and 5. One of these regions is the South West / South Wales area where we will potentially be competing against South West Water, Severn Trent Water and Dŵr Cymru Welsh Water for landbank.

The landbank assessment by Grieve Strategic also concluded that the most likely scenario is Scenario 4. If this scenario materialises, there will be a deficit of c. 4,200,000 ha of available land to enable all biosolids to be recycled at a national level by 2035. This would mean a significant amount of biosolids would need to be disposed via incineration or landfill, as there are currently no other viable disposal routes for sludge. There is therefore a need to invest in the diversification of sludge outputs, such as the development of ATC technologies, to open new sludge disposal routes by 2035 and avoid disposal by incineration.

*Our business plan document ‘WSX18 - Bioresources strategy and investment contains further details on the landbank scenarios in the assessment undertaken by Grieve Strategic.

In practice, landbank availability is not the only additional factor that will affect how we deliver on our SDS ambitions through to 2050. However, we consider that a future state of the world with reduced landbank availability is the most significant individual scenario that would affect the pathway of investment in one of our sub-strategies, and that we can meaningfully forecast at this stage. This will need to be kept under review over time. Other key assumptions and uncertainties – and how we have taken account of them – are set out in Chapter 5 (Foundation), Section 5.1.

Applying scenarios to sub-strategies

Table 7 below sets out how our sub-strategy areas map across to these scenarios. We have not explicitly considered the implications of each scenario for each sub-strategy, because not every adverse scenario is relevant to every sub-strategy area in the sense that our strategy and investments in that area would not be materially different. For instance, the high abstraction reduction scenario only primarily affects water supply and is therefore only likely to have a material impact on the first two sub-strategy areas that comprise our LTDS. We have denoted in Table 7 where we consider that a scenario is materially relevant to a sub-strategy.

Because our core pathway is based on a benign state of the world, all the scenarios present more challenging circumstances to meeting our long-term ambition. It therefore follows that additional enhancement investment (or in the case of GHG emissions a different *profile of investment*) is generally needed to achieve our ambition under each of these scenarios.

Table 7 – Scenario mapping to sub-strategies

Sub-strategy	**Scenario**				
	High demand	High climate change	Slow technology	High abstraction reduction	Reduced landbank availability
Key assumption	**ONS population / property forecasts in latest WRMP planning round.**	**UKCP18 projections, RCP8.5 (50th percentile)**	**Various (sub-strategy specific)**	**Environment Agency's 'enhanced' scenario.**	**Assumed 50% reduction in availability by 2035**
Water treatment and supply			✓	✓	
Water resources*	✓	✓		✓	
Sewerage		✓	✓		
Wastewater treatment	✓	✓			
Bioresources			✓**		✓
GHG emissions			✓		

*See Section 3.4 below for an explanation as to how scenarios have been considered for this sub-strategy.
** We do not have a specific alternative pathway for this scenario, but it interacts with the alternative pathway for landbank availability. See Section 3.5.5 for further details.

3.4. Alternative Pathways

For each sub-strategy area, we have then considered the discrete higher-regrets investments that may be required in response to the scenarios where a material impact has been identified in Table 7.

Additional investment needs have been identified and tested based on the “Key assumption” information set out in Table 7, combined with our industry knowledge, options evaluation process and scenario forecasting, and drawing on input from across the business. In general, we have focused on the costs associated with the most significant activity (or ‘investment driver’) that would be required under this pathway, rather than attempting to build up a full investment profile capturing changes to each and every activity. This reflects that there is an even greater degree of uncertainty around investment requirements in the alternative pathways, and the purpose of adaptive planning is to understand the broad range and magnitude of possible investment profiles under a range of plausible futures.

Furthermore, to ensure we do not overcomplicate the pathways, within the LTDS we have not accounted for any second-order impacts of the pathways e.g. the impact on our greenhouse gas emissions sub-strategy of moving from our core to alternative pathways for wastewater treatment or bioresources. While these interdependencies are important, we consider there is value in keeping the LTDS focused on key investment impacts at sub-strategy level.

These additional investments, over and above those captured in the core pathway, form the basis for an alternative pathway. For instance, the additional investment associated with the key water treatment activity / activities that would be required under a high climate change scenario, to keep us on track to meet the relevant SDS outcomes in this area, form one of the alternative pathways for the water treatment and supply sub-strategy.

Taken across all sub-strategies, these pathways form the set of plausible and material pathways that we anticipate we may migrate between as we approach 2050. These are presented in Table 8 at the end of this sub-section, along with the key additional investments that would be required under each pathway to meet our ambition.

Water resources

Our approach to identifying alternative pathways differs slightly from the approach described above for one sub-strategy – water resources. This is because our water resources strategy is already governed by an existing adaptive planning framework – the Water Resources Management Plan (WRMP). In the WRMP we have developed an adaptive plan following the joint regulatory guidelines, where we have in effect used wider scenario testing to develop an alternative set of pathways that we may be required to follow to meet our ambition and statutory requirements for securing a resilient water supply. These pathways capture different investment programmes of supply-side and demand-side interventions that respond to different plausible future conditions – covering similar considerations as those common reference scenarios set out in Ofwat’s LTDS guidance.

As such, to ensure consistency between our WRMP and LTDS, we have based our alternative pathways for the water resources sub-strategy on a subset of those pathways developed for our WRMP. We have chosen a set of pathways that capture a broad range of plausible futures. Specifically:

- We have presented the 'most likely' pathway from our WRMP as an alternative pathway in our LTDS. This is consistent with Ofwat’s final guidance.
- We have presented one other alternative pathway based on different assumptions about future demand, abstraction reductions, and demand management activities (technology is less relevant to this sub-strategy so has not been explicitly considered).

These alternative pathways represent whole programmes of investment, as opposed to specific individual activities which is the basis for our alternative pathways for other sub-strategies. This reflects that our WRMP planning process is more mature than adaptive planning for areas such as water treatment or bioresources, where this LTDS is the first full exercise of this kind. As noted in Ofwat’s final guidance, WRMPs provide a strong and mature

framework for long-term planning and long-term delivery strategies offer the greatest value in areas of the business that, before PR24, were not covered by formal planning processes.

Alternative pathway branches

Two alternative pathways presented in Table 8 each have two 'branches'. These are:

1. the high demand pathway for wastewater treatment; and
2. the reduced landbank availability pathway for bioresources.

This is because the profile of investment in the scenarios underpinning these pathways are materially affected by decisions about the available solutions that we will be able to use at the trigger points, to achieve our ambition. In other words, *within* the scenario under consideration, there is still significant uncertainty at this stage about how we will respond. We consider it is appropriate to capture that uncertainty by setting out two separate branches that the alternative pathway could follow.

We recognise that all alternative pathways will in practice have several possible branches that the enhancement investment profile could take, based on the assessment of optimal / best-value solutions at the time that the trigger point comes. However, these are the two pathways for which we consider there are material branches that we can identify with some certainty now. We have therefore incorporated this in the presentation of these two pathways.

Summary

Table 8 below presents our suite of alternative pathways for our six sub-strategy areas, taking account of the approach and considerations explained above. The timings of these pathways is also illustrated in Figure 10 (note this does not capture the magnitude of additional investments required under these pathways).

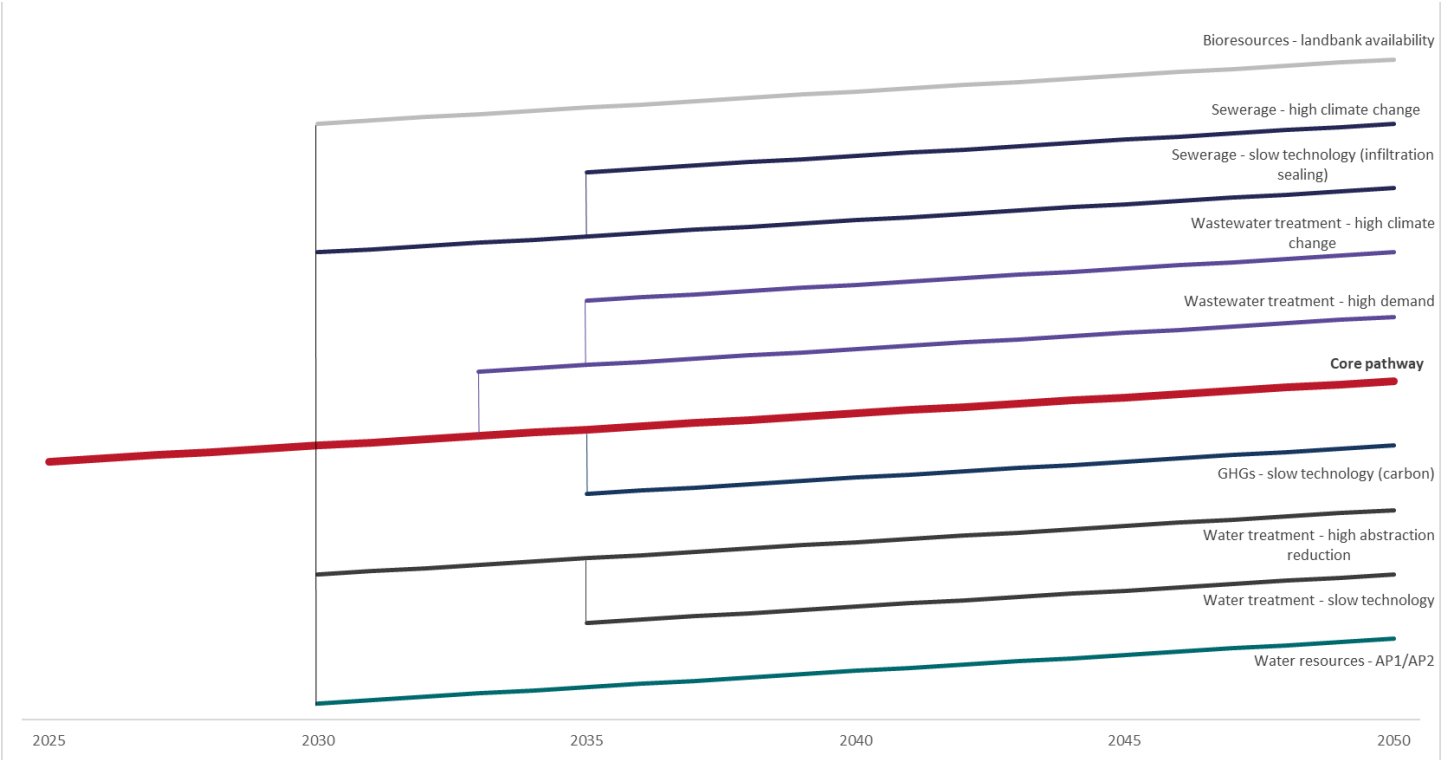
In the next sub-section, we set out more detail on the development of the core pathway; the identification of relevant alternative pathways; and the key investments for both pathways. We do this for each sub-strategy area in turn.

Table 8 – Summary of alternative pathways for each sub-strategy

SDS Outcome	Sub Strategy	Pathway	Key investments
Safe and reliable water supply	Water treatment and supply	High abstraction reduction	Enhanced nitrate removal Enhanced PFAS treatment
		Slow technology	Additional lead pipe replacement
Sustainable abstraction	Water resources	WRMP AP1 – Most likely WRMP pathway	Additional supply side schemes: new internal transfer and increased import from Bristol Water; three small schemes to improve capacity of existing sources.
		WRMP AP2 – High alternative need	Additional supply side schemes: Poole Water Recycling Scheme, new internal transfer and larger import from Bristol Water; new reservoir scheme (benefit by 2058); small schemes to improve capacity of existing sources.

An effective sewerage system	Sewerage	High climate change	Additional hydraulic flooding improvements Larger storm overflow improvement solutions
		Slow technology	Increased infiltration (sealing) programme
Great river and coastal water quality	Wastewater treatment	High demand (a)	Enhanced P and N removal (tighter permits) using catchment-based nature-based solutions
		High demand (b)	Enhanced P and N removal (tighter permits) using grey assets
		High climate change	Increased treatment at bathing waters.
Net zero carbon	Bioresources	Reduced landbank availability (a) – fast technology	Delivery of ATC facilities to replace existing anaerobic digestion processes.
		Reduced landbank availability (b) – slow technology	Increased use of incineration to replace existing anaerobic digestion processes.
Net zero carbon	Greenhouse gas emissions	Slow technology	Wide deployment of nitrous oxide capture and conversion delayed to 2040 onwards

Figure 10 – Summary of number and timing of alternative pathways by sub-strategy



3.5. Pathways by sub-strategy

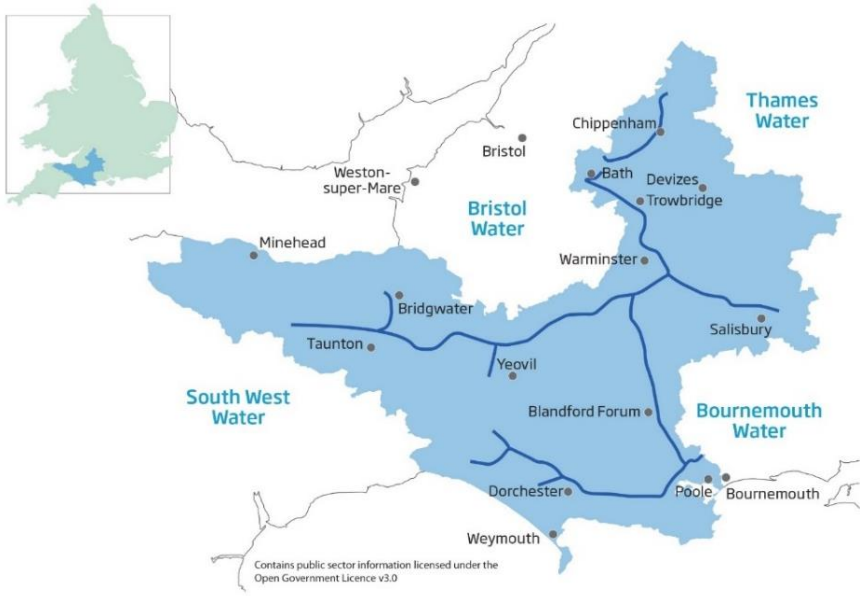
3.5.1. Water treatment and supply

Introduction and summary of sub-strategy

Wessex Water has an extensive portfolio of assets to enable the treatment and supply of water, comprising 64 water treatment centres, over 300 service reservoirs, 12,000 km of supply mains and almost 300 pumping stations. We treat and distribute an average of 340 million litres of clean water a day from over 70 sources, and supply approximately 1.3 million people and over 40,000 businesses. Around 25% of supplies come from surface water sources in Somerset, with the remainder from groundwater boreholes and springs across Dorset and Wiltshire.

Our water quality operations ensure our customers are satisfied with the quality, quantity and reliability of their supply, while complying with regulatory requirements. We manage our assets and operations to minimise the impact of challenges such as asset deterioration, leakage, bursts and contamination. The operational flexibility and resilience of our water supply operations is enhanced by our integrated grid which enables bulk transfer of water across the region from areas of surplus to those in deficit. Figure 11 illustrates the extent of our supply network, showing the main transfer pipeline routes and our integrated supply grid.

Figure 11 – The Wessex Water region, with key towns, neighbouring water companies and key water mains



Our water quality is currently industry leading, as demonstrated by our consistently low compliance risk index (CRI) score (just under 1 in 2023). However, there are tightening regulations on the horizon for both lead and pesticides and per- and polyfluorinated alkyl substances (PFAS) in drinking water, which may affect our performance in the longer term, and which have informed our thinking for this sub-strategy. This is discussed in more detail below.

Customer contacts about water quality (Appearance, taste and odour)

Customer contacts about water quality relating to appearance, taste and odour is a common performance commitment and we have an ambition to reduce this to 0.72 contacts per 1,000 population by 2050. In 2021, we were one of a number of companies issued with a DWI Regulation 28(4) Notice for the specific purpose of reducing our discolouration (black, brown and orange) customer contacts, both regionally and in specific water quality zones. We are also above the national average for taste and odour contacts.

We are therefore working to reduce customer contacts concerning appearance, taste, and odour via a combination of asset management (predominantly mains replacement), operational performance (predominantly mains conditioning and flushing), and customer relationship management – all funded from base expenditure. This approach is proving successful and has reduced customer contacts steadily from a three-year average of 2.3 contacts per 1,000 population in 2013/14 to 1.14 contacts per 1,000 population in 2022/23. However, there is scope for further development to improve our performance in this area. While we are not proposing any enhancement spend specifically to improve this performance area in our core pathway, we note that we are proposing a significant uplift in capital maintenance (base expenditure) in AMP8 and beyond, focusing on the replacement of trunk mains, which we consider will drive improvements in this area. We have assumed for the purposes of forecasting long-term performance that this level of funding will continue into AMP9 and beyond.

Nitrates and PFAS

Nitrate concentrations in groundwater from historical and recent agricultural activity continue to present a significant risk to potable water quality in some parts of our region. Our approach is to instigate catchment management approaches in the first instance (a low regrets approach). If this does not achieve sufficient reduction in nitrate concentrations, we then apply source substitution and/or blending solutions, with treatment solutions (e.g., ion exchange) only considered as a last resort. There are a small number of sources across our network where we need to reduce flows or turn off sources due to seasonal increase in nitrate/ pesticide contamination. Modelling in 2020/21 suggested that some sources where nitrate concentrations had previously been stabilising were still rising, which has led us to commit to further monitoring and modelling for all sources on a biannual basis, to better inform the future risk profile and potential future interventions that may be required.

The latest modelling data has led us to propose the installation of ion exchange nitrate treatment at Sturminster Marshall WTC, as data suggests nitrate concentrations have not yet peaked and will subsequently not start reducing for a significant period. Ion exchange is proposed as blending may not sufficiently mitigate risks, while maintaining the deployable output required for resilience over the long term.

We apply a similar monitoring and catchment risk assessment approach for managing other contaminants in raw water supplies, such as PFAS. We have developed and implemented a risk-based monitoring strategy for 48 PFAS in response to DWI guidance. Furthermore, we have revised our AMP8 PFAS Strategy (which was originally submitted alongside our PR24 business plan) in light of feedback from the DWI. This now contains a strategy to implement PFAS treatment at one of our water treatment sites in AMP8 and complete optioneering and design work for two further sites as part of a multi-AMP risk reduction strategy, which has been included in our core pathway.

Supply interruptions

We have an ambition to eliminate supply interruptions of greater than three hours by 2050. We are on the right path with this ambition, having actively reduced supply interruptions in recent years through business-as-usual use of line stopping, network infusion and other techniques funded from base expenditure. In AMP7, we are also installing additional pressure monitoring in key locations across our network so we can become aware of a service failure in these areas almost immediately.

Having significantly reduced supply interruptions over the past two AMPs, under our core pathway we don’t forecast any enhancement spending on supply interruptions until AMP10, at which point we consider new technology may become available to enable us to drive supply interruptions down to zero by 2050. This profiling of expenditure also reflects the outputs of our customer research, in which respondents ranked supply interruptions as the lowest priority of the three performance commitments in the water supply area, given our existing industry-leading performance in this area.

We have forecast costs over AMP10-12 for two main elements of work to achieve this; firstly the deployment of new technology (subject to this developing) that would allow us to saturate the network with sensors in a cost effective

manner; and secondly, using this data to increase the number and location of repair teams and equipment to resolve any problem in any location in less than three hours.

Lead pipes

Some older parts of the distribution network still have lead pipes, which we are progressively replacing. We estimate there are around 110,000 lead service pipes in our region. Each service pipe comprises of a customer supply pipe (owned by the customer) and a communication pipe (owned by Wessex Water).

Our current strategy for reducing lead involves a twin track approach of plumbosolvency control to manage the public health risk in the short to medium term, and pipe replacement to remove lead from our network over the longer term. Plumbosolvency control through phosphate dosing has been implemented in zones where sample and asset data indicate that >5% of services are lead. In AMP7 we are targeting proactive replacement of 9,000 lead and metallic communication pipes. Our current policy is to replace both our communication pipe and the customer's supply pipe, free of charge up to outside the property only, except for where there are excessive associated costs.

In AMP8, our strategy is to target lead pipe replacements that will have the greatest public health benefit and not including other metallic pipes in our programme. Under this strategy, we plan to deliver 6,000 pipe replacements over AMP8. We then plan to double this to 12,000 in AMP9. Our core pathway therefore includes an increase in expenditure for this activity over time, with unit rates (and total enhancement spend) increasing each AMP as the programme covers more difficult and harder-to-reach streets.

Summary of core pathway investments

Our key core pathway investments for water treatment and supply are summarised in Table 9 below. These investments are what we consider are required, over and above base expenditure, to achieve our 2050 ambitions under a benign state of the world. They correspond to relevant lines in data table LS3 in our PR24 business plan.

Table 9 – Core pathway activities and investments for water treatment and supply sub-strategy

Area	Enhancement line	Key activities and investments	Estimated enhancement cost	Lead time and delivery time
Nitrate and PFAS Management	LS3.29	Nitrate removal at one site in AMP8 and an additional two sites in AMP9 Catchment management approach – with focus at 10 high risk sites Employ blending regimes and seasonal outages of certain sources. Additional PFAS monitoring and sampling to inform ongoing PFAS strategy, and PFAS treatment at one water treatment site	AMP8 £37.5m AMP9 £65.1m	Expenditure forecast in AMP8 and AMP9 Land, planning, and procurement issues mean major investments may require up to five years to complete

Supply interruptions	LS3.40	AMP10-12 – deployment of network sensors and increasing number and location of repair teams and equipment	£76.8m over AMPs 10-12	We have profiled investment on supply interruptions from AMP10 onwards, reflecting customer research (see Section 5.3) and prospect of new technology becoming available.
Lead replacement	LS3.32 – 3.33	Target replacement of 6,000 (AMP 8) and 12,000 (AMP9 onwards) lead communication pipes	AMP8 £16.9m AMP9: £31.1m AMP10 £37.3m AMP11 £43.5m AMP12 £49.7m	Ongoing rolling annual programme of work

Alternative pathways

Scenario considerations

We have assessed how each of our five scenarios may impact on our water treatment and supply strategy. We consider that three scenarios do not pass the materiality threshold for developing an alternative pathway: climate change; demand; and landbank availability. These are not currently forecast to have a significant impact on water *quality* and associated supply impacts (impacts of climate change/demand on water *availability* are considered in the Water Resources sub-strategy). However, we consider that two scenarios are relevant to our ability to meet our SDS ambition for safe and reliable water: **high abstraction reduction**; and **slow technology**.

Alternative pathway 1: high abstraction reduction (**LS3a**) – enhanced nitrates and PFAS

We have set out above that the operational flexibility and resilience of our water supply operations, underpinned by our integrated grid, is a key aspect of our water treatment and supply strategy. This is because it enables us to flexibly manage different water supply sources whilst maintaining the supply of water to all parts of our region.

Environmental investigations taking place in 2025-30 will inform final decisions on abstraction licence reductions from 2035, in line with sustainable abstraction guidelines. If these investigations indicate that we face the EA's 'enhanced' reduction scenario, our options to blend higher nitrate water by abstracting from different sources may become limited, and maximising our existing sources may become more critical – in other words, turning sources off seasonally due to high nitrates and substituting supply may no longer be feasible. Similarly, if one of our water sources records a high PFAS detection, we will be less able to take this source temporarily out of supply while we investigate the issue.

As such, if we cannot rely on grid and supply management to manage the risk of high nitrates and PFAS, we may need to invest in additional nitrate removal plants and PFAS treatment to ensure that we can continue to supply safe and reliable water and achieve our performance targets particularly in respect of water supply interruptions. We have therefore developed an alternative pathway for this scenario (see data table LS3a) which includes the following expenditure:

- Forecast costs for upgrading or building new nitrate removal plants at all ten of the sites at which in AMP8 we are prioritising enhanced catchment management. We estimate this could add around **£70 million** in expenditure across AMP9 and AMP10. While all ten may not be required even under this adverse scenario, we

have taken a conservative approach to illustrating the potential costs for this pathway. We have also included further costs in AMP11 and AMP12 (**£17.5 million** each) for further nitrate treatment if required at other sites.

- Forecast costs for installing PFAS treatment at additional water treatment centres. We have assumed the installation of GAC (granular activated carbon) adsorbers would be the predominant treatment approach at relevant sites. We have conservatively assumed that we will need PFAS treatment at all sites which has recorded a recent reading of 10ng/l, which would reflect a tightening of the existing 'tier 2' threshold for categorising water treatment centres e.g. due to increasing public perception about the impacts of PFAS. This could result in us needing PFAS treatment at six sites per AMP between AMP9 and AMP12 at an additional cost of around **£366 million**.

Decision points and trigger points

We have assumed a decision would be taken on both these investment requirements as part of the next price review, following the outcome of environmental investigations and further clarity on abstraction licence requirements. The trigger point would then come in 2030 at the start of AMP9.

Likelihood

In terms of likelihood, we perceive the likelihood of needing further nitrate removal schemes to be relatively low as our current modelling suggests the majority of at-risk sites have reached their peak nitrate concentrations. In addition, we continue to pursue a proactive catchment management approach. However, there remains uncertainty on a minority of at-risk sites having reached peak nitrate concentration and in particular how existing sites will need to be maximised in future licence reduction scenarios.

For PFAS, we have accounted for GAC treatment at our most at-risk site in our core pathway in AMP8 and AMP9. We also perceive the need for treatment at additional sites to be relatively low. However, the impact of tightened regulatory standards (such as a change to the tier 2 threshold) would be exacerbated in a high abstraction reduction scenario.

Overall, we have attributed a **25%** likelihood of following this alternative pathway from 2030.

Alternative pathway 2: slow technology (**LS3b**) – additional lead pipe replacement

A lead-free network is not an explicit objective to achieve our SDS aim of safe and reliable water, and there is no specific performance commitment in respect of lead pipe replacement. However, our SDS sets out that we will help to remove any health risks posed by items such as lead pipework in customers' homes. Furthermore, we anticipate that the DWI may in future set out guidelines and potential legislation governing expectations for water companies to achieve a 'lead free' network, reflecting increasing customer expectations.

As such, our core pathway assumes a profile of expenditure to achieve a lead-free network by 2050. Under this pathway, we assume there will be a reduction of 6,000 lead pipes for AMP8 then 12,000 for each subsequent five-year period. Although this would not by itself deliver the replacement of all lead pipes, we anticipate that there may be technology advances in the next decade that enable a more efficient approach to lead reduction from AMP10 onwards. These may include pipe re-lining technologies that protect supplies over the long term, that can be used to re-line difficult to replace supply pipes and internal plumbing. If these technologies develop, we may be able to achieve an effectively lead-free network for broadly the same expenditure as forecast for AMP9 onwards (recognising there is significant uncertainty about the cost savings to be delivered by technology improvements).

However, under a slow technology scenario where these advances are not forthcoming, we would need to continue with broadly the same approach through to 2050. This would require an increase in the run-rate of our lead pipe replacement programme. We have therefore developed an alternative pathway showing an increase in our lead activity to meet a 2050 date for a lead-free network. We envisage this would cost around **£180 million** extra from AMP10 onwards (see data table LS3b).

We note that meeting our performance targets for meeting zero supply interruptions by 2050 is also dependent on the development of new technology, and that under a slow technology scenario (where this does not occur) we may need to incur additional expenditure to meet our ambition. However, unlike lead pipe replacement, it is difficult to forecast the magnitude of increased investment in BAU activities that would achieve this. As such, we have not forecast any additional expenditure on under this pathway – but we recognise this means our alternative pathway could understate the total investment needed under a slow technology scenario to keep us on track to meet our SDS aim for safe and reliable water. This is discussed in more detail in Section 4.2 (scenario testing).

Decision points and trigger points

We expect that information gathered during AMP8 and AMP9 on lead pipe relining (and other) technologies will inform the development of the price review leading into AMP10, enabling a decision on whether we need to adopt an accelerated lead pipe replacement programme in order to achieve our ambition. If required, the trigger points for the alternative pathway would be the start of AMP10 in 2035.

Likelihood

The likelihood of switching to this alternative pathway from the core pathway depends principally on the availability of new technologies to more efficiently reduce lead from the network. This is difficult to assess with any certainty, but we consider this could be up to **25%** at this stage – implying a 75% likelihood of deciding to move to the alternative pathway in 2033.

We recognise that, as this is not an explicit SDS aim with a 2050 performance commitment, there is also a chance that our specific *ambition* in this area could change over time (reflecting prevailing regulatory requirements). For instance, if the public health risk of lead is effectively mitigated through phosphate dosing, expensive lead pipe replacement programmes may struggle to achieve binding statutory targets in the medium-term while investment in other areas is prioritised and customers are protected from excessive bill increases. This would affect both the core pathway and alternative pathway and could lead us to reframe our strategy around reducing public health impacts rather than the removal of lead itself. We will keep this under review and adapt our LTDS in future as necessary.

Summary of pathways

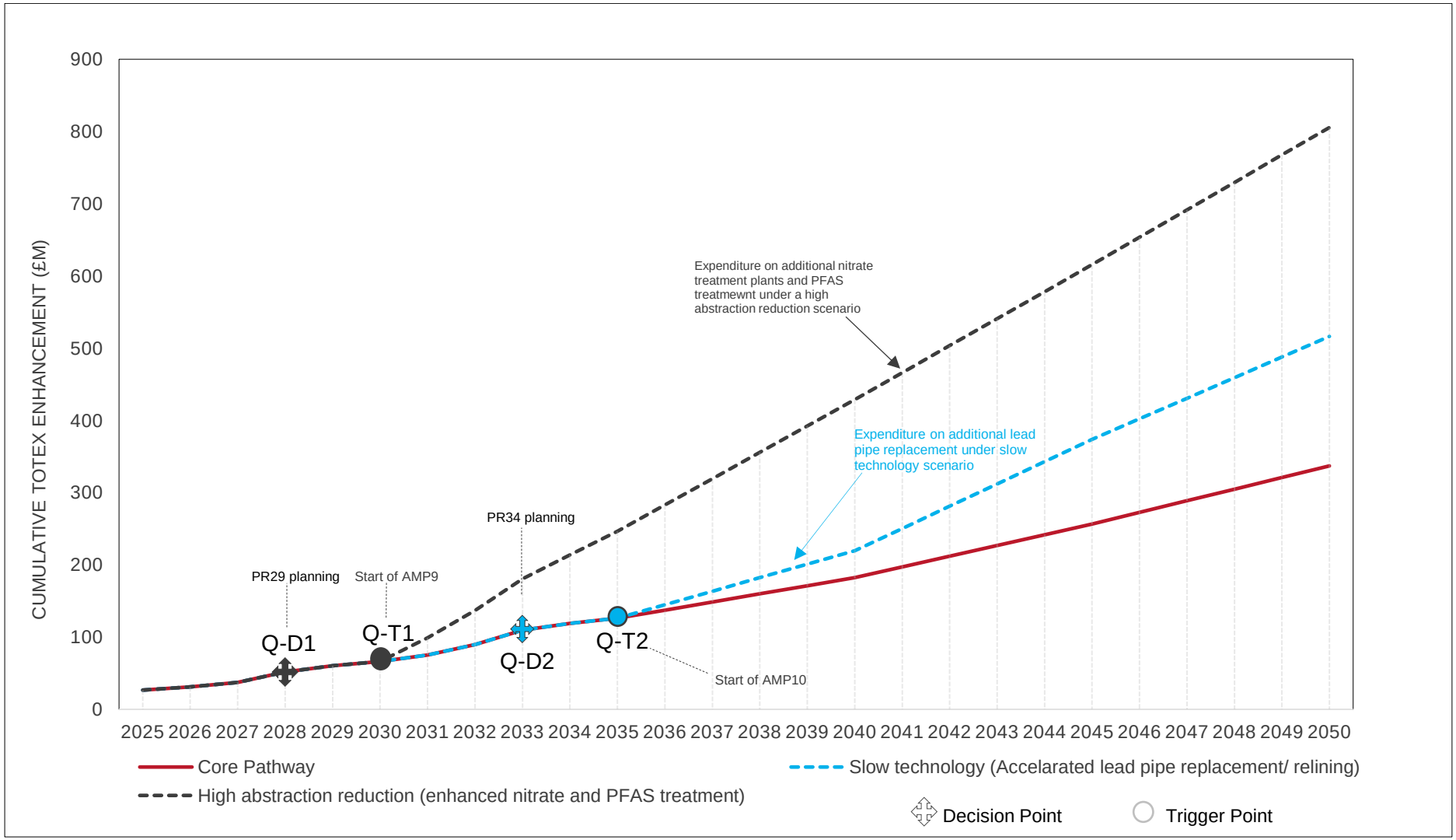
Table 10 summarises key information on our two alternative pathways: Enhanced nitrate removal and PFAS treatment (high abstraction reduction scenario); and additional lead pipe replacement / relining (slow technology scenario).

Table 10 – Water supply and treatment sub-strategy – summary of alternative pathway information

Pathway	Key investments	Decision Point	Decision Point - description	Trigger Point	Trigger Point - description	Likelihood
High abstraction reduction	Enhanced nitrate removal Enhanced PFAS treatment	Q-D1, 2027	PR29 planning	Q-T1, 2030	Start of AMP9	25%
Slow technology	Additional lead pipe replacement / relining	Q-D2, 2033	PR34 planning	Q-T2, 2035	Start of AMP10	75%

Figure 12 below presents the core pathway and alternative pathways for this sub strategy, including the associated decision and trigger points. This shows the magnitude of incremental enhancement spend that we would expect under each of the alternative pathways, to still meet our ambition under these scenarios.

