LONG TERM DELIVERY STRATEGY

PR24 BUSINESS PLAN 25/30

Dŵr Cymru
Welsh Water

October 2023

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Executive Summary

Context

Since Welsh Water was acquired by Glas Cymru in 2001 the long term delivery of excellent water and wastewater services has been the number one priority for this company. The absence of shareholders has enabled our strategic outlook to focus solely on what is best for our customers, the communities we serve, and the environment - both now and into the foreseeable future.

Who we are

Welsh Water is part of the Glas Cymru Group. We are a not for profit company without shareholders, and therefore we retain all financial surpluses for the benefit of our customers. We are responsible for the provision of statutory water and wastewater services to around 1.3 million households and businesses across much of Wales, Herefordshire and parts of Deeside. Our vision is 'to earn the trust of our customers every day'.

From its inception the primary object enshrined in our company's constitution was the provision of high quality water and wastewater services in line with our legal and regulatory obligations at least cost to the communities that we serve. Performance steadily improved during the 2000s, and in 2007 we published our first "Strategic Direction Statement", *"Dwr Cymru Welsh Water: Our Sustainable Future"* for consultation. There we presented a 25-year view of how we would sustain and raise performance levels, eliminate serious service failures, halve greenhouse gas emissions, and achieve the lowest possible customer bills.

11 years on in 2018 on we published "*Welsh Water 2050*" ("WW2050"), which set out our proposed "strategic responses" to the challenges and trends that were expected to test the provision of sustainable high-quality services in Wales over the ensuing 32 years (whilst also providing important opportunities) all within an overall unifying objective of "*becoming a truly world class, resilient and sustainable water service for the benefit of future generations*". The first "*Review and Update*" of WW2050 published in March 2022 broadly retained the original "strategic responses", albeit that some were modifed to take into account new information. But it noted that a number of dramatic and unexpected shocks, including more frequent extreme weather events and the Covid-19 pandemic, had tested the resilience of the services. These developments underlined the fact that long term strategic planning is subject to significant and profound uncertainty, and that evaluating and managing major risks while building overall resilience is a core priority for the business. We remain committed to periodic reviews of Welsh Water 2050 and will publish updates at roughly five year intervals.

As we approach the landmark 2024 regulatory price review ("PR24") it is as important as ever to maintain and refresh a long term strategic outlook, and we have welcomed the incorporation of the Long Term Delivery Strategy ("LTDS") into the PR24 process as a way of further detailing and communicating our long term outlook.

We perceive that the range and potential influence of major uncertainties has changed in recent years. The effects of climate change now play an influential part in day-to-day operational considerations. Although we have a well-developed view of what we have to do to eliminate our own carbon emissions over the medium to long term, the range of potential climate scenarios beyond

2040 remains wide. There is therefore significant longer term uncertainty as to how climate change will impact on our operating environment and our communities. The expectations of regulators, lawmakers and society in general are evolving quickly, all against the backdrop of significant economic and demographic changes, notably the widening of income inequalities and the "cost of living" crisis. The challenge of affordability is exacerbated by the likelihood that the steady reduction over 30 years in the cost of financing investment in water and wastewater services may now have come to an end, and could be reversed at PR24, putting further upward pressure on customer bills.

The scope for "getting it wrong" by committing to major investments that turn out not to have been optimal is therefore a real risk for water companies and their customers. Our long term strategies have constantly evolved as circumstances and priorities have changed, so we welcome the explicit emphasis placed on the role of adaptive planning under the standardised guidance companies have been required to adopt for their PR24 LTDS.

Purpose

The purpose of this document is to present the company's current strategic view of its long term ambitions (including its legal and regulatory obligations) and the proposed enhancement investment pathways required to deliver them in a range of plausible future scenarios. It reflects an up-to-date assessment of the requirements and views of customers and other stakeholders where appropriate, as well as the judgements and assumptions we have made where reliable evidence on such views is not available. We are grateful to all those that have participated in the process of drawing up our LTDS, notably through our customer engagement activities, the work of the Welsh Water 'Independent Challenge Group' and collaboration with various stakeholders, particularly under the auspices of the Welsh Government's PR24 Forum.

This is the first time companies have been specifically required to prepare an LTDS as part of submissions for a regulatory price review. We look forward to the reaction and feedback our LTDS generates and we will contribute positively to the subsequent development of the guidance: this will help us to produce a more sophisticated and robust LTDS for PR29.

In line with other companies we set out our thinking in accordance with the regulatory guidance[1]. Notably this means that:

- we focus primarily on what is known as our "wholesale" water and wastewater functions. Our customer-facing "retail" functions in relation to household and business customers not addressed in similar detail in the LTDS;
- we express our ambitions with reference to standardised regulatory performance commitments (as well as one 'bespoke' performance commitment and a limited set of 'LTDS outcomes'). Aspects of our ambition that are harder to measure and quantify but which may be considered to be similarly important (e.g resilience to "black swan" events) do not explicitly feature;
- broad assumptions are made regarding the outcomes that may be delivered from 'base' expenditure alone, so that attention is concentrated on what additional `enhancement' investment may be necessary to achieve the company's ambitions; and
- we show how our proposed enhancement programmes for AMP8 represent a 'no/low regrets' set of interventions that are required in all plausible scenarios regarding the future.

We have also incorporated the contents of other strategic planning frameworks, notably the Water Resource Management Plan ("WRMP"), the Drainage and Wastewater Management Plan ("DWMP"), and the National Environmental Programme (henceforth "NEP" for Wales, covering also "WINEP" in England for ease of reference).

It should be made clear that our LTDS does not purport to be a comprehensive 25-year business plan. It represents a coherent yet constrained ***view*** of a range of future pathways prepared in accordance with specified assumptions, scenarios and constraints. It will inevitably be modified and refined in response to new information and changing priorities, especially as regards the latter parts of the 25-year period. However, by showing that a minimum set of near-term interventions is required in all plausible scenarios in order to achieve efficient progress towards our 2050 ambitions it does support our firm enhancement proposals for 2025-30, as set out in our PR24 business plan for the AMP8 period.

1 PR24 and beyond: Final guidance on long-term delivery strategies - Ofwat

Our LTDS in a nutshell

The starting point for the preparation of our LTDS was the establishment of our long term **vision** statement. Building on existing stated corporate objectives, and working with stakeholders notably through the PR24 Forum, we settled on the following:

Common company Vision for the water sector in Wales

We will establish the water sector in Wales as a model of **effective collaboration** for delivering **excellent performance** against the backdrop of the climate and nature emergencies.

We will work with communities, stakeholders and regulators to **co-create and deliver solutions in the most efficient way over the long-term** having taken full account of the needs of our customers, the environment and society. We will seek to reflect the diversity of the people we serve in our workforce.

We will both engage and inform customers, helping them to play their part in addressing future challenges. We will always be responsive to their changing needs and expectations, paying particular attention to customers in vulnerable circumstances.

We will deliver **excellent drinking water quality**, working in catchments to protect raw water quality. We will **upgrade our network** to ensure it is fit for the future and resilient to current and future threats.

We will support a **thriving environment** in our rivers and seas by effectively managing and treating wastewater, upgrading treatment and network capacity where required and dealing with changing rainfall patterns. We will achieve net zero carbon emissions and seek to go further.

We will harness **innovation** and adapt to the world as it changes, while keeping bills as affordable as possible. We will provide a world-class, resilient and sustainable water service for future generations.

In order to translate our vision into specific ambitions for 2050 we consulted customers and other stakeholders in Wales, notably under the auspices of the Wales PR24 Forum convened by the Welsh Government. In addition we drew upon our existing WW2050 objectives, as modified by the 2022 review, and the long-term performance projections set out as part of PR19. Our 2050 target outcomes are expressed in the form of four high level objectives, namely:

- **safe and high quality drinking water.** Whilst we have a good track record on water quality compliance we face a number of specific interrelated challenges, notably ongoing deterioration in raw water quality largely associated with the effects of climate change but also the emerging risks associated with PFAS[2], the prevalence of manganese and other factors that contribute to our comparatively high levels of water quality-related customer contacts, and the legacy of lead pipework. Our ambition is to eliminate - or at least reduce to an absolute minimum - all such water quality concerns;
- **a reliable short and long term water supply**. Our general water supply position is relatively strong by comparison with parts of England, but our delivery systems are not as resilient as they need to be, in part for reasons associated with the age of some of our network assets. This manifests itself in levels of supply interruptions and other service issues that we do not consider acceptable in the long term and plan to address. We have identified a number of single points of failure where we need to build additional flexibility and resilience into our supply systems in order to reduce the risk of loss of supply events that have a low likelihood but which would affect large numbers of customers;

[2] Per- and polyfluoroalkyl substances, also known as `forever chemicals'. They are increasingly found in the environment and in drinking water, they are extremely slow to break down, and regulators across the world are looking at the risks they pose and what can be done about them.

- **protecting and improving the environment**. Whilst our performance in reducing wastewater flooding and pollution incidents has been comparatively good in recent years the challenges to such metrics posed by climate change and urban creep, coupled with changing societal expectations (especially with regard to the operation of SOs and river water quality), have established this as one of our top priorities for the future; and
- **wider social value**. The Welsh Government has identified that the sector has an important role to play in furthering government policy objectives, notably in relation to climate issues and the environment. We have identified carbon emissions and biodiversity as two important areas where we will strive to make a major contribution to the delivery of social value over the long term.

The long term outcomes we have set for the LTDS are presented below. Targets for our customer-facing performance measures are included for completeness.

Table 1

High Level Objective	Outcome	Measure	2023 actual	2025 forecast	2030 forecast	2050 forecast
Safe and High Quality Drinking Water	Tap Water Quality Compliance Risk Index	The DWI's Compliance Risk Index (CRI) Score	5.4	4.5	0.0	0.0
	Acceptability of Water	Discolouration, taste, or odour contacts per 1,000 customers	2.35	1.75	1.0	0.5
	Protecting Raw Water Quality	Number of designated safeguard zones	23	18	13	5
	Lead pipe replacement	Cumulative number of lead supply pipes replaced from 2025	n/a	n/a	7,500	100,000
A Reliable Short and Long Term Water Supply	Supply Interruptions	Average duration of supply interruptions over 3 hours (minutes:seconds per property)	44:31	8:00	4:30	2:00
	Leakage	Reduction in total leakage from 2019-20 baseline*	-12%	-3%	18%	50%
	Per capita consumption	Reduction in average water used per person in a residential property from 2019-20 baseline*	-6.2%	0.5%	7.4%	25.1%
	Business demand	Reduction in use of water by business customers compared with 2017-20 average baseline	9%[3]	4%	5%	9%
	Meters installed	Percentage of household customers metered and charged on usage	48%	51%	65%	96%

[3] This figure was artifically inflated due to the fact that the measure is defined as a 3-year rolling average which in this year was significantly affected by the impact of the pandemic on business demand in 2020-21 and 2021-22.

High Level Objective	Outcome	Measure	2023 actual	2025 forecast	2030 forecast	2050 forecast
	Resilience of water network	Population seved by critical water treatment works with no alternative source of supply ('000s)	439.0	439.0	382.6	0
Protecting and improving the environment	Total Pollution Incidents	Number of category 1, 2, or 3 pollution incidents from wastewater assets	89	78	68	24
	Internal sewer flooding	Number of internal flooding incidents	169[4]	200	165	95
	External sewer flooding	Number of external flooding incidents	3,634	3,400	2,700	1,300
	River water quality improved	Percentage reduction in phosphorus discharges from 2020 baseline	3%[5]	10%	20%	80%
	Environmental harm from SOs	Percentage of SOs having `no' or `very low' environmental impact	53.5%	52.3%	61.0%	100%
	SO spill frequency	Average number of spills from all SOs	45[6]	49	39	10
	Resilience of critical wastewater assets	Percentage of critical above-ground assets protected against a 1 in 30 year flood.	75%	75%	80%	100%
Wider environment and social value	Net Carbon Emissions	Percentage reduction in CO2 compared with 2010-11 baseline	65%	66%	90%	100%
	Biodiversity	Net change in the number of biodiversity units per 100km^2 of land	This is an Ofwat measure which is still in development			
Excellent Customer Service	The Customer Measure of Experience - `C-Mex'	Our industry ranking on the C-Mex score, as calculated by Ofwat	5th (2022)	Industry top 3	Industry top 3	Industry top 3
	The Developer Services Measure of Experrience - `D-Mex'	Our industry ranking on the D-Mex score, as calculated by Ofwat (quantitative element only)	12th overall (2022)	Upper quartile	Upper quartile	Upper quartile
	Business customer experience	Average customer satisfaction score	This is an Ofwat measure which is still in development			
	Negative number indicates an increase from the baseline.					

In order to develop investment pathways for the delivery of our chosen outcomes we:

4 This figure was unusually low in this year due to exceptionally benign conditions that would not be repeated in a normal year.