Figure 12 – Water Treatment and supply Sub-Strategy Core and Alternative Pathways



3.5.2. Water resources

Introduction and summary of sub-strategy

As set out in Section 3.5.1, we treat and distribute an average of 340 million litres of clean water a day from over 70 sources, and supply approximately 1.3 million people and over 40,000 businesses. The management of our water resources to ensure a reliable and sustainable long-term supply of water to our region is a vital component of our LTDS and wider business strategy.

Currently, three quarters of our water resource for public supply comes from groundwater sources in the south and east of our region. Important aquifers for us are located under Salisbury Plain, the Cotswolds and the Dorset Downs. The remainder of our water supplies come from impounding reservoirs located in Somerset.

The main river catchments in the region include the Bristol Avon, which includes the Great Oolite aquifer, in the north, the chalk catchments of the Hampshire Avon, the Dorset Frome and Piddle, the Stour in East and South, and surface water reservoirs in the Parrett and Tone in the West. While our regional water resources come from different aquifers and source types, our key trunk mains and integrated grid system enables us to transfer water across the systemin the integrated single water resource zone. It is at this level that we aggregate our available supplies and forecast demand to calculate the supply demand balance.

Water Resource Management Plan

The overarching planning framework that we use to manage and plan our water resources is the Water Resources Management Plan (WRMP). Our WRMP sets out how we will meet demand and protect the environment through to 2080, consistent with the West Country Water Resources Group (WCWRG) regional plan. It provides a detailed description of the resource assessment and optioneering processes used to characterise plausible future scenarios, forecast their impact, and determine the optimum operational response to ensure we deliver a best value plan that satisfies all statutory obligations and regulatory requirements in respect of water resources. These include the following:

- Distribution Input – we should plan to meet Defra's water demand target set under the Environment Act 2021 to reduce the use of public water supply in England per head of population (DI) by 20% from the 2019-20 baseline by 31 March 2038

- Leakage – we should plan as a minimum to meet Water UK's commitment to reduce leakage by **50%** by 2050 (from 2017 levels). The EIP also sets out a trajectory for water companies to reduce leakage, with interim targets to reduce leakage by 20% by March 2027; 30% by March 2032; and 37% by March 2038.

- Household Demand – we should take actions required to reduce per capita consumption (PCC) to **110 litres/person/day** by 2050, with an interim target of 122 l/p/d by March 2038 on the trajectory to achieving the 2050 target.

- Non-household demand – we should take actions to reduce consumption in the non-household (NHH) market by **15%** by 2050, with an interim target of 9% by March 2038 on the trajectory to achieving the 2050 target.

- Drought resilience – Achieve 1 in 500 drought resilience by 2039, or 2050 at the latest.

As explained in Chapter 2, these requirements directly underpin the set of 2050 performance targets that support our overall SDS aim for sustainable abstraction (i.e. achieving 100% compliance with our abstraction licences). Our WRMP therefore constitutes an existing planning framework to deliver our long-term ambitions in this area.

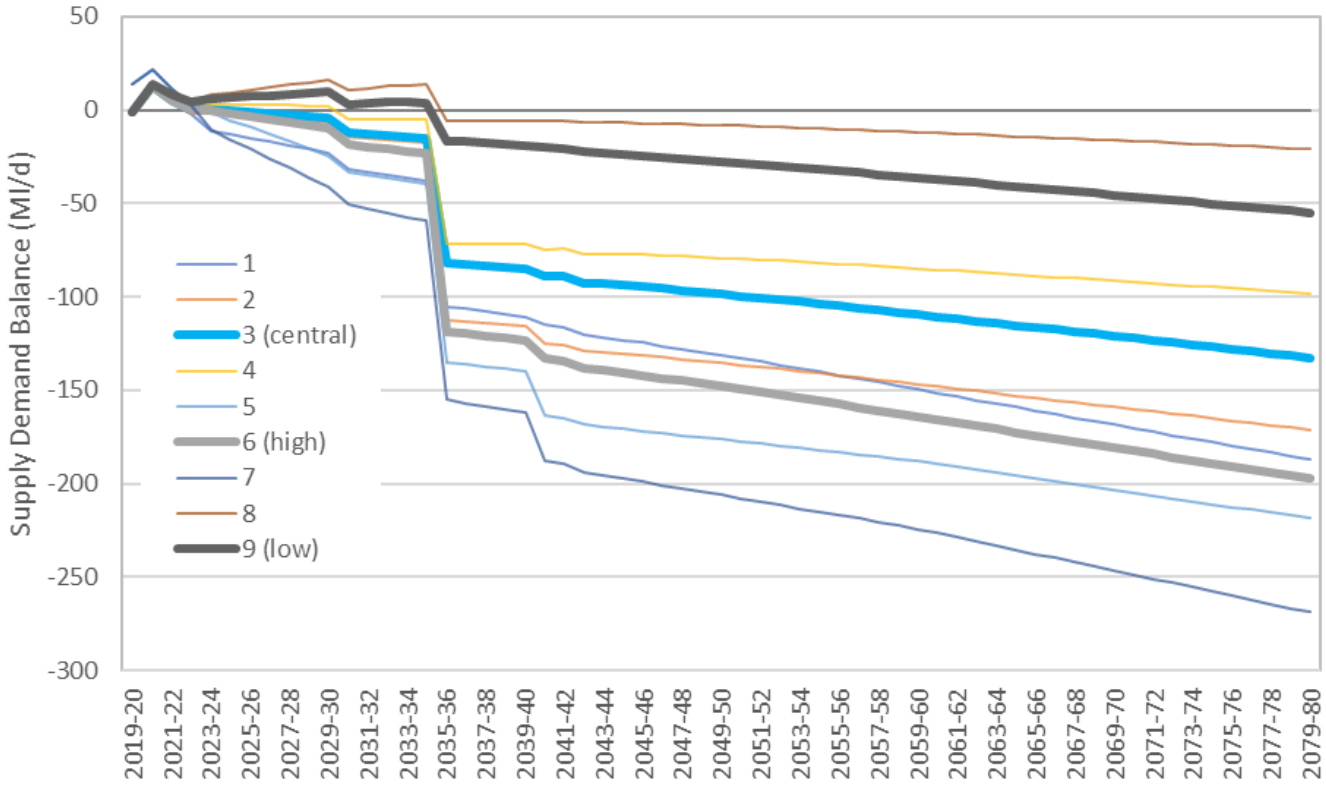
With this in mind, we have developed our water resources core and alternative pathways for the LTDS in line with our WRMP. In the rest of this sub-section, we summarise how we have used the WRMP as the basis for our LTDS pathways, focusing on how we have selected specific WRMP pathways for inclusion in our LTDS. This is consistent with Ofwat's guidance, which recognises that WRMPs already provide a strong and mature framework for long-term planning for water resources.

We note that our original LTDS contained some differences to our WRMP. This stemmed from that fact that we revised our PR24 business plan – and the resulting profile of activity in our LTDS – following the submission of our draft WRMP to regulators in summer 2023. We have since updated and resubmitted our WRMP to regulators such that it aligns with our PR24 business plan, and by extension our LTDS.

WRMP scenarios

To develop our WRMP, we first considered uncertainty in a range of factors that influence the supply demand balance, including climate change; population and property growth, household and non-household water consumption; and abstraction reductions. For each of these factors, we generated a low, central, and high scenario. We then combined these factors to derive a set of baseline 'supply-demand balance' scenarios i.e. the surplus or deficit in water in our region in the absence of proactive intervention. These are shown in Figure 13 below.

Figure 13 – Baseline WRMP supply demand balance



Under all supply demand balance scenarios, we have a supply demand balance deficit, primarily driven by long term growth in demand associated with population and property growth, and in the shorter term, licence reductions to achieve sustainable abstraction from 2035. The uncertainty or spread across the scenarios primarily reflects the uncertainty in the extent of licence losses in 2035.

Because these scenarios incorporate the same factors as those represented by Ofwat's common reference scenarios derived for the purposes of the LTDS – particularly demand and abstraction reduction – they effectively provide a 'menu' that we can use to develop our core and alternative pathways for the LTDS. In other words:

- We can firstly select the scenario that most closely matches the common reference scenario assumptions that should underpin the LTDS core pathway, and use this as the basis for our core pathway.

- We can then select a subset of the other scenarios that reflect more adverse assumptions about the various common reference scenarios, to derive plausible alternative pathways.

This is how we have derived our core and alternative pathways for water resources. Further detail on how we have gone about this is set out below.

Summary of core pathway investments

As set out in Ofwat's guidance, our LTDS core pathway should represent the set of investments that are required to achieve our ambition (i.e. our SDS aims) under a benign future scenario for climate change; demand; abstraction reduction; and a slow development scenario for technological development. This corresponds most closely to **supply demand balance scenario 9** presented in Figure 13 above, which involves the second smallest supply deficit and therefore represents the second-best possible supply demand balance scenario through to 2050[8].

We have therefore based our LTDS core pathway on the activities we would need to undertake to alleviate the supply-demand balance – and by extension achieve our SDS aims of 100% compliance with abstraction licences – under scenario 9.

However, we have also included some additional investments as follows:

- **All activities to be ready for all plausible future scenarios**. In addition to the activities needed under supply demand balance scenario 9, there are 12 additional supply-side schemes that we have included in the core pathway with investments in AMP8 2025-2030. These schemes would not be needed to alleviate a supply deficit under scenario 9; however, the lead times associated with them, as well as the significant abstraction reduction needs that must be met by 2035 under more adverse scenarios, mean that the design and development phases (enabling work) need to be taken forward during AMP8 to keep all plausible alternative pathways open (including sub-variants of the alternative pathways considered here). This is consistent with Ofwat's guidance in respect of including low-regrets investments in the core pathway.

- **Additional demand management activities.** Although strictly not required to alleviate the supply demand balance forecast under scenario 9, we have included some additional smart metering and leakage activities as they would be needed to meet government policy expectations set out above, which form part of our 2050 performance targets underpinning our SDS aim.

Taking account of all the above, the key core pathway investments for water resources are summarised in Table 11 below. These investments represent what would be required to achieve our 2050 ambitions under a benign state of the world, while keeping all other options open to plausible future states of the world. They correspond to relevant lines in data table LS3 in our PR24 business plan.

[8] Scenario 8 involves an even more optimistic set of assumptions than the benign common reference scenarios, so a core pathway based on this supply demand balance may not meet our ambition under all benign assumptions.

Table 11 – Core pathway activities and investments for water resources sub-strategy

Area	Enhancement line	Key activities and investments	Estimated enhancement cost	Lead time and delivery time
Leakage	LS3.15	6.44Ml/d reduction in leakage, expanding acoustic logging and smart network capabilities. Smart meter data will contribute to leakage "find and fix" activities. AMP 9-12 activity focused on smart networks capability, bringing together different monitoring technologies across the network and harnessing innovative predictive techniques to further reduce leak run times; and reducing long running leaks in difficult DMAs and on trunk mains as our flow balance capabilities are enhanced.	£22 million in AMP8 £301 million over AMPs 9-12	Ongoing programme of work over multiple AMPs
Smart metering	LS3.16-LS3.26	Roll out of smart metering to 40% of household and non-household properties (~250,000) by 2030, with installation to ~95% properties by 2035. Further spend in AMPs10-12 on new meter installations and smart metering infrastructure	£37.5 million in AMP8 £60.4 million in AMP9 £10 million over AMPs 10-12	Rollout over AMP8 (40% of region) and AMP9 (95% of region)
Water efficiency	LS3.14	16,800 household home check and plumbing leak visits per year by 2030 and over 160 non-domestic business water efficiency visits. Programme assumed to increase in AMP9 to over 20,000 visits per year to achieve 2037-38 demand reduction targets. Activity then forecast to reduce slightly to reflect diminishing returns.	£12 million for AMP8 and AMP9 Average of £8 million per AMP thereafter	-
Supply-side schemes	LS3.13	Design and development of 15 supply schemes during AMP8 (including SROs) to keep future alternative pathways open.	£92.7 million for AMP8	-

Alternative pathways

Scenario considerations

As explained in Section 3.3, and above, we have taken a slightly different approach to identifying alternative pathways for this sub-strategy than for other strategies – reflecting that our WRMP forms an existing basis for this sub-strategy. Specifically, we have not sought to develop individual alternative pathways to capture additional investment for the adverse assumptions for one or more of our five LTDS scenarios (demand; climate change; abstraction reduction; technology; and landbank availability). Rather, we have selected the WRMP pathways which

comprise a *broad range of plausible combinations* of these scenarios in an adverse state of the world. This allows for our WRMP to slot into the LTDS, as specified in Ofwat's guidance.

As shown in Figure 13, we have forecast 9 supply demand balance scenarios through to 2050 and beyond, but there are three main scenarios (low, central, and high) that our WRMP focuses on. The low scenario forms the basis for our core pathway as discussed above. The central and high scenarios incorporate the following assumptions.

Table 12 – Scenario assumptions underpinning WRMP alternative pathways

Supply demand balance scenario	Related WRMP pathway	Climate change assumption	Demand assumption	Abstraction reduction assumption	Technology assumption
Scenario 3 (central)	**AP1** **Preferred / most likely pathway**	**Adverse** RCP8.5 from UKCP18 probabilistic dataset	**Benign** ONS trend-based forecast	**Adverse** Central scenario for licence changes to meet future legal requirements	**Benign** Full smart metering by 2035
Scenario 6 (high)	**AP2** **High alternative need**	**Adverse +** RCP8.5median of UKCP18 GCM and RCM products	**Adverse** Local Authority plan based forecast	**Adverse** Scenario to future meet legal requirements and enhanced need	**Benign** Full smart metering by 2035

We consider these two scenarios capture the key variation in Ofwat's common reference scenarios that will affect our water resources planning over the next 25 years.

- Compared to the core pathway, scenario 3 assumes an adverse climate change scenario; and a more challenging set of abstraction reduction assumptions.
- Compared to scenario 3, scenario 6 assumes higher demand for water[9]; and an even more challenging set of abstraction reduction assumptions. It also assumes a slightly more pessimistic scenario for climate change than the adverse scenario assumptions in Ofwat's guidance (and scenario 3), but this has a negligible impact on supply-demand balance modelling outcomes.

We have therefore based our alternative LTDS pathways on the WRMP pathways AP1 and AP2 that reflect these WRMP scenarios. Together, we consider these pathways broadly capture the range of enhancement investment

[9] This scenario does assume water labelling benefits with minimum standard are introduced. In Ofwat's guidance, this assumption is included within the benign rather than adverse scenario. However, we consider the overall assumptions for demand match Ofwat's 'high demand' assumptions sufficiently closely.

profiles that we may need to follow over the next 25 years to meet our 2050 ambitions for sustainable abstraction, as they reflect different assumptions about the most important drivers of investment in water resources activities. Pathway AP1 also forms the most likely WRMP pathway, which is consistent with Ofwat's guidance that this pathway should be reflected in our LTDS as an alternative pathway.

The investments, decision / trigger points and likelihood of pivoting to these pathways is discussed in turn below.

We note this is a narrower set of alternative pathways considered in our original LTDS, but we consider that for presentational purposes it is clearer that our strategy presents two of the most significant alternative pathways. We discuss further the impact of other WRMP pathways in relation to stress testing and uncertainty in Section 4.2.4. These are variants of the WRMP pathways presented in this section, driven by additional factors not explicitly captured in Ofwat's common reference scenarios, and in practice we consider that these are all viable options that we may need to pivot to in future if such circumstances arise.

Alternative pathway 1: WRMP most likely pathway (**LS3c**)

The key features of this pathway are set out in Section 6.4 of our WRMP main plan.

The demand management activities relating to smart metering and water efficiency, as well as leakage reduction investments, are the same under this pathway as in the core pathway. However, as shown in Figure 13, there is a much steeper drop in the supply-demand balance from 2035-2036 onwards, which is driven primarily by more restrictive abstraction reduction licences from this point onwards. These licence changes are required to achieve sustainable abstraction to meet relevant legislation, including the Water Framework Directive, but most notably the Habitats Regulations. These principally apply in the Wessex Water area to abstractions from the Hampshire Avon catchment, but licence changes are also required for abstractions that take water from the broader chalk aquifer system, to help protect chalk river systems. There is a significant driver to make these changes to ensure sustainable abstraction as soon as is possible.

Under this scenario, we would need to take forward some supply-side schemes beyond their design and development phase, in order to offset the reduction in abstraction that would be permissible within our licences from 2035 onwards and maintain a positive supply demand balance in 2050 and beyond. In addition to some smaller enhancements to yield at existing sources, the principal supply schemes under the most likely pathway are a new internal transfer from the West of our supply system to the East, which, in addition to a new import from Bristol Water, will help to meet peak period demand in the East of our supply system where we abstract water from Chalk aquifers.

In our WRMP, we have forecast an additional **£186 million** of enhancement expenditure for this, the vast majority of which would be incurred in AMP9 as it would need to be implemented during this AMP in advance of the 2035 abstraction licence dates.

Decision points and trigger points

The decision point for this pathway would come as part of the next WRMP planning round during the middle of AMP8 (i.e. December 2027), following the outcome of environmental investigations and further clarity on abstraction licence requirements. The trigger point would then come in 2030 at the start of AMP9 as this is the point at which we would need to move into the implementation phase of supply-side schemes, should the decision point require a switch to this alternative pathway from the core pathway.

Likelihood

In our WRMP, we assigned a 21% likelihood to following pathway AP1. However, the WRMP also includes some further variants of this pathway to capture other uncertainties. For the purposes of our LTDS, we consider these as part of our stress testing and uncertainty in Section 4.2 rather than including them as specific alternative pathways.

Taking all these variants together, the likelihood of switching from the core pathway to this pathway (or a similar variant) is **60%**. This reflects that this is the preferred / most likely WRMP pathway.

Alternative pathway 2: WRMP high alternative need (**LS3d**)

Compared to alternative pathway 1, there are two main differences for this alternative pathway:

- Firstly, as shown in Table 12, it reflects a scenario with an even more challenging set of abstraction reduction assumptions. This is reflected in an even larger fall in the supply demand balance in 2035-36 in Figure 13
- Secondly, it reflects a scenario where there is even higher demand for water due to an assumption of higher population and property growth. This is illustrated in Figure 13 by the fact that the gradient of the supply demand balance under scenario 6 is steeper than scenario 3, worsening the picture even further after 2035 (absent any mitigating measures). This means that, all other things equal, even more supply-side measures are needed to restore a positive supply demand balance.

Under this scenario, we would need to take forward additional supply-side schemes beyond their design and development phase, over and above those considered under alternative pathway AP1, in order to maintain a positive supply demand balance in 2050 and beyond. In our WRMP, we have forecast an additional **£685 million** of enhancement expenditure for this compared to the core pathway (equivalent to £436 million more than under alternative pathway 1).

As with alternative pathway 1, the vast majority of this would be incurred in AMP9 as it would need to be implemented during this AMP in advance of the 2035 abstraction licence dates. However, around £65 million of expenditure is incurred in AMP11 and AMP12. To meet even more restrictive licence change needs by 2035, compared to under alternative pathway 1, we would expect to need some smaller schemes to enhance supply from existing sites; a new scheme to use recycled water from Poole; a West to East transfer in our supply system to help meet peak demands and offset abstraction from Chalk catchments; and an enhanced import from Bristol Water. Expenditure occurring later on towards 2050 is to deliver a larger reservoir scheme as well as an aquifer storage and recovery scheme after 2050 to meet out supply demand balance forecast out to 2080.

Decision points and trigger points

The decision point for this pathway would come as part of the next WRMP planning round during the middle of AMP8 (i.e. December 2027), following the outcome of environmental investigations and further clarity on abstraction licence requirements. The trigger point would then come in 2030 at the start of AMP9 as this is the point at which we would need to move into the implementation phase of supply-side schemes, should the decision point require a switch to this alternative pathway from the core pathway.

Likelihood

In our WRMP, we assigned a 10% likelihood to following pathway AP2. However, the WRMP also includes a variant of this pathway to capture other uncertainties. For the purposes of our LTDS, we consider these as part of our stress testing and uncertainty in Chapter 4 rather than including them as specific alternative pathways.

Taking all these variants together, the likelihood of switching from the core pathway to this pathway (or a similar variant) is **20%**.

Summary of pathways

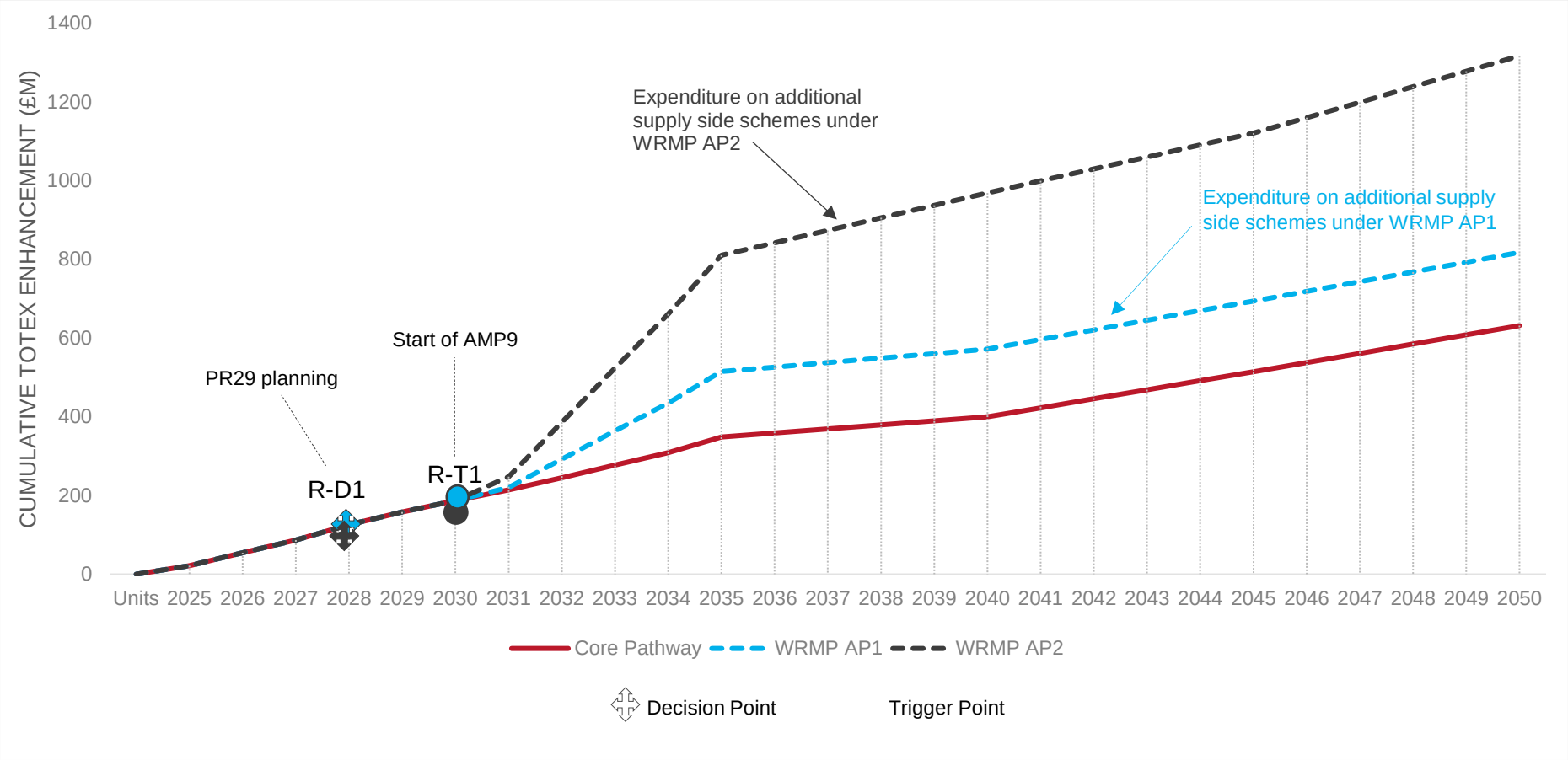
Table 13 summarises key information on our alternative pathways for water resources.

Table 13 – Water resources sub-strategy – summary of alternative pathway information

Pathway	Key investments	Decision Point	Decision Point - description	Trigger Point	Trigger Point - description	Likelihood
WRMP AP1	New internal transfer and increased import from Bristol Water (both to deliver by 2035), as well as three small schemes to improve capacity of existing sources.	R-D1, 2027	PR29 planning	R-T1, 2030	Start of AMP9	60%
WRMP AP2	Poole Water Recycling Scheme, new internal transfer and larger import from Bristol Water (all by 2035), new reservoir scheme and aquifer storage scheme (benefit post 2050), and small schemes to improve capacity of existing sources.	R-D1, 2027	PR29 planning	R-T1, 2030	Start of AMP9	20%

Figure 14 below presents the core pathway and alternative pathways for this sub strategy, including the associated and decision and trigger points. This shows the magnitude of incremental enhancement spend that we would expect under each of the alternative pathways, to still meet under our ambition under these scenarios.

Figure 14 – Water Resources Sub-Strategy Core and Alternative Pathways



3.5.3. Sewerage

Introduction and summary of sub-strategy

Wessex Water's sewerage network comprises 35,000km of gravity sewers, 2,150 pumping stations and 1,296 storm overflows. Sewers take wastewater from customers' homes and businesses and conveys the flow where possible by gravity to Water Recycling Centres (WRC), where the wastewater is purified before being discharged back to the environment. Sewage pumping stations (SPS) are required at some locations to lift flows over hills or into higher sewers or WRCs through pressurised pipes called rising mains. Storm overflows act as relief valves, allowing excess storm water to be released to rivers, ground, or sea, to protect properties from sewer flooding during heavy rainfall. Approximately 80% of our storm overflows are located within urban sewerage networks serving towns and cities, and 262 storm overflows are at WRCs where they protect treatment works from flooding.

Our long-term core sewerage plan is underpinned by our Drainage and Wastewater Management plan (DWMP) and is designed to:

- Ensure compliance with the Government's SODRP.
- Achieve the 2050 performance targets set out in Chapter 2 of this LTDS. This includes halving the number of sewer flooding incidents by 2050 and reducing average storm overflow spills.
- Make use of nature-based solutions or sustainable solutions where they represent best value.

A summary of the key components and status of our core sewerage plan – to deliver this – is set out below.

Storm overflows

We have a good understanding of our storm overflows, having completed monitoring rollout at the end of 2023 and increased computer hydraulic modelling across our network, to improve our ability to understanding of hydraulic performance and opportunities to optimise the network. Our investment priorities for AMP8 and beyond are heavily focused on reducing the frequency and impact of storm overflows, and we are investing in a range of improvement initiatives including reducing inflows; reducing infiltration; and increasing network capacity. This will continue into AMP9 and beyond, and forms the majority of enhancement costs included in our core pathway.

Storm discharges are being reduced through catchment-based solutions, such as removal of surface water inflows from roofs and roads, as well as traditional grey solutions, such as larger assets and attenuation (storage) tanks. In addition, we are looking at end of pipe solutions increasing overall hydraulic capacity of the treatment works or pumping stations to reduce the number of discharges to below 10 per annum. As mentioned, this is being achieved using a variety of grey and nature-based solutions through increasing storm tank capacity and nature-based wetland solutions for ground water infiltration. In respect of the latter, we are working with the Environment Agency to determine whether wetlands can be used to reduce the polluting impact of storm overflows.

Infiltration sealing

During prolonged wet periods, groundwater levels rise above public and private sewers and drains. Any cracks or holes in the sewer system can allow the groundwater to infiltrate and can inundate the sewers. This can cause sewer flooding and restricted toilet use which can continue for many weeks during very wet winters.

Catchments that are vulnerable to groundwater inundation are subject to Infiltration Reduction Plans. These plans are our commitment to inspecting sewers and making good any significant defects that could let the groundwater infiltrate into the sewer. Alternatively, wetlands can be constructed to treat the very dilute sewage that results from infiltration. We consider this is a more efficient and sustainable solution and have been advocating for their implementation in appropriate circumstances, where it can be shown that the discharge can be treated.

Sewer flooding

Wessex Water clears approximately 13,000 sewer blockages each year, costing over £5 million. In recent AMPs, investment constraints have adversely affected our network maintenance and expansion. Our repair and renewal work has not been sufficient to prevent asset deterioration, while capacity enhancement has not kept pace with the increase in new properties and increased run-off from paving of permeable surfaces. This has increased the risk of sewer blockages, as well as other issues such as collapses, flooding and pollution incidents. Around 90% of our sewer flooding incidents are due to blockages and collapses. Sewer blockage by non-flushables has been a particular challenge in some areas, requiring us to invest heavily in preventive maintenance and blockage removal. Some of our sewers in chalk catchments are also subject to high levels of groundwater infiltration, which increases the amount of sewage to be conveyed and the risk of storm overflow.

We are seeking an increase in our base maintenance expenditure in AMP8 which will help to address these issues and ensure we can maintain the long-term health of our sewer network in the face of these pressures. Furthermore, our core pathway includes additional enhancement in improvements in monitoring and remedial works to halve incidents of sewer flooding and slow down the rise in sewer collapses, in line with our 2050 performance targets.

Domestic and business customer education

Data shows around 75% of blockages are caused by misuse – predominantly wet wipes and fats entering the sewer network. Wipes, sanitary products, fats, oils, and greases can build up to form blockages that in turn cause sewerage to back up and ‘escape’ from sewers into homes, gardens, and the environment. These flooding incidents can be detrimental to the environment and distressing for our customers, in addition to being costly to clear up.

Although we will continue to improve our sewerage network, as explained above, we are therefore committed to addressing the issue ‘at source’ by encouraging customers to adopt blockage-friendly behaviours and dispose of waste appropriately or not generate the waste in the first place. To this end, we are making more use of data to identify blockage hotspot areas to focus customer engagement where it can have most impact. We plan to build on this approach to engage with all customers who experience blockages due to sewer misuse. These customers may receive a letter offering advice, a face-to-face visit, or one of our free waste packs to help them prevent future blockages. Targeted engagement will also be supplemented with more public awareness campaigns. Our future working will additionally see customer engagement on the topic of stormwater separation including advice and support on what can be done at a household and community level to help reduce flooding incidents.

We have also worked with local businesses to get them to help us in the fight against ‘fatbergs’. In communities where high levels of blockages are understood to be caused by the food sector, we have visited flood service establishments including restaurants, pubs, cafes, fast food outlets, takeaways, and schools to review their daily kitchen practices and what equipment – if any – they have installed to trap fats, oils, and grease (FOG) to prevent them from entering the sewer network.

Community engagement

We have regular engagement with communities regarding drainage and wastewater infrastructure through correspondence and attendance at established forums with the Lead Local Flood Authority and support to the flood warden network of volunteers that exists across many communities within the Wessex Area. This regular engagement with communities enables flood wardens and representatives to gain a good understanding of roles and responsibilities relating to flood risk and understand how to report any concerns.

Influencing policy

We have a track record of influencing policy at a national and local level. A Wessex Water director has represented water and sewerage companies on the Defra / EA storm overflows taskforce and has chaired the storm overflow legislation options review task and finish group. We are also promoting the benefits of introducing regulation to ban wet wipes, which, as noted above, is important to addressing sewer misuse issues ‘at source’.

Summary of core pathway investments

14 summarises key information on our core pathway for sewerage. These investments are what we consider are required, over and above base expenditure, to achieve our 2050 ambitions under a benign state of the world. They correspond to relevant lines in data table LS4 in our PR24 business plan. Enhancement costs in future AMPs are based on the core pathway costs contained within our DWMP.

Table 14 – Core Pathway activities and investments for sewerage sub-strategy

Area	Enhancement Line	Key activities and investments	Estimated enhancement cost	Lead time and delivery time
Storm overflow improvements	LS4.6–4.9 LS4.13	Providing addition storage (grey) and providing increased capacity (grey). Nature-based end of pipe solutions such as wetlands (green) Retrofitting sustainable drainage and separation surface water management. Ensuring all storm overflows have fine screens.	£440 million in AMP8 £700 million in AMP9 c.£600 million in AMP10, AMP11 and AMP12	Ongoing programme of work to achieve 128 improvements by 2030 and all improvements by 2050
Making sewers watertight	LS4.14	Sewer sealing to prevent groundwater entering public and private assets. This will reduce stork overflow durations under the infiltration reduction plan requirement.	£11 million in each AMP	Ongoing programme of work
Emergency overflow monitoring	LS4.4	Monitoring of emergency overflows; monitoring discharges to the environment and where located at pumping stations, monitoring pass forward flows.	£10 million in AMP8 £25 million in AMP9	Two-AMP programme to achieve 25% by 2030 and all by 2035.
Pollution reduction	LS4.63 (Additional Line 5)	Total pollutions programme, inspections, sewer rehabilitation, additional maintenance, enhanced customer engagements, pumping station optimisation, WRC tactical interventions.	£0m in AMP8* £35 million in subsequent AMPs	Ongoing programme of work
Reducing sewer flooding incidents	LS4.51 Reduce flooding risk for properties	Customer campaigns to stop customers flushing wet-wipes, rehab to reduce likelihood of blockages, hydraulic flooding programme.	£0 in AMP8** £61 million in subsequent AMPs	Ongoing programme of work

First time sewerage	LS4.52 First time sewerage	Installing new infrastructure to connect private property drainage systems that are causing pollution to the public sewerage system for the first time.	£6 million per AMP.	Ongoing programme of work

*We previously allocated £46 million and £77 million in enhancement funding for lines LS4.63 and LS4.51 respectively in AMP8. We have now reallocated this to base in our updated PR24 plan, to be covered by a cost adjustment claim. We consider that reducing flooding risk requires a step change in funding, whether through an increase in base costs or further enhancement funding. As such, we continue to forecast enhancement costs for these lines.

Alternative pathways

Scenario considerations

We have assessed how each of our five scenarios may impact on our sewerage strategy. We consider that three scenarios do not pass the materiality threshold for developing an alternative pathway: abstraction reduction (which is primarily related to water supply); landbank availability (which is related to bioresources); and demand. Although a high demand scenario would have some impact on our ability to meet our sewerage strategy to meet our SDS aim, our modelling work indicates that demand / population growth does not change sewer infrastructure requirements as significantly as climate change; we estimate even a 30% increase in population (far higher than the high demand scenario) would increase hydraulic flooding and storm overflow improvement requirements by less than 1%. As such, we do not consider this scenario meets the materiality threshold for an alternative pathway.

However, we consider that two scenarios are relevant to our ability to meet our SDS ambition for an effective sewerage system: **high climate change**; and **slow technology**. This is discussed in more detail below.

Alternative pathway 1: high climate change (**LS4a**) – larger storm overflow storage / flood risk requirements

Under a high climate change scenario (RCP8.5 from UKCP18), we can expect to see a much larger increase in global temperatures in the medium to long-term – equivalent to a 4.3°C temp. rise by 2100. The pace and intensity of climate change has an impact on our ability to meet our ambition for an effective sewerage system. For instance:

- Increasing storm intensity will result in more intense rainfall, leading to increasing flood risk and storm overflow volumes being discharged to the environment. As such, this would require larger storm tank volume solutions that will cost more to install.
- Wetter winters may increase the risk of seasonal groundwater inundation leading to flooding, restricted toilet use and storm overflow discharge volumes and duration.
- Furthermore, tidal increase will increase the risk of flooding due to submerged discharges and could prevent storm overflows from discharging. This is likely to be a longer-term impact (i.e. primarily beyond 2050) and so our alternative pathway only includes some limited additional investment from AMP10 specifically to address this. However, as part of the next DWMP, we will consider the impact of sea level rise in vulnerable catchments (e.g. Poole) to inform our PR29 plan, and we will update our LTDS accordingly if this picture changes (both in terms of timing and scale of investment).

Our core pathway for flooding and storm overflow improvements assumes a 20% increase in design rainfall intensity for climate change. This allowance for climate change in the design and construction of solutions is the

current best practice and is broadly consistent with the assumptions underpinning the low climate change pathway[10].

We have used our hydraulic computer models to predict how much larger the solutions would need to be for the high climate change scenario (RCP8.5 i.e. a 4.3° increase by 2100). For flooding, the risk of flooding in a storm shows that 30% more properties would also be at risk of flooding. For storm overflows, the models predict an 8% increase in discharge volumes compared to the benign scenario.

In order to continue to meet our 2050 ambitions in respect of sewer flooding (halving the number of incidents) and storm overflows (reducing spills to an average of 8.9 spills per overflow), we would need to invest more in mitigation solutions under this scenario. Specifically, this would result in:

- Increased costs for storage schemes – the volume of storage solutions required to adequately reduce spill frequency will need to be larger if there is an 8% increase in discharge volumes. Our alternative pathway therefore accounts for higher storm storage scheme costs. We have assumed these would primarily be grey solutions, though we have included some costs for additional green solution as well. We have also included some additional costs for attenuation and surface water separation solutions, which we consider could also form part of the optimal mix of solutions to combat higher discharge volumes in this scenario.

- Additional infiltration management would be needed to combat the increased risk of seasonal groundwater inundation (which contributes to the 30% increase in the number of properties at risk of flooding) and keep us on track to halve sewer flooding.

- Additional costs to reduce property flooding risk, resilience and odour abstraction. Under this scenario, we estimate that we could require an additional £7.65 million per AMP from AMP10 onwards to start addressing the risk from sea level rises, as well as increasing the resilience of our sewage pumping stations against major fluvial flooding events. We have assumed a 10% increase in expenditure for these activities, under this pathway.

The profile of these investments is set out in data table LS4a. In total, we forecast this would comprise an additional **£236 million** in enhancement investment over AMP10-AMP12. The profile across these AMPs is broadly flat to reflect a consistent increase in activity over time to combat worsening effects of climate change.

Decision points and trigger points

We consider the decision point for this alternative pathway would be the DWMP and price review planning round falling during AMP9. We expect by this point we will have a clearer idea about the pathway of climate change and the pressure that it is putting on our sewerage network, based on the metrics set out in our monitoring plan (see Table 23 below).

This is a change to our original LTDS, which had the decision point in 2028, as we consider that we can defer a decision on this investment until later in the period while still meeting our ambition. This does not materially impact the scale of investment in this pathway as we only forecast some infiltration management work in AMP9. In practice, the decision point for this particular pathway could come sooner or later as the ultimate driver for this scenario is

[10] This assumption is arguably this is on the conservative side, as the UKCP18 RCP2.6 scenario effectively assumes that global temperature rises will level off at 1.6°C. However, there is a range around this figure of +/- 0.7°C so this assumption is consistent with the high end of this range.

faster climate change, and there is no specific point in time when that scenario materialises; in other words, the thresholds for the metrics in Table 23 are not definitive.

The trigger point for this alternative pathway would then be the start of AMP10, which is when we would start to make the investments in additional storm storage, infiltration management and other activities at relevant sites.

Likelihood

The likelihood of switching to this alternative pathway from the core pathway is related to the likelihood of different climate change scenarios materialising. Recent research has placed the probability of global temperature increases being at or above the low end of the RCP8.5 range by 2100 to be around 10%[11].

Alternative pathway 2: slow technology (**LS3c**) – wetland solutions and infiltration sealing

Technological progress is another scenario that has a significant impact on our ability to meet our ambition for an effective sewerage system.

In our original LTDS, we consider the impact of a range of technology changes – for instance, changes in communications technologies (PSTN switch-off, improvements in in-sewer monitors). This may affect our investment profile particularly for managing flooding and pollutions risk. However, having reviewed this sub-strategy, we consider the most significant technological uncertainty in terms of driving investment needs relates to wetlands and infiltration sealing.

As explained above, groundwater infiltration can cause sewer flooding which can continue for many weeks during very wet winters. Where sewers sit upstream of storm overflows that discharge during seasonally wet periods, the groundwater may also enter sewers and mix with sewage before being discharged back into the environment. Options to reduce the risk of infiltration are:

- replace with new pipes by open cut;
- sewer lining / sewer sealing using gel techniques; or
- constructing wetlands to treat the very dilute sewage.

Where overflow discharges are very dilute, due to groundwater inundation, we consider that the best option to treat this issue is the use of nature-based solutions such as wetland to treat the discharge. This addresses any harm from this discharge, which can then be reclassified as a permitted discharge and removed from spill counts, helping to achieve our ambition in respect of storm overflow spill performance in the most environmentally-friendly way.

Accordingly, in AMP8, we are proposing to construct 36 constructed wetlands to address groundwater inundated sewers that cause storm overflows to discharge the clean water back into the environment. This was not possible a decade ago but has been progressed due to improvements in our understanding and use of wetlands to treat discharges. We have been working with the Environment Agency and others to demonstrate the effectiveness and benefits of this as a solution. However, the decision of whether this is an acceptable way of dealing with groundwater inundated overflows is being considered and decided by the government.

We have assumed in our core pathway further use of wetlands in AMPs 9-12 to continue to address instances of groundwater-induced overflows, totalling around £42 million in enhancement spend over this period. However, this is likely to be contingent on technical developments in the efficacy of wetlands, combined with monitoring of such discharges during AMP8, allowing us to demonstrate the effectiveness of this solution as a long-term part of our sewerage strategy. Integrated constructed wetlands is a new technology that we have not used before. It is being

[11] See Venmans and Carr, The unconditional probability distribution of future emissions and temperatures, working paper.

proposed in our core pathway as we believe it has been applied successfully overseas, and treating sewage that is heavily diluted with ground water is more feasible that treating raw sewage. However, there is a risk that our regulators will not accept this technology as a viable mainstream solution to allow re-permitting.

In our DWMP, we included an alternative pathway for the implications that nature-based solution is not accepted as a technologically robust solution. We consider this pathway reasonably reflects the likely profile of investment under a scenario where we cannot use wetlands. Under this pathway, enhancement investment on infiltration sealing is approximately **£343 million** higher per AMP[12], partly offset by some savings in green solutions to reflect the more limited use of wetlands than under our core pathway. This is reflected in data table LS4c. The expenditure profile across these AMPs is flat.

Decision points and trigger points

The decision point for this is the decision is made by regulators on the viability of wetlands to treat storm discharges, and therefore whether treated spills need to be reported as discharges in the EDM returns and the SODRP metric. In our DWMP, which was published in mid-2023, we considered this to be the start of AMP8. We now consider this may come midway through AMP8 as these discussions have not yet concluded and are likely to continue. We have therefore adapted the decision point for this alternative pathway to the middle of AMP8.

The trigger point would be the start of AMP9, as this is when our infiltration sealing programme would increase.

In practice, we recognise this decision could be revisited by regulators in future, in which case we could in theory move from the alternative pathway back onto our core pathway. The decision point therefore represents the point at time in which we would next need to review the use of green solutions in our sewerage strategy.

We also recognise that delaying the trigger point compared to our DWMP pathway would in principle require a higher level of ‘catch-up’ investment over AMPs 9-12 to keep us on track to meet our sewerage ambitions in the absence of a wetlands programme, but we have maintained the same profile here for simplicity.

Likelihood

The likelihood of switching to this alternative pathway from the core pathway depends principally on the ability to demonstrate the efficacy of wetlands as a mainstream viable solution to groundwater-induced overflows. We have assumed a 50% probability of not being able to demonstrate this by the decision point in 2028.

Summary of pathways

Table 15 summarises key information on our two alternative pathways: larger storm overflow storage requirements (high climate change scenario) and additional infiltration sealing (slow technology scenario).

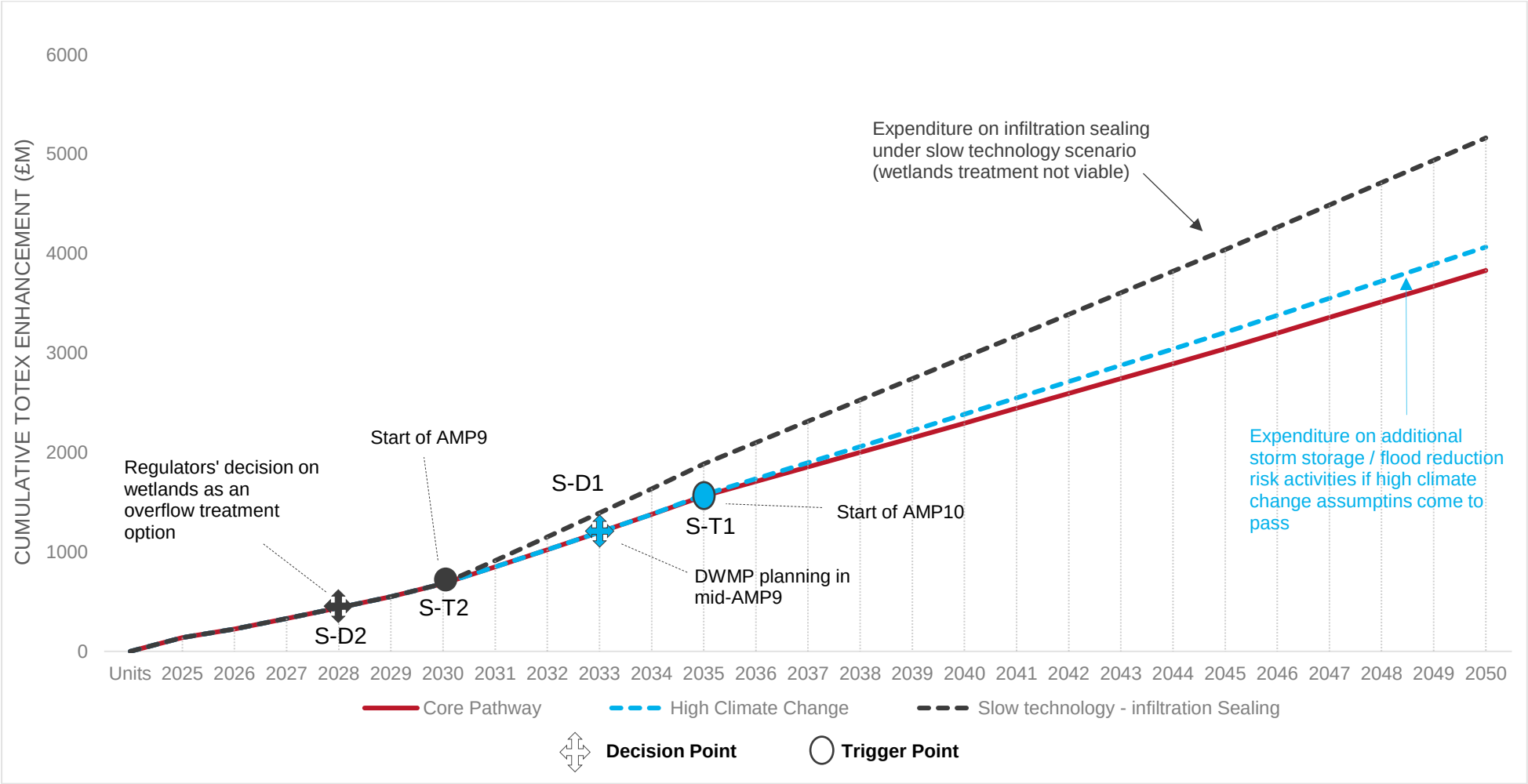
[12] See our published DWMP data tables, tab 3. Adaptive Plans The difference between our core pathway and AP2 is £343 million per AMP. The expenditure was based on levels of investment that we currently apply to our leakage part of the business, applied to the wastewater side of the business (and adjusted for differences in network size between supply and wastewater) to prevent groundwater entering public and private sewers and manholes.

Table 15 – Sewerage sub-strategy – summary of alternative pathway information

Pathway	Key investments	Decision Point	Decision Point - description	Trigger Point	Trigger Point - description	Likelihood
High climate change	Larger storm overflow storage requirements Additional flooding risk costs	S-D1, 2033	DWMP planning in mid-AMP9	S-T1, 2035	Start of AMP10	10%
Slow technology	Additional infiltration sealing	S-D2, 2028	Regulators' decision on wetlands as an overflow treatment option	S-T2, 2030	Start of AMP9	50%

Figure 15 below presents the core pathway and alternative pathways for this sub strategy, including the associated and decision and trigger points. This shows the magnitude of incremental enhancement spend that we would expect under each of the alternative pathways, to still meet under our ambition under these scenarios.

Figure 15 – Sewerage Sub-Strategy Core and Alternative Pathways



3.5.4. Wastewater Treatment

Introduction and summary of sub-strategy

Wastewater and stormwater from the sewage network is delivered to water recycling centres (WRCs) for processing to mitigate the impact it has on the environment. We currently have 398 WRCs treating effluent from a combined population equivalent of c3.5 million and an overall flow of 330,000,000 m^3/year.

Wastewater is a mixture of household and non-household foul water and industrial trade effluent as well as roof, road and land run off. The treated wastewater ultimately ends up in rivers and coastal waters so must be treated to prevent harm to the environment. Each WRC has a discharge consent issued by the Environment Agency detailing the acceptable levels of pollutants in the final effluent. The pollutants of focus are typically total suspended solids (SS), biological oxygen demand (BOD), Ammonia (NH_3), and total phosphorus (P). Each pollutant has a different impact on the environment – excessive levels of BOD and SS can choke rivers of oxygen preventing aquatic life from breathing, NH_3 is toxic to plants and animals while P is a nutrient causing eutrophication.

We have several performance commitments relevant to wastewater treatment that support our SDS ambition for great river and coastal water quality. These include reducing pollution incidents and increasing bathing water quality and river water quality (phosphorus).

A summary of the key components and status of our wastewater activities – to deliver on this long-term ambition – is set out below.

Treating wastewater

To treat sewage to levels required in each discharge permit, various types of physical, chemical and biological processes are used. BOD and NH_3 are typically removed with a combination of biological and physical process with bacteria consuming the pollutants. SS is settled in tanks or filtered, and P can be removed through chemical precipitation or biological adsorption. Increasingly chemical limits are being added to WRC permits, and we envisage that in the future microplastics and pharmaceuticals could also be permitted.

In AMP7, we are upgrading 63 WRCs to comply with new P permits as part of the WINEP programme for the Environment Agency. Treatment for P typically involves addition of ferric sulphate dosing to precipitate the P and tertiary filtration to remove the resulting solid P particulates but – generally when targeting less stringent permits – it can be feasible to utilise a nature-based solution or biological P removal instead. Due to the nature of our WRCs we generally employ chemical treatment processes to achieve the amount of phosphorus removal required. We are aware that this is not the most sustainable solution and that the increasing demand for more stringent levels of phosphorus removal will exacerbate this further.

In AMP8 and AMP9, we will be upgrading significantly more WRCs to comply with nutrient (phosphorus & nitrogen) permits as part of the WINEP programme. This programme of work forms the single biggest component of our core pathway, not just for wastewater but across all our sub-strategies, with over £1 billion of enhancement investment required.

We have extensive catchment management experience in working with farmers to reduce nitrates coming into our supply sites. During AMP6 (2015-2020) and AMP7 (2020-25), we were industry leading more sustainable options for meeting the outcomes required by an expanding nutrient (particularly phosphorus) removal programme. Measures have included:

- Catchment Permitting: Spreading the risk and avoiding excess asset redundancy by targeting stretch permits across several sites within the same catchment, reducing the overall capex and opex.
- Catchment Nutrient Balancing: Working with farmers to reduce nutrient run-off from agricultural land to off-set that to be removed by asset solutions at WRCs.

- Constructed wetlands: Habitat creation to encourage the natural removal of nutrients, as an alternative to investing at smaller WRCs when combined with flexible permitting.

We are committed where possible to achieving this ambition through greater use of nature-based solutions which are lower cost, lower carbon and more sustainable than alternatives. Both our core pathway and alternative pathways reflect this commitment.

Sewage treatment capacity

Water companies have a duty to expand our sewerage network and WRCs to accommodate development. The main requirement is sewerage network reinforcement to enable specific housing developments to meet the requirements of an increased population in a timely manner, without planning restrictions and without reducing service levels for existing customers. Even under the core pathway, which is based on benign assumptions for demand, there is still significant population growth forecast over the next 25 years. Accordingly, our enhancement expenditure profile includes investment in a rolling programme of work to increase capacity at our WRCs based on risk-based prioritisation as to where capacity increases are needed. This is necessary to comply with our duty and to meet our performance commitment in respect of discharge permit compliance.

Inland bathing waters

As of April 2024, there were 49 designated bathing waters in our region. However, one bathing water is closed indefinitely and one is a private swimming lake. The majority of the remaining 47 bathing waters are classified as excellent or good, based on sample data for the past two years.

In May 2024, the EA designated 3 further bathing waters in our region – at Farleigh Hungerford, Fordingbridge and French Weir Taunton – taking the total effective number of bathing waters to 50. Without intervention, these bathing waters would be classified as poor status. Bathing water quality is influenced by a number of factors including the natural environment, rural and urban activities and the drainage infrastructure in the upstream catchment. The level of influence which these factors have will vary at every location and it is essential to understand these before they can be addressed. For example, urban runoff from roads can contribute hydrocarbons, microplastics and metals; whereas rural runoff can contribute nutrients, pesticides and bacteria and sewerage systems, whether private or public, can also contribute nutrients, bacteria and a range of contaminants influenced by the area and population served. Understanding the relative influence and contributions from these sources means that we can reduce the impact by providing the most appropriate (and sustainable) solutions.

Our core pathway therefore includes enhancement expenditure in AMP8 to undertake enhanced monitoring work, as well as work to make improvements at CSOs and some preparatory design work at treatment works that discharge upstream of these bathing waters. Given the likelihood of further bathing water designations in future, our core pathway also provides for estimated disinfection costs at 2 designated bathing waters per AMP in AMPs 9 -12 – noting that the actual intervention required will depend on analysis undertaken at the time as to what sources are most affecting bathing water quality.

Monitoring work

The Environment Act 2021 sets out ambitious targets for the protection of our rivers, estuaries, and coastal areas. it includes a requirement on water companies to monitor water quality upstream and downstream WRC and storm overflows discharging to watercourses for a range of parameters. The Act requires the installation of continuous water quality monitoring equipment upstream and downstream of all storm overflows and WRCs. There are 1,483 assets in the Wessex Water region that will require continuous water quality monitoring under this legislation by 2035. The enhancement investment necessary to complete this rollout is included in our core pathway.

Summary of core pathway investments

Our key core pathway investments for wastewater treatment are summarised in Table 16 below. These investments are what we consider are required, over and above base expenditure, to achieve our 2050 ambitions under a benign state of the world. They correspond to relevant lines in data table LS4 in our revised PR24 business plan submission.

Table 16 – Core pathway activities and investments for wastewater treatment sub-strategy

Area	Enhancement line	Key activities and investments	Estimated enhancement cost	Lead time and delivery time
Sewage Treatment Capacity (Growth)	LS4.50	Sewage treatment capacity provision to accommodate growth (household, non-household, and trade discharges)	AMP8: £176m AMP9: £112 million AMP10: £172 million AMP11: £186 million AMP12: £174 million	Ongoing programme of work Approximately flat profile across future AMPs with some adjustments based on modelling of forecast growth and resulting profiling of capacity increase requirements
Tightening of Sanitary Parameters	LS4.25	Improved sewage treatment levels to ensure no deterioration and/or improvements to river water quality.	AMP8: £85 million AMP9: £94 million AMPs 10-12: £79 million per AMP	Ongoing programme of work, approximately flat profile across future AMPs. Land, planning and procurement constraints mean major investments may require at least five years to complete
Nutrient Removal	LS4.19-24,27	Nutrient (phosphorus and nitrogen) removal, to meet requirements of Water Framework Directive, Habitats Directive, Levelling-up and Regeneration Act, Environment Act (80% reduction by 2038). Covers all solution types, including site-based solutions (grey chemical/biological and nature based), catchment management measures, site transfers and discharge relocations as appropriate.	AMP8: c.£1.1bn AMP9: c.£500m AMP10-12: c.£25m	Ongoing programme of work – PR29 WINEP to inform PR29/AMP9 delivery. Majority of spend in AMP8 and AMP9 given timing of legislative drivers (Environment Act 2038 targets)

Chemicals and Emerging Contaminants	LS4.17-18 LS4.26	Treatment technologies (and/or source control) as appropriate.	AMP8:£20 million AMP9: £100 million AMPs10-12: c.£80 million per AMP	Ongoing programme of work – AMP8 investigations to feed into PR29 WINEP to inform PR29/AMP9 delivery.
Bathing Water Improvements	LS4.30	Microbiological treatment (e.g. disinfection) at WRCs upstream of existing, recently designated and to-be designated coastal/inland bathing waters.	AMP8: £10 million for preparatory work £142 million per AMP thereafter	Anticipated new designations would align with WINEP/PR timeframes, for investigations and subsequent improvements – assumed 2 per AMP under core pathway. As Wessex Water activities are not the only contributory factors, improvements from other sectors likely required to achieve desired bathing water standards.
Continuous water quality monitoring	LS4.3	Rollout of monitors for monitoring water quality upstream and downstream WRC and storm overflows discharging to watercourses for a range of parameters, in line with 2021 Environment Act 470 monitors will be required in AMP8 and a further 1,406 monitors will be installed in AMP9	AMP8: £61 million AMP9: £204 million	Two-AMP programme of work over AMP8 and AMP9. Profile of expenditure reflects ramp-up of programme between AMP8 and AMP9

Alternative pathways

Scenario considerations

We have assessed how each of our five scenarios may impact on our wastewater treatment sub-strategy. We consider that three scenarios do not pass the materiality threshold for developing an alternative pathway: abstraction reduction (which is primarily related to water supply); landbank availability (which is related to bioresources, increased sludge from WRC growth and phosphorus removal has been considered as part of that sub-strategy); and technology. Under the core pathway, we have not assumed specific technological advances in wastewater treatment beyond those required to achieve BAU efficiency improvements, so a slow technology scenario would not result in material changes to our investment requirements to meet our ambition.

However, we consider that two scenarios are relevant to our ability to meet our SDS ambition for great river and coastal water quality: **high demand;** and **high climate change**. Thes are discussed in more detail below.

Alternative pathway 1: high demand (**LS3g and LS4f**) – enhanced phosphorous and nitrogen removal

Under a high demand scenario, regional population growth would follow the higher local authority forecast. This would result in an additional ~40,000 properties between now and 2050. This would have a variety of impacts on future expenditure on wastewater.

- Firstly, it would increase the quantity of wastewater that needs treating. We have assumed an increase in expenditure on WRC growth of 2.5% from AMP9 onwards, to account for this.
- Secondly, increased population growth may increase the likelihood of housing development close to existing treatment works, which would necessitate additional odour removal required. We have increased expenditure on odour control by 2.5% from AMP10 onwards to account for this.
- Furthermore, we consider higher population growth may also translate into a requirement to achieve more stringent permit limits for phosphorous and nitrogen removal. This is particularly the case in light of nutrient neutrality regulations, which require that housing development to accommodate additional population growth does not lead to a net increase in nutrients in waterways. In practical terms, we have assumed this could lead to a requirement to:
    - Reduce phosphorous levels to the technically achievable limit (0.25mg/l) at all inland WRCs above 1,000 population equivalent; and
    - Reduce nitrogen levels to a new technically achievable limit established after future trials.

The latter impact would require significant additional investment in nutrient removal at more WRCs, over and above that which is forecast under our core pathway to meet current Water Framework Directive (WFD), Habitats Directive (HD) and the Environment Act permit requirements and targets – and by extension, our 2050 performance commitment targets in respect of discharge permit compliance and river water quality.

As explained in Section 3.4, we have forecast two alternative 'branches' to capture this additional investment. One branch (a) assumes that we can only meet tighter phosphorous and nitrogen permits using traditional asset-based (or 'grey') approaches, while the other branch (b) assumes that we can make use of nature-based solutions (e.g. wetlands) to treat nutrients in wastewater. Being allowed to address phosphorus and nitrogen permits through nature-based solutions at a wider catchment scale is something we have been advocating for, both before and during the PR24 process, as a lower-cost and more sustainable solution to achieving these performance targets[13]. We continue to strongly advocate further work to maximise the benefits of these approaches, where they can be shown to work, and we believe that a catchment-based approach including engagement with farmers and landowners should be permitted in the future.

In total, we forecast an additional **£729 million** in expenditure on treatment for phosphorous and nitrogen removal under branch (a), and an additional **£650 million** under branch (b). The difference between these branches reflects the forecast efficiency benefit of using nature-based solutions where feasible. While the difference in expenditure is moderate in the context of overall investment, we consider it is important to reflect as this is a key strategic decision.

Decision points and trigger points

We consider the decision point for moving to this alternative pathway would be sometime during AMP9 i.e. 2032. By this point, we would have a clearer understanding of population growth trends and whether ONS or local authority projections were more accurate. By extension, we would also expect that any tightening of phosphorous and

[13] For AMP8, we proposed a small trial in the Bristol Avon of catchment permitting. In January 2024, we also submitted alternative proposals for delivery of Levelling-up and Regeneration Act (LURA) nutrient reduction requirements in three catchments.

nitrogen permits would be confirmed by the EA as part of the PR34 WINEP, having also considered the outcomes of nitrogen trials to establish new Technically Achievable Limits (TAL).

The trigger point for this adaptive plan would be the start of AMP10 i.e. 2035. This would also allow sufficient time for us to demonstrate the efficacy of catchment-located nature-based solutions as viable for nutrient control, which would determine the specific profile of investment that this alternative pathway would follow. We would then begin constructing solutions to achieve new permit requirements from this point onwards.

The trigger point also reflects that we already have a major programme of nutrient removal spanning over AMP8 and AMP9 and there would be deliverability constraints to further WRC upgrades to meet additional permit limits during this period. As such, there is very limited scope to deviate from our core pathway in advance of the start of AMP10, even if the decision point were to be brought forward for any reason.

Likelihood

We have forecast a likelihood of switching to this alternative pathway from the core pathway of 40% for branch (a) – grey asset solutions – and 30% for branch (b) – nature-based solutions. Overall, we consider there to be a high (70%) likelihood that population growth will result in regulatory changes and therefore us needing to follow this pathway to meet our 2050 ambition (and associated performance commitment targets) for great river health, which reflects that the core pathway is not our most likely scenario, but a low/no-regrets scenario. We have assigned a slightly greater likelihood of using grey asset solutions (branch a), given that branch (b) would be contingent on regulatory support for nature-based solutions.

Alternative pathway 2: high climate change (**LS3e**) - accelerated disinfection for bathing waters

Under a high climate change scenario (RCP8.5 from UKCP18), we can expect to see a much larger increase in global temperatures in the medium to long-term – equivalent to a 4.3°C temp. rise by 2100. While the shorter-term impacts of this are difficult to predict, we expect this would be associated with hotter and drier summers in our region.

This could have a variety of impacts on wastewater expenditure – for instance, an increase on odour and resilience expenditure. Drier summers would also increase the risk of reduced river flow, which could prompt a tightening of discharge permits in a similar way as to high demand discussed above. Drier summers may also lead to the requirement for more internal recirculation of flows within WRCs to maintain sufficient wetting rates of biological processes, leading to higher operating expenditure.

However, we consider the most significant impact under this scenario could be in relation to bathing waters.

- As explained above, there are 50 designated bathing water sites in our region (including three inland bathing waters newly designated in 2024, for which classification data is not yet available). Under our core pathway, we have assumed that an additional 2 bathing water sites per AMP would be designated by the EA. Whilst recognising the many contributory sources and factors affecting water quality, we anticipate that this will drive enhancement expenditure in our core pathway from AMP8 onwards, to provide for improvement treatment – assumed to be ultraviolet disinfection – for upstream WRCs with the most influence.

- If, under the higher climate change scenario, there is a greater public focus on the need for public bathing water amenities during hot and dry summers, we consider that this could lead the EA to increase the number of bathing water designations from AMP10 onwards, to increase choice and availability of safe swimming spaces for the general public.

- We have assumed in our core pathway an additional 2 designations per AMP. For simplicity that, under this scenario, we assume the EA doubles its designations each AMP, such that our region receives an additional 4 bathing water sites per AMP. Additional disinfection work would therefore be needed to ensure all these sites

meet and maintain sufficient / good bathing water status. While this is largely illustrative, we consider these assumptions are consistent with the EA's recent announcement of an additional 3 sites in our region. This sits between our core and alternative pathway assumptions, so suggests that a benign assumption of 2 sites per AMP and an adverse scenario assumption of 4 sites per AMP are both reasonable.

Moving from 2 to 4 further bathing water sites per AMP would roughly double enhancement investment requirements from AMP10 onwards. This is equivalent to an additional £142 million per AMP, or around **£428 million** additional enhancement investment in total under this alternative pathway, over and above the core pathway.

Decision points and trigger points

The decision point would be a new EA notification about additional bathing water designations. We have assumed that a step change in designations – resulting from hotter summers and increasing public demand for these amenities – would come during the middle of AMP9. In practice, this is largely illustrative as the ultimate driver for this scenario is faster climate change, and there is no specific point in time when that scenario materialises.

The trigger point for this alternative pathway would then be the start of AMP10, which is when we would start to make the investments in additional disinfection to improve bathing water status at these new sites.

Likelihood

The likelihood of switching to this alternative pathway from the core pathway would be driven by the likelihood of climate change following the UKCP18 RCP8.5 scenario, and the EA responding to this by increasing its requirements for bathing waters. We have assigned a 10% probability to this scenario occurring.