5 This figure was unusually high in this year due to exceptionally benign conditions that would not be repeated in a normal year.

6 This figure was unusually low in this year due to exceptionally benign conditions that would not be repeated in a normal year.

- made certain basic assumptions about the future, for example population growth and the efficiency improvements we are building into our unit cost forecasts (both ongoing efficiency improvements and "catch-up"). In particular we have assumed that the wholesale allowed regulatory cost of capital will be 3.23% (real CPIH) throughout the 25-year period, in line with the "early view" published by Ofwat in December 2022;
- identified what changes in performance could be expected to be delivered from "base" expenditure. We found that material improvements in leakage in particular could be achieved without "enhancement expenditure";
- carried out a rigorous process of option evaluation to establish what interventions offered best value; and
- examined how potential strategies would change under certain scenarios. These included the "common reference scenarios" specified by Ofwat, namely climate change, technology, and demand. However, as we were keen to examine other material potential influences on the future path of water and wastewater services we also evaluated two scenarios of our own, namely: changes in legislation/regulation; and enabling a true "Team Wales" collaborative approach to solving problems where different parties can make a contribution to preventing or solving issues such as threats to river water quality.

Throughout this work we were mindful of the fact that the further into the future was the focus of our considerations, the greater the scope for - and effects of - uncertainty.

A standout feature of our LTDS is the absence of any discrete large-scale project of the type that requires detailed preparation and long lead times ahead of implementation. Rather, the least cost interventions required to deliver our ambitions are in the nature of ongoing programmes of relatively small-scale work that are essentially modular in nature and can therefore be `dialled up or down' or modified in a qualitative way as priorities evolve and constraints arise or recede.

For example, our strategy on lead primarily comprises the replacement of the remaining lead pipework on our delivery system and, where possible, on customers' supply pipes too. It can be expanded or slowed, depending on priorities and constraints, but there is little if any scope for "high-regret" mis-steps if circumstances change unexpectedly. The same is substantially the case for the large SO improvement programme, which is the largest single element of our strategy.

We present below in summary form our **core pathway** expenditure. This comprises the enhancement investment areas that we project will be required over the 25-year period in a wide range of plausible scenarios, both "benign" and "adverse".[7] Further detail on the individual programmes is set out in Part Two of the main document.

[7] Note that the table excludes short term enhancement programmes for which projections are limited to the AMP8 period, including areas such as dam safety where we know with reasonable certainty that future expenditure will be needed but for which requirements will be subject to a wide range of uncertainty until relevant investigations have been carried out.

Table 2

	LTDS Outcome	AMP8	AMP9	AMP10	AMP11	AMP12	Total
Safe and high quality drinking water	Tap Water Quality Compliance Risk Index	65	56	19	19	17	176
	Acceptability of Water	118	108	84	77	72	459
	Protecting Raw Water Quality	27	41	25	-	-	92
	Lead pipe replacement	15	42	40	37	35	169
A reliable short and long term water supply	Supply interruptions	67	68	93	90	51	368
	Per capita consumption	15	15	12	19	44	106
	Accelerated metering	125	75	5	19	13	237
	Resilience of water network	54	173	237	230	129	823
Protecting and improving the environmennt	SOs (Harm and Spills)	393	1303	1193	601	560	4051
	Other NEP/WINEP (River water quality etc)	575	784	285	-	-	1643
	Other DWMP (Flooding, Pollution)	220	182	171	161	151	886
	Resilience of wastewater assets	9	24	22	21	20	95
Wider environment and social value	Net carbon emissions	38	145	141	-	-	325
	Biodiversity	10	67	35	7	6	126

A number of features of the core pathway warrant particular mention. First, we re-iterate that it comprises the low/no regret expenditures that will be necessary to achieve our long term outcomes: it does not purport to represent the "most likely" pathway.

Second, the centrepiece of the strategy is the large programmes of expenditure required on SOs and other wastewater assets. These will transform performance on pollution, flooding, river water quality and other environmental outcomes in line with stakeholder and customer expectations. This is an area where our plans are particularly subject to adaptation and refinement as we learn from the investments we make and the potential for innovation in developing solutions is realised. In particular, for now we have developed our costings based on grey solutions, but we are hopeful that we will be able to make increasing use of nature-based solutions instead as we and our regulators gain experience in this area.

Third, the profile of interventions across the 25-year period substantially reflects near-term constraints on affordability, deliverability and financeability that limit what can be programmed for the AMP8 period. For example, just £15m of the £169m proposed to be spent on replacement of lead pipework is scheduled for 2025-30 because of the effective overall cap on total expenditure during that

period. This "artificial" near-term constraint is the reason why expenditure is shown to peak during the AMP9 period. It will be necessary to re-visit this when we prepare our LTDS and business plan for the 2029 price review in the context of how those same constraints manifest themselves then.

Fourth, the core pathway entails a marked and sustained increase in the level of water and wastewater bills. We have given careful thought to the importance of maintaining inter-generational fairness as between today's customers and the customers of the future. Customers tell us they prefer a steady increase in expenditure and bills rather than a sharp rise early followed by a flatter profile, or a delay in expenditure which would mean a big increase in future years. Our bill profile reflects our view that customers in each generation should face bills broadly commensurate with the services and benefits they are receiving.

The following table presents the increases in the average household combined bill in constant 2022-23 prices in each AMP period that would be necessary to finance the expenditures proposed in the core pathway. The starting bill in 2024-25 is projected to be £463, so the projected increases would take it to £735 by the end of AMP10 dipping slightly to £718 by the end of AMP12.

Table 3

	AMP8	AMP9	AMP10	AMP11	AMP12
Change across AMP period (£)	118	112	42	-6	-11
Cumulative vs 2024-25 (£)	118	230	272	266	256

Although the profile falls slightly in AMPs 11 and 12, this should be treaated with some caution. As the core pathway only comprises the known no/low-regret expenditures that will be required in all plausible scenarios, it does not reflect a central `most likely' view, and is therefore likely to understate expenditure further out into the future. For example, the core pathway includes nothing for NEP/WINEP in AMPs 11 and 12, but it seems probable that the actual expenditure will be positive and significant.

As noted above we have examined a range of possible future scenarios in order to test our strategy for achieving our 2050 ambitions. From this process we have developed five costed alternative pathways. These can be described as follows:

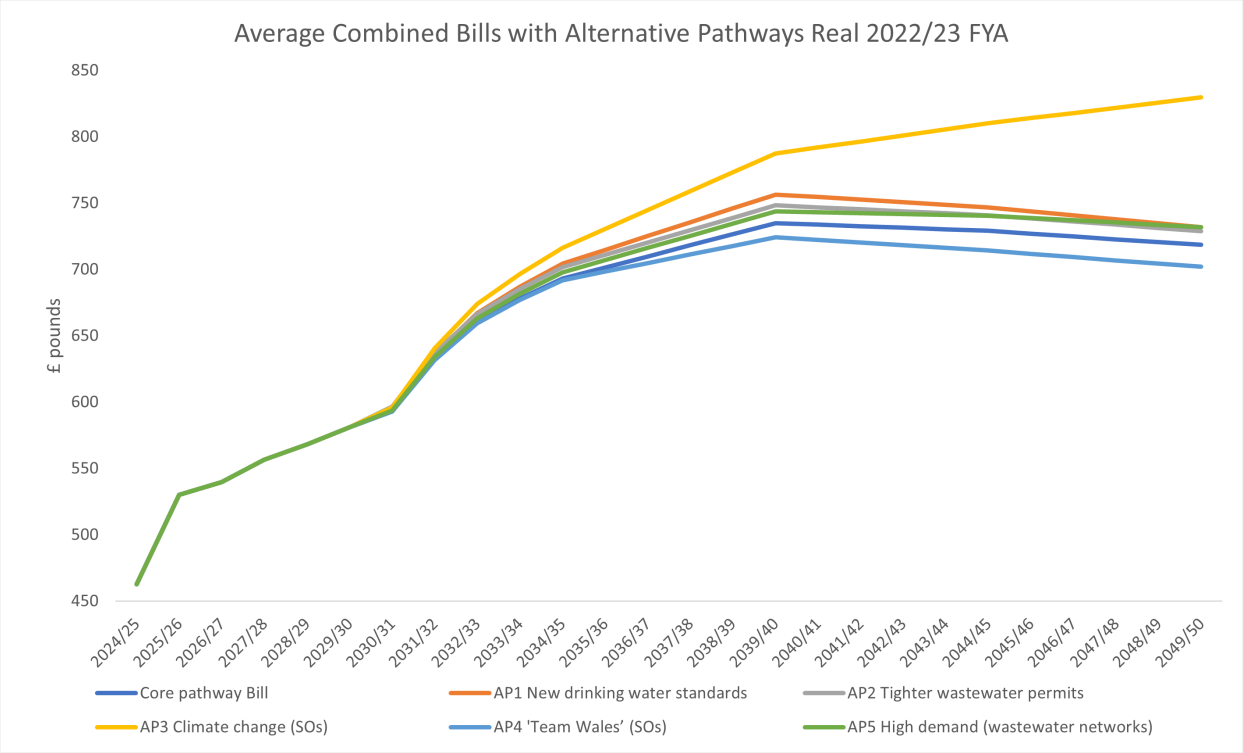
1. Regulatory tightening of **drinking water quality standards**, including treatment of PFAS and THMs, assumed to occur in 2028 with implementation to take place in AMP9 and AMP10. This pathway would add £708m to the 25-year spend necessary to maintain compliance which would mean a further increase in bills of 2% by 2050;
2. Regulatory tightening of wastewater standards, notably the **elimination of sludge to land** and the **tightening of discharge limits** in the latter part of AMP8. In line with the underlying requirement to maintain compliance, this would cost £445m over 25 years and raise bills by a further 1% by 2050.
3. The impact of a **"high" climate change** scenario on SOs and sewer flooding, beginning to affect our programmes from the start of AMP9. This would necessitate more and larger schemes, notably in greater sewer network and storm tank capacity. It is estimated that this would add £4.3 billion to the 25-year programme and would increase 2050 bills by 15%.

4. Benefical impacts of effective **collaboration and use of markets** to facilitate globally optimal solutions for wastewater, specifically the SO programme. We assume that this would start to be put in place during AMP8 and would start to bear fruit during the course of AMP9. We estimate this would **reduce** expenditure by £655m over the 25-year period and enable bills in 2050 to be 2% lower as a result.
5. The effect of **adverse demand assumptions** on SOs and sewer flooding occurring progressively over the post-2030 period, which would cost a further £548m. This would mean that bills in 2050 were 2% higher as a result.

The costed alternative pathways are not, in general, mutually exclusive. Any combination of them is therefore plausible.

Average household bills under the core pathway, and each of the alternative pathways, are shown below.

Picture 1



We have also prepared a number of additional `qualitative' alternative pathways that we have not costed in detail. These have arisen out of our wider consideration of future scenarios and represent potential developments and eventualities on which we are keeping a `watching brief' because there is a realistic prospect that they will feature in our strategy as it develops in the coming years. Consequently they feature in the narrative in the main document. Examples include the effect of large scale hydrogen production, and the potential implications on dam safety expenditure of future legislation arising as a result of the Toddbrook incident. Importantly, we also note that the current NEP/WINEP programmes only run through to the 2030s, but in practice a fresh set of requirements is likely to emerge during the course of the coming years.

Concluding Remarks - Challenges and Risks

The Long Term Delivery Strategy provides a different way of looking at long term planning for the water industry. It will inevitably become more sophisticated in the future as companies develop better information on long-term risks and requirements, regulatory guidance is developed and refined, and as the sector learns from this first iteration of the strategies, in particular by embedding adaptive planning in 'business as usual' decision-making processes.

However, the exercise has helped to quantify our best view of the implications for investment and bills of the long-term trends and our ambitions for 2050 described in WW2050, while the PR24 Forum in Wales has enabled us to work through the difficult choices and trade-offs with our key stakeholders.

We are very conscious of the sensitivities around projections of future bill levels in the current political and economic environment. We are also very mindful of the importance of fairness as between generations of customers. It will not be welcome news that bills are forecast under our core pathway to increase sharply in real terms by 2050.

However, there is an emerging consensus around the need for additional investment in our wastewater infrastructure (in particular), and that ultimately has to be paid for through bills. Our customers tell us that they do not wish to see necessary investment delayed, and are concerned about the need to manage the impacts of climate change and improve environmental outcomes.

We plan to build on the success of our existing measures to support affordability to mitigate the burden of financing these improvements for those least able to pay. And in any event the onus is on us to ensure that every pound is spent wisely and effectively, in order to minimise that burden.

Stability in our regulatory framework has an important role to play. Collaboration amongst stakeholders is essential if our programmes are to be effective and costs are to be minimised.