Summary of pathways

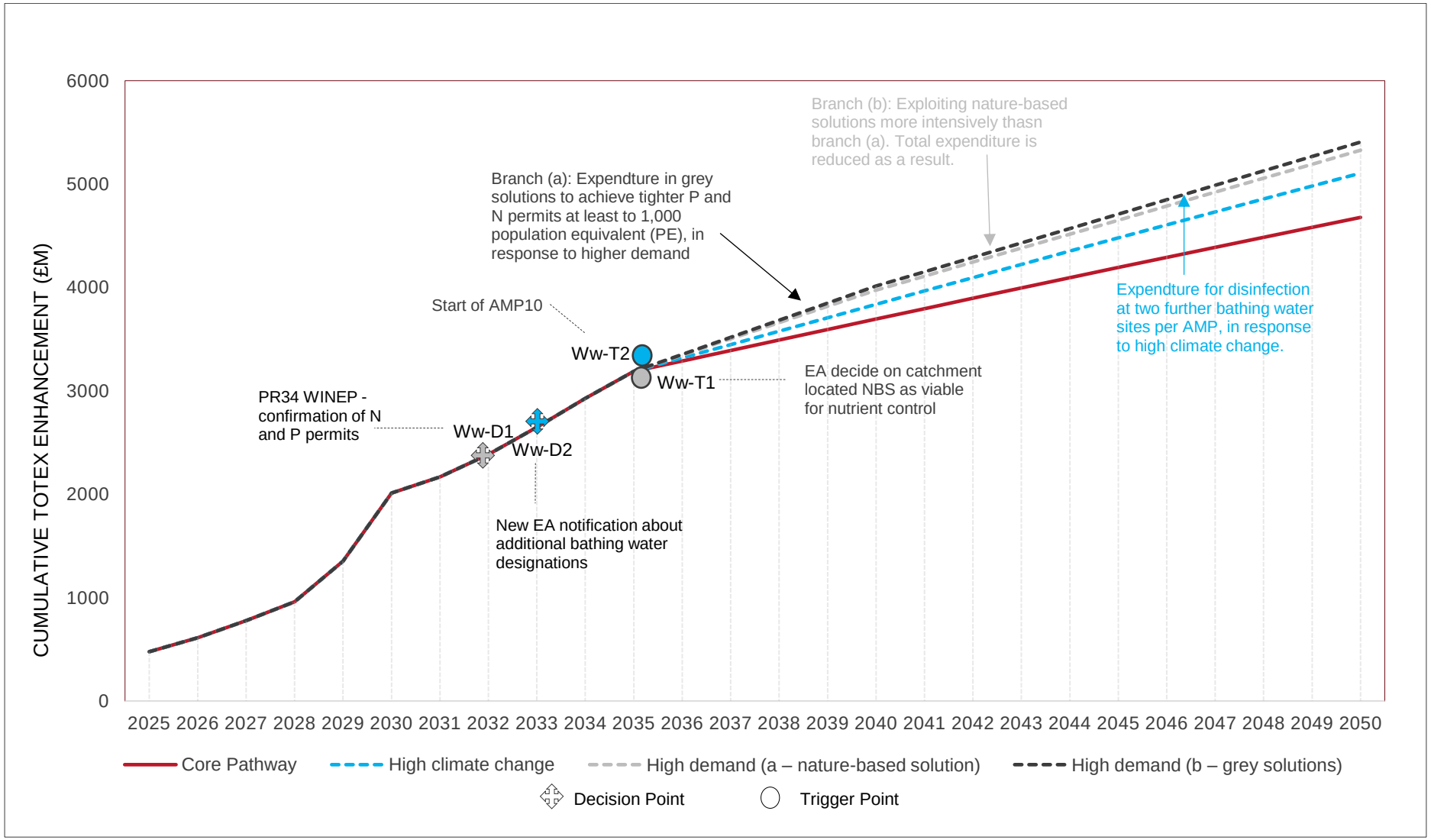
Table 17 summarises key information on our two alternative pathways for enhanced phosphorous / nitrogen removal (high demand scenario) and accelerated disinfection (high climate change scenario).

Table 17 – Wastewater Treatment sub-strategy – summary of alternative pathway information

Pathway	Key investments	Decision Point	Decision Point - description	Trigger Point	Trigger Point - description	Likelihood
High demand	Enhanced phosphorous and nitrogen removal (tighter permits) - grey solutions (branch a)	Ww-D1, 2032	Outcomes of nitrogen trials to establish new TAL. Confirmation of phosphorous and nitrogen permits by the EA as part of the PR34 WINEP	Ww-T1, 2035	Start of AMP10	40%
	Enhanced phosphorous and nitrogen removal (tighter permits) - nature-based solutions (branch b)					30%
High climate change	Accelerated disinfection for bathing waters	Ww-D2, 2033	New EA notification about additional bathing water designation	Ww-T2, 2035	Further bathing beach designations start	10%

Figure 16 below presents the core pathway and alternative pathways for this sub strategy, including the associated decision and trigger points. This shows the magnitude of incremental enhancement spend that we would expect under each of the alternative pathways, to still meet under our ambition under these scenarios.

Figure 16 – Wastewater Treatment Sub-Strategy Core and Alternative Pathways



3.5.5. Bioresources

Introduction and summary of sub-strategy

Sewage treatment processes produce a liquid by-product stream known as sewage sludge that contains the organic and inorganic solid material from sewage. Sewage sludge from WRCs would typically be transported to dedicated sites known as bioresources centres (BCs) for treating the sludge through anaerobic digestion (AD) or lime stabilisation before it is then dewatered and applied on agricultural land as a soil additive. The activities associated with transporting, treating, and recycling sewage sludge to land are known in the industry as bioresources.

Recycling treated sewage sludge (biosolids) to land reduces the need for inorganic fertilisers and enables the return of carbon, organic matter, and beneficial nutrients such as nitrogen and phosphorus to the ground. However, the misapplication of biosolids to land can pollute receiving waters via run-off or nutrient leaching or could contaminate land if heavy metals are present. Biosolids application to land is therefore subject to a code of practice and the national Biosolids Assurance Scheme (BAS), which requires sludge meets prescribed standards before it is applied to land.

The benefits of recycling biosolids to land have led to the decline in sewage sludge disposal via incineration and landfilling. These disposal methods are costly, do not provide much environmental benefit or align with our decarbonisation goals.

Each year all our WRCs produce a total of c.68,000 tonnes dry solids (TDS) of sewage sludge, which is transported as liquid sludge or dewatered cake to our BCs. These plants consist of two advanced AD plants, three conventional AD plants and four lime treatment sites. About 80% of incoming sludge goes to AD and 20% to lime treatment. Our most significant AD operation is at Avonmouth, which treats approximately 50% of all our sewage sludge. Our AD plants produce biogas which is about 60% methane, and this is either combusted to generate heat and electricity required by the digestion process or exported to the grid as biomethane. This biogas represents 28.5 GWh of renewable energy generation each year and contributes significantly towards our decarbonisation efforts.

Our bioresources management operations also include the transport of sewage sludge from WRCs to BCs, and the treated biosolids from BCs to storage barns and land application sites. We reduce the cost of transport and storage by reducing the water content in sludge and biosolids through thickening and dewatering processes. Treated biosolids are recycled to a landbank comprising 60,600 hectares of agricultural land and we achieve 100% compliance with BAS quality certification requirements for storage, transportation, and land application. We have 4 storage barns for storing 50% of our sludge for 6 months a year to mitigate the risk associated with prolonged wet weather in winter periods, when it is not possible or necessary to apply biosolids to land.

There is currently sufficient landbank to allow us to recycle all our biosolids, but we expect future landbank availability to reduce due to changes in the Farming Rules for Water (FRfW) regulation which will restrict biosolids application on land based on nutrient management requirements. Depending on the extent of the changes to FRfW, the reduction in landbank could lead to insufficient landbank to accommodate all our biosolids by 2035.

There is also a concern about the presence of contaminants in sewage sludge such as PFAS, which is a persistent organic pollutant that is not removed in current sludge treatment methods of AD and lime stabilisation. Studies have shown that PFAS levels can only be reduced in sewage sludge through advanced thermal conversion (ATC) processes, such as pyrolysis and gasification. The potential PFAS contamination on agricultural land through biosolids application could lead to public pressure to close the landbank route. In the event of sudden landbank closure, we will be forced to dispose all our biosolids via incineration or landfill, as alternative ATC solutions have not yet been developed for sewage sludge treatment.

Our long-term strategy for delivering efficient and reliable bioresources services to our customers is to provide sufficient resilience in our entire bioresources supply chain to ensure that our sludge can be treated and recycled in

a safe, reliable, and sustainable way – and in compliance with all the relevant regulations. We also aim to maximise the potential of nutrient and energy value in sludge to minimise the cost and carbon footprint of our bioresources.

While we do not have any specific performance commitments related to bioresources, we consider that this sub-strategy area is particularly important to the achievement of our SDS aim of being a net zero carbon business. This is because the efficient disposal of biosolids contributes significantly towards our decarbonisation efforts. Our core and alternative pathways have been developed to ensure that our bioresources services continue to make the required contribution to our net zero carbon ambition.

Summary of core pathway investments

Our core pathway involves treating as much sludge through AD and recycling biosolids to land, which is the most cost-efficient solution for bioresources and provides the best carbon benefits. Our review of alternative solutions concluded that other established disposal routes such as incineration and landfill are costly and do not provide much benefit to the environment, while novel ATC solutions for sewage sludge treatment and disposal have yet to be proven at commercial scale. Therefore, we would want to continue with AD as our main treatment process for as long as possible, until it is no longer viable due to landbank restrictions or closure.

Our key core pathway investments for bioresources are summarised in Table 18 below. These investments are what we consider are required, over and above base expenditure, to achieve our 2050 ambition for net zero carbon under a benign state of the world. They correspond to relevant lines in data table LS4 in our revised PR24 business plan submission.

Table 18 – Core pathway activities and investments for bioresources sub-strategy

Area	Enhancement line	Key activities and investments	Estimated enhancement cost	Lead time and delivery time
Sludge storage - Tanks (pre-thickening, pre-dewatering or untreated)	LS4.43	Additional sludge storage tanks will be required to accommodate increased sludge production (due to population growth and increased P removal) in future AMPs: • 500-700m^3 of storage in AMP9, • 100-200m^3 of storage in AMP10, • 300-500m^3 of storage in AMP11, • 900-1,100m^3 of storage in AMP12.	c.£3.7million across AMP9-12	Ongoing process across all AMPs
Sludge storage - Tanks (thickened/dewatered or treated)	LS4.44	Additional sludge storage tanks will be required to accommodate increased volumes of thickened sludge for AD treatment, and treated sludge for post-digestion storage in future AMPs: • 900-1,100m^3 of storage in AMP9, • 200-400m^3 of storage in AMP10, • 800-1,000m^3 of storage in AMP11, • 2,300-2,500m^3 of storage in AMP12.	£7.0 million across AMP9-12	Ongoing process across all AMPs

Sludge storage - Cake pads / bays /other	LS4.45	We will need to provide additional cake storage in future AMPs to improve the resilience of our biosolids recycling to land operation and comply with FRfW regulation. We forecast that we will need to provide: • 31,300 m^2 additional cake storage area in AMP8, • 18,000m^2 of additional cake storage area in AMP9, • 9,000m^2 of additional cake storage area in each subsequent AMP.	£44.6 million in AMP8 £23 million in AMP9 £14 million in each of AMP10-12	Ongoing process across all AMPs
Sludge treatment - Anaerobic digestion and/or advanced anaerobic digestion	LS4.46	We are not forecasting any enhancements to existing AD plants from AMP8 to AMP12 as any AD capacity expansion would be provided under sludge growth enhancement.	-	-
Sludge treatment – Thickening and/or dewatering	LS4.47	We will likely need to provide enhanced dewatering or thermal drying from AMP9 to AMP12 for reducing the volume of our biosolids to mitigate the risks associated with landbank availability and storage. We will also need to provide additional thickening capacity to manage the increased sludge volumes from AMP8 to AMP12.	c.£48m	Ongoing process across all AMPs
Sludge enhancement (growth)	LS4.53	We are forecasting sludge production to increase around 4,000tds per year at the end of each AMP based on current population growth patterns and P removal requirements. As our core strategy is to maximise sludge treatment through AD, we will be providing the additional capacity through 2 new digesters in AMP8, an AAD plant in AMP10 and another AAD plant in AMP12. As part of this strategy, we will review opportunities for centralising our treatment and conversion of existing AD capacity to AAD (i.e., rationalisation).	AMP8: £21m AMP9: £41m AMP10: £31m AMP11: £41m AMP12: £50m	Ongoing process to deliver additional capacity in AMP8, AMP10 and AMP12

Alternative pathways

Scenario considerations

We have assessed how each of our five scenarios may impact on our bioresources sub-strategy. We consider that three scenarios do not pass the materiality threshold for developing an alternative pathway: abstraction reduction; climate change; and demand. Abstraction reduction is primarily related to water supply, while the other two common reference scenarios could affect our bioresources strategy but primarily through their impact on landbank accessibility / utilisation. These impacts overlap with the locally-specific scenario that we have included in our LTDS, and which is particularly relevant to our ability to meet our SDS ambition for net zero carbon: **landbank availability.** The relevance of this scenario is explained in more detail in Section 3.3.

We have therefore focused on an alternative pathway for our bioresources sub-strategy under a scenario of reduced landbank availability. However, within this, we have also considered explicitly the impact of **technology** on this profile. This is because we consider there is a specific dependency between these scenarios that could materially affect our bioresources strategy, and that should be captured in our LTDS. This is explained in more detail below.

Alternative pathway 1: reduced landbank availability (**LS4h / LS4i**) – increased use of ATC / incineration

As explained in Section 3.3, we consider there is a credible future scenario where landbank availability reduces to 50% by 2035 and to 0% by 2050. In this scenario, we would need to consider alternative solutions to biosolids disposal with additional investment needs.

As explained in Section 3.4, and above, we have forecast two alternative ‘branches’ to capture this additional investment. One branch (a) assumes that ATC technology will be available as a solution to the issues, while the other branch (b) assumes we would need to rely on incineration.

ATC technology is still developing unlike AD, which is tried and tested. The benefit of an ATC process is that it converts sludge into biochar, ash or other materials that have potential uses outside of agriculture, and therefore removes the sole reliance on the agricultural route for disposal. The water sector will need to collaborate on ATC technology trials in AMP8 to enable viable ATC solutions to be developed. Irrespective of the outcome of the trials, the landbank will need to be retained.

If landbank availability does reduce, the only options available would be either ATC (if viable) or incineration.

- If we can implement ATC to replace our existing digestion process to achieve 50% ATC treatment by 2035 and 100% ATC treatment by 2050, we can reduce the amount of biosolids going to the land by 50%, meaning existing landbank capacity would be sufficient until c. 2035, and sludge treatment operations would be more resilient in the meantime. We forecast this would cost an additional **£274 million** from AMP9, offset by a reduction of around £66 million in sludge storage compared to the core pathway due to the reduction in biosolids from the use of ATC.

- The other solution to reduced landbank availability is incineration. While incineration is an established technology, it is expensive to deploy, difficult to secure planning permission (due to community concerns about smoke and odour nuisance) and not aligned with our carbon or net zero goals. Disposal by incineration will also increase sludge transportation costs, as sludge from all water recycling centres will need to be transferred to regional incinerator sites (because incineration relies on large economies of scale to be viable).

  As large-scale incineration is not a favoured strategy internally within Wessex Water as well as within the wider industry, we are considering incineration as a last resort option. We forecast the investment required to build new incineration capacity for all our sludge (including future growth until AMP12) would cost an additional **£816 million** between AMP9 and AMP10, again offset by £66 million in avoided sludge storage costs. There would

not be any capital investment required for additional incineration capacity in AMP11 and AMP12 as the incineration capacity provided in AMP9 and AMP10 would then be sufficient for future AMPs.

Decision points and trigger points

There is a collaborative approach within the water sector to implementing short-term measures to maintain stakeholder confidence in biosolids recycling to land, to limit the shrinking of landbank availability in the short term and keep this outlet viable throughout AMP8. For the purposes of this pathway, we have assumed that landbank availability reduces to 50% by 2035 and to 0% by 2050, likely driven by a combination of:

- A significant drop in farmer acceptance for biosolids, which would signal reduction in landbank availability beyond 50%; and
- Public pressure to limit or stop biosolids recycling to land due to the presence of contaminants in sewage sludge, which will result in rapid closure of the landbank.

While the timing of these factors is uncertain, we anticipate having a much clearer understanding of them, and therefore the prospect of future landbank constraints, when preparing our next business plan. We also expect to have a clearer understanding of ATC viability by then, based on the outcome of industry trials. We therefore consider that the decision point for this alternative pathway would be mid-way through AMP8, i.e. 2028. If these factors materialise during AMP8, we will need to plan for diversification of sludge outputs in PR29 to unlock alternative disposal outlets by 2035 (recognising the lead times involved in switching solutions away from AD). If viable ATC solutions are ready by PR29, we would plan for ATC to be implemented in AMP9 to replace the existing AD process in phases. If ATC is not ready by PR29, we will need to plan for incineration instead.

The trigger point for this alternative pathway would then be the start of AMP9, which is when we would start to make the investments either in ATC or incineration at relevant bioresources sites.

Likelihood

The likelihood of switching to this alternative pathway from the core pathway depends on the likelihood of landbank availability being reduced in future. Given the current regulatory environment, and the outputs of the Grieve Strategic & ADAS study, we have assigned a 75% likelihood to this scenario. We have also assigned a 33% likelihood of ATC incineration technologies being ready for use by 2028. Together, this means that there would be a 50% change of switching to alternative pathway branch (b), and a 25% likelihood of branch (a).

Summary of pathways

Table 19 summarises key information on our two alternative pathways phased ATC implementation and phased incineration (both reduced landbank availability scenario).

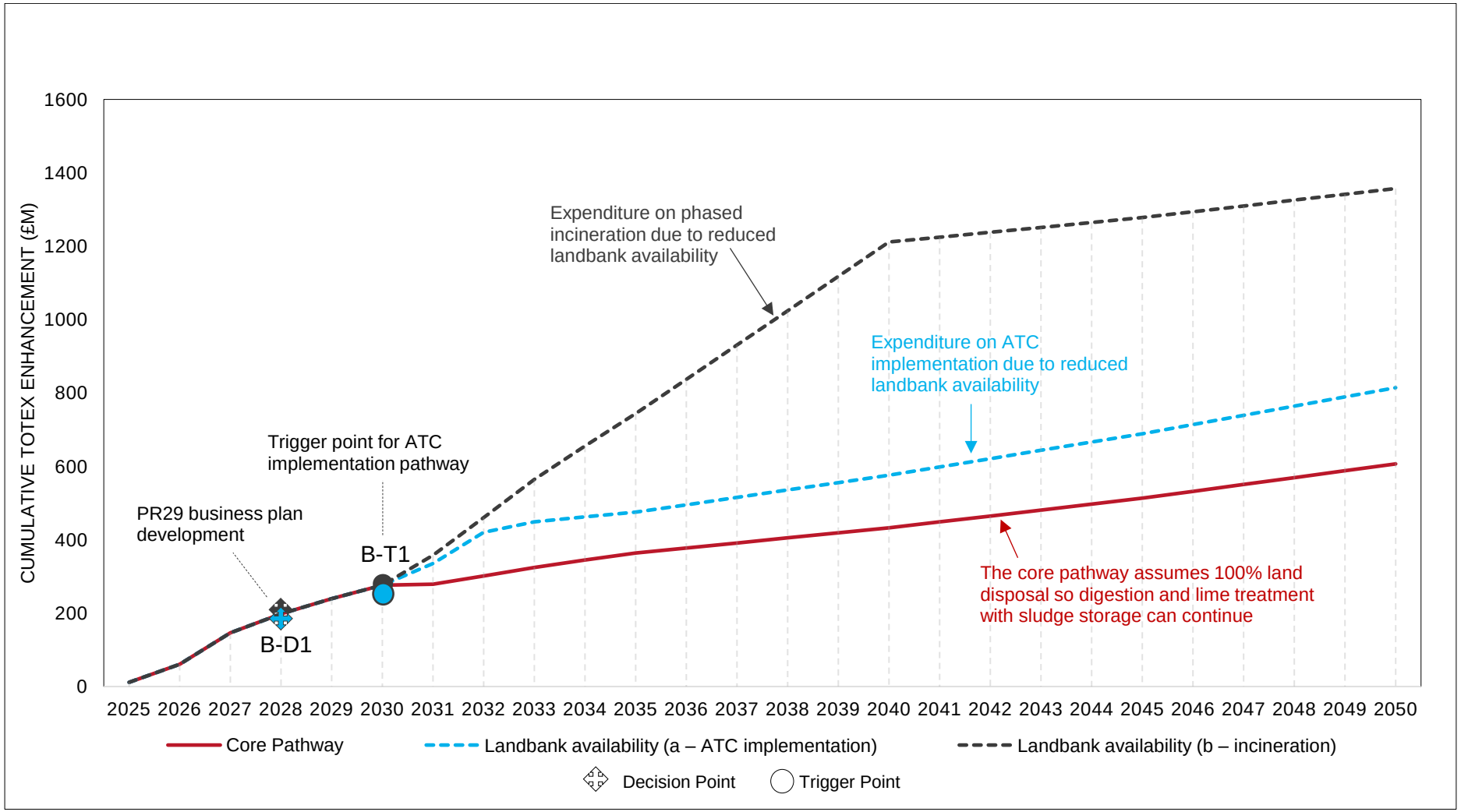
Table 19 – Bioresources sub-strategy – summary of alternative pathway information

Pathway	Key investments	Decision Point	Decision Point - description	Trigger Point	Trigger Point - description	Likelihood
High landbank availability	ATC implementation to replace digestion (branch a)	B-D1, 2028	PR29 business plan – informed by:	B-T1, 2030	Start of AMP9	25%

	Phased incineration of sludge for disposal (branch b)		Clarity on future landbank availability Outcome of ATC viability trials			50%

Figure 17 below presents the core pathway and alternative pathways for this sub strategy, including the associated and decision and trigger points. This shows the magnitude of incremental enhancement spend that we would expect under each of the alternative pathways, to still meet under our ambition under these scenarios.

Figure 17 – Bioresources Sub-Strategy Core and Alternative Pathways



3.5.6. Greenhouse Gas Emissions

Introduction and summary of sub-strategy

The world faces a climate emergency that we must address in two ways. Firstly, we must decarbonise all aspects of human activity, to reduce the risk of dangerous climate change. Secondly, we need to adapt to the effects of climate change: in our case, drier summers; wetter winters; and more frequent extreme weather events.

We must collectively adapt to these future impacts and reduce our greenhouse gas emissions. The UK Government aims to achieve net zero carbon emissions by 2050 and, as part of the 2008 Climate Change Act, has legally binding carbon budgets, placing a restriction on the amount of greenhouse gases the UK can emit over five-year periods. To achieve net zero in a phased manner by 2050, the UK government has agreed to a series of interim targets, notably an overall 78% cut in UK emissions (from 1990 levels) by 2035.

In this context, we have a clear and stretching set of ambitions for greenhouse gas emissions.

- By 2030, we aim to achieve net zero operational carbon emissions. These are our annual emissions linked to our energy use and transport, plus other greenhouse gases that are emitted from sewage and sludge treatment processes. Our PR24 plan achieves these ambitions – albeit with the use of carbon offsetting - and are detailed in WSX23 - Our route to net zero. We have set out performance commitment trajectories for operational greenhouse gas emissions in Chapter 2 that are consistent with these aims and with longer-term government targets for 2035 and 2050. Our strategy to achieve these targets is discussed in the rest of this section.

- Beyond 2030, we also aim to achieve net zero total carbon emissions by 2040 at the latest. This includes our operational emissions outlined above, plus embodied emissions linked to construction materials, and consumables such as treatment chemicals. These activities are not explicitly captured in our LTDS core and alternative pathways, for the reasons discussed in Chapter 2, but further discussion of this aspect is included below.

Our current position

In 2022-23 our net emissions were 104 kilotonnes carbon dioxide equivalent. Around 65% of this is related to energy use, 25% from sewage and sludge process emissions and 10% from transport. We have a long track record of carbon management work through a wide range of activities.

Future operational emissions

Various trends, and emerging knowledge and technology, are influencing likely future operational greenhouse gas emissions. These can be characterised as a series of upward pressures (headwinds), acting at the same time as opportunities and wider shifts towards a lower carbon economy (tailwinds).

- Headwinds: recalibration of nitrous oxide and possibly methane emissions; accounting additions: chemicals; sludge to land; fossil-fuel extraction and production (as well as distribution).

- Tailwinds: rapid decarbonisation of grid electricity, and gradual decarbonisation of fuels and transport.

Against this context, we have set out below a summary of the key operational greenhouse gas reduction investments and activities to fully deliver on our long-term ambition to achieve net zero. We note the following:

- Our **water supply emissions** are dominated by a) electricity use which will be decarbonised by 2035 in Ofwat's common reference scenario for technology, and b) fleet transport (predominantly vans) which are expected to decarbonise by 2030 in Ofwat's benign technology scenario. We have therefore assumed limited investment is

needed to achieve our net zero ambitions for water (primarily related to a share of the required investments in electric vehicle charging infrastructure to facilitate this).

- Consequently, our principal focus is on enhancement investment related to **wastewater emissions** – especially (but not exclusively) nitrous oxide emitted at water recycling centres. As energy and transport decarbonise, there would be steady residual nitrous oxide emissions in the absence of investment, given the current lack of fiscal, regulatory or commercial drivers. Methane emissions are also important, but we anticipate them being addressed through the bioresources programme (enhancement) and leak detection and repair (maintenance).

We also note that a large component of our operational net zero carbon route map is based on a 'natural' reduction in emissions from other areas of our business planning, for instance; reducing water use and leakage; and promoting nature-based solutions that avoid energy use. There is also a major overlap with our bioresources sub-strategy, as set out in Section 3.5.5 above. For the purposes of our LTDS, our core and alternative pathways for this sub-strategy capture specific investments – *outside of other sub-strategies* – that are intended to reduce our operational GHG emissions. However, we recognise that our long-term ambition also relies on the successful delivery of those sub-strategies, particularly bioresources.

Other items affecting operational emissions, but outside the core and alternative pathways for investment, include:

- Retention of biomethane certificates. Currently we sell these certificates. Retaining them would offer a large contribution to our emissions reduction efforts, and would be needed to reach net zero wastewater emissions in 2050 given the forecast residual wastewater process emissions (see Figure 18)

- Less certain or more marginal technologies e.g. sewer heat recovery; ammonia recovery and reuse as a hydrogen carrier. We include a profile of potential technologies of this sort in WSX23.

As explained above, our core pathway is based on a fast or 'benign' technology scenario – with our alternative pathway capturing the investment profile if technology was to develop more slowly than expected. In parallel with our LTDS, we are continually assessing the maturity and availability of new technologies to support decarbonisation, and we will take part in trials where appropriate. This will be critical as reductions in background emissions using the most readily-available options are unlikely to be sufficient to achieve our goal of net zero carbon, and we will need to pursue more innovative options involving emerging science and technology.

Embodied emissions

We have also explained that our LTDS focuses on operational net zero rather than full net zero. However, going forward, we plan to develop a whole-life 'total carbon' approach, rather than treat operational emissions and embodied carbon in the materials and products we use as separate issues. This will include building whole-life carbon into our decision-making processes[14], to enable our transition into a truly low carbon business. We note the CRS assumptions that in the faster technology scenario the whole-life financial cost of low-carbon construction materials equals that of conventional building materials by 2035; and in the slower technology scenario, conventional building materials remain cheaper than low-carbon construction materials through to 2050. We will also be working on further improving our capital carbon quantification and management during AMP8 and will continue develop our work in this area during the 2030s and 2040s.

[14] Specifically, by including it in our Service Measure Framework, which is a systematic service risk- and value-based investment framework that enables a consistent approach across the business for how we plan, manage and make-decisions on our investments. Further details of this is set out in Section 4.1.

Summary of core pathway investments

Our key core pathway investments for operational greenhouse gas emissions are summarised in Table 20 below. Our AMP8 investments are set out in our PR24 plan, and detail what we intend to do over the next five years to achieve net zero operational carbon emissions with the use of offsets. The investments from AMP9-AMP12 capture what is required for operational emissions, over and above base expenditure, to achieve the Government's 2035 interim target (a 78% cut in emissions compared to 1990 levels) and 2050 ambition for net zero, under a benign state of the world. They correspond to relevant lines in data table LS4 in our revised PR24 business plan submission.

As explained above, the vast majority of this enhancement expenditure is related to nitrous oxide emissions on our wastewater network.

We note that these investments are forecast to deliver around a 70% reduction in operational emissions by 2035 (to c.58,000 tonnes, compared with an estimated 186,000 tonnes in 1990). While this is not strictly equal to the government's 78% interim target by 2035, we consider it substantively similar as there is significant uncertainty over our 1990 emissions levels, so there is a reasonably wide margin of error in deriving a profile to meet this interim target. Furthermore, these investments are forecast to achieve the long-term target of eliminating all operational emissions (without any offsetting) by 2050.

Table 20 – Core pathway activities and investments for greenhouse gas emissions sub-strategy

Area	Enhancement line	Key activities and investments	Estimated enhancement cost	Lead time and delivery time
Wastewater	LS4.58	Nitrous oxide emissions: • Earlier investment (from 2025 onwards) involves investment in nitrous oxide monitoring and data analysis as a way of optimising treatment processes to reduce emissions, starting at larger sites with aeration. • Later investment in physical coverage of aeration tanks, and potential breakdown of nitrous oxide into nitrogen and oxygen.	£2.2 million in AMP8 £1.2 million in AMP9 £90 million in AMP 10 / 11 /12	Monitoring & optimisation: ongoing from 2025-50 Capture / breakdown: from 2035-40 onwards, following evidence of trials elsewhere during 2025-2030
Effluent heat recovery	LS4.58	Investment at Avonmouth: reduces natural gas consumption by CHP engines, thereby generating opex savings.	AMP8: £3.7 million (capex investment)	2025-30
Transport	LS3.39 LS4.58	Electric vehicle charging infrastructure: water and wastewater sites	AMP8: £6.1 million	2025-30

We also considered the inclusion of (theoretical) wind turbine development within the enhancement core pathway after 2030, but we did not include this in our final analysis. If grid electricity were to be fully zero carbon by 2035, the CO2 savings would only derive from electricity generated before that date. Generation and development after 2035 would be based solely on their economic case.

Alternative pathways

Scenario considerations

We have assessed how each of our five scenarios may impact on our greenhouse gas emissions sub-strategy. This sub-strategy is slightly different to others in that, while the other sub-strategies are relatively self-contained, there are greater linkages between the impacts of a given scenario on this sub-strategy and other sub-strategies. For instance, the impact of a more adverse scenario on our sewerage and wastewater treatment strategy may lead to additional investment which would itself increase our emissions and / or carbon footprint, and could therefore indirectly affect our greenhouse gas emissions strategy.

However, in order that our LTDS focuses on the most significant impacts of different future states of the world, we have considered here the direct impacts of each scenario on greenhouse gas emissions and our ability to meet our 2030 operational net zero ambition. We recognise that in practice this may understate the impact of some scenarios on this sub-strategy, but we consider this to be a reasonable simplifying assumption.

Based on that approach, we consider that four scenarios either do not pass the materiality threshold for developing an alternative pathway or are captured elsewhere in our LTDS.

- High abstraction reduction requirements: We believe the greenhouse gas emissions implications of higher abstraction reduction requirements would be relatively small. It may require more pumping of water over longer distances via our integrated grid, to manage regional water supply issues, but this would be mitigated by the decarbonisation of electricity supply by 2035. There would be some impacts of the investments in enhanced nitrates and PFAS removal (captured in the water supply and treatment alternative pathway), particularly if GAC is used, but as explained above we have not explicitly considered these second-order impacts as the primary impact is captured in the relevant sub-strategy.

- High demand: Population growth and consequent demand for water and wastewater services would act as upward pressure on our greenhouse gas emissions (increased treatment and pumping energy consumption; greater biological load at water recycling centres; greater use of treatment chemicals; higher sludge volumes; and expansion of infrastructure to provide capacity, increasing our embodied carbon footprint. However, these effects are likely to be gradual, and outpaced by the rate of decarbonisation in energy and transport.

- High climate change: The main impacts of this scenario on our operational GHG reduction strategy would be:
    - Fuels: We may potentially need to use standby generators more in response to extreme weather events that impact energy infrastructure or affect the capacity of our assets. However, if low carbon methods become more available over time the impact on emissions would be low.
    - Transport: It is conceivable that there would be more non-routine journeys linked to adverse weather, but the total impact on emissions would be low, especially as the vehicle fleet decarbonises over time.
    - Energy use and generation: Heatwaves, dry conditions and prolonged wet weather all have an upward impact on pumping energy i.e. to meet peak water demand and convey storm water. Prolonged wet weather could also lead to more storm overflow operation. However, as explained above, we have not explicitly considered these second-order impacts.

- Reduced landbank availability: This will affect our net zero ambitions through the impact on our bioresources strategy and how we dispose of biosolids. As the most direct impacts are captured in our bioresources sub-strategy and alternative pathways, we have not considered any second-order impacts here.

However, we consider that one scenario is directly relevant to our ability to meet our SDS ambition for net zero carbon: **technology.** This is discussed in more detail below.

Alternative pathway 1: slow technology (**LS3d**) - slower fugitive emissions capture

The key areas in which operational emissions are present are as follows:

- Process emissions: novel technology is needed firstly for quantification of a) nitrous oxide formation in sewage treatment, and b) methane leaks and off-gassing from sewage and sludge treatment assets. These are relatively new, but Prototype systems are being trialled at present, and the period from 2025-35 will provide evidence of their efficacy for different process types and in different operating conditions. In turn, this will lead to a range of interventions, ranging from optimisation of aeration processes to reduce nitrous oxide spikes; repair of leaking assets; to coverage of treatment tanks. The largest capital investment decisions will relate to the latter; for example, the installation of systems for covering treatment tanks and converting nitrous oxide to nitrogen and oxygen, an early version of which (Actilayer) is being tested by Severn Trent at Strongford WRC.

- Transport: decarbonisation requires the shift from petrol and diesel to low carbon alternatives including electricity, biofuels and green hydrogen (or hydrogen carriers). We need to be able to source vehicles with these propulsion systems that can operate to the same or similar levels as petrol and diesel vehicles, e.g. carrying or towing heavy loads across all types of topography. We also need the right recharging and refuelling infrastructure.