We believe that the approach we have put forward ensures that we can deliver on society's ambitions for the sector in the face of climate change and other long-term uncertainties, whilst being fair to both current and future customers.

List of Acronyms

AMI	Advanced Metering Infrastructure
AMP	Asset Management Period
AMR	Automatic Meter Reading
CCW	Consumer Council for Water
CRI	Compliance Risk Index
DPC	Direct procurement for customers
DWI	Drinking Water Inspectorate
DWMP	Drainage and Wastewater Management Plan
EA	Environment Agency
EPA	Environmental Performance Assessment
ICG	Independent Challenge Group (formerly the Customer Challenge Group)
IEAP	Independent Environmental Advisory Panel
INNS	Invasive non-native species
IoT	Internet of things
LTDS	Long Term Delivery Strategy
NRW	Natural Resources Wales
PAYG	'Pay As You Go'
PC	Performance Commitment
PCC	Per capita consumption (i.e. average household water use, per person)
PCD	Price Control Deliverable
PFAS	Poly- and perfluoroalkyl substances, often referred to as micro-plastics
PR	Price Review
RCV	Regulatory Capital Value
SAC	Special Area of Conservation
SEMD	Security and Emergency Measures Directive
SO	Storm Overflow
SPS	(Welsh Government's) Strategic Priorities Statement (to Ofwat)
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Urban Drainage Systems
UKWIR	UK Water Industry Research
WACC	Weighted Average Cost of Capital (i.e. allowance for company finance)
WRMP	Water Resources Management Plan

1. Part One - Ambition

We have structured our LTDS in line with the requirements of the guidance.[8] Accordingly, in this first substantive part of our LTDS we set out what we are planning to achieve by 2050 and how we arrived at those decisions. Our Ambitions for 2050 are aligned with our long term Vision, which in turn has it roots in the foundation of our company in 2000 and reflects the evolution of our corporate strategy over the subsequent 22 years.

Section 1.1 provides an overview. In section 1.2 we explore the challenges that have shaped the process of developing our 2050 Ambitions.

This is followed in Section 1.3 by a description of the processes through which we arrived at our final decisions, including the important roles played by customers and other stakeholders (section 1.3.1). Whilst no aspect of the water and wastewater services that we provide can be viewed in complete isolation, we have chosen to frame our Ambition in terms of a small number of high level objectives (section 1.3.2) which are expressed in turn as a portfolio of outcome measures (the `LTDS outcomes'). These include most of the Performance Commitments (PCs) set for the water industry by Ofwat for PR24, as well as some measures of our own. Full details are presented in sections 1.3.3-1.3.7.

The LTDS outcomes, on the basis of which we want to drive our strategy, overlap with, but are not identical to, the list of PCs for PR24. Some of the LTDS outcomes will be put forward as 'Price Control Deliverables' in our PR24 Business Plan. Section 1.3.8 provides a mapping that shows the relationship between our LTDS outcomes, the common PR24 PCs, our proposed 'bespoke' PC (CSO harm reduction), and our proposed PR24 PCDs. Finally, in section 1.3.9 we explain that we do not see the LTDS outcomes as being fixed for the long-term. Rather, we expect to see a process of evolution and refinement of the list as circumstances and priorities change over the coming years.

1.1 The Long Term Vision

The long term Vision that underpins this LTDS is the result of a process of evolution spanning more than 20 years.

When Glas Cymru was created in 2000 with the sole purpose of acquiring Welsh Water and running it on a non-shareholder basis, it established as its primary objective the delivery of high-quality water and wastewater services in line with its legal and regulatory obligations, at least cost to the communities that it serves.

In Welsh Water's first `Strategic Direction Statement' in 200y we set out the following vision of what customers should be able to look forward to over the following 25 years:

2007 Vision for Customers

- even higher quality standards - for drinking water, customer service, and the protection of the environment;
- a zero tolerance approach to pollution and service failure;
- at least a 50% cut in greenhouse gas emissions; and
- the lowest possible customer bills - lower than those of other equivalent UK water companies.

In 2013 we launched a new `Vision Statement'. This was intended to give an updated and clear sense of purpose for all our people and to help our customers understand what we stand for.

8 See *PR24 and beyond: Final guidance on long-term delivery strategies* (page 13) which can be found here

2013 Vision Statement

We will *earn the trust of our customers* every day.

We will do this by delivering high-quality, essential services that protect our customers' health, our communities and the environment around us.

To give effect to this, in 2016 our Board decided to adopt a new mission for 2050: **'To become a truly world class, resilient and sustainable water service for the benefit of future generations'.**

Following an extensive public consultation, we published our landmark 'Welsh Water 2050' strategy document in 2018.

Welsh Water 2050

- identified the eight key challenges and opportunities ("trends") that we need to respond to in our long-term planning;
- set out 18 Strategic Responses that we would need to pursue over the coming decades to meet these challenges and take advantage of these opportunities; grouped around the water cycle elements of 'drinking water', 'customer and communities' and 'environment';
- gave effect to the importance to stakeholders of affordability and our role in helping to promote healthy ecosystems and biodiversity;
- highlighted the crucial roles played by efficiency and innovation in minimising future bills to customers; and
- illustrated the vital importance of working with others to help us deliver our responsibilities more efficiently and also to help us play our part in delivering wider social "Well-being Goals", as set out in the Welsh Government's `Well-being of Future Generations Act'.

In 2019, against the backdrop of public debate on water companies' wider corporate responsibilities, we re-affirmed the company's core objectives by issuing a refreshed Statement of Purpose.

2019 Statement of Purpose

Welsh Water's purpose is to provide high-quality drinking water and environmental services, so as to enhance the well-being of customers and the communities we serve, both now and for generations to come.

As highlighted in Welsh Water 2050, the achievement of our objectives effectively and efficiently is increasingly reliant on customers and other organisations, both public and private. So when we embarked upon the process of preparing our LTDS we elicited input from all relevant stakeholders. In particular, we consulted customers, we engaged with our Independent Challenge Group, we collaborated with Hafryn Dyfrdwy, and we involved the Wales PR24 Forum, the body that brings together representatives from Welsh government and all of our regulators.

As part of the PR24 Forum's early deliberations we developed a draft Vision for the water sector in Wales with Hafryn Dyfrdwy. The intention was to recognise that when it comes to most of the challenges that need to be tackled in Wales for the long-term, the boundaries between water companies are largely irrelevant. By working together and pulling in the same direction we can achieve more for customers and the environment. The Vision statement below was endorsed by the PR24 Forum and approved by our Board in November 2022.

Common company Vision for the water sector in Wales

We will establish the water sector in Wales as a model of **effective collaboration** for delivering **excellent performance** against the backdrop of the climate and nature emergencies.

We will work with communities, stakeholders and regulators to **co-create and deliver solutions in the most efficient way over the long-term** having taken full account of the needs of our customers, the environment and society. We will seek to reflect the diversity of the people we serve in our workforce.

We will both engage and inform customers, helping them to play their part in addressing future challenges. We will always be responsive to their changing needs and expectations, paying particular attention to customers in vulnerable circumstances.

We will deliver **excellent drinking water quality**, working in catchments to protect raw water quality. We will **upgrade our network** to ensure it is fit for the future and resilient to current and future threats.

We will support a **thriving environment** in our rivers and seas by effectively managing and treating wastewater, upgrading treatment and network capacity where required and dealing with changing rainfall patterns. We will achieve net zero carbon emissions and seek to go further.

We will harness **innovation** and adapt to the world as it changes, while keeping bills as affordable as possible. We will provide a world-class, resilient and sustainable water service for future generations.

In many respects the new Vision for the water sector in Wales represents a natural process of evolution from what has come before, with many elements and themes similar to previous vision and strategy statements. However, we highlight two of the newer themes for particular attention.

First, it has become increasingly evident that future success in achieving the societal goals to which we and our stakeholders aspire will rely more and more upon **effective collaboration** across different organisations. The scope of what can be achieved by acting in isolation, even with substantial investment on our part or others, will be increasingly constrained. Finding new ways for us to work with third parties, including co-funding of activities, offers the prospect of unleashing the power of collaboration in a way that facilitates large improvements in outcomes and a step change in efficiency.

This is not just a question of intensifying and enhancing our working relationships with existing and historical stakeholders - our regulators, Welsh Government, local authorities, customers, developers and environmental NGOs - though this will be essential to the achievement of our goals. If we are to deliver on our vision we will have to build on the relationships we have, or forge new productive relationships, with others including:

- landowners, especially farmers and other land users;
- catchment partnerships;
- wildlife trusts and other environmental organisations;
- other holders of abstraction and discharge permits;
- users of the aquatic environment;
- highways authorities; and
- developers.

Where appropriate the active support of government, possibly by means of legislation, may be necessary in order to establish the regulatory frameworks necessary to unlock the full potential of collaborative working.

Second, whilst customer engagement has played a significant role in driving decision-making for many years, advances in data collection and dissemination are providing greater opportunities to inform and influence our customers (and other stakeholders). This improves their understanding of

what we do and why, in turn enriching future customer engagement and widening the scope for collaboration. For example, we have for some time provided real-time information on operational issues potentially affecting customers, but we are in the process of expanding and enhancing this resource so that we can provide on-line and real-time information on the operation of Storm Overflows (SOs).

We currently support the Catchment Systems Thinking Cooperative (CaSTCo) that aims to empower local communities to gather robust data which can be shared with decision-makers, customers and other stakeholders. We welcome the framework and guidance that has been put in place by Ofwat seeking to promote the use of `open data' across the industry, and we are committed to playing a full role in its development. Ultimately, we believe that the better informed are our customers and other stakeholders, the more effective will be their role in driving our strategies and behaviours going forwards.

1.2 Current and Future Challenges

By way of context we set out here the principal influences on our thinking in approaching the translation of our vision into high level performance objectives.

Ongoing Long Term Challenges

Our long term ambitions have been substantially shaped by the major ongoing long term challenges we face. Our Review of Welsh Water 2050 (link), prepared and published in preparation for PR24 in collaboration with Cardiff University, concluded that many of the challenges we face are intensifying. Foremost amongst these are:

- **Climate change**. As has been well-documented we are facing progressively more frequent and extreme weather events associated with ongoing climate change. For example, in 2022 we experienced the hottest weather since the 1976 drought. As a result of climate change the level of resilience that may have been built into assets and systems when they were first designed and constructed - often several decades ago - is no longer adequate, and we have to upgrade and reinforce delivery infrastructure just to offset the increasingly adverse conditions in which we are operating.
- The **expectations of our customers**. We view this challenge as a positive one, as customer expectations drive excellence in service delivery. For example, public interest in (and concern for) the aquatic environment and the role we play in determining river water quality, particularly via the operation of our SOs, has risen in recent years. We are also seeing trends towards a greater desire for service resilience and less tolerance of major service outages. We expect these trends to continue, especially for our non-household customers.
- **Affordability**. The past 15 years have seen irregular and sluggish economic growth in the UK. At the same time the distribution of income and wealth has widened, which has put yet more pressure on the significant proportion of our customers who struggle to pay their water and wastewater bills. The present `cost of living crisis' is exacerbating the situation, and given the expectation of positive real bill increases during the years following 2025 the affordability challenge is set to grow.

In addition, we will continue to be confronted with the effects of demographic trends, environmental changes over and above those brought about by climate change (e.g invasive species and land-use changes), as well as any new policy, legal, or regulatory developments that impinge upon the services that we provide.

Current Issues

At the same time we are substantially pre-occupied with a number of significant issues with which the company is having to wrestle at the present time. In certain areas of performance we have been falling short of our own and others' expectations, and are devoting substantial management attention and resources to putting things right.

Our performance on **supply interruptions** and **leakage** has not been good enough in recent years, not helped by extreme weather events such as the hot dry spell in the summer of 2022 and the severe freeze/thaw event some months' later. In the immediate future we are tackling performance recovery by implementing organisational changes that will enable quicker repair times together with other operational initiatives. In the longer term we will move to a more predictive capability based on our SMART Networks programme, so that we can respond to incidents more quickly. Ultimately, however, we must address the fundamental root causes of the network failures that give rise to supply interruptions and leakage, including network age and reliance on single supply routes, both of which play a significant role in shaping our LTDS.

Similarly, our performance on **drinking water quality** has lagged in recent years. Though the latest reporting period shows an improving trend we still have considerable ground to make up, and will be implementing a number of initiatives for the last two years of the 2020-25 AMP period. These include a Drinking Water Recovery Plan (DWRP) to recover recent under-performance on water quality compliance (measured by Compliance Risk Index - CRI), with the aim of achieving upper quartile industry performance. To improve our performance on `acceptability of drinking water', we are modifying treatment works operation to remove more manganese from our soft upland water sources and replacing more of the old cast iron pipes which can cause discolouration incidents.

As well as performance issues we are currently dealing with a number of other challenges. Three warrant particular mention:

1. An adverse **macroeconomic** backdrop. In contrast with the comparative stability of the previous decade or so, the 2020-25 period has so far been characterised by volatile swings in macroeconomic conditions, including the highest interest rates the UK has seen for approximately 15 years and the highest consumer price inflation for over 40 years. This has had a particular effect on the purchase prices we face for some of our inputs (notably energy and chemicals) and dramatically increased our financing costs through the effect of inflation on index-linked debt.
2. The imperative to improve and maintain systems that support the highest standards of **governance and assurance.** In 2022 internal assurance processes discovered that we had been miscalculating our leakage performance. Ofwat was informed and has since launched an investigation with which we are cooperating fully. In addition we have recognised our failing and apologised to customers. The measures we have taken as a consequence include paying a £10 rebate to each of our water customers. This ongoing issue highlights that we can never let up in striving to maintain the high standards we have set ourselves.
3. Recent years have seen heightened public awareness of the significant role played by the operation of **Storm Overflows** in the water quality of rivers and coastal waters. Public criticism of the sector has provided a fresh impetus to prioritise improvements and deliver the necessary investments, and we will step up to this challenge. However, vigorous public debate also brings with it a potential to over-simplify what are often complex and quite nuanced systems. While public pressure can help to ease the way to rapid delivery, it is vital to ensure that resources are wisely and efficiently directed, a view shared by all key stakeholders in Wales. That is why we have worked closely with others through the Better River Water Quality Taskforce, the PR24 Forum and other fora in developing our long-term prioritised approach to addressing this issue.

Areas of Strength

Notwithstanding the long term challenges we face and the current issues we are addressing, we are confident in our ability to work through difficulties and remain focused on our long term objectives. Our financial position is solid and our credit ratings are amongst the highest in the sector. Our workforce has shown itself to be resilient and flexible to changes in the demands placed upon it (for example, at the outset of the Covid-19 pandemic). We are fortunate that our customers have bestowed considerable trust in us to do the right thing and make the right judgement calls. And we increasingly benefit from the many collaborative relationships, both formal and informal, that we have developed with stakeholders, all the way from the national level with Welsh Government to micro- local-level organisations such as river user groups.

Whilst we naturally focus our attentions at any one time upon those areas where we have immediate problems and face challenges, we know there are areas where we do well and we set standards. Our performance on customer service has been consistently good in recent years, we do well on a number of wastewater performance measures, and we have played our part in driving the sector forwards by leading in a number of areas. Examples include:

- the coverage of social tariff support for customers that would struggle to pay their bills;
- the installation rollout of Event Duration Monitors on SOs; and
- river water quality, where our activities in the last decade or so have contributed to the fact that 45% of rivers in Wales are at WFD `good' status, compared with 15% in England.

1.3 Translating Our Vision Into High Level Performance Objectives

During the course of the past two years we have undertaken a detailed and rigourous process to answer the question: `how do we define the Ambition that gives effect to our Vision, and what does this mean in practical terms - for customers, other stakeholders, and the environment - in the form of the common PCs, other outcomes, and the principal outputs from the strategic frameworks?' In this section we explain how we approached this process, who was involved, and how we arrived at our conclusions.

1.3.1 Approach

In order to translate our vision for 2050 into specific performance goals we did not start with a blank canvas. As set out above, whilst this is our first LTDS, long term horizon-scanning and planning has been integral to our philosophy for decades. Most recently we set out a high level `direction of travel' in Welsh Water 2050, published in 2018, and in our PR19 Business Plan. The `Welsh Water 2050 Review and Update' published in 2022 carried out a thorough review of progress and indicated where we were and were not on track to meet our goals, but did not take the additional step of specifically refining them in the light of the updated evidence. In addition, the so-called strategic frameworks - the WRMP, the DWMP and the NEP - have created blueprints for elements of our strategy.

Nonetheless, we have approached the question of what our long term vision means in practice with an open mind. Priorities change, science progresses, and technology opens up opportunities and possibilities that did not exist before. We have therefore drawn upon a wide range of views and evidence in order to inform our decisions. This broadly comprises five elements: government, customers, stakeholders, the outputs of the `strategic frameworks' and the decision-making processes of our Board.

Welsh Government Policy Framework

Welsh Government policy is set out in a combination of legislation, policy statements, and the exercise of its statutory roles under the 1991 Water Industry Act, notably its power to publish a statement setting out strategic priorities and objectives for Ofwat to follow in carrying out its relevant functions relating to Welsh companies.

The Well-being of Future Generations (Wales) Act 2015 and the Environment (Wales) Act 2016 provide most of the important legislative context for our long-term planning. The current updated `Programme for Government' [9] highlights the importance of responding to the climate and nature emergencies, including measures to support the transition to net zero. In 2022 the government also issued its latest guidance under the Water Industry Act - `*Strategic Priorities and Objectives Statement to Ofwat issued under section 2B of the Water Industry Act*' (the `SPS'). [10] Together they provide a clear view of the considerations that should shape the translation of our vision into specific service objectives:

- the drive to de-carbonisation and net zero;
- the need to prioritise biodiversity in company planning;
- the sustainable management of natural resources;
- the importance of resilience in service delivery and the health of water and wastewater assets; and
- the affordability of bills.

In addition, the government recognises the essential role that collaboration needs to play in order to achieve the desired outcomes. The government encourages multi-agency 'Team Wales' working between water companies and third parties, including co-funding where appropriate.

Customer Engagement

Engagement with our customers is an ongoing process, and as we have no shareholders we are able to give primacy to their interests and what they tell us. We receive a constant flow of information on customers' views by means of surveys, analysis of complaints and complements, and tracking of social media. In addition, from time to time we conduct `set piece' customer research exercises. For example, our Welsh Water 2050 consultation in 2018 drew over 20,000 responses from the public in the run-up to the 2019 price review, providing a rich and detailed understanding of their concerns and priorities.

We have refreshed this through a number of targeted research exercises as part of our preparations for PR24, including a specific research project on long term outcomes. We are conscious that eliciting customers' views on long term issues has its well-documented limitations. However, having carefully considered all of the evidence available to us we think it is reasonable to draw the following conclusions:

- customers support our focus on taking a long term approach;
- they broadly support investment in pursuit of our stated long term objectives, but keeping bills as low as possible is also important;
- they perceive insufficient ambition on sewer flooding and leakage in particular; and
- given that the fulfilment of our ambitions is expected to necessitate higher bills in real terms in the future, customers would prefer that they increase gradually over time rather than they be higher in the shorter term and lower in the longer term or *vice versa*.

9 The latest version can be found at link

10 Available here (link).

Customer research on LTDS outcomes - Summary

In 2022, with the support of Blue Marble research, we carried out a research exercise to gauge customer views on DCWW's long term ambitions, as well as on the pace and sequencing of our delivery plans. Stage 1 involved an in-depth qualitative exploration of customers' deliberations about our long term ambitions based on nine focus groups and four follow-up inter-generational paired depths with reconvened participants. In stage 2 we carried out a quantitative survey of 986 customers designed to provide a statistical basis for customer opinions.

We found that customers were pre-occupied with the cost of living crisis. They rated water bill value-for-money and affordability lower than in 2018, and were reluctant to contemplate further bill increases. However, in spite of this, the balance of opinion leant towards us prioritising investment in our long term plans, rather than delivering the lowest possible bills. We found that the more customers are informed about the nature of the work that we are doing, the more they are prepared to support the necessary investment to secure resilient services over the long-term.

When asked about investment priorities they expressed most support for improvements in leakage, flooding, and river water quality. Water efficiency and lead pipe replacement were seen as lower priorities. The same pattern was broadly mirrored in their responses on the urgency with which they wanted to see improvements made, and where they wanted us to be most ambitious.

Finally, views were sought on the future profile of investment and bills. Despite the immediate cost-of-living concerns, few respondents advocated delaying investment until the medium term. Rather, a gradual approach involving a steady rise in bills was considered to be the fairest and most preferred option, as compared with a sharp increase in bills now followed by a flat profile, or lower bills for the time being followed by a steeper increase in the medium term.

We have also had regard to other sources of information on customers' views, such as the research carried out by Ofwat on customer valuations of service attributes and performance metrics.

A more detailed overview of the customer research we carried out for this price review is presented in Section 2.2 of our PR24 Business Plan document (link). All the details and results of our research exercises are set out in our PR24 Customer Engagement report (link).

Stakeholder Engagement

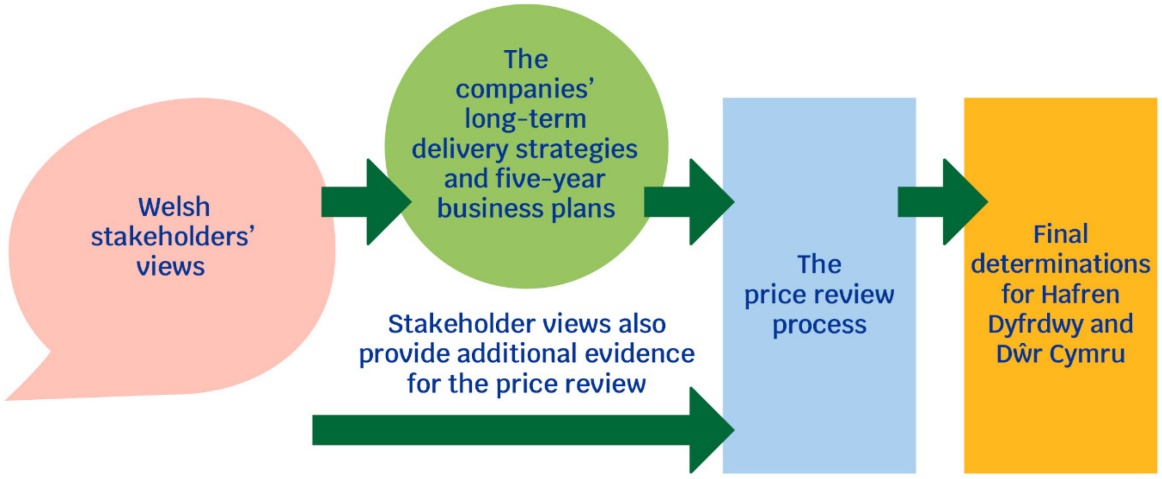
Like customer engagement the involvement of other stakeholders in our long term planning processes is to all intents and purposes an ongoing process. We are in constant dialogue not only with our primary regulators - NRW, DWI, Ofwat and CCW - but with a wide range of other organisations as well. These include:

- our **Independent Challenge Group**, the successor to our "Customer Challenge Group" at PR19. It comprises of an independently appointed chair and individual members with relevant experience. They meet at a minimum 4 times a year, although frequency does vary depending on the price review cycle. The ICG is an independent customer focused stakeholder group that provides scrutiny and challenge, ensuring that the needs of current and future customers and communities are at the heart of how we operate. Its diverse membership reflects a range of customer perspectives and includes experts in customer research and engagement. Organisations represented within the group include those working on behalf of older people or people in vulnerable circumstances, and environmental organisations;
- the 62 **members of Glas Cymru**. Their role under the company's constitution is to hold the Board to account. They generally meet twice a year but also attend special events;

- our **Independent Environmental Advisory Panel** (IEAP), comprising over 20 key environmental stakeholders, including representatives of eNGOs such as the RSPB, a variety of environmental trusts, and of key industries, including agriculture and mining, as well as government and the regulators;
- **local government** organisations across Wales; and
- numerous other **trusts**, **charities**, **associations**, **clubs**, and other parties with interests in the services we provide and how they will develop in the future.

In addition, our preparations for the 2024 price review have benefited from the implementation of the `**collaborative approach in Wales**', centred on the Wales PR24 Forum with Ofwat as an advisory member. This is intended to identify the high-level outcomes to be achieved in Wales and the phasing of these outcomes within the long-term delivery strategies for Welsh companies. The Forum has identified and discussed key issues for Wales and the Welsh companies for PR24, and it has used this important groundwork to provide `strategic steers' on the high-level outcomes and priorities. Companies are expected to feed these into their plans and long-term delivery strategies, as depicted below.

Figure 1



Source: Ofwat

We have replicated in full the PR24 Forum strategic steers document in an Appendix to this document. We make reference to them as appropriate throughout the following sections. In particular, it should be noted that whilst the majority of the Forum's expectations are reflected in our ambitions and resulting strategies, there are some exceptions. These are either where we plan to go further than the Forum has suggested, or for specific reasons do not plan to go as far/fast as suggested. Where this is the case we have made this clear and set out the reasons why.