- Energy: decarbonisation of energy will include a shift to low / zero carbon electricity, either from the national grid or our own generation; low carbon alternatives to diesel for standby power generation (and potentially storage); and alternatives to natural gas for heating and combined heat and power engines

Under an alternative pathway in which technology develops more slowly, we have considered the key differences relative to the core pathway (as set out in Table 6) that would affect our ability to decarbonise our operational emissions. We consider there are two such differences.

1. Low-emission HGVs available, and small to medium vehicles decarbonised, by 2040 rather than 2030

The availability of low emission HGVs and other vehicles would have an impact on the mix of our fleet during the 2030s, and we would expect more prolonged use of diesel and petrol fleet during the 2030s under the slow technology scenario as full transition to electric / low emissions vehicles is deferred to later in this period. Our transport costs are generally funded from base expenditure, and we have only forecast some transport-related enhancement expenditure during AMP8 to invest in charging infrastructure. Under this pathway, we would therefore expect a slower reduction in operational GHG emissions from base expenditure as emissions from diesel and petrol vehicles persist throughout the next decade.

In principle, in order to achieve the same reduction in emissions by 2035 as under our core pathway, we would need to invest in additional GHG reduction activities particularly over AMP9. However, transport emissions comprise less than 10% of our total operational GHG emissions (of which HGVs only account for around 30-40%), so the more prolonged transition to lower emissions vehicles under this pathway would not in practice have a major impact on overall emissions. Given there is significant uncertainty around the precise level of emissions needed to align with the Government's 2035 target, as explained above, we have not included additional enhancement investment to offset the small change in performance from base expenditure (i.e. the slower reduction in vehicle emissions) under this pathway. Importantly, this would not affect our ability to meet the Government's operational target for 2050 as low-emission vehicles would still be available by 2040 even under this slow technology scenario.

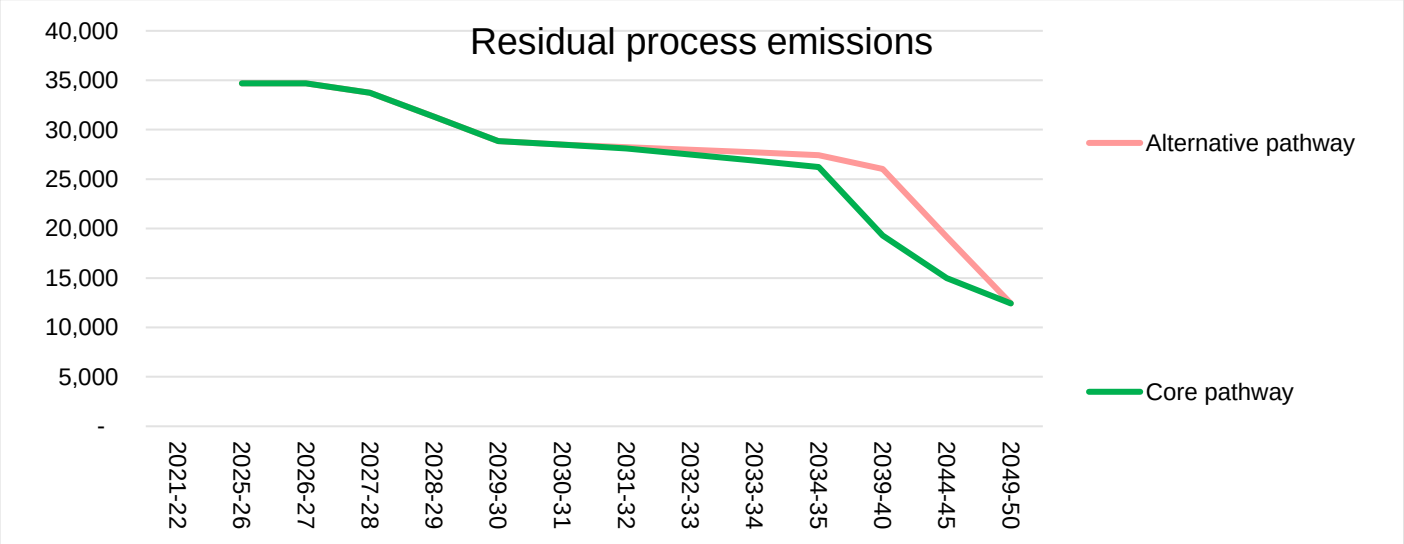
Overall, therefore, while this assumption is relevant to our GHG sub-strategy, it does not materially affect our alternative pathway for GHG emissions reduction.

2. Nitrous oxide prevention / conversion fully demonstrated and deployable from 2040

The lack of availability of nitrous oxide prevention / conversion technologies does affect our operational GHG reduction pathway. This would not affect our ability to meet the Government's interim target of a 78% reduction in emissions, as we have only assumed this will be deployed from 2035 onwards (assuming it is successfully demonstrated between now and the decision point in 2033 when technologies for PR34 are being appraised. However, it is an important element in our strategy to reduce emissions further to zero by 2050. Delayed availability would therefore make it harder to reduce residual operational emissions from 2035 onwards.

In these circumstances, we would not in practice expect to target the same reduction profile of operational emissions as we consider there are limited alternative technologies available under this scenario to achieve such a reduction. We would instead make the same enhancement investments in nitrous oxide prevention / conversion technology as in the core pathway, but only when the necessary technology is fully deployable at a later stage (i.e. 2040 rather than 2035, as per Table 6). This means that our total enhancement investment in operational GHG reduction would not be any different under the alternative pathway than the core pathway. However, the profile of enhancement investment would change. This is reflected in Figure 18 below, which shows that our residual process emissions would decline at a slower rate particularly after 2035 as nitrous oxide prevention / conversion technologies cannot be deployed to contribute to this. However, after 2040, we would expect to deploy this more intensively to achieve the same level of residual process emissions reduction as under the core pathway and therefore still achieve zero operational emissions by 2050.

Figure 18 – Residual process emissions under core and alternative pathways



The delayed profile of enhancement investment, shown in Figure 19 below, mirrors the decline in process emissions as expenditure on these technologies would be deferred from AMP10 until AMP11 and AMP12.

Decision points and trigger points

We consider the decision point for this pathway would occur midway during AMP9 in the preparation of the PR34 business plan, based on the demonstrated success during trials conducted between now and 2030. At that point, we would know whether it would be efficient to include enhancement spend on nitrous oxide prevention / conversion technologies in our AMP10 plan.

The trigger point would be the start of AMP10, reflecting whether this investment commenced in AMP10 (*as per* the core pathway) or in AMP11 *as per* the alternative pathway.

Likelihood

The likelihood of switching to this alternative pathway from the core pathway depends on the likelihood that fugitive emissions capture technology will have been proven in the next five to seven years, i.e. by the early 2030s. We have assigned a **50%** probability to the likelihood of that scenario.

Summary of pathways

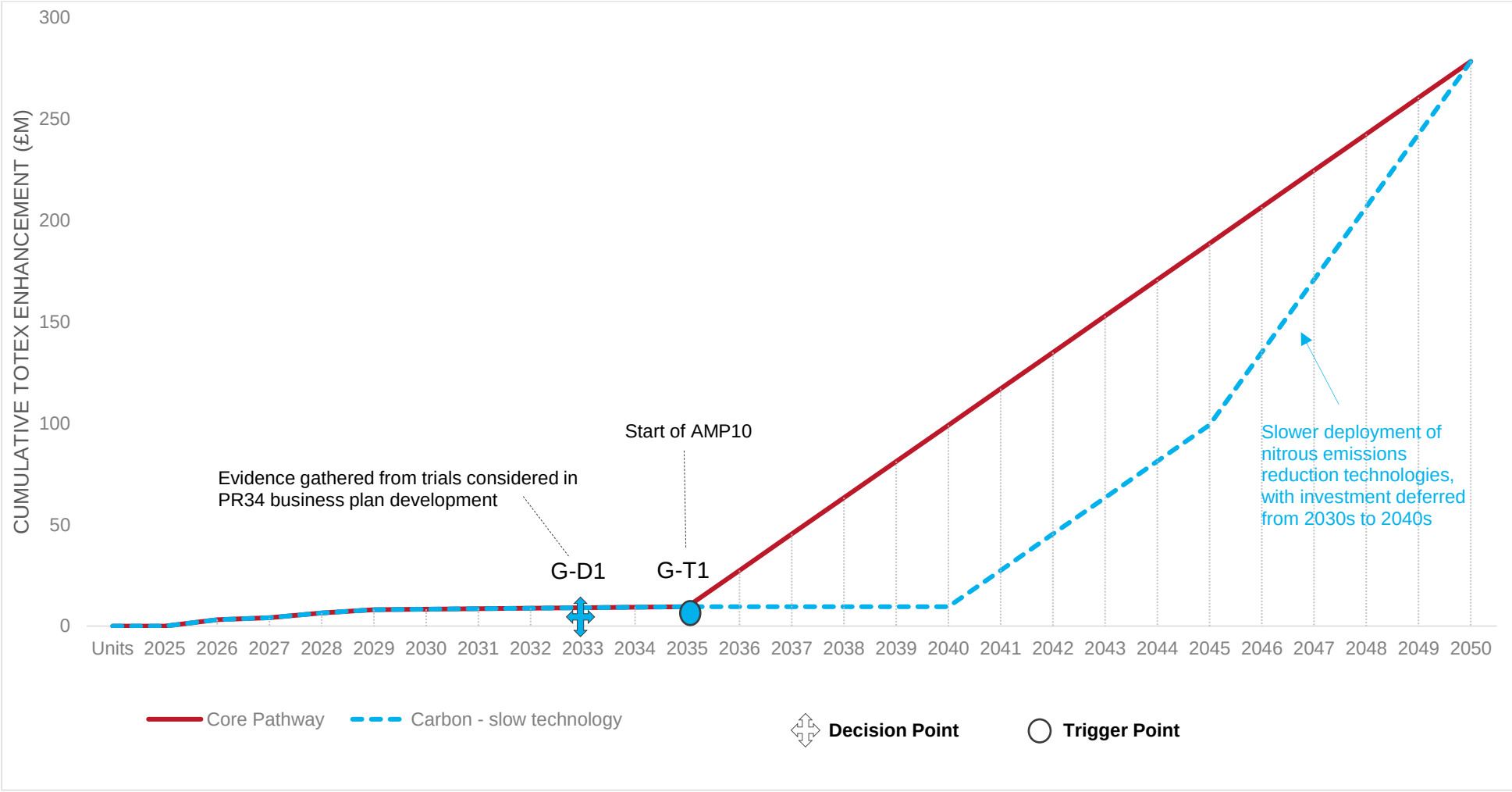
Table 21 summarises key information on our alternative pathway representing fugitive carbon emissions capture (slow technology scenario).

Table 21 – Greenhous gas emissions sub-strategy – summary of alternative pathway information

Pathway	Key investments	Decision Point	Decision Point - description	Trigger Point	Trigger Point - description	Likelihood
Slow technology	Fugitive carbon emissions capture	G-D1, 2033	Evidence gathered from trials considered in PR34 preparation	G-T1, 2035	Start of AMP10	50%

Figure 19 below presents the core pathway and alternative pathways for this sub strategy, including the associated and decision and trigger points. This shows the magnitude of incremental enhancement spend that we would expect under each of the alternative pathways, to still meet under our ambition under these scenarios.

Figure 19 – Greenhouse Gas Emissions Sub-Strategy Core and Alternative Pathways



3.5.7. Other investment areas

As shown in Figure 9, the investments under the six sub-strategies covered above comprise the vast majority of the forecast enhancement investment under our core pathway, to achieve our SDS aims. Furthermore, we consider that our five scenarios are most likely to affect investment needs – and therefore the need for alternative pathways – in these areas. As such, our LTDS is focused around these six sub-strategies.

However, there are other investment areas that do not fall into one of these six sub-strategy areas, but for which we do expect to require enhancement schemes to meet our overall SDS ambitions. Together, these areas comprise around £700 million in enhancement spend across the 25-year period (an average of £141 million per AMP).

We discuss in this section the high-level assumptions that we have used to derive our core pathway investments for three of the most important of these other areas: **biodiversity, resilience / SEMD; and investigations**. We have not explicitly considered alternative pathways for these areas, for the reasons set out above, but they are nevertheless an important part of our core pathway and our overall strategy to achieve our 2050 ambition (particularly biodiversity, which is one of our eight SDS outcome areas).

We also discuss our long-term strategy in respect of **retail** – though we have not forecast any enhancement investment to support this as we consider that the improvements needed to meet our 2050 ambition can be funded from base expenditure.

Biodiversity

The Wessex Water estate amounts to slightly fewer than 3,000ha, including 2,158 company-owned sites, many of which support an operational function such as supply-side water treatment centres and reservoirs, waste-side water recycling centres. The Wessex Water landholding also includes undeveloped land adjacent to or separate from existing sites which provide capacity for future operational growth, plus source protection land and sites under long-term leases to individuals or organisations.

We are also the stewards of 293 hectares of land designated as a Site of Special Scientific Interest (SSSI). This protection recognises that these habitats are the most important areas for wildlife in England. Wessex Water are committed to managing SSSIs to ensure they can meet and maintain favourable condition.

Our land varies considerably in quality (biodiversity value) and use, from ‘typical’ half hectare sized water recycling centres that are busy, intensively managed operational sites to several hectares of farmland, often managed with low inputs to protect water sources. Much of this land, especially land set aside and protected for water supply, is of conservation value or has the capacity to be of value for wildlife.

<u>Our ambition</u>

Wessex Water has a duty to enhance and protect biodiversity as laid down in legislation such as the *Water Industry Act 1991, the Environment Act 1995, and Natural Environment and Rural Communities Act 2000 (as amended by the Environment Act 2021), and the* Water Industry Code of Practice for Conservation, Access and Recreation.

In addition to the enhanced biodiversity duty, the *Environment Act 2021*, sets out that Wessex Water must:

- achieve the statutory minimum level of biodiversity net gain for all schemes subject to planning permission. (Wessex Water will go further than this and ensure that all development schemes, irrespective of whether they require planning permission, will achieve no net loss of biodiversity and from 2025, achieve a net overall gain).

- contribute to achieving the environmental targets set out under the Act, including:

- halting the decline in species abundance by 2030
- increasing species abundance by at least 10% by 2042, compared to 2030 levels.
- improving the GB Red List Index for species extinction risk by 2042 compared to 2022 levels.
- creating or restoring in excess of 500,000 hectares of a range of wildlife-rich habitats outside protected sites by 2042, compared to 2022 levels.
- 70% of the designated features in the Marine Protected Area network to be in favourable condition by 2042, with the remainder in recovering condition

Wessex Water are committed to complying with all biodiversity-related legislation – and going beyond this. As set out in Chapter 2, one of our eight SDS aims is to double our contribution to our region's biodiversity by 2050. This translates into improving or creating habitat on our landholding which will achieve a minimum uplift of 2,000BU (at target condition) by 2050.

Our Biodiversity Action Plan, published since our SDS, builds on this and sets out a plan to improve or create habitat on our landholding which will achieve a minimum of 5,000 biodiversity units by 2050. Our performance commitment profile through to 2050 is consistent with this ambition[15].

Furthermore, our broader commitments to no net loss and overall biodiversity net gain (from AMP8) go beyond current government requirements and demonstrate our commitment to enhancing biodiversity. We believe this places us in a strong position to be one of the industry leading water companies for biodiversity.

How we will achieve this

Our key core pathway investments for biodiversity are summarised below. These investments are what we consider are required, over and above base expenditure, to achieve our 2050 ambitions in respect of biodiversity. These fall into two main categories:

- Increased tree planting: Wessex Water is delivering a tree planting programme to increase trees and woodland across our region to support biodiversity and deliver wider benefits while contributing to national targets. 60,000 trees have been planted over AMP7 (to date) both on and off the Wessex Water landholding, with a tree planting target of 729,835 by the end of AMP8.

- Managing Wessex Water landholdings: This covers activities such as:
  - prioritising land appropriate for habitat enhancement and delivering management where practicable.
  - identifying land appropriate for enhanced habitat creation and delivering habitat creation.
  - establishing appropriate process for measuring and 'accounting' the biodiversity value of our land.
  - delivering a step change in management of SSSIs to ensure management actions are appropriate for delivering favourable condition.

The costs of these activities are captured in relevant lines in data tables LS3 and LS4 in our PR24 business plan submission (reflecting their relation to both water and wastewater). Together, they comprise around £20 million over AMP8-AMP12.

[15] As explained in Chapter 2, the definition of Ofwat's performance commitment for biodiversity is related to an increase in BUs *on nominated land.* The activities that form our biodiversity strategy, to create an additional 5,000 biodiversity units, go beyond this. They also meet wider stakeholder expectations, in accordance with the performance commitment definition, to show that our wider landholding is not declining - i.e. that our conservation activities go beyond the nominated land.

The proposed enhanced management for biodiversity will be initiated from 2025, with preparatory work starting in 2024. The opportunity for future biodiversity enhancement is likely to decrease over time as the most practicable (largest, most straight-forward) sites are enhanced. Consequently, diminishing returns mean that future costs to deliver the same BU gain will increase over time. However, we have not explicitly accounted for this in our core pathway expenditure forecasts.

In addition to this, further biodiversity-related enhancement activity which is **not** explicitly captured in the relevant lines in our data tables (in terms of their costs) includes:

- Minimising the impact of our activities through improving and expanding our sites without compromising the habitats and species they support
- Supporting partnerships and projects to improve biodiversity outside our sites and activities
- Working at a catchment scale and with partners to ensure the environmental integrity and biodiversity of river and groundwater catchments while integrating biodiversity options into our catchment management work with farmers and landowners.
- Choosing nature-based solutions to problems.

Assumptions and uncertainty

As explained above, there are no alternative pathways for biodiversity investments. This reflects the relatively low magnitude of the enhancement expenditure for this sub-strategy, compared to the six key sub-strategies, and the fact that our core pathway for biodiversity is not expected to be particularly sensitive to the five scenarios that underpin our LTDS (in other words, enhancement investment of this broad order of magnitude would be expected to achieve our biodiversity ambition in all adverse states of the world with a reasonable degree of confidence). Correspondingly, there are currently no decision points or trigger points in the absence of any alternate pathways.

However, we recognise that this may change in future as more becomes known about biodiversity challenges and opportunities across the Wessex Water estate. If so, we will revise our LTDS accordingly.

Resilience / SEMD

✂

Investigations and wider environmental lines

We do not have any specific performance commitments related to investigations and wider environmental lines. Nevertheless, we regard these activities as necessary to delivering on our wider ambition in a number of areas.

We expect further new investigations will be required throughout the period. To accommodate this, we have forecast ongoing enhancement expenditure on investigations based on AMP7 and AMP8 proposed funding. We have either used an average of the two AMPs if appropriate (or on occasion if a single AMP is more representative of the types of activities, rolling this expenditure forward). We consider this is a reasonable simplifying assumption, and as shown in the relevant expenditure lines in tables LS3 and LS4, our forecast enhancement spend on investigations is flat from AMP9 onwards.

Likewise, for the 25-year environment plan driver we have forecast that our current level of enhancement expenditure continues. This is based on an assumption that our current projects in the Wellow and Cam Valley, once completed, are likely to be replaced by similar projects. As shown in table LS4, this constitutes around £5.7 million on enhancement expenditure per AMP from AMP9 onwards.

Retail

While we do not have any specific performance commitments related to retail activities (besides C-Mex), our aim is to, by 2050, be a top 10 customer service provider in the UK, based on the UKCSI; we are currently 93rd. We will also continue to maintain our top position on the water industry measures of customer experience.

Our success to date in delivering excellent customer service has been due to our going the extra mile ethos and our strong desire to continuously improve our service based on customers' feedback. We will not waiver from these fundamentals making sure our service always meets our customers' expectations.

To make this further step change in our customer service, we will do the following:

- Continue to embrace new technologies and digital developments to provide an effortless service, giving customers more control of and information about their water services.
- Always make it as easy and convenient as possible for customers to interact with us by adopting new and emerging communication channels but remaining true to our longstanding 'warm voice at the end of the phone' philosophy for those customers that want it.
- Seize every opportunity to positively engage with our customers be it a communication alongside a bill, working with a local community project or conducting roadworks.
- Use data to be able to predict when problems may occur on our network before they impact customers and better diagnose problems in customers' homes, avoiding the need for visits and reducing resolution times.
- Continue to upskill and empower our workforce to do whatever it takes to deliver the best outcomes for customers when they contact us.
- Keep up with customers' changing expectations, seeking feedback on our service at every opportunity and using it to continuously improve our service.
- Ensure all customers, whatever their situation, can access and use our services when they need them.
- Respond to change in the developer and business retail markets amending our service offering accordingly.
- Continue to play our part in the community and contribute to the wellbeing of our customers for example by providing access to our sites for recreation; through our role as a large employer; funding local community and environmental improvement projects; helping communities tackle shared goals of reducing water demand and sewer misuse and/or through our education team's engagement work in schools and across the region to equip our customers of the future.

As explained above, we consider these activities form part of our base activity and so we have not explicitly forecast any enhancement expenditure to meet our ambition for retail.

3.6. Monitoring and Reporting

In order for us to successfully deliver on our LTDS and so our future investment can adequately reflect the state of the world as it materialises, it is crucial to have an efficient and practical plan for monitoring and reporting. This will allow us to act on the LTDS, i.e. to adapt our approach based on the strategy outlined to keep us on track with corrective action as needed to meet our 2050 ambitions. In this way, it will ensure the LTDS influences and add value to our decision-making.

To this end, for each of our sub-strategies, we have presented below a monitoring plan which consists of the following:

- The estimated *ex-ante* likelihood of following each alternative pathway.

- The metrics that we will track, to understand whether we may be moving towards a more benign or adverse long-term picture, and therefore whether we should pivot to an alternative pathway. These metrics have been developed based on discussions with internal subject matter experts. We have sought to strike a balance between reflecting a sufficiently broad range of factors pertinent to the scenario / pathway in question, while limiting them to the most relevant metrics, as this will help the decision-making process (as well as ensuring a proportionate data collection burden). We have also set out the data sources for those metrics.

- The threshold that the metrics will be monitored against. Specific thresholds cannot be specified in all circumstances at this stage. Additionally, it is important to note that in most cases **we will make a holistic decision to move to an alternative pathway, rather than being driven by a single metric exceeding a given threshold (one exception to this is changes in regulatory standards).** In other words, a single metric being above a threshold at or before the decision point does not automatically mean that we would switch to the alternative pathway at that point in time. Nevertheless, where possible, we have identified thresholds that would cause us to consider switching pathways i.e. they would prompt a material review of the sub-strategy.

- The decision point when the decision would be made as to whether / when we need to move from the core pathway onto the alternative pathway.

- The necessary actions to take upon reaching the threshold.

See tables 22 – 27 below for our full monitoring plan for each sub-strategy.

Other factors to monitor.

Aside from specific metrics, we will also monitor wider developments that could affect our LTDS. This includes:

- Changes to our SDS. Our SDS was last revised in 2021, following extensive consultation with our customers and other stakeholders. Any changes to our SDS should be reflected in the ambition set out in our LTDS.

- Developments in wider strategic planning frameworks. We have set out in our LTDS how this strategy aligns with other longer-term planning frameworks, particularly the WRMP and DWMP. To the extent that these plans changes, either as part of the next planning or cycle or if the overarching framework set by regulators changes, we will need to consider any knock-on implications for our LTDS.

- Future changes in technology. For our LTDS, we have largely considered the relevance of technological factors set out in Ofwat's guidance, supplemented by key emerging technologies that we are aware of and have factored into our core pathway. Other, unanticipated in technology could affect the speed with which we could move to existing alternative pathways or create new emerging pathways altogether. We will remain alive to this possibility.

Table 22 – Monitoring plan – Water treatment and supply

Pathway and ex-ante likelihood	Metrics	Source of data	Frequency of review	Threshold	Decision Point	Action taken
High abstraction reduction (25%)	Environmental investigations in 2025-30 - will inform final decisions on abstraction licence reductions from 2035.	Reports to EA	Ad hoc	-	Q-D1, 2028	Develop business case for enhanced nitrate removal as part of PR29 business plan. Review additional investment needs in line with internal PFAS strategy and develop business case accordingly.
	Changes to DWI regulations governing PFAS thresholds / requirements.	DWI regular liaison	Ad hoc	-		
	PCV nitrates in water supply	Water quality sample data	Continuous monitoring with reviews triggered by changes.	DWI MAC 50 mg/L		
	PFAS concentrations at water treatment centres	Water quality sample data	Continuous monitoring with reviews triggered by changes.	The DWI guidance value of 0.1 micrograms per litre, which is equivalent to 0.1 parts per billion.		
	Customer contacts about water quality / CRI quality performance commitment	Internal reporting for APR	Mid-AMP	Above or below performance commitment for first two years of AMP8		
Slow technology (75%)	Availability of a viable alternative for lead pipe replacement	Technology scan to determine cost effectiveness and commercial viability of emerging technologies	Annual	Internal assessment of viable alternative technologies	Q-D2, 2033	Develop business case for higher lead pipe replacement as part of PR34 business plan.

Table 23 – Monitoring plan – Water resources

Pathway and ex-ante likelihood	Metrics	Source of data	Frequency of review	Threshold	Decision Point	Action taken
Most likely WRMP pathway (60%)	All water balance components and forecast of these components into the long-term supply-demand balance: • Licence change investigation outcomes. • Demand changes and population and property growth forecasts. • Effectiveness of demand strategy implementation • Updates to supply forecasting, including climate change impact.	Annual Performance Reporting on water balance components. Water Resources Management Plan 2029 technical component work	Annual monitoring as part of our WRMP annual review process. Production of the next draft WRMP in 2027.	Supply demand balance forecast follows scenario 3.	R-D1, 2027 R-D2, 2027	Seek investment in the next Business Plan in PR29 to deliver required schemes to meet need, notably environmental need in 2035.
WRMP AP2 – High alternative need (20%)				Supply demand balance forecast follows scenario 6.		

Table 24 – Monitoring plan – Sewerage

Pathway and ex-ante likelihood	Metrics	Source of data	Frequency of review	Threshold	Decision Point	Action taken
High climate change (20%)	Global temperature increase – changes to global climate projections	IPCC data UKCP18 projections	Dictated by IPCC publications – but full review in 2030	> 20% likelihood of RCP 8.5	S-D1, 2033	Shorter-term - refine and update modelling to reflect improved understanding of climate science and/or its impact on sewerage systems. Longer-term - develop business case for additional enhancement investment as part of PR34 business plan
	Discharge volumes	Internal reporting	Mid-AMP	> +10% from internal forecasts		
	Number of bursts linked to rainfall events.	Internal reporting / root cause analysis on the number of bursts	Annual	> +5% from previous year		
	Internal / external sewer flooding incidents	Internal reporting for APR	Annual	Above or below performance commitments for first two years of AMP8		
Slow technology (50%)	Additional data and evidence on efficacy of wetlands treatment on groundwater egress.	Technology scan to determine cost effectiveness and commercial viability of emerging technologies	Annual – with review to coincide with next Wessex Water Innovation Report	-	S-D2, 2028	Develop business case for infiltration sealing as part of PR29 business plan
	Defra / Environment Agency decision or guidance on re-permitting groundwater induced overflows.	Defra / EA liaison	Ad hoc	-		

Table 25 – Monitoring plan – Wastewater treatment

Pathway and ex-ante likelihood	Metrics	Source of data	Frequency of review	Threshold	Decision Point	Action taken
High demand (60% / 80%)	UK and regional population forecasts	ONS household and population forecasts Local authority population and occupancy forecasts	Mid-AMP	Observed growth is closer to local authority forecasts than ONS forecasts	Ww-D1, 2028	Develop business case for investment areas (e.g. growth, nutrients, sanitary) as part of PR29
	Number of connected properties	Internal reporting	Annual	> 105% of PR24 business plan forecasts		
	River water quality performance commitment (phosphorous)	Regulatory flow and sample data (MCERTS)	Annual	Above or below performance commitments for first two years of AMP8		
	Outcome of 2025-2030 WINEP investigations into nutrient loads and limits	Reports to EA	Ad hoc	-		
	Legislative and / or regulatory changes in respect of nature-based solutions and need to reach TAL.	Defra / EA liaison	Ad hoc	-		
High climate change (40%)	Global temperature increase – changes to global climate projections	IPCC data UKCP18 projections	Dictated by IPCC publications – but full review in 2030	> 20% likelihood of RCP 8.5	Ww-D2, 2033	Begin working with EA on action plan to improve bathing water quality. Prepare associated PR34 business case.
	Number of / process for designating bathing water sites	EA designation of additional sites	Ad hoc	-		

Table 26 – Monitoring plan – bioresources

Pathway and ex-ante likelihood	Metrics	Source of data	Frequency of review	Threshold	Decision Point	Action taken
Reduced landbank availability (25% / 50%)	Available land for biosolids recycling	National Landbank Assessment Further analysis by Grieve Strategic (scenario likelihood)	Mid-AMP	Landbank availability reduces below 50% Change in Grieve assessment of scenarios	B-D1, 2028	Develop contingency plan to transition out of biosolids disposal to land. Develop business case to adopt ATC technology as part of PR29 business plan
	Changes in the Farming Rules for Water Regulation (FRfW)	Defra / EA liaison	Ad hoc	-		
	Viability of ATC technology	Outcome of trials to determine cost effectiveness and commercial viability of ATC.	Expected in 2027	-		

Table 27 – Monitoring plan – Greenhouse gas emissions

Pathway and ex-ante likelihood	Metrics	Source of data	Frequency of review	Threshold	Decision Point	Action taken
Slow technology (50%)	Proven efficacy of nitrous oxide capture and conversion technologies, at municipal scale i.e. % reduction vs no-intervention control sites.	Technology scan to determine cost effectiveness and commercial viability of emerging technologies	Biannual as part of corporate innovation report	Internal assessment of performance against a % reduction benchmark (derived from peers' experience)	G-D1, 2033	Development of investment case for PR34 business plan
	Supply chain availability of low-carbon HGVs	Engagement with supply chain and wider industry	Aligned to fleet replacement strategy	-		
	Abatement cost: absolute and normalised by emission reduction.	Engagement with suppliers on costs and efficacy of solutions	Annual, regarding emissions factors. Otherwise, ad hoc based on need.	-		

While not strictly related to our current sub-strategy, we will also monitor developments in whole life carbon accounting and embodied carbon data to enable us to understand when we can update this sub-strategy to bring in embodied carbon impacts and our SDS aim to achieve full net zero carbon by 2040. As noted above, we expect that this could coincide with the implementation of a specific performance commitment for embodied carbon as part of the next price review, as this is likely to be underpinned by industry-wide work and standardisation of methodologies to calculate and estimate embodied carbon in the water industry.

Reporting approach

We will routinely monitor how each scenario develops and report on this via our Annual Performance Review (APR). Our annual report, supported by 6-monthly internal reporting, will track the metrics set out in Tables 22-27 above and determine the extent to which changing conditions necessitate moving to an alternative pathway through decision or trigger points.

We note that some of these metrics are based directly on associated performance commitments, which we already report on as part of the APR. For metrics without associated performance commitments, we will report on progress towards the long-term targets.

We will share this with our regulators and publish the report as part of the normal annual reporting cycle.

Given that many decision points occur midway through AMP8, as part of the planning of our next business plan and WRMP / DWMP, we will also evaluate overall achievement via a stand-alone evaluation in 2027-28. This evaluation will additionally review the overall effectiveness of our LTDS, i.e., whether the strategy itself needs to be updated and amended (e.g. to add or remove specific pathways), not merely whether we need to take an action within the strategy.

We consider this reporting framework will come into its own from PR29 onwards when we need to make key decisions about investment in several of our long-term outcomes. However, given that is has been almost a year since we originally published our LTDS, we have already undertaken an initial review of our pathways against the ad hoc and annual metrics set out above. While this has not given us any reason to move away from our core pathway as yet, it has led to us amending our pathway likelihood assessment - specifically for the bioresources landbank pathway (due to changes in our view about the status of the FRfW).

4. Rationale

The section provides further detail on how we developed the strategy set out in Chapter 3, and how our core and alternative pathways represent the optimal set of investments to deliver our ambition for the relevant set of scenarios underpinning each pathway. Additionally, we explain how the LTDS aligns with other planning / forecasting exercises, and how we have considered affordability considerations and fairness between current and future customers.

4.1. Identification of core and alternative pathways

The core and alternative pathways each represent a set of investments that, together, achieve our full range of long-term ambitions by 2050, albeit under different circumstances. These should be the optimal – or best value – set of investments out of a range of possible solutions that could be pursued to deliver on our ambitions.

To do this, we have applied the same principles that we use to develop our PR24 business plan and as part of our wider business planning processes.

4.1.1. Approach to solutions identification

Our overarching approach to identifying the optimal mix of investment solutions to address a risk, or to achieve a given output or level of performance, is set out in our PR24 business plan document WSX37 – Resilience, risk management and decision frameworks. This document sets out how we identify options and optimise / combine a subset of these options to create a best value solution.