Strategic Frameworks

In parallel with the early developmental work on the LTDS we have been progressing the development of the three principal so-called `Strategic Frameworks'. Each of these has its own bespoke requirements and is subject to its own process and timetable, including publication. We are reflecting the outputs from the three frameworks in full (though noting that the first two focus on a `most likely' planning view, as opposed to the no/low-regrets underpinning of the LTDS) and a summary of each is presented below:

- the **Water Resources Management Plan** (WRMP). This comprehensive examination of the balance between water supply and demand over a 25-year horizon evaluates the options for maintaining long term security of supply, including the potential need for additional capacity, against the

backdrop of potential future scenarios (e.g. regarding the effects of climate change). Through our WRMP we have developed an ambitious, long-term demand management strategy that recognises the need to take action to reduce leakage and help customers use water wisely. We have also identified a number of supply-side zone interconnections that we plan to deliver in AMP8. As a consequence, we expect to have sufficient water resources to be able to continue to supply water to our customers in the long term across all climate change scenarios, and to meet our objective of achieving resilience to a 1 in 500 year drought;

- the **Drainage and Wastewater Management Plan** (DWMP). Although the modelling of wastewater catchments has been a core part of our planning work for some time, this is our first full DWMP. It addresses the impacts environmental pressures, climate change and customer pressures will have on the wastewater services we provide. These have highlighted significant need for long-term programmes of investment, particularly to reduce the impacts of storm overflows, the nutrient content in treated effluent discharges, flooding risks, and, in some cases, the impacts of wastewater operations on designated waters, such as those used for bathing. It should be noted that this inaugural DWMP follows specific guidance issued by the Welsh Government, who will sign-off the plan. As set out in Section 6.2 of the PR24 Business Plan (link)the status of the DWMP and the link to PR24 is different in Wales compared with England. While we have complied with Ofwat requirements to produce specific outputs from the DWMP, in terms of performance and investment requirements, these should be regarded as preliminary and indicative, given the context in Wales; and
- the **National Environmental Programme** (NEP). The precise make-up of the NEP is determined by NRW in dialogue with ourselves, Welsh Government, and other stakeholders. It includes some short-term requirements (for 2030) and some long-term objectives. At the time of writing there is broad consensus on the shape of the programme over the longer term, but some elements remain subject to ongoing discussions. It is clear that the programme will be dominated by schemes intended to limit harm from SOs and improve river water quality across the whole of Wales. For those parts of our operating areas located in England the relevant framework is the **Water Industry National Environment Programme** (WINEP).

Board Processes

Details of the Board's oversight of the development of the LTDS and the process by which it arrived at its decisions (including in relation to the derivation of 2050 outcomes) are set out in Part Five, `Board Assurance' below.

In summary, the role of the Board in arriving at our proposed 2050 outcomes was carried out over a process spanning nearly two years. During this time the Board reviewed the evidence from our customer engagement, it was regularly briefed on our interaction with stakeholders, high level discussions between directors and ministers and regulators took place, and it provided oversight of the development of the strategic frameworks.

The challenge it faced was to weigh up often competing evidence and/or views. Different contributors have different priorities: for example, supply interruptions is not one of our customers' biggest short term concerns, but it continues to be one of Ofwat's primary common PCs, and it is the Board's job to weigh such differences in arriving at its decisions. It also falls to the Board to evaluate the desirability of going further and faster in delivering the improvements that people want to see on the one hand, and constraints on affordability, deliverability, and/or financeability on the other, having regards to the views of customers and other stakeholders.

1.3.2 Our 2050 Outcomes - Overview

We prepared our set of LTDS 2050 outcomes over the course of a two-year period. We evaluated the evidence on the views of customers and stakeholders and considered the emerging outputs from the development of the Strategic Frameworks, all against the backdrop of the Welsh Government's policy framework and our statutory duties.

We concluded that the effect of the company's long-term vision could be expressed in the form of five high level strategic objectives (or `themes'), namely:

- **safe and high quality drinking water;**
- **a reliable short and long term water supply;**
- **protecting and improving the environment;**
- **wider environment and social value; and**
- **excellent customer service.**[11]

In the following sections we set out our ambition for each of the objectives in terms of the LTDS outcomes we have selected, together with an explanation of how we arrived at the targets we chose.

Note that the outcomes we chose to give effect to our ambition and the common PCs used by Ofwat (and set out in Business Plan tables LS1 and LS2) are not identical. Whilst they overlap to a considerable degree, some of the common PCs do not relate specifically to our ambition as defined. One of our chosen outcomes is put forward as a "bespoke" performance commitment (and therefore is not presented in tables LS1 and LS2 as such) and some of our chosen outcomes fit neither into the common nor the bespoke performance commitment category, and are therefore presented here but not in the business plan tables. The following sub-sections make clear into which category each outcome falls.

It should also be noted that some outcomes do not readily lend themselves to being expressed as annual measures of improvement that can be easily defined and tracked. Aspects of compliance and resilience, for example, are intrinsically probabilistic, which makes them easier to define than to observe, especially in circumstances where probabilities are low but potential consequences are high. We recognise, therefore, that our proposed performance measures in this LTDS do not perfectly capture all the dimensions of our ambition, and there may be scope for evolution and refinement when the strategy is refreshed and updated for PR29.

In addition, it should be recognised that our over-riding compliance obligations do not, in every aspect, lend themselves to the formulation of long term outcome measures driving multi-AMP enhancement programmes, as envisaged for the LTDS. For example, under section 10 of the 1975 Reservoirs Act we are obliged to have all our dam structures inspected for safety at least once every ten years and to carry out recommended works. Our AMP8 business plan includes a programme of specific dam safety schemes brought about by inspection reports. However, future inspections that have not yet taken place will inevitably recommend works which we will carry out in order to maintain compliance, but we cannot anticipate the nature or scope of what this will entail. For the purposes of the LTDS, therefore, we are unable to particularise the effect of our Reservoir Act obligations beyond 2030, though we know requirements will arise and it is likely that substantial investment programmes will be required in each of the subsequent four price control periods.

1.3.3 Safe and high quality drinking water

'Clean, safe drinking water for all' was one of the six promises we made to customers as part of Welsh Water 2050. Drinking water quality remains one of the top priorities for our stakeholders, yet standards of performance are threatened by a number of factors. These include:

[11] Note that the third and fourth of the high level objectives have been combined into one AMP8 `investment case' supporting document for the purposes of presenting our AMP8 proposals. From the rather shorter-term perspective of the 2025-30 plan it was decided that dealing with them together in one place was to be preferred.

- deterioration in raw water quality brought about by changing land use in our catchments, exacerbated by the effects of climate change;
- the effect on water quality of ageing assets, notably unlined cast iron mains; and
- the emergence of new threats such as PFAS. [12]

We have chosen to focus on **four outcomes** to drive this component of our LTDS. Each is set out below, together with our rationale for the choice of measure and the targets we set.

Table 4

Outcome	Measure	2025 (forecast)	2030	2050
Tap Water Quality Compliance Risk Index	The DWI's Compliance Risk Index (CRI) Score	4.5	0.0	0.0
Rationale for Choice of Outcome The CRI is the primary regulatory metric for drinking water quality and is a common performance commitment. It is designed to capture the risk arising from treated water compliance failures.				
Rationale for Target Although the methodology for compiling the CRI score makes it difficult to achieve a score of zero (only one company achieved this in 2021-22 and none did so in 2020-21) our customers have consistently told us that safe drinking water is of the highest priority. The PR24 Forum would like us to target a level performance at least as good as the average for the rest of the sector (which itself is likely to improve over time). We know why our scores have been high and we are planning to eliminate the causes of potential non-compliance by the end of the AMP8 period. Targeting a score of zero is undoubtedly ambitious, indeed it is rarely if ever achieved by any water company, but by setting a target of zero we set a standard and ensure we are incentivised to absolutely minimise tap water compliance risks.				

Table 5

Outcome	Measure	2025 (forecast)	2030	2050
Acceptability of Water	Discolouration, taste, or odour contacts per 1,000 population	1.75	1.0	0.5
Rationale for Choice of Outcome Although `customer contacts' is not a direct measure of water quality it is a strong indicator of customers' experience and has rightly been adopted as a common performance commitment for AMP8 and beyond. Recent research carried out by Ofwat suggests that customers' valuation of acceptability of water contacts is high. It is also a measure on which we lag the rest of the industry. One of the most challenging elements of our ambition for 2050 is to bring our performance into line with the best in the sector. This will require a sustained programme of investment to achieve.				
Rationale for Target It is not possible to eliminate customer contacts regarding water quality entirely. We have chosen to target 0.5 contacts per 1,000 customers in 2050 because even the best-performing companies with simple groundwater systems have not been able consistently to beat this level, and there will always be a residual level of contact caused for example by issues on customers' own pipework. It is also in accordance with the strategic steer from the PR24 Forum (see Appendix). Our interim target of 1.0 for 2030 is particualrly ambitious because it implies a reduction of more than 40% over the five-year AMP8 period. However, we acknowledge that this is what our regulators expect of us, it is in accordance with the steer from the PR24 Forum (see Appendix), so we are determined to work hard to achieve it.				

[12] Poly- and perfluoroalkyl substances (PFAS).

Table 6

Outcome	Measure	2025 (forecast)	2030	2050
Protecting raw water quality	Number of designated safeguard zones	18	13	5

Rationale for Choice of Outcome
One of the primary drivers of drinking water quality at the tap is the state of the catchments from which water is abstracted and ultimately supplied to our customers. This is recognised by the framework for designating safeguard zones. Raw water quality is at risk from a variety of influences, and provides a basis for regulation by NRW of permitted activities in the relevant area. In the first instance therefore this is a measure of raw water quality and its potential to prejudice drinking water quality, in turn necessitating a need for expensive water treatment. This measure was a bespoke PC for us at PR19, linked to our planned work in catchments. The removal of a designated safeguard zone is an indication that the risks to drinking water caused by raw water quality have been sufficiently addressed. To enable a designation to be removed we will undertake an action plan to engage with landowners and businesses within the catchments – some of which are very large areas. As we are not a regulator we cannot compel third parties to engage and change practices, and we cannot remove the designation. If designations ultimately cannot be removed an agreed and effective action plan will be considered as a surrogate for removal.

Rationale for Target
The target of 5 remaining designated safeguard zones in 2050 recognises the fact that some catchments are large and are influenced by a significant number of landowners and other occupiers, so there is a point beyond which it is not economic to try to bring about the changes that would be required to remove a designation. Further, the impact of our actions may take a considerable time to have the impact required to remove a designation even with full engagement. The continued existence of a designation supports our approach as it gives NRW powers to limit what additional activities can be undertaken in the catchment, potentially preventing further raw water quality deterioration. From 23 zones in 2021-22 we are steadily moving through the programme and plan to have removed 10 by the end of AMP8, and a further 8 by 2040.

Table 7

Outcome	Measure	2025 (forecast)	2030	2050
Lead pipe replacement	Cumulative number of lead pipes replaced from a 2025 baseline	n/a	7,500	100,000

Rationale for Choice of Outcome
`Towards a lead-free Wales' was one of the `Strategic Responses' set out in Welsh Water 2050. Lead is known to be a cumulative poison for humans, and the trend around the world is for ever-tightening standards. Addressing the sources of lead in drinking water is a priority for the DWI. It is a complex and sensitive topic to discuss with customers, and the responses we have had from our research are mixed. The primary (and in some areas the only) means of addressing is the replacement of customers' lead supply pipes. It is not a common PC but is proposed as a Price Control Deliverable (PCD) for the purposes of AMP8.

Rationale for Target
Realistically, it will take decades to replace all the lead supply pipes in Wales. An important constraint is the willingness of householders to allow us to carry out replacement of their pipework. We estimate that there are upwards of 200,000 lead supply pipes outstanding in our area - though there is a considerable range of uncertainty around this. Setting the target of 100,000 by 2050 - approximately 20,000 per AMP on average - was chosen as it is seen as a feasible rate and means we will have dealt with around half of the problem as it is viewed today. It is also in accordance with the steer from the PR24 Forum (see Appendix).
It should be noted that the strategic steer from the PR24 Forum was to replace 10,000 lead pipes by 2030. However, we have capped the target for AMP8 to 7,000, partly because of our affordability, financeability, and deliverability constraints, and partly because the current rate of householder consent to supply pipe replacement is not as high as we would like, so we plan to explore options for improving it in future AMPs.

1.3.4 A secure and reliable water supply

The long term security of water supplies is the primary focus of the WRMP Framework. Short term reliability is important to customers and provides a useful gauge as to how well we are operating and maintaining our delivery systems. This high-level objective can be seen as the quantitative counterpart to the qualitative `safe and high quality drinking water' objective set out above, and it too faces several challenges over the coming years:

- climate change is likely to lead to more extreme weather, including drier and hotter summers, putting pressure on the availability of water in certain areas. This may be exacerbated by demographic and economic trends and their effects on the level and geographical distribution of water demand;
- our water supply delivery systems are generally fit-for-purpose, but they are subject to increasing risks from a range of factors, including climate change (and its effect on flooding risks) and the potential for disruption from cyber-attacks. The continued existence of `single points of failure' on a number of our systems poses an increasing challenge as our networks get older, giving rise to difficult-to-measure risks of high consequence/low probability service failure events; and
- these factors are exacerbated by the effect of ageing on parts of our networks, for example those dominated by the use of asbestos cement mains typically laid in the 1950s and 1960s, and now showing a high and growing propensity to burst, exacerbated by the operating conditions in our area such as hard water.

Reliability of water supplies brings in a complex array of influences. After careful consideration we have chosen to focus on a set of **six outcomes** to drive our LTDS:

- supply interruptions;
- reduction in leakage;
- per capita consumption;
- business demand;
- meters installed;
- resilience of the water network.

In addition, the resilience of our water resource systems to a 1 in 500 year drought is one of the principal guiding objectives of our WRMP, and the AMP8 plan contains a programme of work that will substantially achieve this goal in the short to medium term. There are also other relevant metrics that we will monitor, including those that we are required to report for regulatory purposes, but it is the six listed above where we have most ground to cover and that together will define our progress in meeting the high level objective. Each is set out below, together with our rationale for the choice of measure and the targets we set.

Table 8

Outcome	Measure	2025 (forecast)	2030	2050
Supply Interruptions	Average duration of supply interruptions over 3 hours (minutes:seconds per property)	8:00	4:30	2:00
Rationale for Choice of Outcome Supply interruptions has consistently been a regulatory common PC for a number of years and it is likely to remain so going forwards. It is a good indicator of operational performance and asset serviceability, and customers have told us that preventing major supply interruptions in the future by focusing on resilience over the long-term is a priority. Our				

Outcome	Measure	2025 (forecast)	2030	2050
performance has lagged that of the rest of the industry in recent years, and we have paid over £20m back to customers in the form of regulatory penalties and compensation payments in AMP7, with the biggest factor in failing the regulatory targets being the impact of extreme weather (such as the freeze-thaw of December 2022).				
Rationale for Target The common industry target for 2024-25 is 5 minutes. Notwithstanding a number of significant initiatives currently under way our best estimate of performance in 2024-25 will fall short of this benchmark at 8 minutes (our best performance on this measure so far was 11:05 in 2020-21), but we are determined to beat the 5 minute standard by 2029-30. In the longer term we would like to move towards elimination of the principal causes of supply interruptions but there is a minimum level below which we do not think it is possible to go without unreasonbly high levels of expenditure. We estimate that this is in the region of two minutes, which is also the target suggested by the PR24 Forum (see Appendix). To put this in perspective, only one company has averaged better than two minutes on this measure in recent years. Companies with smaller and more integrated networks tend to be able to reach higher levels of performance than larger, more dispersed networks such as ours.				

Table 9

Outcome	Measure	2025 (forecast)	2030	2050
Leakage	Reduction in total leakage on a three year rolling basis from 2019-20 baseline (negative figure indicates an increase)	-3%	18%	50%
Rationale for Choice of Outcome Leakage has been a primary common PC for many years, albeit that its precise definition has changed from time to time. It is important to customers and it plays a central role in long term supply security.				
Rationale for Target In 2018 the National Infrastructure Commission challenged the industry to halve leakage by 2050. [13]This aspiration has subsequently been endorsed and adopted by governments (e.g in the Welsh Government's `Guiding Principles' for water resources management plans) and by regulators. See our revised draft WRMP (page 73) for further details. In addition, the PR24 Forum has endorsed the 50% reduction target (see Appendix). The Forum also suggested that we should deliver an additional 10% reduction in AMP8 over and above a 15% reduction in AMP7. However, as we are behind on leakage performance in AMP7 and our enhancement expenditure in AMP8 is constrained by financiability, affordability, and deliverability constraints, the 18% target by 2030 is considered to be more realistic, albeit that it is undoubtedly stretching.				

Table 10

Outcome	Measure	2025 (forecast)	2030	2050
Per Capita Consumption (PCC)	Reduction in average water used per person in a residential property from 2019-20 baseline (three year rolling average)	0.5%	7.4%	25.1%
Rationale for Choice of Outcome PCC has been a regulatory common PC since 2020 and it is set to continue to be so into the future. In general, reductions in household consumption can be more cost effective than supply-side interventions in sustaining long term supply reliability. However, reductions in PCC depend on behaviour change by customers, which can be influenced by water company action. However, the degree to which PCC can be reduced through water company influence over the long-term is uncertain.				
Rationale for Target				

[13] `*Preparing for a Drier Future*': National Infrastructure Commission, March 2018.

Outcome	Measure	2025 (forecast)	2030	2050
The reduction in PCC to 110 litres per head per day, equivalent to 25% on the regulatory measure, is considered to be a challenging but achievable target. This is in accordance with the steer from the PR24 Forum (see Appendix). We believe it is also in line with targets being adopted by other companies in the industry, following guidance from Defra.				

Table 11

Outcome	Measure	2025 (forecast)	2030	2050
Business demand	Reduction in use of water by business customers compared with average 2019-20 baseline (3 year rolling average)	3.7%	5.1%	8.5%
Rationale for Choice of Outcome Non-household customers account for approximately one quarter of total water usage by our customers. As with household demand, future reductions are essential if we are to meet our long term ambitions. This will be a common PC from PR24 onwards.				
Rationale for Target There is less scope for achieving reductions at the level of the individual non-household customer level because the overwhelming majority of our business customers are either already metered or use comparatively small volumes of water. Reducing leakage beyond the customer's meter is excluded from any reductions. In addition, reductions we achieve will be offset by the effects of economic growth. We therefore consider a net target reduction of 8.5% by 2050 to be stretching but achievable.				

Table 12

Outcome	Measure	2025 (forecast)	2030	2050
Meters installed	Percentage of household customers metered and charged on usage	51%	65%	96%
Rationale for Choice of Outcome Our new metering strategy is one of the cornerstones of the WRMP and hence the LTDS, and will play a vital role in securing reliability of supplies in the longer term. Accordingly we have chosen household meter penetration as one of our LTDS outcomes. It is not a common PC: however, it has been put forward as a PCD for the AMP8 period.				
Rationale for Target Our 2050 target reflects the fact that we aim to achieve universal coverage, but certain properties cannot be metered for practical reasons. The target of 65% by the end of AMP8 reflects a number of factors. First, the bulk of the metering programme has been profiled across AMPs 8 and 9, having regard to deliverability constraints in particular, but also affordability and financeability as well. Second, the majority of first time installations on existing properties will not necessarily be used for charging straight away as we cannot force sitting customers on to the measured tariff. Rather, these meters will contribute to the achievement of this outcome either when existing occupants opt to pay the measured tariff, or there is a change of occupant in which case we can require that the measured tariff apply thereafter.				

Table 13

Outcome	Measure	2025 (forecast)	2030	2050
Resilience of water network	Populations served by critical water treatment works with no alternative source of supply ('000s)	439.0	382.6	0

Rationale for Choice of Outcome
One of the principal drivers of short term reliability is the availability of back-up options when failures occur. Customers in population centres served by a single treatment works lacking connectivity to the rest of the network are at higher risk of extended outages. We have chosen this outcome because it is simple and provides a direct measure of the scope of the risk to continuity of supply that we wish to bring down. It is not a common PC. For AMP8 it has been put forward as a PCD, expressed in terms of the named schemes that will deliver the targeted improvement.

Rationale for Target
At the end of this AMP period we forecast that over 400,000 people will still be supplied by systems with no alternative source of supply, over 10% of our population served. We anticipate that customers service expectations will continue to rise in the future, and lapses in supply reliability will be increasingly unacceptable. Our ambition is therefore to eliminate this source of risk altogether, so we have set a target for 2050 of zero.

1.3.5 Protecting and improving the environment

Our third high level objective recognises that one of the cornerstones of the LTDS Vision is to **support a thriving environment**. Whilst the main focus is naturally on the aquatic environment, we are also aware of our wider impact on local communities (e.g by means of pollution incidents or our impact on biodiversity) and we are committed to play our part in protecting them too.

In order to give effect to this objective we have identified **seven outcomes**, of which five are regulatory common performance measures, one is a `bespoke' performance measure, and one is chosen specifically for our LTDS. Each is set out below, together with our rationale for the choice of measure and the targets we set.

Table 14

Outcome	Measure	2025 (forecast)	2030	2050
Total pollution incidents	Number of category 1, 2, or 3 pollution incidents from wastewater assets	78	68	24
Total pollution incidents (Ofwat measure)	Number of category 1, 2, or 3 pollution incidents from wastewater assets per 10,000km of sewer	21.52	18.76	5.82

Rationale for Choice of Outcome
Pollution incidents is a long-standing regulatory common PC. It is an indicator of the extent to which our assets and the way they are operated and maintained are fit-for purpose, and it also reflects the negative impact that unintended escapes of contaminated water have on the environment and our communities. It also plays an important role in the annual Environmental Performance Assessment (EPA) by NRW. We prefer to express the measure in terms of actual numbers of incidents,, but the normalised Ofwat measure is also shown for completeness.
The `sister' measure of total pollution incidents is `serious pollution incidents', which captures category 1 and 2 incidents from wastewater *and* water supply assets. It too is a common PC. As we already target zero on this measure we have not chosen it as a separate outcome for the purposes of the LTDS, but it remains a central element of the overall high level objective.[14]

Rationale for Target

[14] Similarly, we target a 4-star EPA assessment and 100% discharge permit compliance as a matter of course, but do not give prominence to these objectives in the LTDS, as they are less suitable as metrics to drive our enhancement strategies.

Outcome	Measure	2025 (forecast)	2030	2050
Our performance on pollution incidents compares well with that of other companies. However, there is no such thing as an acceptable pollution incident, and we plan to continue to bear down aggressively on the numbers. We have set a target for 2050 of 24 incidents because we view this to be the minimum feasible level that can be achieved given, for example, that the impact of third party activity over which we have no control cannot be eliminated entirely. In addition, it is worth noting that our target for `serious pollution incidents', (which just captures category 1 and 2 events for water and wastewater assets and is a separately common performance commitment), is zero throughout the period covered by the LTDS.				

Table 15

Outcome	Measure	2025 (forecast)	2030	2050
Internal sewer flooding	Number of internal flooding incidents	200	165	95
Internal sewer flooding (Ofwat measure)	Number of internal flooding incidents per 10,000 customers	1.33	1.07	0.55

Rationale for Choice of Outcome
Internal sewer flooding is an established regulatory common PC. Customers consistently tell us that this is the worst service failure they can experience. It is also an indicator of significant failures of the wastewater network. Most incidents now occur due to 'random' blockages and collapses, but a few customers are still affected in heavy rainfall events for which the capacity of the network is inadequate. We prefer to express the measure in terms of actual numbers of internal flooding events, but the normalised Ofwat measure is also shown for completeness.

Rationale for Target
Our ultimate ambition for internal sewer flooding is to reduce it to zero. However, until a way can be found to eliminate collapses and blockages caused by third parties there will remain a stubborn minimum level that will be difficult to reduce further, and this is reflected in the 2050 target. The PR24 Forum has suggested a target for 2050 of 120 (see Appendix), but we have challenged the plan and decided to target a somewhat lower level.

Table 16

Outcome	Measure	2025 (forecast)	2030	2050
External sewer flooding	Number of external flooding incidents	3,400	2,700	1,300
External sewer flooding (Ofwat measure)	Number of external flooding incidents per 10,000 customers	22.64	17.47	7.59

Rationale for Choice of Outcome
External sewer flooding has been used as a PC by a number of companies, and will become a common PC at PR24. Though it generally has a lower impact on customers, external flooding is nonetheless a priority for customers and is an indicator of failure of the wastewater systems. It is also far more commonplace than internal flooding. We prefer to express the measure in terms of actual numbers of external flooding events, but the normalised Ofwat measure is also shown for completeness.

Rationale for Target
As with internal flooding, our ambition is essentially to eliminate all external flooding that we can by 2050. However, we forecast that approximately one third of the current rate of flooding will persist due to factors largely out of our control. Our target of 1,300 is in line with that suggested by the PR24 Forum (see Appendix).

Table 17

Outcome	Measure	2025	2030	2050
River water quality improved	Percentage reduction in phosphorus discharges from 2020 baseline	10%	27%	43%

Rationale for Choice of Outcome
Although river water quality is influenced by a number of pollutants, phosphorus is the most common reason why a river fails to achieve `good' status. Wastewater systems are a primary source of phosphorus, alongside agriculture. In general terms, in Wales wastewater discharges contribute a lower proportion of phosphorous than is the case in England, with agriculture contributing a higher share. However, phosphorous reduction is the top priority of the Welsh Government in relation to improving river water quality and releasing the lock on housing development in certain areas. While our plan targets phosphorous reduction specifically in priority rivers, in line with the collaborative approach agreed in Wales, we have adopted this PC as an LTDS outcome.