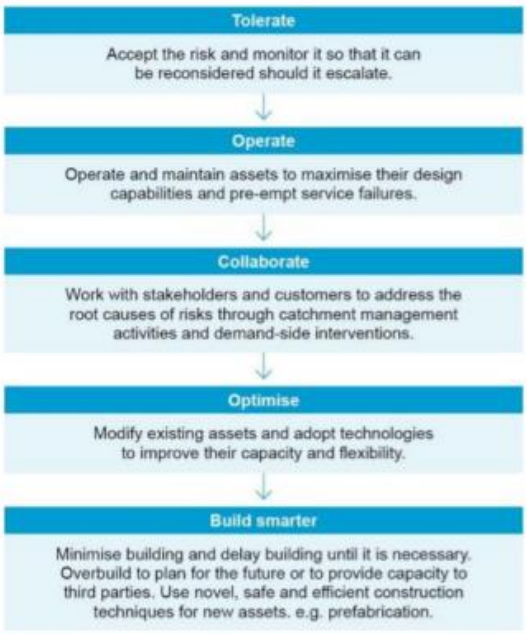
A key element of this is our 'TOCOB' approach which underpins our PR24 investment options appraisal (see Chapter 6 of WSX37). Under this approach, every investment need identified should be reviewed and the potential solutions challenged to understand whether we can:

- **Tolerate** the need – is activity needed now? Can we live with the risk if there is indeed a risk?
- **Operate** to address the need – are we able to adjust the way we operate to mitigate or remove the need?
- **Collaborate** to address the need – can we work with third parties to resolve a joint issue in a more effective manner?
- **Optimise** to address the need – can we, using our existing assets, optimise their performance with relatively minor investment to deliver the required need?
- **Build smarter** to address the need – if building is the required solution, can we improve the value of our build creating greater environmental and social value than the traditional 'grey asset' solution (e.g. through a green solution on site, a modular build that can be scaled up over time).

Figure 20 below – which is taken from WSX37 – illustrates how this approach is used to identify potential solutions, and how it underpins our approach to business plan optioneering.

Figure 20 – Illustrating our approach to 'TOCOB' over time.

Figure 9 – Our mitigation hierarchy, TOCOB: tolerate, operate, collaborate, optimise, and build smarter.



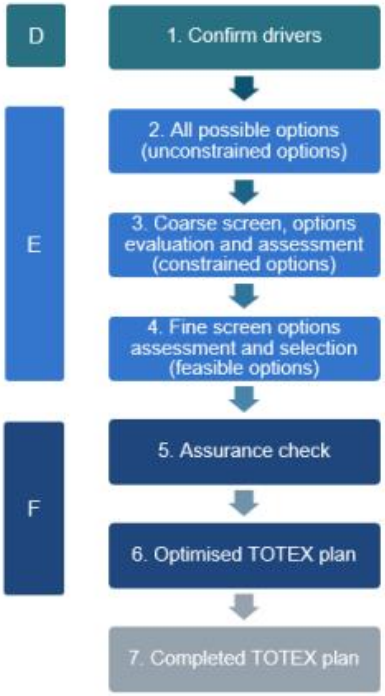


Figure 10 – Our approach to optioneering.

Once a shortlist of options is identified, they are captured within our Enterprise Decision Analytics (EDA) portfolio optimisation tool. The EDA portfolio provides users with the ability to add all their investment needs into a repository, ready to be optimised. Against each need, users can add one or more solutions. Each solutions contains the following information:

- For costs: Identifying the totex (including capital and operational expenditure) for each intervention for each year of the planning horizon. To inform our costing we utilise standardised cost databases & curves.

- For benefits: Understanding the benefit (or value) of the investment, based upon the change in risk over a 30-year planning horizon (i.e. the post-intervention value minus the pre-intervention value). For each option, we identify any further service measures affected by the intervention. In-depth or bespoke assessments are captured utilising our ‘avoidable costs’ service measure.

The calculation of benefits is underpinned by our service measure framework (SMF). It consists of defined service measures, and subsets of impact categories, with standardised units of measure which we use to articulate service risks and benefits. Each service measure assigns monetised value for risk-reduction or benefit-added using four capitals: Natural; Social; Human; and Financial / Built. The process then identifies and defines solutions to those needs, articulating the cost of the interventions, the risk reduction and benefits added. The SMF enables the step change between need and solution to assign monetised value to enable best-value decision making.

EDA then determines a Benefit Cost Ratio (BCR) and Net Present Value (NPV) in accordance with UKWIR’s 2010 CBA guidance and Ofwat’s Price Review 24 (PR24). This generates a portfolio of solutions which can be selected based on whether the determining factor is the best BCR, or lowest whole life cost within pre-determined performance target constraints.

In this way, we use EDA to capture the detail for our investment plan for PR24 and assess the impact of different service targets and constraints over the short, medium and long-term horizon. EDA allows us to apply constraints and scenarios to optimise our portfolio of interventions. This process is undertaken iteratively and allows us to compare options and timeframes for implementation to generate a preferred investment programme. We use the outputs of EDA to determine the optimal investment plan for our customers and other stakeholders.

Further details of this are summarised in Annex A-5 of WSX38 – Annexes – Resilience, risk management and decision frameworks.

4.1.2. Application to LTDS

We have applied these same principles and techniques to developing our LTDS. Having identified the relevant scenarios for each sub-strategy, we have firstly used the same business intelligence used in the development of our PR24 plan to devise a shortlist of solutions to achieve the more stretching set of performance targets / outputs consistent with our 2050 ambition. In some cases, this has been relatively straightforward. For instance, under our alternative pathway 1 for water supply and treatment, we have assumed under the high abstraction reduction scenario that this could lead to tighter regulatory requirements on PFAS; we have a good idea as to which of our Water Treatment Centres would be affected by such a change in regulations; and, as things stand, the only reliable treatment solution for PFAS is GAC. The resulting investment under this pathway to still meet our ambition for safe and reliable water is therefore reasonably clear.

In other areas, for instance reducing total pollutions to 0, there is a wide range of possible interventions that could achieve this step change in performance, and the EDA tool is therefore what we use to ensure the best value set of interventions are selected for inclusion in the pathway. This is similar to the process we have used for our PR24 business plan – though the mix of solutions needed to deliver a more stretching targets or outputs over a longer time horizon, potentially reflecting differences in capex : opex ratios for different solutions. The EDA tool takes account of these differences in producing an optimised set of solutions.

We also note that a subset of our pathways – for water resources and sewerage – are taken directly from the WRMP and DWMP. The investments in these pathways were therefore determined through those separate planning frameworks. However, the same overarching principles and approach described above has also been used in the development of our WRMP and DWMP.

The optimal solutions and their associated investments for each sub-strategy are described in Section 3.5. We have not set out here a full range of options that were considered; rather we have described the overarching process through which we identified the key investments.

Some other differences which apply to the development of LTDS pathways – as opposed to our five-year business plan – are as follows:

Cost information

Our LTDS gives an overview of the high-level costs and activities we believe are, with the current knowledge, needed to meet these requirements. Inevitably, our cost information for activities to be implemented in 20+ years' time is going to be less accurate than activities costed for delivery over the next 5-6 years. We recognise that our cost estimates will evolve in the future (as well as our knowledge of the success of activities and their ability to deliver the outcomes, which may lead to changes in the optimal mix of solutions to deliver performance targets).

Nevertheless, we have applied sensible assumptions to costing solutions based on information currently available to us and so we believe the magnitude of enhancement investment under our pathways is broadly reasonable, Moreover, to the extent that our cost estimates are shown to be incorrect over time, we would not expect this to materially affect *relative* cost estimates. As such, to the extent that the LTDS is most useful as a tool for

understanding the potential for variation in investment requirements to different scenarios, we consider our LTDS accurately captures this.

Sequencing investments

A difference between five-year business planning cycles and long-term (i.e. 25 year) planning frameworks is that the latter allow for some choices around when and how investments are sequenced. In general, we have adopted the following principles:

- We have tried to smooth investments over time to create the smoothest possible profile, which we consider to be beneficial from the perspective of affordability (i.e. a reasonably consistent increase in bills over time rather than short sharp bill shocks) and deliverability (allowing a constant and predictable pipeline of work for our supply chain, and minimising additional costs that may result from upwards pressure on tender bidding), subject to the constraints of meeting interim milestones and regulatory dates (e.g. nutrient upgrades in our core pathway are spread over AMP8 and AMP9 to reflect 2037 Environment Act targets).

- For incremental investments incurred under alternative pathways, we have sequenced incremental investment as late as possible while still meeting 2050 ambitions, taking account of leads times involved with individual intervention, so as to minimise the risk of aborted investment if that scenario does not come to pass in future. We have also had regard to the likelihood of new technology developing in future periods which could reduce the whole lift cost of achieving our ambition in certain areas.

Overall, we consider that this approach ensures our core and alternative pathways deliver long-term outcomes as efficiently as possible and in a way which does not foreclose future options or unnecessarily constrain future choice, while still delivering on our 2050 ambitions.

4.2. Scenario Testing

Our overall strategy – encompassing both core and alternative pathways – is the product of robust scenario testing.

- We have firstly considered which company-specific factors not covered by Ofwat's common reference scenarios are likely to have a particularly significant impact on our strategy (see Section 3.3).

- We have then tested each element of our core pathway against each of the common reference scenarios, plus the one additional scenario identified (landbank availability), to consider whether it would be materially affected by a more adverse state of the world coming to pass (see 'Scenario considerations' in each relevant section of Section 3.5.).

- For each scenario which is materially relevant, we have then considered in detail the implications of a more adverse state of the world for our investment needs, and estimated the change in enhancement expenditure that would be required to still meet our long-term ambitions.

The result of this is a comprehensive set of alternative pathways that reflects the major investment impacts under a wide range of different future scenarios.

We have identified three circumstances in which the process outlined above – and our resulting strategy in Chapter 3 – may not be sufficient to deliver our 2050 ambitions. These are as follows:

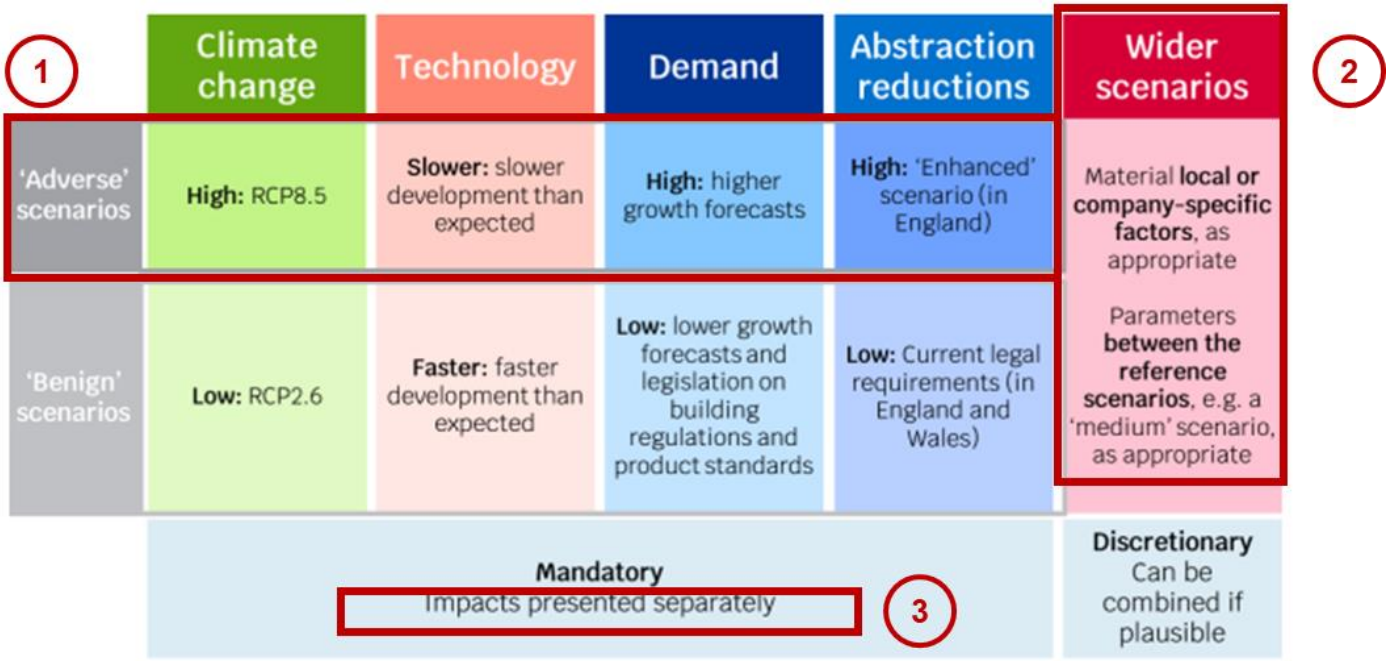
1) The future state of the world is even more extreme than the assumptions underpinning the adverse scenarios (which Ofwat's guidance says is intended to capture 'plausible extremes'), e.g. even higher growth in demand than local authority growth forecasts; landbank availability reduced by more than 50% before or by 2035. This is tantamount to stress-testing (1) in Figure 21 below.

2) There are changes in additional relevant factors not covered by the five scenarios explicitly considered in our strategy. This is tantamount to stress-testing (2) in Figure 21.

3) Two or more adverse scenarios materialise, and there are interdependencies between these scenarios which affect our strategy. This is tantamount to stress-testing (3) in Figure 21.

In the rest of this section, we consider the likelihood and impact of these circumstances in the context of each of our sub-strategies. Overall, we consider that our strategy is reasonably resilient to a wide range of plausible eventualities, though we have noted some specific factors that could significantly impact our alternative pathways. Our bioresources sub-strategy is most affected by this stress-testing exercise.

Figure 21 – Wider scenario testing framework (taken from Ofwat guidance)



Water treatment and supply

The key scenarios that affect this sub-strategy are abstraction reduction and technology. We have made relatively conservative assumptions about the impact of higher abstraction reduction requirements, factoring in the impact of regulatory change particularly in respect of PFAS, and we have allowed for the costs for nitrate removal and PFAS at the majority of our high-risk water treatment sites under this pathway. We therefore consider that our alternative pathway is relatively robust even to a scenario where abstraction reduction requirements go even further than the EA's enhanced scenario.

In respect of technology, as noted in Section 3.5.1, we have focused on the impact of the pace of technological change on lead pipe relining technologies. We have not explicitly considered the impact on supply interruption detection as it is difficult to forecast the magnitude of increased investment in BAU activities that would achieve this. We recognise this means our alternative pathway could understate the total investment needed under a slow technology scenario to keep us on track to meet our SDS aim for safe and reliable water.

In terms of additional scenarios, our water treatment and supply sub-strategy may also be affected by changes to **land use** in response to future government agricultural policy. These changes may impact on the availability and quality of water resources, such as changes to groundwater recharge patterns, and the timing of fertiliser application affecting the magnitude and occurrence of nitrate peaks in groundwater abstractions. We have not explicitly considered this as an additional scenario, as we propose to manage these changes by a combination of

farmer engagement and investment in supply management. Nevertheless, this is an additional risk that could lead to additional expenditure being incurred in future in this area.

In terms of interdependencies, we do not consider that the combination of a slow technology and high abstraction reduction scenario would create any further requirements or risks to the strategy beyond those already identified, as they affect relatively distinct investment areas of our water treatment and supply programme.

Water resources

As explained in Chapter 3, we have aligned our Water Resources sub-strategy on our WRMP. Our sub-strategy presents two alternative pathways taken from our WRMP (AP1 and AP2) that reflect two plausible combinations of the adverse scenarios for climate changes, demand, and abstraction reduction. However, our WRMP includes some additional alternative pathways for variants of these two pathways. This scenario exercise focuses on three key uncertainties as follows:

1) **Demand management strategy effectiveness** – the effectiveness of future demand management measures is uncertain, as demand is influenced by a range of factors beyond the control of the company, including changing demand resulting from post-covid changes and in response to changing economic circumstances and the recent cost of living crisis. In our WRMP, we have therefore tested a scenario where only half the benefits of the demand management strategy are achieved.

2) **Additional need from Ministry of Defence Sites and Veolia Water Services** – alongside licence reductions in the catchment to achieve sustainable abstraction, both the Ministry of Defence and Veolia Water Services may require additional volumes of water to meet their future needs above and beyond those already accounted for in our core pathway and pathways AP1/AP2. This depends in part on the outcome of subsequent environmental investigations in the 2025-2030 period. We have therefore tested scenarios where an additional 9.84Ml/d is required. These additional demands would be in the eastern part of our supply system in the Hampshire Avon.

3) **Hampshire Avon options** – one solution to meet the needs of licence changes in the Hampshire Avon catchment for both Wessex Water and other users' needs is to combine existing abstractions and move them further downstream to different locations that have more water in the river and then supply this water back upstream to existing demand centres. Investigations are being taken forwards under the WINEP programme in the 2025-2030 period to assess option feasibility.

Our WRMP presents a range of additional pathways to capture the impacts of various combinations of these three factors.

These pathways can be used to stress-test our LTDS. Specifically, we can consider the magnitude of the difference in required enhancement investment under these variant pathways, compared to our alternative pathways, as a proxy for the robustness of our pathways to changes in the assumptions set out above. As explained in Section 3.4.2, we consider that in practice these pathways are all viable options that we may need to pivot to in future if such circumstances arise.

The impact on our enhancement expenditure needs is set out in Table 28 below – this replicates Table 6.2 in our WRMP24 main plan.

- For AP1, we have considered four variants of this pathway (AP4 – AP7) all with more adverse assumptions about demand management effectiveness, additional MoD / Veolia needs, and availability of Hampshire Avon mitigation options. The incremental impact on enhancement investment required to maintain a supply-demand surplus (and therefore achieve our SDS aims) is between £83 million and £98 million (NPV).

- For AP2, we have considered one variant of this pathway (AP3) where Hampshire Avon mitigation options are not available. The incremental impact on enhancement investment required to maintain a supply-demand surplus (and therefore achieve our SDS aims) is £109 million.

While this exercise does not capture all possible combinations of the assumptions set out above, it nevertheless provides a good indication as to the scale of the additional activities that may need to be included in our alternative pathways under even more adverse scenarios than those assumed, and the order of magnitude of the associated costs. In both cases, this is equivalent to around £100 million. This represents a reasonably significant potential impact.

Table 28 – Summary of wider scenario and stress testing

Pathway	Description	NPV	Difference to LTDS alternative pathway
AP1	WRMP most likely pathway	£834 million	-
AP2	WRMP 'high alternative need' pathway	£1,259 million	-
AP3	AP2 – but Hampshire Avon options not available	£1,368 million	+ £109 million
AP4	AP1 – but demand management less effective	£917 million	+ £83 million
AP5	AP1 – but demand management less effective and Hampshire Avon options not available	£923 million	+ £89 million
AP6	AP1 – but additional need from MoD and Veolia	£921 million	+ £87 million
AP7	AP1 – but additional need from MoD and Veolia and Hampshire Avon options not available	£932 million	+ £98 million

Note that enhancement expenditure is presented as NPV so will not match figures in table LS3.

We have not identified any other locally-specific scenarios besides the common reference scenarios that could also affect our water resources sub-strategy.

In terms of interdependencies, we have already considered this via our approach to identifying alternative pathways in this area.

Sewerage

The key scenarios that affect this sub-strategy are climate change and technology. In respect of climate change, we have undertaken further modelling and stress testing to understand the impact of more extreme climate change scenarios on storm intensity, and by extension on storm storage and flood mitigation activities. This shows that the additional investment in our alternative pathway is robust to a range of plausible sensitivities around the high climate change assumption (RCP 8.5). We also note that our assumptions underpinning the core pathway are on the conservative side of the benign scenario (see footnote 10).

In respect of technology, we have also been relatively conservative in our assumption about the progression of wetlands treatment, i.e. assuming that this approach is not permitted as a solution for groundwater inundation and that infiltration sealing must be used as the primary solution to address this type of overflow. As such, we consider this pathway is also relatively robust as this is the most extreme adverse assumption. As noted in Section 3.5.4, slower technological development may have other impacts – including changes in communications technologies

(PSTN switch-off, improvements in in-sewer monitors) – which may affect our investment profile particularly for managing flooding and pollutions risk. However, we consider it unlikely this would trigger material additional investment needs, particularly when set against the scale of investment needed in infiltration sealing.

We have not identified any other locally-specific scenarios besides the common reference scenarios that could also affect our sewerage sub-strategy.

In terms of interdependencies, we do not consider that the combination of a slow technology and high abstraction reduction scenario would create any further requirements or risks to the strategy as our strategy relies on the use of existing technologies (e.g. additional storm tank storage) to address the impacts of higher climate change, so this would still be a viable strategy even under a slow technology scenario. A high demand scenario may somewhat exacerbate the impacts of climate change on our sewerage strategy, but as explained in Section 3.5.4 our modelling work indicates that demand / population growth does not change sewer infrastructure requirements anywhere near as significantly as climate change. As such, we consider the impact on investment requirements would likely be negligible (which is why we have not explicitly developed an alternative pathway around a high demand scenario).

Wastewater treatment

The key scenarios that affect this sub-strategy are climate change and demand.

Under the high climate change scenario, we have assumed under our alternative pathway that hotter and direr summers could increase public pressures for public amenities, resulting in a greater number of inland bathing water designations. We recognise that an even more adverse state of the world could create pressures for even more inland bathing water sites to be designated. We expect the costs would scale broadly linearly in such circumstances i.e. a jump from 4 to 6 sites per AMP would be roughly double the impact of moving from our core pathway (2 sites per AMP) to four sites per AMP. We note that our assumptions about bathing water designations are largely illustrative and there is significant uncertainty about this under all (core and alternative) pathways, which means there is a wide potential range for the enhancement profile under this pathway.

In respect of high demand, an even more adverse scenario could in principle lead to requirements to achieve even more stringent phosphorous and nitrogen permits. However, we have been relatively conservative in our assumptions about the additional permit requirements under our alternative pathway – this assumes we need to reduce phosphorous levels to the technically achievable limit (0.25mg/l) at all inland WRCs above 1,000 population equivalent; and reduce nitrogen levels to a new technically achievable limit established after future trials. This is already a particularly stretching set of requirements. As such, we consider this is relatively robust to changes in the assumptions underpinning the high demand scenario.

We have not identified any other locally-specific scenarios besides the common reference scenarios that could also affect our sewerage sub-strategy.

In terms of interdependencies, the combination of a high climate change and a high demand scenario coming to pass at the same time could be to exacerbate the additional investment requirements under both pathways. For instance, drier summers caused by climate change would increase the risk of much reduced river flow, potentially prompting a tightening of discharge permits. Likewise, higher population growth could increase public demand for bathing water amenities and provide a further impetus to improve the quality of more inland bathing water sites to meet this demand. As such, there is a risk that the combination of these scenarios would require more enhancement expenditure than captured by our two alternative pathways in isolation. While we recognise this risk, we have not attempted to quantify it.

Bioresources

The key scenario that affects this sub-strategy is reduced landbank availability. We have assumed in the adverse scenario that there will be a 50% reduction in landbank availability by 2035, before falling to 0% by 2050. However, it is possible that the reduction could come sooner than 2035, i.e. midway through AMP9. In the event of

accelerated landbank reduction in AMP9, we would need to switch to alternative solution to biosolids disposal more rapidly than under the alternative pathway. Because of the lead times involved in ATC technologies, which are currently undergoing trials, the only viable solution in this timeframe would be incineration. This means we would have to make more use of incineration, and incur the associated costs of this, even sooner than from 2030 onwards; this would be tantamount to bringing forward the trigger point for this into AMP8. We have proposed an uncertainty mechanism in our PR24 plan to manage the investment risk this (and other) uncertainties present for AMP8.

A possible worst-case scenario is a rapid loss of all the landbank within the next 1-2 years, which could be triggered by public pressure. As there are no alternative outlets with sufficient capacity to accommodate all biosolids at national level, this could result in a shutdown of the UK bioresources industry, which is not a scenario for which we can plan. We have therefore not focused on this for our LTDS planning, but it does present a risk to our strategy.

Other than landbank availability, we have not identified any other locally-specific scenarios besides the common reference scenarios that could also affect our sewerage sub-strategy.

In terms of interdependencies between scenarios:

- We have already explicitly captured the interdependency between landbank availability and technology through the use of two ‘branches’ on our alternative pathway; one that is consistent with a fast/benign technology scenario and one that is consistent with a slower technology scenario (as explained in Section 3.4). The incremental difference between the investment profiles under these branches is set out in Figure 17

- We also consider that a high climate change and high demand scenario could serve to exacerbate landbank availability constraints. For instance:

    - Climate change: Wetter winters may limit opportunities for sludge disposal to the landbank (increasing the need for temporary storage). Furthermore, increasing storm intensity could affect landbank accessibility by increasing the risk and frequency of run-off and contaminant export to watercourses.
    - Demand: Expanding urban development may remove some disposal sites from the landbank.

    The interaction of these scenarios could place additional pressure on landbank, beyond those driven by public considerations and stricter regulatory requirements (FRfW) therefore could lead to a greater than 50% reduction in availability by 2035.

    This would increase our need for reliance on either ATC or incineration technologies, and would be represented by an even steeper increase in investment from 2030 onwards, compared to the core pathway.

Overall, for these reasons, we recognise there is a risk that the alternative pathway for reduced landbank availability might underestimate both the immediacy and scale of investment required in this scenario. While we have not explicitly sought to quantify this risk, we recognise that it could be material.

Greenhouse gas emissions

The key scenario that affects this sub-strategy is technology; in particular, the timing of the availability of nitrous oxide prevention / conversion technologies. We have assumed under the slow technology scenario that this would be available from 2040 rather than 2030. If this technology emerged even later than 2040, it would affect our specific GHG strategy but would not directly affect the achievement of our operational net zero goal by 2030, which will be met through some use of offsetting; in practice, it would affect the degree to which residual emissions (to be offset) occur through to 2050. As such, it is not likely to materially affect our enhancement expenditure in this area.

We have not identified any other locally-specific scenarios besides the common reference scenarios that could also affect our sewerage sub-strategy. We recognise that a high demand and high climate change scenario would create some upward pressure on our greenhouse gas emissions (see Section 3.5.6 for details), but, for the same reasons

above, this would be more likely to affect the timing of our investments and the degree to which we use offsetting for residual operational emissions post-2030, rather than driving an increase in the scale of enhancement investment.

As there is only one alternative pathway for this sub-strategy, interdependencies between two or more pathways materialising is not relevant here.

In practice, the key uncertainty in our greenhouse gas sub-strategy lies in how we achieve the more ambitious goal of net zero (including embodied carbon) by 2040. As explained in Chapter 2, we expect to expand and update this sub-strategy accordingly as our plans for fully decarbonising embodied carbon develop and the decarbonisation trajectories of key supply chain sectors become clearer. Wider scenario testing will form part of this work.

Summary

Table 29 below summarises the outcomes of our wider scenario and stress testing exercise. The impact of each factor is colour-coded red, amber or green to reflect the relevant and potential impact for each sub-strategy.

Table 29 – Summary of wider scenario and stress testing

Sub strategy	More adverse assumptions?	Additional scenarios?	Interdependencies?	Key implications
Water treatment and supply				++£ - Potential for additional enhancement investment required for improving supply interruptions under slow technology scenario. +£ - Potential for additional investment in partnership working and supply management if land use change occurs in future.
Water resources				++£ - Potential for additional enhancement investment required to meet 2050 targets if demand management less effective / Hampshire Avon options not available / additional needs from MoD / Veolia
Sewerage				Potential for changes in enhancement spend required for monitoring flood risk under slow technology scenario, but impact likely to be small. Alternative pathway for high climate change may be affected if high demand scenario also comes to pass, but impact likely to be small.
Wastewater treatment				+£ - Potential for additional investment in bathing water designation if more adverse climate change scenario comes to pass. +£ - Potential for additional enhancement investment in nutrient removal and UV treatment if high climate change and high demand scenarios come to pass.
Bioresources				B-T1 brought forward into AMP8 if reduced landbank scenario comes to pass sooner than expected. +++£ - Potential for additional investment in ATC / incineration if high climate change and high demand scenarios come to pass.
Greenhouse gas emissions				Potential for changes in profile of enhancement spend if process emissions technology develops even slower than expected, but impact on total expenditure likely to be small

4.3. Comparison to previous long-term strategies

We have summarised in this section how our LTDS aligns with other long-term strategic and planning frameworks that we have developed, as well as highlighting any differences (and the reasons for these) where relevant.

Strategic Direction Statement (SDS)

As explained in Chapter 2, we have used our SDS as the basis for our LTDS ambition. Our SDS sets out exactly how we intend to stretch ourselves over the coming 25 years, based around eight outcomes that we are committed to delivering by 2050. We have developed a set of 2050 performance targets around six of these eight outcomes, which form the starting point for our LTDS ambitions. We have developed our strategy around a set of core and alternative pathways that will achieve these ambitious outcome targets under a range of plausible future states of the world.

While our SDS ambition is therefore at the heart of our LTDS, there are two sub-strategy areas where this version of our LTDS has focused on specific aspects of that ambition. There is also one area where our LTDS ambition goes above and beyond the SDS. These are explained elsewhere in this document and summarised below.

- Sewerage: In our SDS, we set out our ambition to eliminate the discharge of untreated sewage from storm overflows, prioritising those that discharge most frequently and those that have any environmental impact. Our more recent research, conducted in the development of our PR24 business plan, shows strong customer support for investment in reducing storm overflows, but also that affordability has been flagged as a concern. Given the significant cost of eliminating discharges from all storm overflows, we have not explicitly developed our LTDS around this SDS aim.

- Net zero: In our SDS, we set out our ambition to achieve net zero total carbon emissions by 2040. This includes our operational emissions plus emissions linked to construction materials and consumables such as treatment chemicals (including those related to our supply chain emissions). As explained in Chapter 2, while we remain committed to this ambition, our LTDS focuses on how we will achieve and exceed our aims in respect of *operational* emissions as there is currently much greater certainty over the activities needed to achieve this, and the impacts of different scenarios on doing so.

  Furthermore, for operational emissions, we have also focused primarily on alignment with UK Government targets to reduce emissions by 78% (from 1990 levels) by 2035 and to zero by 2050. This is because our SDS aim in this area is to achieve operational net zero by 2030 (including the use of offsets), and so has a reasonably short time horizon.

- Biodiversity: In our SDS, we set out our ambition to double our region's contribution to biodiversity. This translates into improving or creating habitat on our landholding which will achieve a minimum uplift of 2,000BU (at target condition) by 2050. Our Biodiversity Action Plan, published since our SDS, builds on this and sets out a plan to improve or create habitat on our landholding which will achieve a minimum of 5,000 biodiversity units by 2050. Our performance commitment profile through to 2050 is consistent with this enhanced ambition.

Our SDS was last revised in 2021, following extensive consultation with the Wessex Water Services Limited Board, customers, and stakeholders. If our SDS is revised before our first full evaluation of this LTDS planned for 2027-28, we will consider the implications for our LTDS at that point.

Long-term performance commitments produced at PR19

The table below sets out a comparison of our long-term performance commitments targets for 2045, produced as part of our PR19 business plan, and the equivalent performance commitment target included in this LTDS. In some

areas (leakage and PCC), our ambition has increased since PR19, reflecting public policy announcements and new regulatory targets since then. For sewerage, our long-term targets for some sewerage performance commitments are slightly less ambitious than PR19, and in another case it is more ambitious.

Table 30 – Comparison of PR19 and LTDS long-term performance forecasts

Performance commitment	2045 long-term target (PR19)*	2045 target (LTDS)	Commentary
Leakage	27.2% reduction	43.6% reduction	Increased ambition reflecting regulatory targets from the 2023 Environmental Improvement Plan and Defra's Plan for Water
PCC	124.2 l/h/d	107.8 l/h/d	
Customer contacts about water quality (number per 1,000 population)	0.41	0.77	Higher target reflects amended performance commitment definition (to include contacts about taste and odour as well as appearance)
Water supply interruptions (over three hours)	00:00:00	00:00:00	-
Unplanned outage	<2.34	5.02%	Definition has changed for AMP8 to include raw water quality outages, therefore a direct comparison with the previous target cannot be made. The 2045 LTDS target reflects the same underlying ambition of maintaining stable asset health.
Internal sewer flooding	0.52 per 10,000 connections	0.78 per 10,000 connections	Recent years of wet weather has resulted in more incidents, which has resulted in resetting the starting position.
External sewer flooding	6.42 per 10,000 connections	9.46 per 10,000 connections	As above, and the impact of Covid with more people working from home has seen an increase in reported number of incidents.
Sewer collapses	18.1 collapses per 1,000 kms	8.47 collapses per 1,000 kms	Definition has changed for AMP8.
Total pollutions	0	3.42	Ambition for zero pollutions now set at 2050, reflecting SDS and need to profile investments to meet affordability considerations

*See PR19 business plan document Appendix 3.1.A for details.

Other strategic planning frameworks produced at PR19

As explained in Chapter 3, our LTDS aligns with the latest iterations of the WRMP and DWMP. Specifically:

- Our core and alternative pathways for our water resources LTDS sub-strategy are taken from the most recent version of our WRMP, and they capture the core pathway and two of the most likely other pathways set out there. Other WRMP pathways have been considered in the context of our scenario testing in Section 4.2

- We have also used one of our DWMP pathways as the basis for an alternative pathway in our sewerage sub-strategy, as we consider this well-reflects the likely impact of a slow technology scenario materialising.

Any differences between our LTDS and previous iterations of the WRMP planning framework reflect updates to the WRMP made during the latest WRMP planning round. We consider the LTDS should, as far as possible, be aligned with the most up-to-date version of our WRMP as this is the most comprehensive and mature planning framework governing our water resources strategy, and our long-term activities in respect of the sustainable abstraction SDS objective.