Rationale for Target
The level of the target and the profile of our planned performance are driven by the ultimate objective of delivering improvements in river water quality. In other words, we see phosphorus reduction more as a means to an end, rather than an end in itself. We have taken into account the PR24 Forum strategic steer, which expects us to reduce our discharges from wastewater treatment works in Special Areas of Conservation (SAC) sensitive areas to the levels deemed consistent with healthy river water quality, alongside other contributors on an agreed 'fair share' basis, so as to achieve 90% of the phosphorus reduction required on a 'fair share' basis by 2030, and 100% by 2032.

Comparisons will be made with the higher expected headline targets for phosphorus reduction in England (80% by 2050). The reasons for the difference are two-fold:

- first, river water quality in Wales is starting from a better postion, with 45% of rivers achieving `good ecological status' in 2021, compared with just 15% in England. In part this reflects the fact that phosphorus removal schemes had already been implemented at many of our treatment works before 2020;
- second, the main source of phosphorus discharges into rivers in England is sewage, whereas in Wales it is agriculture. At this state we do not plan to go beyond 43% reduction by 2050 because many waterbodies would still be unable to achieve good ecological status because of the influence of agriculture. As circumstances change over the course of the coming years, however, we will review and modify our targets as appropriate, e.g if changes in run-off from agriculture open up new opportunities to move rivers into good status by delivering reductions in phosphorus from wastewater discharges.

Table 18

Outcome	Measure	2025 (forecast)	2030	2050
Environmental harm from SOs	Percentage of SOs having `no' or `very low' environmental impact	52.3%	61.0%	100%

Rationale for Choice of Outcome
There is widespread agreement on the urgent need to address the effect of the operation of SOs on the ecological status of receiving waters. At stake is decisions on the shape and content of a programme which will cost the equivalent of many thousands of pounds per customer in Wales, so it is of paramount importance that we get this right. Views differ, however, on what performance metrics should drive improvements. We have had extensive dialogue with our regulators, government, and other stakeholders on this issue. Ofwat is introducing a measure of the number of spills per SO per annum, and will apply this as a common PC We acknowledge that spill events are the focus of much public concern. However, after careful consideration we have chosen an alternative measure which targets directly the actual ecological impact of the operation of SOs, because the number of spills is often an imperfect indicator of harm, and we do not want to be incentivised to target investment at frequently-spilling SOs that cause little or no ecological harm rather than infrequently-spilling SOs that do. Our approach is in line with the Welsh Government's emphasis on preventing ecological harm to our water bodies, and is also supported by the Wales PR24 Forum. We acknowledge that the average spills measure will be the primary metric used in England, and will report our own performance on this basis alongside our own preferred PC (see below).

Rationale for Target

Outcome	Measure	2025 (forecast)	2030	2050
We plan to address every SO that causes harm, so the target is 100%. We intend to achieve this as soon as possible, with significant progress to be made during AMP8 and the aim of reaching 100% by 2040. This is in line with the steer from the PR24 Forum, viz: `*We expect DCWW to invest to increase the proportion of SOs causing no harm (or `very low' harm) to the environment to 100% by 2040 at the latest including all currently unpermitted SOs. We expect the company to achieve 60% by 2030 and 80% by 2035*' (see Appendix).				

Table 19

Outcome	Measure	2025 (forecast)	2030	2050
SO spill frequency	Average number of spills per annum from all SOs	49.2	38.7	10.0
Rationale for Choice of Outcome See discussion above under `environmental harm from SOs'. This is expected to be a regulatory common PC from 1st April 2025 onwards.				
Rationale for Target Our strategy is focused on eliminating significant environmental harm from SOs, and we aim to achieve that by 2040. In the course of doing so we estimate that in an average rainfall year spill frequency will automatically fall to 26.6 in 2040 as a consequence of our harm-reduction-driven interventions. Thereafter our commitment is to improve all the remaining SOs that are classified `substandard' by NRW, and to maintain performance on our `harm' measure. In practice we expect that this will involve taking some SOs beyond the current requirement of UPM, i.e that the definition of `impact' will tighten as better evidence becomes available. As a consequence we expect spill frequency to fall further over the course of AMPs 11 and 12 to a level consistent with the stated target for companies in England of no more than 10 spills per SO per annum.				

Table 20

Outcome	Measure	2025 (forecast)	2030	2050
Resilience of critical wastewater assets	Percentage of critical above-ground assets protected against a 1 in 30 year flood.	75%	80%	100%
Rationale for Choice of Outcome A critical wastewater asset is an asset that serves a population equivalent greater than 5,000 and has a potential environmental impact on Water Framework Directive, bathing waters, shellfish waters or SSSI water bodies, or alternatively potentially impacts 30 or more properties if flooded. Extreme rainfall has the potential to cause flooding of these assets, which can impair their ability to function normally, often in the precise circumstances when it is so important that they do. This can have detrimental effects on local communities as well as consequences for other outcomes. Stakeholders have identified this as a priority. The PR24 Forum, for example, says `*...we expect companies to enhance the resilience of their assets and operations to flood and coastal risk....*" (see Appendix).				
Rationale for Target Our ambition is to ensure that no critical wastewater assets are vulnerable to a 1 in 30 year flood. We recognise that this is effectively a `moving target' because climate change is expected to increase the intensity of a 1 in 30 year flood. Nonetheless, our ambition is to achieve a score of 100% by 2050. Note that we aim to achieve this level of resilience for critical water treatment works by 2030.				

1.3.6 Wider environment and social value

Our fourth high-level objective recognises that in realising our Vision we have a wider role to play in delivering social value because of the magnitude of the impact our service delivery activities have on the wider environment, and the contribution we can make to tackling the climate and nature emergencies in Wales. This is consistent with one of the strategic steers of the PR24 Forum:

`We expect companies to deliver at scale and pace to address the climate and nature emergencies during PR24, prioritising action based on delivering the maximum improvement to the environment in terms of reducing harm'.

This manifests itself in two important ways, and these are each represented in the LTDS outcomes we are proposing to give effect to our Ambition, as set out below.

Table 21

Outcome	Measure	2025 (forecast)	2030	2050
Net Carbon Emissions	Percentage reduction in total (operational and embedded) CO_2 emissions compared with 2010-11 baseline	66%	90%	100%

Rationale for Choice of Outcome
The general concept of `net zero' is well understood and supported by customers and other stakeholders. Ofwat has proposed separate common PCs for operational greenhouse gas emissions from water and wastewater, expressed as percentage reductions from a 2021/22 baseline.
However, we prefer to express our ambition in terms of a single reduction in net carbon emissions compared with the 2010-11 baseline, consistent with the Net Zero Strategy we published in 2020 and the way in which we have been presenting our progress to stakeholders in our Annual Report and elsewhere. As it includes total emissions, we believe our measure is more comprehensive and better aligned with the Welsh Government's ambition on net zero, as it goes further than the targets based on operational emissions by taking into account total carbon emissions throughout the lifecycle of our assets, including construction and operation, as well as fugitive emissions.

Rationale for Target
Eliminating net carbon emissions is an urgent priority. Our 2020 strategy set 2040 as the date by which we intend to eliminate net carbon emissions, and we plan to meet or beat that target date. This is in accordance with the strategic steer from the PR24 forum (see Appendix). Note that our commitment to reduce total greenhouse gas emissions by 90% by 2030 remains a key part of our Journey to Net Zero strategy. However, the size of our AMP8 capital programme and the constraints on affordability, financeability and deliverability in AMP8 put this target at risk. We will reassess the viability of this target following the Final Determination in December 2024.

Table 22

Outcome	Measure	2025 (forecast)	2030	2050
Biodiversity	Net change in the number of biodiversity units per 100km2 of land (provisional - see below)	tbc	tbc	tbc

Rationale for Choice of Outcome
The purpose of this outcome is to capture the improvements we can make to biodiversity in the fulfilment of our functions. However, as set out in section 9.3 of our Business Plan (link) our existing biodiversity strategy, the expectations placed on us for the future by NRW, and the wider opportunities available to deliver biodiversity improvements, are all multi-dimensional. Biodiversity does not, therefore, lend itself easily to being captured in a simple linear metric.
Ofwat has defined a common PC for biodiversity in terms of `*the net change in the number of biodiversity units on nominated land per 100km^2 of land in the company's area*'. Much of the information required to put the measure in place does not yet exist and will need to be collected, so it is not possible to prepare medium or long term targets, or to evaluate

Outcome	Measure	2025 (forecast)	2030	2050
the extent to which the measure is suitable to drive our strategies. For the time being our working assumption is that we will adopt this measure as our LTDS outcome for biodiversity, but if an alternative presents itself that appears to align more closely with the strategic direction in which we are drawn, in line with NRW expectations, we may consider a change.				
Rationale for Target Targets will not be set until a measure has been adopted and the information is available to enable calibration.				

1.3.7 Excellent customer service

Excellent customer service has consistently been one of our primary objectives over the past 20 years or so, as evidenced by our strong track record. Its importance over the coming years will, if anything, increase, as customers' expectations rise, digitisation continues to transform how we interact with our customers, and we grapple with the effects of the cost of living crisis and the wider macroeconomic backdrop. We have decided to express our ambition with reference to the common performance commitments for each of the three main custoer categories: households, developers, and non-households.

Table 23

Outcome	Measure	2025 (forecast)	2030	2050
The Customer Measure of Experience - `C-Mex'	Our industry ranking on the C-Mex score, as calculated by Ofwat	Top 3 in the industry	Top 3 in the industry	Top 3 in the industry
Rationale for Choice of Outcome C-Mex is the common performance commitment used by Ofwat to measure the quality of customer service to households. It draws on survey results and objective information about the range of services offered by companies.				
Rationale for Target There are 17 companies in the industry. We believe that targeting third place provides a stretching but achievable target. This is in line with the strategic steer from the PR24 Forum (see Appendix).				

Table 24

Outcome	Measure	2025 (forecast)	2030	2050
The Developer Services Measure of Experience - `D-Mex'	Our industry ranking on the D-Mex score, as calculated by Ofwat (quantitative measure only)	Upper quartile	Upper quartile	Upper quartile
Rationale for Choice of Outcome D-Mex is the common performance commitment used by Ofwat to measure the quality of service provided to developers. It is based on a combination of (qualitative) customer satisfaction scores and (quantitative) performance against a set of industry performance metrics (e.g time taken to respond to certain requests). Whilst we strive to be amongst the leading companies in providing services to developers, we are at a structural disadvantage on the qualitative part of the measure, due to significant differences in the legal frameworks applying in England and Wales. We play a different role in our relations with developers compared with the English companies, because effectively we have to regulate or enforce requirements that are unique to the Welsh context. These include the obligations on developers to install fire sprinkler systems in new homes, mandatory build standards associated with mandatory adoption, and sustainable drainage requirements. In survey responses developers often score us negatively for reasons associated with the more onerous legal standards they have to meet, not for reasons associated with the actual service we have provided.				

Outcome	Measure	2025 (forecast)	2030	2050
As a consequence, our overall performance on D-Mex has put us in the bottom half for the industry. Whilst we will continue to work hard to improve our services to developers yet further, we do not think this will be reflected in our qualitative score as the measure is currently defined by Ofwat. We have been working with Ofwat to try and have the measure adjusted in order to allow for the differences in legal framework between England and Wales. In the meantime for the purposes of our LTDS outcome we will focus on the quantitative element alone.				
Rationale for Target We aim to be amongst the leading companies in providing services to developers, so we are targeting an upper quartile position on the quantitative component of D-Mex.				

Table 25

Outcome	Measure	2025 (forecast)	2030	2050
Business customer experience in Wales	Average customer satisfaction score	not applicable	see below	see below
Rationale for Choice of Outcome For the purposes of the current regulatory period we adopted a simple measure of customer satisfaction based on a score out of 5. Our target has been an average score of 4.5. Ofwat is currently carrying out a consultation on the definition and format for a common PC for ourselves and Hafren Dyfrdwy. We will adopt this measure for the purposes of our long term Ambitions when it is finalised in 2024, and set ourselves targets accordingly.				

1.3.8 Mapping of outcome measures to AMP8 business plan submission

As noted in section 1.3.2 above, not all of the LTDS outcomes we have chosen to express our Ambition are regulatory common PCs at present, and *vice versa*. Some of our LTDS outcomes are specific to our circumstances (e.g. protecting raw water quality), and of these some are put forward to be considered as PCDs for the purposes of the AMP8 business plan.

Some common performance commitments (e.g. sewer collapses) are undoubtedly important, but have not explicitly been chosen as LTDS outcomes because their impact in the long term is adequately captured by other overlapping metrics (in this case, flooding and pollution incidents).