4.4. Affordability

Throughout the creation of our PR24 plan and our LTDS, maintaining affordability has been key. We set out in this sub-section how our LTDS protects customers' ability to pay their water bill over the long term; and how it delivers fairness between what existing customers will pay for, and what is paid for by future customers.

Customer bill impacts

We need to make the investments necessary to achieve our 2050 ambition. Furthermore, we have explained in Section 4.1 why the core and alternative pathways represent the optimal mix of investments deliver long-term outcomes as efficiently as possible.

Nevertheless, in deriving our pathways we have sought to limit the impact on bills over the longer-term in the following ways:

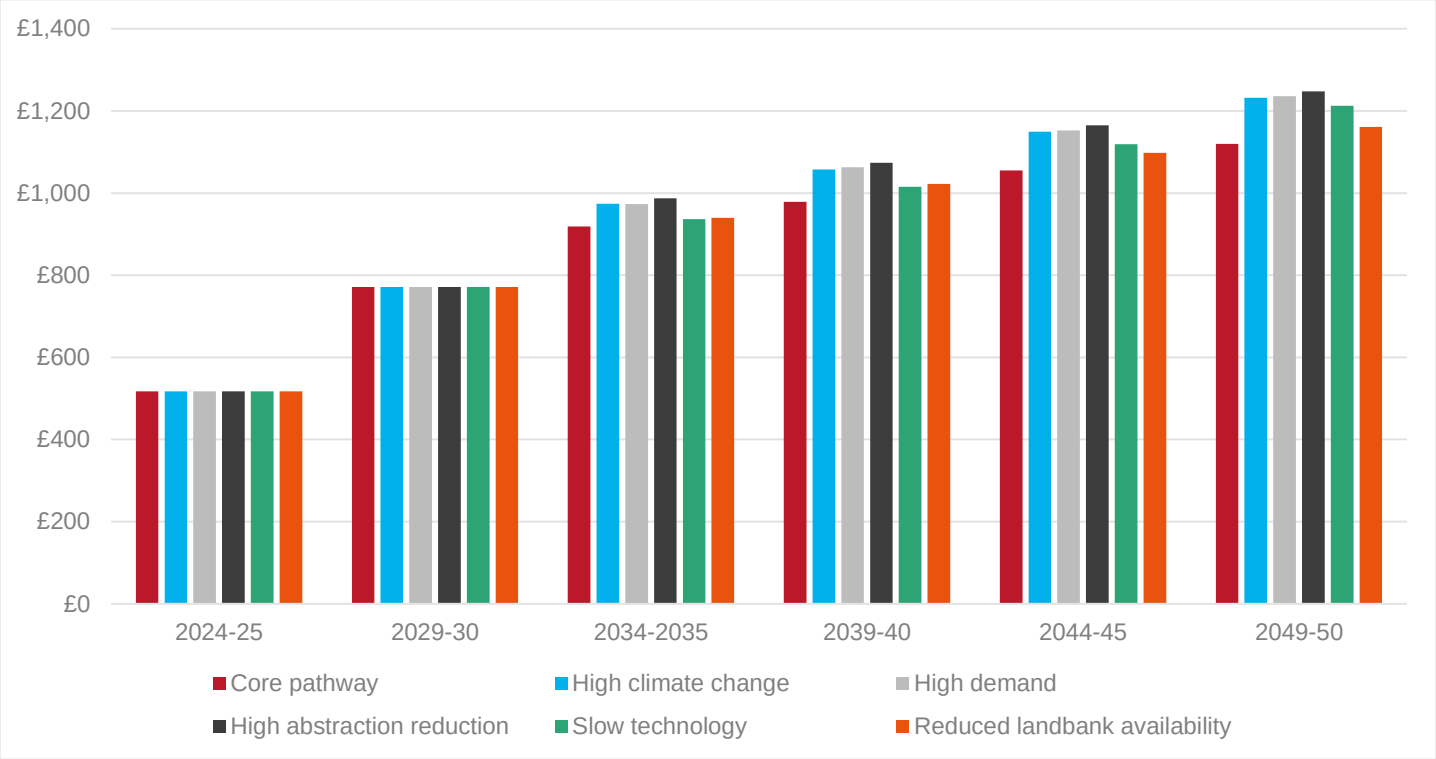
- Firstly, as with all our planning, we have developed our enhancement cost estimates to be robust and efficient and have been subject to internal challenge and scrutiny (recognising there is inevitably more uncertainty about longer-term projections, as discussed above).

- Secondly, we have forecast stretching performance from base, such that some aspects of our 2050 ambition will be delivered purely from efficiencies in the way that we carry out existing activities (e.g. operational and process improvements; savings from innovation). This means that all pathways only capture the incremental enhancement investment that is genuinely unavoidable if we are to meet our 2050 ambition.

- Thirdly, we have profiled our investments in such a way as to smooth bill impacts over time (as far as possible). For example, we have deferred some investment to improve our performance on supply interruptions to later AMPs, to achieve a smoother profile while still achieving the necessary performance improvement by 2050. This is discussed in more detail in the next sub-section.

Figure 22 shows the average water and sewerage bill at the end of each AMP under our core pathway, and under the relevant alternative pathways that form each scenario in our LTDS. The total average bill forecast in 2050 is £1,120 in the core pathway, with a smooth increase over time (albeit faster over the first 10 years) rather than short sharp shocks and erratic movements. The average bill under alternative pathways is between £1,161 and £1,248.

Figure 22 – Average bill forecasts under core and alternative pathways



The bill impacts presented above reflect a worst-case outcome for a given scenario; in other words, we have taken the most pessimistic combination of alternative pathways relevant to each scenario, as per Table 31 below.

Table 31 – Bill profile assumptions

Bill profile	Alternative pathways included	Data table reference
High climate change	• Water resources – alternative pathway 2 • Sewerage – alternative pathway 1 • Wastewater treatment – alternative pathway 2	• LS3d • LS4a • LS4e
High demand	• Water resources – alternative pathway 2 • Wastewater treatment – alternative pathway 1 (branch a)	• LS3d • LS4g
High abstraction reduction	• Water treatment and supply – alternative pathway 1 • Water resources – alternative pathway 2	• LS3a • LS3d
Slow technology	• Water treatment and supply – alternative pathway 2 • Sewerage – alternative pathway 2 • Greenhouse gas emissions – alternative pathway 1	• LS3b • LS4c • LS4d
Reduced landbank availability	• Bioresources – alternative pathway 1 (branch b)	• LS4i

On the other hand, if two or more of the adverse scenarios materialise, the bill impacts would be compounded. Therefore £1,248 is not the maximum long-term average bill that may be needed in 2050 to fund the investment required to meet our full set of 2050 ambitions.

It is worth highlighting that the 2025-26 to 2029-30 bill impacts will vary from those proposed in the wider plan; for this graph we have followed to Ofwat guidance, whereas our full AMP8 plan is based on more sophisticated financial modelling.

Fairness between current and future customers

A long-term strategy requires us to consider fairness between what existing customers will pay for and what is paid for by future customers. It would not be appropriate nor feasible to burden current customers with the full costs of securing the performance improvements that we need, but equally it would not be appropriate to push all costs to later in this period.

We have undertaken several customer research projects that specifically discussed the phasing of investments to and the related impact on bills over the longer term.

The first two of these projects – to support the development of our regional water resources plan (WCWR) and our drainage and wastewater management plan (DWMP) – indicated preferences to invest early.

- WCWR: Customers favoured earlier investment in new supply options, even if this carried an increased risk that they may not be needed, or they could be incorrectly scoped. For customers, the benefits of acting early and being prepared were seen to outweigh the potential benefit of waiting for more certainty in the future.

- DWMP: Customers preferred that Wessex Water should invest in the immediate period (2025-2030) rather than spread investment over a longer period.

However, our Affordability and Acceptability Testing (A&AT), which was undertaken for PR24 and which presented customers with a fuller investment plan, revealed a more mixed picture. Of those respondents that expressed an opinion on bill phasing, 44% preferred an increase starting sooner to spread increases across different generations of bill-payers, while 13% preferred to delay bill increases to put more increases onto younger and future bill-payers. Non-household customers had a slightly stronger preference (50%) for investment to start sooner.

Furthermore, a significant proportion of customers didn't feel this was a topic they could reasonably comment on – with 43% of household customers and nearly a quarter of non-household respondents (23%) indicating they didn't know enough to give a view.

See WSX04 – A summary of our customer research for more details on these projects, including how we ensured our quantitative and qualitative research drew on a representative sample of younger and older customers.

We have carefully considered the phasing of investments, taking account of these insights. Given the mixed picture presented by respondents, we have generally sought to deliver a smooth profile of performance improvement and cost across the AMPs. We recognise that our core pathway shown in Figure 9 does not reflect a flat profile of spend, and that there is a larger increase in costs over AMP8 and AMP9 before investment falls. However, as explained in Chapter 3.2, this reflects the need to deliver major enhancement programmes by 2035 in order to meet specific regulatory targets, particularly in respect of wastewater and water resources.

In light of this, we have sought to mitigate the resulting impact on current customers as far as possible by phasing some necessary (but time-flexible) investments. For instance, we have reprofiled the speed of our smart metering rollout programme over AMP8 and AMP9, rather than completing the majority of the rollout in AMP8. We have also profiled investments in areas such as pollutions / flooding and supply interruptions to later in the 2025-2050 period.

In this way, we can to some extent mitigate some of the ‘bow wave’ in investment and bill impacts over the next two AMPs and smooth the profile of bills. While the resulting profile of investment remains front-loaded, this is consistent with a slightly stronger preference among respondents for undertaking investment sooner rather than later. Overall, we consider the pathways in our LTDS have been refined and optimised in the best way possible to deliver fairness between existing and future customers, within the constraints created by statutory requirements.

We discuss the wider customer insights used to inform our LTDS – besides affordability issues - in Section 5.3. This includes a summary of our research conducted in support of our SDS, which covered included intergenerational family group in-home immersion sessions.

4.5. Enhancement funding for preparatory work

Ofwat’s guidance that some enhancement investment may be necessary to keep future options open in circumstances where it is unclear whether a trigger point is likely to be met in the following price review period, but work is required in this period to ensure the potential need can be met.

In our LTDS, all our trigger points occur at or after the next price review period after the decision point. In other words, the point at which additional expenditure needs to be occurred always falls at the start of (or after) the following AMP in which the decision point is reached. This means that for all alternative pathways, we have the opportunity to develop the business case for additional enhancement investment as part of the price review process.

We recognise however that the time lag between our decision point and trigger points are our best view at this point in time and may not always be sufficient. Where circumstances change and the trigger point needs to be brought forward, for instance due to an updated view of development lead times for a particular activity, we would expect to see transition funding for this work in advance of the start of the next AMP.

5. Foundation

Consistent with Ofwat's final methodology guidance, we have set out in this chapter the key assumptions and uncertainties behind our LTDS, to give stakeholders further insight as to how our strategy has been built up (Section 5.1). This includes our specific assumptions about performance improvements from base expenditure (Section 5.2), which are particularly important in determining the profiles of our core and alternative pathways.

We have also set out in this chapter a more detailed summary of the customer research and insights that have fed into our LTDS, as this is one of the key foundations of the overall strategy.

5.1. Key assumptions and uncertainties

As set out in Ofwat's guidance, the LTDS is based on a set of assumptions about how certain factors will change over time. Changes in circumstances relating to the five scenarios outlined in Chapter 3 (e.g. the pace of climate change) underpin the development of our alternative pathways for each strategy, and are explained in more detail in Chapter 3. This section focuses on the broader assumptions underpinning our LTDS. While we have not developed specific alternative pathways to take account of changes in these assumptions, they may nevertheless affect how our priorities and expenditure develop over the next 25 years.

Economic growth, changes in household incomes and affordability

We have not sought to forecast future changes in economic growth or household incomes; this LTDS sets out the investment that we currently believe will be required under our core and alternative pathways now and in the future. We do not consider that changes in this factor would materially affect the core and alternative pathways presented in this LTDS, which are all intended to meet a given level of ambition. Having said this, if affordability becomes an even more pressing concern over time, this may affect the *profile* of expenditure – and associated bill changes – that allows us to deliver on our ambition. For instance, we may need to defer some enhancement expenditure to later periods in order to mitigate affordability challenges at a particular point in time. This would apply under all scenarios and pathways.

Availability of skills and supply chain capacity

As shown in Chapter 3, AMP8 will see a significant step change in the programmes required to be delivered across the industry. Our LTDS does not forecast such a step change again in the future; indeed, the total expenditure from 2023 onwards (AMPs 10-12) is lower than in AMP8 and AMP9 primarily as the size of our wastewater treatment programme is forecast to decline from then onwards. Given the profile of investment, there is a risk that supply chain skills and capacity could create constraints to delivering on our ambition particularly in the short terms. We have set out in our PR24 plan how we intend to manage these deliverability constraints[16].

However, as with affordability considerations discussed above, we will need to keep this under review and may revise our core and alternative pathways accordingly if things change.

[16] Our approach to deliverability is set out in our PR24 business plan document WSX29 – Transition and Delivery.

Cost of inputs

In developing our core and alternative pathways, we have not made any assumptions about real terms changes in the cost of inputs. If we see material changes in input costs in the future, these will be factored into our options development processes to ensure that the most appropriate solutions are identified at that point in time. In principle, this could affect not just the absolute level of enhancement investment required to meet our ambition, but also the relative expenditure requirements under different pathways (e.g. if the cost of incineration processes increases, this would affect the gap between our bioresources core pathway and alternative pathway LS4(i)).

Wider industry activity

We assume that knowledge sharing between companies will continue to develop, allowing more effective development of solutions. Although the innovation fund is in its infancy, we hope that it will create opportunities that can be utilised in the future and bring down the cost of delivery. No explicit activities have been factored into our forecasts beyond those detailed in Chapter 3.

We have also not made any assumptions on other sectors beyond the water industry having fundamental shifts in the expectations placed on them, for example increases in expectations on farmers for nutrient reductions. Our nitrates plan for supply assumes catchment management is successful, with an alternative pathway if this is not the case. For bioresources, we are forecasting changes to come in at some point limiting the ability to spread sludge to land as detailed in our alternative pathways.

Innovation and cost efficiency

Innovation is key to delivering our plans now and in the future in the best value way possible. We will continue to encourage innovation within Wessex Water, as demonstrated by many of the case studies throughout our PR24 plan[17], to (among other things) maximise cost efficiency and minimise the cost to customers of delivering the improvements required under our PR24 plan and LTDS.

In the LTDS, this is primarily reflected in our assumptions about performance improvements from base expenditure. This is discussed in more detail in Section 5.2 below. In summary, we have considered the scope for potential future technology and innovation to drive improvements from similar levels of base expenditure as is proposed in our AMP8 plan. We have done this primarily by looking at historical trends in performance, given base expenditure levels, combined with a forward-looking view as to the near-term impact of planned improvements in processes and approaches.

In addition, we have also made specific assumptions about technological developments. These have been based on Ofwat's common reference scenario for technology, and further informed by our internal Innovation Forum which horizon scans for future innovation developments and produces a biannual report on this. As set out in Chapter 3, our core pathway is based on the 'fast technology' scenario. This assumption is particularly important for the profile of investment under our water treatment and greenhouse gas sub-strategies, and is why we have also developed an alternative pathway for each of these sub-strategies where technology developed more slowly and we have to use more costly interventions to meet our ambition.

In practice, the impact of innovation on cost efficiency is very difficult to forecast particularly over a 25-year time horizon. In some areas, we may well be able to achieve more stretching performance improvements from our

[17] See for instance our work with Stormharvester, described in our PR24 business plan Executive Summary (WSX01), as an example of where an initial challenge for the business and its solution has been extended to provide a wealth of benefits.

assumed levels of base expenditure, which would imply a reduction in enhancement funding required to deliver on our 25-year ambition. In other areas, unforeseen headwinds may offset any efficiency gains from innovation. As such, this remains a key area of uncertainty and one which requires close monitoring as part of our LTDS.

Government and regulatory policy

In revising our LTDS, we have not developed a specific scenario related to changes in government and regulatory policy, as any such changes are unlikely to be specific to our circumstances. However, in developing our alternative pathways, we have assumed that changes under some of the common reference scenarios may themselves lead to a resulting change in regulations, which in turn would affect the profile of investment. We have sought to make sensible assumptions about such changes where relevant, to provide the best view as to future expenditure requirements.

For example, one of our alternative pathways for the water treatment and supply sub-strategy – while underpinned by a scenario of high abstraction reduction – assumes a change to DWI regulations to reduce the existing 'tier 2' threshold for categorising PFAS. This reflects recent regulatory announcements and responses to increasing public perception about the impacts of PFAS.

Likewise, for our wastewater sub-strategy, our alternative pathway – while underpinned by a scenario where demand is higher – assumes this will manifest in a tightening of phosphorus and nitrogen permits, which would then require further investment in treatment options to meet our 2050 ambition and associated performance commitment in respect of discharge permit compliance. Moreover, in this particular case, uncertainty around regulatory approval will have a major impact on the solutions that we use to meet this tightened regulation (i.e. the extent to which we can employ nature-based solutions). We have sought to highlight the extent of this uncertainty by developing two branches for this pathway. This also reflects that the use of nature-based solutions is a priority for Wessex Water.

Besides this, we have not sought to forecast future regulatory targets.

5.2. Performance improvements from base expenditure

The alternative pathways set out in this LTDS focus on enhancement requirements and how these would change under a range of possible future scenarios. However, even without enhancement expenditure, there is potential to deliver performance improvements over the long term through their base cost allowances.

Ofwat's final methodology guidance states that companies should explain how their approach towards asset management will help meet long-term objectives. Companies should also set out their long-term performance forecasts from base expenditure, considering improved technology and processes.

Assumptions about base expenditure

For the purposes of forecasting alternative pathways and long-term customer bill profiles (as set out in Section 4.4), we have assumed that we are funded, for PR24 and into the future, at a level of base expenditure that recovers the depreciation of all existing and newly created assets[18].

For AMP8, this is broadly consistent with the level of base expenditure we are submitting in our wider PR24 submission. This represents an increase in expenditure compared to historic base funding levels, which is necessary to put us on a sustainable path to maintaining asset health.

[18] On a *pre*-frontier shift basis – as discussed in more detail below.

In practice, we would expect our capital maintenance requirements to further increase in the next AMP9. This is because due to the size of our enhancement programme and the potential impact on customer bills in AMP8, we have constrained our proposed AMP8 allowance for capital maintenance expenditure – specifically by deferring some activities until the next AMP. This deferral means we expect to have an even larger capital investment programme in AMP9 than AMP8. This is set out in more detail in WSX10 - Maintaining our services commentary and analysis – see Table 4, which shows that we expect capital maintenance requirements to be around £300 million higher in AMP9 (£1,380 million) than our proposal for AMP8.

We have also assumed enhancement opex from preceding AMPs is allocated to base expenditure in the next AMP. As such, base expenditure would also include cumulative enhancement opex over multiple AMPs, with alternative pathways being focused on new enhancement requirements in each AMP.

To the extent that our base expenditure does not increase in AMP9 and beyond to reflect these factors, this means that our forecast performance from base expenditure set out in this LTDS may be overstated – and therefore the required enhancement expenditure levels to meet 2050 performance targets would be understated. We will keep these assumptions under review and update this aspect of our LTDS accordingly as we develop our business plan for the next price review. We note that, while our base expenditure assumptions would affect the overall level of enhancement expenditure required under all pathways, it would have less impact on the *relative* level of expenditure between different pathways (which we consider to be an important comparison for the LTDS).

Performance improvements from base

Taking the above assumptions as our starting point, we have considered the ability to deliver performance improvements purely from base expenditure. To do this:

- We have primarily drawn on historic trends to understand where we have been able to drive year-on-year improvements in the past, without a step change in investment, and where this is likely to continue. This draws on principles set out in Ofwat's approach to what base buys (see for instance Figure 6.3).

- We have also overlaid the scope for potential future technology and innovation to drive further improvements from similar levels of expenditure, consistent with the benign state of the world used to develop our core pathway.

- However, in doing so, we have also been mindful that we will continue to be challenged to make efficiency improvements to our capital maintenance programme in each AMP, and that many technological and operational innovations contribute towards *maintaining* performance in light of a frontier shift efficiency challenge, rather than increasing the absolute level of performance[19]. In other words, we have assumed the *post-frontier shift* capital maintenance allowance will reduce over successive AMPs (all other things equal) to reflect changes in the efficiency frontier – driving reductions in costs – over time.

For four areas (customer contacts about water quality; storm overflows; operational GHG (water); and operational GHG (wastewater)), we consider that the assumed level of base expenditure would allow us to improve our performance.

We have also forecast an improvement in performance from base for internal / external sewer flooding and total pollutions. This is because for AMP8, we have allocated specific expenditure on these areas to base expenditure,

[19] We assume an ongoing frontier shift efficiency of 0.5% per annum, consistent with our PR24 business plan.

as part of cost adjustment claim. We consider further improvements in these areas would require another step change in funding, whether through an increase in base costs or further enhancement funding.

For most other areas, we have forecast flat performance from base expenditure through to 2050. We consider this to be ambitious in practice, particularly for key asset health indicators such as leakage and sewer flooding, as it would require significant efficiencies to be realised to maintain asset health and offset natural rates of rise in the face of an ongoing frontier shift challenge. However, for the purposes of this LTDS, and recognising the uncertainty in future funding levels, we consider this is a reasonable simplifying assumption.

For sewer collapses, we forecast that performance would decline between now and 2050 if we were funded for AMP8 levels of base expenditure. As explained in Chapter 2, we consider that even if we matched replacement investment rates to the rate of deterioration it would still take decades of investment to slow down the rising trajectory.

The full set of performance targets and what change in performance we would expect from base expenditure is set out in Table 32. It also summarises where we need enhancement investment in the core pathway to meet our overall ambitions as set by the SDS. For areas where (i) flat performance is consistent with this ambition, and (ii) base expenditure allows us to achieve this, our core pathway does not include any enhancement expenditure allowance in future AMPs to directly contribute to such performance, as this would not represent good value for money. For other areas where we intend to meet a more stretching target by 2050, and base expenditure cannot by itself allow us to meet this, the core pathway includes relevant enhancement expenditure.

Table 32 – Summary of performance from base by performance commitment

Forecast performance from base	Performance target	Base delivers ambition?	Enhancement expenditure required?
Improving performance by 2050	Customer contacts about water quality	Yes	No
	Operational GHG (water)	No	Further enhancement expenditure included in core pathway to increase speed of reduction to 2030, and to further mitigate reliance on offsetting beyond 2030 – see GHG sub-strategy for details.
	Operational GHG (wastewater)	No	
	Internal / external sewer flooding	No	Further enhancement expenditure included in core pathway to achieve 2050 target to halve flooding incidents – see Sewerage sub-strategy for details.
	Total / serious pollutions	No	Further enhancement expenditure included in core pathway to achieve 2050 target to reduce incidents to 0 – see Sewerage sub-strategy for details.
Maintaining performance by 2050	Water supply interruptions	No	Enhancement expenditure included in core pathway to deliver step change in interruptions from AMP10 – see Water Treatment and Supply sub-strategy for details.

	Unplanned outage	Yes	No
	Storm overflows	No	Enhancement expenditure included in core pathway to deliver storm overflow improvements consistent with SODRP – see Sewerage sub-strategy for details.
	Leakage	No	Enhancement expenditure on leakage reduction activities included in core pathway to meet leakage reduction targets – see Water Resources sub-strategy for details.
	PCC / Business demand	No	Enhancement expenditure on water efficiency activities included in core pathway to achieve stated reduction in PCC – see Water Resources sub-strategy for details.
	River water quality	No	Enhancement expenditure on new phosphorous removal schemes included in core pathway – see Wastewater Treatment sub-strategy for details
	Biodiversity	No	Enhancement expenditure on tree planting and land management included in core pathway to deliver increase in BUs – see Section 3.5.7 for details.
	Bathing water quality	No	Enhancement expenditure required to maintain performance in the face of additional bathing waters being designated across future AMPs.
Declining performance by 2050	Sewer collapses	Yes	No
	Mains repairs[20]	Yes	No

Performance forecasts from base expenditure across the 2025-2050 period are set out in data table *LS2 – forecast outcomes from base expenditure.* We have also set out in Table 33 below the performance profiles if we were only funded for AMP8 levels of base expenditure for the next 25 years.

Our document WSX47 – Outcomes tables commentary goes into detail on the performance we expect to deliver from base for our performance commitments, both in AMP8 and through to 2050. For more detail about specific assumptions for individual performance commitments, please see WSX47, section 1.X.3.

[20] We are forecasting an increase in proactive repairs from today's levels to deliver an *improvement* in performance for leakage reduction and customer contacts about water quality. This means that the mains repairs performance commitment itself would show a decline in performance over the period. However, if we are not funded for leakage enhancement activities, this knock-on impact would be less prevalent, and our mains repairs profile could be maintained.

Table 33 – Full performance forecasts from base

Performance commitment	Forecast change in performance level?	Improvement from base expenditure?	Forecast end of AMP7 performance	Performance from base (2050)	Total forecast performance (2050)	Proportion of absolute improvement delivered through base	Details
Water supply interruptions (over 3 hours)	Yes	No	00:05:00	00:05:00	00:00:00	-	-
Customer contacts about water quality	Yes	Yes	1.02 per 1,000 population	0.72 per 1,000 population	Same as base	100%	Assumed historic improvements continue as per recent trend. Improvements expected from increased level of mains replacement (funded from increased base expenditure in AMP8) alongside targeted proactive flushing activities; dynamic risk assessment of worst-performing zones; improved customer awareness and education around causes of water quality.
Unplanned outage	No	N/A	5.02%	5.02%	5.02%	-	-
Mains repairs	Yes	No	145 per 1,000km of mains	150 per 1,000km of mains	158 per 1,000km of mains	-	Assumed a continuation of recent historic trends of reactive repairs reducing but forecast increase in proactive repairs to meet leakage reduction targets. However, if only base funding was available and we are not funded from leakage enhancement activities, this knock-on impact would be less prevalent, and our mains repairs profile from base could be maintained at 150 per 1,000kms.

Internal sewer flooding	Yes	No	1.32 incidents per 10,000km of sewer	1.16 incidents per 10,000km of sewer	0.66 incidents per 10,000km of sewer	24%	We have reallocated flooding reduction costs to base in our updated PR24 plan, so would see an improvement from base in AMP8. Further improvements would require another step change in funding, whether through an increase in base costs or further enhancement funding.
External sewer flooding	Yes	Yes	16.93 incidents per 10,000km of sewer	13.07 incidents per 10,000km of sewer	8.25 incidents per 10,000km of sewer	44%	
Storm overflows	Yes	No	Average of 26.1 spills per overflow	Average of 22.65 spills per overflow	Average of 8.9 spills per overflow	20%	Improvement between end of AMP7 and 2050 performance from base is due to end-AMP7 improvements accruing in year 1 of AMP8, as well as forecast 5% improvement from base achieved in AMP8.
Sewer collapses	Yes	No	5.73 per 10,000km of sewer	9.78 per 10,000km of sewer	9.78 per 10,000km of sewer	-	
Leakage	Yes	No	7% reduction on 2019/20 baseline	12% reduction	50% reduction	12%	Improvement between end of AMP7 and 2050 performance from base is due to end-AMP7 improvements accruing in year 1 of AMP8.
Per capita consumption	Yes	No	1.7% increase	1.0% increase	23.6% reduction	3%	
Business demand	Yes	No	4% reduction	3.1% reduction	15.4% reduction	0%	
Total pollution incidents	Yes	No	35.5 incidents per 10,000 kms of sewer	13.68 incidents per 10,000 kms of sewer	0 incidents per 10,000 kms of sewer	62%	We have reallocated pollutions reduction costs to base in our updated PR24 plan, so would see an improvement from base in AMP8. Further improvements would require another step change in funding, whether

							through an increase in base costs or further enhancement funding.
Serious pollution incidents	Yes	No	1	1	0	0%	
Bathing water quality	Yes	No	80.6%	80.6%	83.2%	0%	
River water quality (phosphorus)	Yes	No	0.1232	0.1232	0.8131	0%	
Biodiversity	Yes	No	0 BUs	0 BUs	2.21 BUs	0%	-
Operational greenhouse gas emissions (water)	Yes	Yes	31049 tonnes	0 tonnes	0 tonnes	83%	Base activities include: energy efficiency measures, use of non-fossil fuel alternatives to diesel for standby generation, conversion of our fleet from diesel to electric, behind-the-meter renewable electricity methane monitoring. Note this excludes netting-off impact of retention of biomethane certificates that are currently sold – hence there are some residual wastewater process emissions of around 12,348 tonnes by 2050.
Operational greenhouse gas emissions (wastewater)	Yes	Yes	113337 tonnes	28854 tonnes	12,348 tonnes		

Other improvements from base

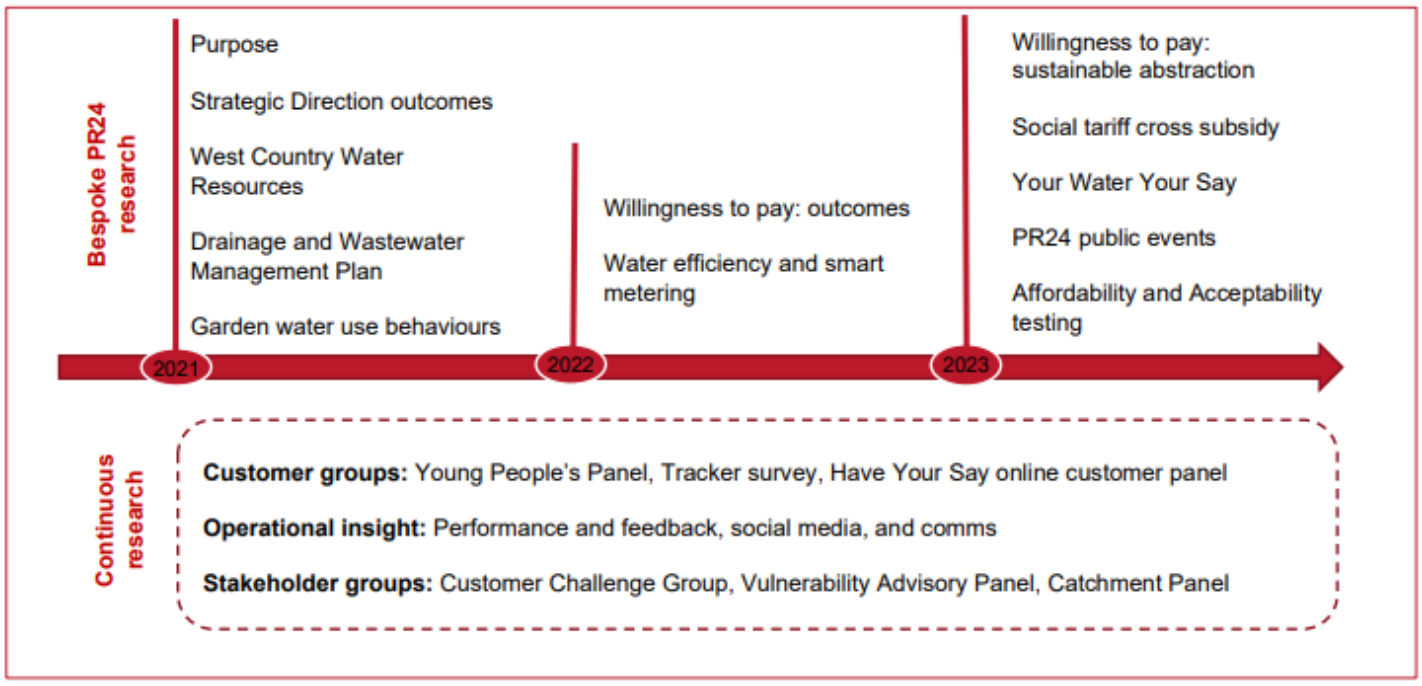
The above discussion focuses on improvements to performance targets which underpin our key LTDS ambitions. However, we note that base expenditure will also contribute to other areas that contribute to our overall corporate mission. This includes our ambition in respect of C-Mex (as discussed in Section 3.5.7) to improve customer and wider stakeholder engagement, and other objectives such as our commitment to open data; supporting apprenticeships; and improving employee satisfaction and wellbeing. These will all be achieved through better use of base funding.

5.3. Customer and stakeholder insight

Customers are a key part of our decision-making process alongside other regulators and stakeholders. Where we are able to meaningfully, we seek their views on outcomes, priorities, delivery options and affordability. We engage with a wide range of stakeholders through a variety of regularly convening panels and bespoke research projects. Our customer research projects seek to engage with people that are representative of the demographics of our region, and we have a Young Persons Panel that takes place every year gaining the view of our future customers.

Our comprehensive research programme of bespoke and continuous insight projects has influenced our PR24 plans and our LTDS. We describe below how our research has been foundational to these plans and strategies.

Figure 23 – Timeline of research projects that have shaped our Business Plan and LTDS



More detail of the customer research activities, and how they meet Ofwat standards for research, challenge, and assurance, can be found in our PR24 business plan documents WSX04 – WSX06.

Ambition – creating our SDS outcomes.

The primary way in which customer insight has informed our LTDS has been through the SDS itself. This is because the SDS sets the outcomes that we are seeking to achieve, through our LTDS. This is explained in detail in Chapter 2 of this document.

This means that all customer and stakeholder insight that fed into co-creating our 8 SDS outcomes ultimately influences our long-term strategies.

We conducted a bespoke research project to support the development of our SDS, taking account of the challenges around obtaining meaningful views on long-term preferences that is highlighted in Ofwat's final methodology guidance. In summary:

- We worked with Accent Market Research to use a complementary mix of qualitative and quantitative methods between July and September 2021.

- Qualitative methods included:
    - A co-creation workshop with 11 industry experts representing a range of interests alongside 'emerging thinkers' from within Wessex Water.
    - Intergenerational family group in-home immersion sessions – different generations within the same family discussing broad priorities and different motivations.
    - Focus groups and depth interviews with 92 participants. These sessions were tailored to a range of customer and stakeholder audiences – including industry stakeholders, retailers, businesses, colleagues, and customers including some who need extra help. Recruitment screening was used to ensure a representative sample of customers were selected – participants were from a range of socio-economic statuses, household or business sizes and geographical areas.

- The quantitative elements of the research involved online, face-to-face and telephone surveys with uninformed household customers, citizens and businesses plus informed household customers and colleagues. In total this involved 1,379 household customers, 113 colleagues and 135 businesses.

The qualitative phase spontaneously generated a list of 11 potential outcomes which were then verified and refined into 9 outcomes during the quantitative phase. These co-created outcomes underwent further development internally into the 8 outcomes in our strategic direction which our plan, and LTDS, has been created from.

Furthermore, there is one area in which more recent customer research has informed our LTDS ambition. In our SDS, we set out our ambition to eliminate the discharge of untreated sewage from storm overflows, prioritising those that discharge most frequently and those that have environmental impact. As explained in Section 2.3 and 4.3, our more recent research, conducted in the development of our PR24 business plan, shows strong customer support for investment in reducing storm overflows, but also that affordability has been flagged as a concern. Given the significant cost of eliminating discharges from all storm overflows, we have not explicitly developed our LTDS around this SDS aim – rather, we have focused for the purposes of our LTDS pathways on the level of investment required to achieve the other SDS aim (in this outcome area) of halving the impact of sewer flooding.

Strategy – how we achieve our ambition.

We have also taken account of customers' and stakeholders' views in developing the strategy to meet our ambition; that is, we have used evidence of customer priorities and preferences to inform the selection and sequencing of key enhancement investments for our core pathway.

We have drawn on our PR24-specific research to shape our core pathway and the investment profiles for each sub-strategy that comprises this pathway. In particular, throughout the creation of our PR24 plan, maintaining affordability has been key and we have sought to develop a plan which limits bill increases through to 2030 to affordable levels. This has led us to deferring several investments that were originally included for consideration as part of our AMP8 plan (for instance in respect of nutrients and demand management), as well as adjusting our low and no regrets investments in AMP8 to ensure we propose a plan that is affordable for customers. This has pushed some investment into AMP9. This is reflected in our LTDS, and is the primary reason why the core pathway presented in Chapter 3 increases slightly between AMP8 and AMP9, as it leads to a smoother profile of bill increases over time than if all investment was undertaken in AMP8.

The table below sets out how customer research has informed the development of our core pathway for individual sub-strategy areas.

Table 34 – Key customer insights for LTDS core pathway

SDS Outcome	Sub-strategy	Customer research and insight
Safe and reliable water supply	Water treatment and supply	This was an area of priority for customers, reflected in our ambitious performance commitments for 2050. However, in our PR24 affordability and acceptability testing (AAT), customers ranked supply interruptions as the lowest priority of the three performance commitments in the water supply area, given our existing industry-leading performance in this area. This has informed our LTDS core pathway for supply interruptions, where we are expecting to defer enhancement investment until later AMPs and focus on improvements from base expenditure up to that point, which we consider will keep our relative performance high in this area as well as keeping us on track to meet our 2050 ambition. This is also supported by the willingness to pay research we conducted in autumn 2022, where we saw a status quo preference for this area for AMP8.
Sustainable abstraction	Water resources	Our customer research has informed our investment in the water resources sub-strategy. Specifically, while our draft WRMP included plans for rolling out smart meters to over 90% of properties by 2030, our AAT found this to be an area which customers were less supportive of. We have therefore spread this investment over AMP8 and AMP9 to ease affordability concerns. This is reflected in our core pathway. Supply side investment was also flagged in our WRMP research to be important to customers. Accordingly, our AMP8 business plan (and LTDS core pathway) includes several 'low regrets' options assessments for supply side schemes to allow us to keep future resource options open in AMP9 and beyond. This adds some cost to the core pathway, but allows us to move to the alternative pathways set out in Chapter 3 should this become necessary in future. This is consistent with Ofwat's guidance on what should be included in a core pathway.
An effective sewerage system	Sewerage	Our customer research conducted for PR24 and for the DWMP indicated customers strongly support a reduction in flooding incidents. This has informed our LTDS core pathway and supports our sequencing of key enhancement investments so as to deliver a significant improvement in pollution incidents using additional enhancement investment over AMP8 and AMP9. This also means that we will be well-placed to meet our 2050 ambition in this area.
Great river and coastal water quality	Wastewater treatment	Our customer research conducted for PR24 and for the DWMP indicated customers strongly support a reduction in pollution incidents. This has informed our LTDS core pathway and supports our sequencing of key enhancement investments so as to deliver a significant improvement in pollution incidents using additional enhancement investment over AMP8 and AMP9. This also means that we will be well-placed to meet our 2050 ambition in this area.
Net zero carbon	Greenhouse gas emissions	Achieving net zero remains a key commitment for the industry and the government, and we must play our part to help the UK reach net zero emissions and reduce our impact on climate change. However, our customer research indicates this is seen by customers as a less important area to see increased investment for some customers. As such, our core pathway includes moderate enhancement investment in this area particularly over AMP8 and AMP9 such that the mix of investments in the core

		pathway, while achieving our full SDS outcomes overall, is more heavily weighted towards customer priorities in the early period.
Increased biodiversity	Biodiversity	Supporting the environment, which underpins several outcomes, has now become an important area for customers alongside what has traditionally been seen as our core areas of focus – the supply of drinking water and treatment of wastewater. In particular, enhancing the natural capital of the land we own has been a key focus of our Customer Challenge Group and Catchment Panel. Our core pathway therefore includes some enhancement spend in each AMP to improve our contribution to regional biodiversity and to achieve our SDS outcome for biodiversity by 2050. As discussed in Chapter 3, we expect this to be sufficient under a range of plausible scenarios and so no explicit alternative pathways have been developed for biodiversity. Further detail on our biodiversity strategy including customer insight, can be found in WSX25 - Improving biodiversity.
Great customer experience	Customer experience	While this is not an area of focus for this LTDS, our long-term ambition is to be a top ten service provider in the UK by 2050. Our willingness to pay research showed customers are happy with the service they receive now, but in the future, we will ensure we continue to provide the service customers have come to expect from us, and other industry leaders. We consider we can deliver this through our base expenditure, and so no specific enhancement investment has been included in the core pathway for this.

Summary

Overall, we consider that both the ambition and strategy underpinning our LTDS has been well-informed by, and is consistent with, the evidence from our extensive customer research and insight. This has been complemented through our engagement with the Customer Challenge Group (CCG), with whom we have shared our updated strategy and the long-term bill profiles associated with our alternative pathways.

We note that the Consumer Council for Water's review of water companies' 2025-30 business plans noted Wessex Water as a good example of a business plan that reflected evidence from customers, which further supports this foundation of our LTDS.

6. Response to Ofwat feedback

This chapter sets out a summary of the feedback we have received from Ofwat during the development of the LTDS (Table 35), and in its July 2024 Draft Determination (Table 36) on our original submission to Ofwat in October 2023.

We have set out the actions we have taken to address the comments, signposting where relevant to revisions to the original LTDS submission.

Table 35 – Key feedback received in April 2023 on our LTDS and our response[21]

Area	Feedback	How our LTDS addresses feedback
Ambition	In the PR24 submission, Ofwat expects Wessex Water to use the factors listed in their guidance to inform the ambition.	2050 performance commitments reflect the priorities in the Government's strategic policy statement – including environmental ambition (as all relevant targets are higher in 2050 than now) and on all aspects of water resilience. 2050 performance targets for leakage explicitly reflect relevant legislation – specifically 2021 Environment Act targets. 2050 performance targets are consistent with strategic planning framework outputs and with meeting all WINEP requirements. Customer and stakeholder preferences have been reflected in our ambition via the SDS, as explained in Section 5.3. Ongoing service improvements are reflected in that we have forecast improvements from base, as detailed in Section 5.2, and considered what this means for the absolute level of performance we can achieve by 2050.
	It is expected that Wessex Water consider the coherency between proposed performance commitment levels for PR24, forecast performance commitment levels up to 2050, and the customer evidence used to inform the ambition. Where appropriate, explain how and why these levels differ.	Forecast performance commitments to 2050 are aligned to SDS targets where relevant. Where performance commitments do not have an explicit SDS target, we have derived these for our LTDS. Our PR24 performance commitment targets to 2030 put us on a credible trajectory to meet these longer-term targets, though in some areas the profiles reflect an assumed step change in enhancement investment in later AMPs. This reflects the customer evidence about respective priorities – as set out in Section 5.3.

[21] Ofwat feedback on development meeting for long-term delivery strategies, 3 April 2023.

	If alternative glidepaths for different performance levels and pace of delivery are being considered, Wessex Water should present a 'most likely' view of the glidepaths in the business plan tables. This approach allows to present a single adaptive strategy, in line with Ofwat's minimum expectations, rather than multiple alternate plans.	Our alternative pathways seek to deliver the same level of ambition set out in Chapter 2.
Core and alternative pathways	In the PR24 submission, Ofwat expects Wessex Water to clearly explain how they have identified and prioritised low-regret investment.	Our core pathway contains essential investment required to deliver on our ambition in a benign state of the world, and low regrets investment to keep options open (e.g. design and development work for different supply options). This is detailed in Chapter 3. We have also identified what proportion of this investment is driven by statutory requirements.
	The selected investment, and the timing of that investment, needs to be shown to be optimal given a wide range of plausible scenarios and their likely occurrence. This includes investment required to keep future options open or investment required to minimise the cost of future options. Where possible, low-regret investments should be flexible and modular.	Investments have been selected using our optioneering and decision-making process and EDA tool embedded in our wider business planning, as explained in Section 4.1. The timing of alternative pathway investments has been sequenced to come as late as possible while still ensuring we meet our 2050 ambitions, to minimise the risk of abortive work. They have also been affected by our customer research and considerations around the overall profile of investment, as explained in Section 5.3.
	The LTDS should clearly describe decision and trigger points and explain how the optimal timing of these points were decided.	In Section 3.5, decision points and trigger points for each alternative pathway for each sub-strategy are clearly shown in the relevant diagrams and discussed further in the accompanying narrative. Our monitoring and reporting plan has been expanded to make it clear how we will monitor metrics to inform decision and trigger points – see Section 3.6.
Scenario testing	Ofwat expects Wessex Water to use scenario testing to inform the development of strategy, including the selection and timing of activities in core pathways and the development of alternative pathways.	Scenario testing is embedded in our TOCOB approach to selecting investment options, as set out in Section 4.1 We have considered wider scenario testing (Section 4.2) which demonstrates that our core and alternative pathways are resilient to a reasonably wide range of potential outcomes. The timing of activities is primarily driven by lead times required to meet 2050 ambitions (including any interim milestones such as regulatory dates) and the outputs of our customer research regarding priorities and affordability.

	In the PR24 submission, demonstrate the sensitivity of proposed enhancement investments to future needs and uncertainty.	Section 4.2 sets out our wider scenario testing to understand the sensitivity of our alternative pathways to different assumptions, and how we might expect our investments to change in different circumstances.
	We expect you to use the common reference scenarios to test all areas of enhancement strategy, including those covered by WRMP and DWMP. It is essential that only plausible scenarios are used to develop the core and alternative pathways.	We have applied the common reference scenarios to all sub-strategies. We have considered the relevance of each scenario to each sub-strategy and only developed a pathway where we consider the scenario would materially affect the profile of investment and there is a material likelihood of following this pathway. We have also streamlined the number of pathways in our revised LTDS, compared to our original submission, to ensure that it only captures the most plausible pathways.
	Wider scenarios should be measurable factors with clear and observable metrics that can be used to define decision and trigger points.	We have explicitly considered one wider scenario – landbank availability – which can be clearly measured and monitored. This is set out in the bioresources sub-strategy in Section 3.5. This is in line with other companies' LTDS.
	For scenarios that influence alternative pathways, Wessex should clearly detail the decision and trigger points and explain the mechanism to monitor, review, and report these metrics over time.	In Section 3.5, decision points and trigger points for each alternative pathway for each sub-strategy are clearly shown in the relevant diagrams and discussed further in the accompanying narrative. Our monitoring and reporting plan has been expanded to make it clear how we will monitor metrics to inform decision and trigger points – see Section 3.6.
	There was limited evidence of testing common reference scenarios for technology in line with Ofwat's guidance. Use these scenarios to test the sensitivity of options to different futures and justify the timing and sequencing of activities in the strategy. Consider a wide range of technological developments, beyond those set out in the reference scenarios. Clearly set out all assumptions about the impact of the scenario in the PR24 submission.	We consider that the technology scenario is relevant to three of our sub-strategies (water treatment, sewerage and GHG) as set out in Table 6, and we have developed alternative pathways in each case which reflect the impact of different rates of technological changes. Technology assumptions also dictate the 'branches' of our alternative pathway for bioresources. Our specific assumptions regarding technological developments are set out in Table 6. We have considered more factors than those in Ofwat's guidance, including additional factors which we expect to affect our investment profile for: water treatment and supply; bioresources; and GHG emissions reduction.

	If there are specific technologies which is considered implausible that their adoption could be cost-effective in the region by the dates in the scenarios, clearly explain the reasons why.	We have not assumed that any specific technologies included in Ofwat's guidance for the 'fast technology' or 'slow technology' scenarios would not be available and cost-effective in our region by the respective dates specified.
Base expenditure	Enhancement investments should build on base expenditure initiatives that Wessex Water is considering for long-term performance improvements to meet long-term ambition.	Section 5.2 of our revised LTDS clearly sets out what we have assumed about base expenditure for the purposes of developing our pathway. Where we consider realistic, we have assumed performance improvements from base. The core and alternative pathways in our LTDS consider the incremental investments required over and above this. These assumptions are also set out in data table LS2.
	Ofwat expects Wessex Water to deliver stretching levels of performance from the base expenditure allowance and reflect this in the LTDS.	
Engagement	Clearly explain how the strategies has been informed by customer preferences and provide sufficient and convincing evidence that the customer engagement activities meet Ofwat standards for research, challenge, and assurance.	Section 5.3 summarises how customer insight has informed our LTDS.
	In the PR24 submission, Ofwat expects Board to provide an assurance statement that explains how it has challenged and satisfied itself that the strategy is the best it can be.	We provided a Board assurance statement that covered the LTDS. This is set out in Chapter 7. Our summary of assurance activities has also been updated.

Table 36 – Ofwat feedback received in July 2024 (as part of its draft determination) and our response[22].

Area	Feedback	What we did
Strategy	The company provided insufficient detail on its proposed core and alternative pathways, scenarios, and base expenditures.	The structure of our LTDS has been updated and amended in various places to provide sufficient detail on each of these areas. In particular, Chapter 3 (Strategy) has been expanded to include further information on both core and alternative pathways. Further information on our assumptions about future levels of base expenditure is included in Chapter 5, Section 5.2. Table 1 in the revised LTDS sets out where each of the key areas of Ofwat's final methodology are covered in the revised documents.
Strategy	It did not present a clear coherent plan with a single core pathway and there was no detail on the key strategic investments that make up the core pathway outside of the numbers provided in the data tables.	Our revised LTDS contains a new Chapter 3 – Strategy – which presents our entire 25-year strategy in one place. Section 3.2 presents our single core pathway – see in particular Figure 9. We also present more information on the key investments assumed under the core pathway, by sub-strategy. This is covered in Chapter 3, Table 7, and each of the relevant sub-sections in Section 3.5. This corresponds to the accompanying data provided in data tables LS3 and LS4.
Strategy	It did not include any information on what activities are being done to meet short-term requirements, keep future options open or minimise the cost of future options.	Our core pathway includes investment that is required to ensure we are ready for all plausible future scenarios. This is most relevant to our water resources sub-strategy, given the lead times required to move to alternative scenarios there. This is explained in more detail in Section 3.5.2. Minimising the cost of future options is achieved by sequencing investments such that they are only incurred if necessary to deliver our ambition. We have reviewed and in some cases amended out trigger points for some alternative pathways to achieve this.
Strategy	Its alternative pathways were poorly presented. It was difficult to ascertain under what circumstances it would need to move to an alternative pathway, when this decision would be made or how these circumstances will be assessed and monitored.	We have re-presented each of our alternative pathways, separately for each sub-strategy to aid clarity, and drawing on best practice from other companies' LTDS. For each sub-strategy, we have also set out a description of the decision point capturing the circumstances under which we would move to an alternative pathway, and when this decision would be made. Section 3.6 sets out what metrics we will monitor to evaluate these circumstances.

[22] Table 2, PR24 draft-determinations – Wessex Water Quality and Ambition appendix

Strategy	The company outlined scenarios but the impact of each common reference scenario across the whole strategy was not clearly laid out.	The impact of each common reference scenario across the whole strategy is presented in Table 6 and discussed further in Section 3.3. In Section 4.4, we also present the impact on long-term customer bills at a scenario-wide level i.e. capturing the full impacts of each adverse scenario coming to pass, across all affected sub-strategies.
Foundation	The company provided some detail on the impact of base expenditure on the strategy but there was no detail on the methodology it used to prioritise spending.	Section 5.2 of our revised LTDS clearly sets out what we have assumed about base expenditure for the purposes of developing our pathway. As explained there, we have prioritised spending by assessing whether our 2050 ambitions can be achieved through forecast base expenditure, and then identifying enhancement investment where this is necessary to achieve a step change in performance to meet this ambition. Decisions on how to *sequence* enhancement investments are driven by the timing of relevant regulatory or statutory targets, and where possible informed by customer priorities. These considerations are explained in Section 3.5, and (in the case of customer priorities) further in Sections 4.4 and 5.3.
General	The company did not provide a clear narrative on how the base or enhancement expenditure will contribute to meeting long-term outcomes.	We have substantively revised the narrative in our new Chapter 3 – Strategy – such that there is now a much clearer line of sight between scenarios, pathways, and outcomes.
	The company's long-term delivery strategy submission relied on a second document and was longer than our guidelines.	We have included more information on how customers insights have been used in the development of our LTDS – see in particular section 5.3. This means the updated LTDS is a standalone document.

7. Board Assurance

7.1. Assurance Process

The Board supports the Company's approach to long-term stewardship and challenges the management team to both set an ambitious strategy across all aspects of the business and that each individual element of delivery is aligned with that strategy. The Board therefore supports the concept of the Long-Term Delivery Strategy (LTDS) as one very similar to the approach it already takes. This strategic framework is a key component of the Company's approach to achieving its long-term objectives, bringing together the suite of strategic plans.

In February 2022, the Board considered the strategic direction statement (SDS), which frames the LTDS. The Board were clear that the LTDS must align with the SDS in order to remain aligned to the holistic approach to delivering outcomes and to ensure that the Company does the best for customers, communities and the environment in the long term. The PR24 Non-Executive Group spent considerable time and effort focusing on the intent and detail within the SDS to ensure it reflects the Company's high level of ambition. This led to revisions to outcomes, metrics, and targets. The relationship between the 25-year objectives set out in the SDS and the proposed five-year plan was challenged to confirm the credibility of each. This ensured that the next five-year plan would be representative of the first five years of the LTDS. The Board have continued to refer back to the SDS outcomes throughout the development of the LTDS and the Plan to ensure that the proposals are all pulling in the same direction and that the Plan is credible, ambitious, and specific in its aims.

In October 2022, the Board reviewed the proposed structure of the LTDS and the core and common reference scenarios and, in February 2023, the Board reviewed the methodology used to set the performance forecasts to 2050. The Board discussed whether the LTDS represented the best strategy to meet the Company's stated long-term objectives and how they can continue to support ongoing engagement with our regulators to develop the most efficient planning framework. The Board noted the uncertainty of future statutory and regulatory licence obligations and has taken this into account when reviewing the planning frameworks. As the LTDS is based upon adaptive planning principles the Board is confident in assuring the Plan given future uncertainties and given the ability to react to changes in regulation and other external factors.

In February 2023, the Board were also briefed on the customer engagement, both carried out to date and planned, to ensure that the LTDS reflected customer priorities. The Board is content with the proposals to ensure that the LTDS delivers the best solutions at the right investment pace based on customer feedback and delivers on the targets set out in the SDS.

In June 2023, the Board again discussed the performance commitment levels to 2050 which were developed as part of the LTDS. It was confirmed that these aligned with the outcomes in the SDS, although was noted that for some outcomes there were more PCs than overarching metrics. The Board also noted the inherent risk in targeting stretching performance commitment levels for total pollution incidents and serious pollution incidents. The Board is confident that a reduction in incidents can be achieved with the level of investment being proposed and committed to implementing mitigation measures for third parties as well as improving sewer monitoring required to achieve the performance level. The Board also challenged the proposed approach to mains repairs noting that it is particularly stretching and requires a change in approach, being satisfied that with sufficient funding the target is achievable.

During this period, the Board also reviewed the customer research conducted in Spring 2023, which shows that customers' top outcomes were 'safe and reliable water', 'effective sewerage system', 'excellent river and coastal quality' and 'affordable bills'. This information was reflected in the LTDS. The outcome of the affordability and acceptability research was used to influence the Plan, in particular for smart metering and storm overflows.

In August 2023, the Board reviewed the outcomes of the customer engagement to test smart metering and storm overflow investment trajectories, the results of which were incorporated into the LTDS. In response to this customer

feedback, the smart metering programme was scaled back with a further roll out in AMP9. Both deliverability and affordability concerns were flagged with the acceleration of the storm overflow plans, also leading to a scaling back albeit noting the political, public, and Company desire to ensure the programme remains as ambitious as possible. These are examples of the steps the Board has taken to secure long term affordability for current and future customers.

Additional assurance

In June 2024, the PR24 Executive Group considered the feedback from Ofwat on our original LTDS submission, and the process that had been followed to address this feedback and update our strategy. This has included: a review of Ofwat's published guidance on the development of an LTDS, to identify where our original LTDS did not meet aspects of this guidance; and a review of other companies' LTDS documents to identify areas of best practice. The Executive Group noted the additional detail that has been included particularly around the key strategic investments in each pathway, and the monitoring and reporting plan, so that our LTDS clearly sets out when and how we will move from our core pathway to alternative pathways in future.

The Executive Group also considered the key changes that had been made to the LTDS, as set out in Annex 1. It considered these changes were consistent with our PR24 plan and wider strategic planning framework, and ensure the strategy continues to reflect a credible range of pathways to account for future uncertainty and delivers the best solutions at the right investment pace.

In June 2024, we discussed with our CCG the key changes to our strategy and the implications in particular for customers' long-term bill profiles.

In August 2024, the Board considered our revised strategy, including further changes made to the LTDS to ensure it fully aligns with and reflects the proposed changes set out in our response to Ofwat's Draft Determination. The Board were satisfied that our revised strategy represents a credible and comprehensive set of pathways to allow us to achieve our SDS ambition under a range of plausible futures, and that our revised PR24 plan sets us on the right path to achieving this.

Separately, we also engaged an independent expert (Martin Hurst) to scrutinise our revised strategy against Ofwat's requirements. The Board noted the conclusions of this review and were satisfied with the process followed.

We also engaged Mott Macdonald to provide further assurance of the changes to our data tables that accompany our LTDS, to reflect the updates made.

The Board have also scrutinised the strategic planning frameworks that align to the LTDS to confirm consistency. Specific challenges across these strategic planning frameworks can be found in the costs and outcomes section of WSX44 - Our assurance strategy and assurance statements.

7.2. Assurance statement

We fully recognise and embrace the importance of Board level challenge of the PR24 Business Plan (the "**Plan**") and are clear that our Board is fully satisfied that the Plan represents the long-term vision and ambition of the Company within the current statutory and regulatory requirements.

We have fully engaged and utilised the breadth of experience on our Board during the development of the Plan. This is how we have ensured that the final Plan represents a high quality, financeable and deliverable part of a long-term strategy to provide the services that our customers want and is affordable.

The Board's scrutiny of the Plan and engagement with it, is founded on the Board having assured itself that Wessex Water's internal systems for generating the data and information on which the Plan is based are consistent, accurate and assured and that there are effective internal systems, controls, and processes to ensure that the data

and information on which the Plan is based are wholly reliable. This has provided the basis for the Board to robustly challenge Company management on all the key elements of the Plan and as a whole.

The Board has been particularly focused on ensuring that all the elements of the Plan have been stress tested, considering multiple options to mitigate risks across a wide range of scenarios and we are confident that the Plan is adaptive to future developments. While the future is by nature uncertain, our Board involvement with the Plan has helped to ensure that the Plan provides a robust five-year foundation for taking us from where we are now to delivering on our longer-term objectives, while continuing to meet our statutory and licence obligations, across an extremely wide range of future eventualities in an efficient and customer focussed manner. The WINEP will require updating to take into account recent legal and regulatory changes including nutrient neutrality and Common Standards Monitoring Guidance.

There are other areas where there has either been regulatory resistance or lack of response to proposals that are material to the company meeting its statutory and licence obligations. The members of the Board have also recognised that scrutiny of the Plan must also align with their wider statutory duties under the Companies Act including the need to promote the success of the Company. In considering and challenging the Plan, the Board has therefore considered the long-term consequences of their decisions, the fostering of relationships with suppliers and customers and the impact of operations on the community and the environment and concluded that it is consistent with ensuring a deliverable, affordable and financeable Plan that achieves the goals set for the Company.

Finally, as a Board we are confident that the Plan comfortably exceeds Ofwat's minimum expectations for a Quality Plan and we are proud of the ambition it shows to exceed the expectations of our current and future customers and deliver high quality water and sewerage services for them on an affordable basis into the long term.

Based on the PR24 governance and assurance process and detailed evidence of challenge and recommendations described above, the Board makes the following assurance statement:

The Board has challenged and satisfied itself that the long-term delivery strategy:

- reflects a long-term vision and ambition that is shared by the Board and Company management;
- is high quality, and represents the best possible strategy to efficiently deliver its stated long-term objectives, given future uncertainties;
- will enable the Company to meet its statutory and licence obligations, now and in the future;
- is based on adaptive planning principles;
- has been informed by customer engagement; and
- has taken steps to secure long-term affordability and fairness between current and future customers.

The Board has challenged and satisfied itself that the 2025-30 business plan implements the first five years of the long-term delivery strategy. However, the Board also recognises that due to the latest regulatory changes published at the time of submission, adjustments to the WINEP programme are likely to be required to meet new statutory obligations.

The Board has challenged and satisfied itself that:

- the full implication of the 2025-30 business plan for customers was considered and that the plan achieves value for money; and
- the long-term delivery strategy protects customers’ ability to pay their water bill over the long term and delivers fairness between what existing customers will pay and what is paid for by future customers.

The Board has challenged and satisfied itself that:

- the performance commitment levels in the plan are stretching but achievable and reflect performance improvements expected from both base and enhancement expenditure;
- the expenditure forecasts included in the company’s business plan are robust and efficient;

- the needs for enhancement investment are not influenced by non-compliance or non-delivery of programmes of work (both base and enhancement) that customers have already funded
- the options proposed within the business plan are the best options for customers and a proper appraisal of options has taken place;
- PR24 plans and the expenditure proposals within them are deliverable and that the company has put in place measures to ensure that they can be delivered. This includes setting out the steps the Board has taken to satisfy itself that supply chain risk is manageable and delivery plans account for:
    - the ability of the Company and its supply chain to expand its capacity and capability at the rate required to deliver the increased investment;
    - the impact of similar levels of growth across the sector and any overall sector and supply chain capacity constraints; and
    - key supply chain risks and capacity constraints, such as the availability of specialist resource or components, e.g. river quality monitors, smart meters, or SuDS designers.
- the plan includes price control deliverables covering the benefits of material enhancement expenditure (not covered by performance commitments);
- that the expenditure proposals are affordable by customers and do not raise bills higher than necessary; and
- the expenditure proposals reflect customer views, and where appropriate are supported by customers.

The Board provides assurance that the Plan is financeable on the basis of the notional capital structure, consistent with the definition adopted in the Risk and Return section above of maintaining target credit ratings at least two notches above the minimum of the investment grade under a base case scenario, and over the period from 2025-2030.

The Board provides assurance that the actual company is financially resilient over the 2025-2030 period and beyond under the Plan.

The Board provides assurance that the company's customer engagement and research meets the standards for high-quality research and any other relevant statements of best practice and has been used to inform its business plan and long-term delivery strategy.

Please see WSX44 - Our assurance strategy and assurance statements for the fully signed statements.

Annex 1 – Summary of changes to LTDS

This version of the LTDS – published in August 2024 – is an updated version of our LTDS that was originally published on our website in October 2023.

While the overarching ambition underpinning our LTDS has not changed, we have made some changes to our pathways. This is partly in response to feedback received on our LTDS, and partly to take account of changes in the external environment that have already occurred since then. We have summarised the key changes here to aid comparison and show how our strategy has evolved since it was originally developed.

The framing and presentation of all our pathways has been updated to aid clarity; this table captures the changes that affect the choice of pathways and / or the actual profile and magnitude of enhancement spend captured by those pathways, as these changes are the most material in terms of the underlying strategy.

Table 37 – Changes to LTDS since original publication

Area	Summary of change
2050 performance targets	We have amended the 2050 performance target for customer contacts about water quality to reflect that the definition of this performance commitment (as determined by DWI guidance) has changed since October 2023 – specifically, to continue to count contacts about multiple issues as a single contact. As such, while our level of ambition in this area has not changed, the specific trajectory now aligns with the revised definition. We have aligned our performance commitment trajectories with our 2050 targets for operational GHG (water and wastewater) to achieve 0 tonnes. Besides this, we have made some further changes to the trajectories of performance commitments to reflect updates to our PR24 plan, which has resulted in different 2030 targets. However, no 2050 performance targets have materially changed from our original submission. Any minor changes do not affect our overall ambitions in any area.
Inclusion of bespoke scenarios	We have removed two bespoke scenarios that were originally in our LTDS, capturing changes in Government / regulatory policy; and nitrogen and pesticide levels in our groundwater. This is on the basis that these uncertainties overlap with – and are to some extent captured by - Ofwat's common reference scenarios. Focusing on the common reference scenario therefore streamlines our LTDS without materially affecting any of the alternative pathways it contains.
Water treatment and supply	We have amended our alternative pathways for the 'high abstraction reduction' scenario. This includes additional investment for enhanced nitrate removal upgrades at more sites. In light of DWI clarifying its expectations for PFAS since October 2023, and issuing further undertakings, we consider that additional PFAS treatment at more sites may also be needed under this scenario. The incremental enhancement spend in this pathway has therefore increased to include both nitrates removal *and* PFAS treatment.
Water resources	We have refined the alternative pathways included under this sub-strategy, to align with the most recent version of our WRMP (which has been slightly updated since we submitted our LTDS) and reflect the most representative set of likely pathways in response to the common reference scenarios. This is explained in more detail in Section 3.5.2.

Sewerage	We have removed one alternative pathway covering a scenario where wet wipes are banned. This is on materiality grounds, as this does not result in significantly different investment requirements. We have amended the decision point and trigger point for the alternative pathway to reflect a high climate change scenario, having reassessed the timing of the investment required under this scenario to maintain our ambition. We have also replaced the alternative pathway that captures investment required to eliminate all overflows by 2050. This pathway was taken from our DWMP, but it reflects a higher level of ambition than our core pathway. We consider that it is more appropriate for all pathways in our LTDS to achieve the same 2050 performance, so we have replaced this with another DWMP pathway that keeps the same 2050 performance ambition for storm overflows but reflects uncertainty over the ability to use wetlands to treat overflows.
Wastewater treatment	We have removed one alternative pathway covering a scenario where enhanced nitrate removal is needed at some WRCs. This is on materiality grounds, as this does not result in significantly different investment requirements. We have amended the decision point and trigger point for the alternative pathway to reflect a high climate change scenario, having reassessed the timing of the investment required under this scenario to maintain our ambition.
Bioresources	We have clarified the trigger point for this alternative pathway as the start of AMP9, which is when we would start to make the investments either in ATC or incineration at relevant bioresources sites.
Bill impacts	Bill impacts have been revised to reflect changes to pathway profiles; updated inputs for asset lives, forecast customer numbers and the cost of capital; and correcting some minor errors identified in the calculation of bill profiles in our original submission.

Annex 2 – Summary of adaptive pathways

Table 38 – Summary of adaptive pathways and corresponding data tables.

Area	Pathway	Data table
Water treatment and supply	High abstraction reduction	LS3a
	Slow technology	LS3b
Water Resources	WRMP AP1 – Most likely WRMP pathway	LS3c
	WRMP AP2 – High alternative need	LS3d
Sewerage networks	High climate change	LS4a
	Slow technology	LS4c
Wastewater programme	High demand (a)	LS4g
	High demand (b)	LS4f
	High climate change	LS4e
Bioresources	Reduced landbank availability (a) – fast technology	LS4h
	Reduced landbank availability (b) – slow technology	LS4i
Net zero carbon	Slow technology	LS4d

Table LS4b has been left blank.