Others (e.g. discharge permit compliance) are fundamental performance metrics, but have not explicitly been identified as `LTDS Outcomes' as such because they do not by themselves drive enhancement expenditure beyond AMP8 and our focus is generally on driving improvements where our strategy is to be targeted and progress can be measured.

Further, the business plan tables themselves (LS1, OUT1, etc) only require completion for a subset of the common performance commitments. For ease of reference, therefore, the following table provides a `roadmap' of the relationship between the different metrics and where they are presented. For completeness, all of the PCDs that are being proposed specifically for the AMP8 plan are also shown.

Table 26

Measure	LTDS Outcome	Common PC	Bespoke PC	In BP Tables?	AMP8 PCD
Tap Water Quality Compliance Risk Index	✓	✓		✓	
Acceptability of water (customer contacts)	✓	✓		✓	

Measure	LTDS Outcome	Common PC	Bespoke PC	In BP Tables?	AMP8 PCD
Protecting raw water quality (number of of designated safeguard zones)	✓				✓
Lead pipe replacement	✓				✓
Supply interruptions	✓	✓			
Leakage	✓	✓		✓	
Per capita consumption	✓	✓		✓	
Business demand	✓	✓		✓	
Meters installed	✓				✓
Resilience of water network	✓				✓
Mains repairs		✓		✓	
Unplanned outage		✓		✓	
Total pollution incidents	✓	✓		✓	
Internal sewer flooding	✓	✓		✓	
External sewer flooding	✓	✓		✓	
River water quality improved (phosphorus reduction)	✓	✓		✓	
Bathing water quality		✓		✓	
Environmental harm from SOs	✓		✓	✓ *	
SO spill frequency	✓	✓		✓	
Resilience of critical wastewater assets	✓				
Discharge permit compliance		✓		✓	
Sewer collapses		✓		✓	
Net carbon emissions	✓				
Operational greenhouse gas emissions (water)		✓		✓	

Measure	LTDS Outcome	Common PC	Bespoke PC	In BP Tables?	AMP8 PCD
Operational greenhouse gas emissions (wastewater)		✓		✓	
Biodiversity	✓	✓		✓	
C-Mex	✓	✓			
D-Mex	✓	✓			
Business customer experience in Wales	✓	✓			
Dam safety schemes delivered					✓
Asbestsos cement mains replaced					✓
Security/SEMD					✓
South East Coastal Sewer					✓

* Our bespoke performance commitment is presented in the Additional Tables (WSH201).

Finally, for completeness, it should be noted that business plan tables LS1 and LS2 (though not tables OUT1-OUT5) also require information on two `forecast other outcomes' associated with the WRMP and the DWMP respectively, namely:

- `supply-side scheme benefit', defined as the benefit in Ml/d delivered to the supply-demand balance; and
- `wastewater network storage volume delivered or avoided'; defined as the effective network storage benefit in m^3 from both grey and green infrastructure.

The first falls within the scope of our `*reliable short and long term water supply*' high level objective and is covered by the WRMP. The second relates to `*protecting and improving the environment*', and falls within the scope of the DWMP. As both can be regarded more as `output' measures that make a contribution to the achievement of the outcomes we have chosen to express our Ambition, they are not considered further in the LTDS.

1.3.9 Future evolution and refinement of 2050 outcomes

We are confident that the outcomes we have set out to be achieved by 2050 cover all aspects of what will be required in order to give effect to our Vision, and provide a comprehensive basis for the development of a robust long term strategy that reflects our legal and regulatory framework and the views of customers and other stakeholders. Our AMP business plan has been shaped in order to give the strategy the best possible start, given the various near-term constraints to which we are subject.

However, as set out above, long term planning is an ongoing process at DCWW. We know that as we work through our AMP8 programmes the drivers of the LTDS will evolve, whether it be the priorities of customers and stakeholders, the requirements of regulators and legislation, or wider factual parameters such as climate change, technology, and macroeconomic influences. We are conscious that we are looking at 2050 through a 2023 lens, which will quickly become out-dated.

We are also aware that our suite of proposed outcomes for 2050 is not perfect, and a number of measures may be improved. Designing metrics to hold performance to account is not always straightforward, as information may be limited and direct measurement may be difficult or expensive. We expect evolution in a number of Ofwat's common PCs over the coming years, and possibly in our own LTDS outcome measures as well. Nonetheless, the development and refinement of the means by which we track our progress will always take place within the overall Vision that we have set out for ourselves, and the over-riding objective of becoming a `truly world class, resilient and sustainable water service for the benefit of future generations'.

2. Part Two - Presentation of Strategy

2.1 Overview

In line with Ofwat's guidance,[15] in this Part we present our strategy for achieving the Vision and Outcomes presented in Part One above. For each of our four high level objectives we describe how we plan to reach our goals, and we present details of the enhancement programmes that we consider will best deliver them in most or all plausible scenarios - the `core pathway' (2.2). We set out what this is expected to mean for household bills and explain how our enhancement plan for AMP8 has been derived from the 25-year strategy (2.3).

We go on to present a number of alternative pathways (2.4). Five are fully costed, and differ from the core pathway in the following respects:

1. the strategy for dealing with a tightening of drinking water standards (PFAS and THMs);
2. the strategy for dealing with a tightening of wastewater permits (including sludge);
3. the strategy that would accommodate the effect of adverse climate change impacts on wastewater networks (flooding and SOs);
4. the potential effect on the SO strategy of an enhanced `Team Wales' approach; and
5. the strategy for responding to the potential impact on wastewater networks (flooding and SOs) arising from adverse demand trends.

In the course of testing our strategy we have also given thought to a number of additional alternative pathways. These are presented in narrative form, but either they have not been fully costed, or the nature of the pathway is such that the margin of uncertainty around future costs is extremely wide (e.g the NEP after 2035). It is possible that as we progress through the AMP8 period one or more will start to crystallise and warrant a deeper assessment, whilst others might become irrelevant or highly unlikely.

In Parts Three and Four below we provide details of the rationale for our strategy and the foundations on which it has been built. However, by way of context to the material presented here we provide a summary overview of the principal assumptions underpinning the strategy and why our strategy is the best way of achieving our high level objectives.

Approach

In a nutshell, the general approach we adopted to the derivation of our strategy can be described as: **the identification of the programme of best value enhancement activities to achieve our Ambition that is robust to a range of plausible uncertainties about the future and satisfies constraints on speed of implementation and sequencing**. Given the contrasting nature of different elements of the programme - compare for example the complexities involved in achieving our `no harm' outcome for SOs with the relatively `linear' characteristics of the lead pipe replacement programme - the precise methodologies applied varied pragmatically from component to component. In general, however, for each objective some or all of the following steps/processes were involved:

- `long list' interventions were identified as possible solutions and evaluated at a high level;
- activities that would deliver multiple benefits (e.g. reductions in leakage and supply interruptions) were highlighted;
- `adaptive planning' techniques were applied where appropriate. However, it is worth noting at the outset that no part of our strategy involves any large projects with long lead times where adaptive planning is most beneficial. Rather, most of the enhancement interventions we have considered

[15] See *PR24 and beyond: Final guidance on long-term delivery strategies* (page 13) which can be found here

comprise programmes that are more modular in nature. Many are projected to be ongoing through several AMP periods, and in several cases the shape of the strategy is substantially dictated by the requirements of legal compliance.

Where alternative options presented themselves, we derived our preferred choices using our multi-capitals framework. Our approach to costing was based on our standard methodology, as detailed in `*Our approach to investment planning*' (see our PR24 Business Plan Section 4 - link).

Having arrived at a preliminary view of the enhancement programmes that will be necessary in order to achieve our high-level objectives, we undertook a process of `core pathway testing'. We assessed our programmes against a number of plausible scenarios, including the common reference scenarios, and modified them where necessary in order to ensure that they only included activities that would be required in all or nearly all plausible future scenarios. In some cases we responded to the testing process by including provision for the carrying out of studies and other exploratory exercises that would enable uncertainties to be narrowed and the scope for `potential regret' expenditures to be limited. In others, any modifications that could be made to the preferred solution now to make it more capable of being adapted to operate if a future scenario materialised were considered, and incorporated where it was cost beneficial to do so.

It was apparent early on in the development process that the strategy would entail a material rise in the rate of enhancement expenditure which would have implications for financeability, affordability, and deliverability in the form of potential supply chain constraints. The implications of different expenditure profiles were evaluated and views were obtained, notably from customers. These helped to shape the final profile, particularly in relation to the 2025-30 period for which expenditure has been significantly constrained below what would otherwise have been optimal, in order to ensure the AMP8 business plan is financeable, affordable, and deliverable.

Principal Assumptions

The main assumptions we have made for the purposes of the LTDS are as follows.

First, in order to isolate the improvements that would need to be delivered by the enhancement programmes, it was necessary to make an assumption as to the changes in performance that would be delivered from base expenditure. Details of our thinking are set out in section 4.1.3 below. In summary:

- for some LTDS outcomes, notably leakage, our projections show an improvement in performance from base expenditure over the 25-year period;
- for others, e.g. water supply interruptions, we are projecting flat performance from base expenditure; and
- for a small number where enhancement expenditure is required just to `stand still' because of adverse movements in the environment within which we operate (e.g. tap water compliance risk index) we are assuming a worsening trend in performance from base expenditure.

Second, as part of our Ambition for the 25-year strategy we have adopted challenging assumptions on cost efficiency. We have applied a one-off reduction in unit costs from 2025 onwards of 6.7% across the board, and notwithstanding that the UK economy is into its second decade of zero or low productivity growth with no immediate prospect of a return to growth, we are assuming a1% year-on-year improvement in efficiency from 2030 onwards. This means that by 2050 we are assuming real unit costs almost one quarter lower than those we incur today.

Third, we gave careful thought to the range of economic assumptions that need to be made for the purposes of our strategy. After years of comparative macroeconomic stability, the current AMP period is characterised by significant volatility in the economic environment. Making forecasts even

for the short term is more than unusually challenging. We have therefore decided to adopt a set of neutral economic assumptions for the purposes of our projections and placed more emphasis on testing our plans against economic scenarios that deviate from our forecasts. These include:

- we have adopted Ofwat's `early view' of the weighted average cost of capital, published in December 2022, namely 3.23% real (CPIH) at the wholesale level;
- we assume that the real prices of all of our inputs remain unchanged from 2030 onwards, i.e they move in line with CPIH inflation; and
- there is no further widening of income inequalities that could make our affordability challenges even more of a constraint.

2.2 Detailed Delivery Strategies

2.2.1 Safe and high quality drinking water

In modern water supply systems safe and high quality drinking water is a function of a complex and inter-related set of factors covering the whole supply chain from catchment to tap. Our high level strategic document `*Safe and High Quality Tap Water*'' (WSH51 - link) provides a holistic technical overview of the challenges we face and our plan for addressing them, especially in the near-term.

Our four chosen outcomes span what we consider to be the most important metrics to track for the purposes of the LTDS. As they relate to quite distinct elements of the overall high level objective we present separate strategies for each, albeit that they are fundamentally part of a single issue and have been considered as such in our planning processes. Where appropriate we highlight the principal linkages and interactions.

Table 27

Strategy for Tap Water Quality Compliance Risk Index	
What are we going to achieve?	From a score of 5.4 in 2022-23 and a forecast score of 4.5 in 2024-25 we are planning to achieve a score of zero by 2030 and maintain it at that level throughout the remainder of the 25-year period, i.e 100% compliance.
How much will be delivered from base?	Base will deliver no net improvement. Exogenous factors tend to impact negatively on performance over time. These include raw water quality deterioration and the increasing security threats to our supply systems. As far as possible, base expenditure in catchments will slow the rate of deterioration. However, enhancement expenditure is required to eliminate the major risks to compliance now, and in order to counter the effects of growing risks to tap water compliance going forwards.
What are we going to do?	Our strategy comprises four elements: • works to install ultra-violet treatment in order to comply with Regulation 26 disinfection requirements; • the implementation of a strategic monitoring programme for coliphages and other microbiological threats using on-site flow cytometry; • works to facilitate same-day cleaning at contact tanks, final water tanks, and other structures in order to meet DWI requirements, especially during AMP8; and • installation of new equipment and systems to monitor PFAS.

Strategy for Tap Water Quality Compliance Risk Index						
How much is it going to cost? (£m 2022-23 prices)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	65	56	19	19	17	176
Business Plan table reference	Lines LS3.27 (part) and LS3.29 (part),					
Interactions with other outcomes	The works required to meet the other three outcomes under the safe and high quality drinking water objective will contribute towards the achievement of this outcome.					
Rationale for profile of spend, including provision for AMP8	Specific schemes at certain treatment works are regarded as urgent in order to achieve the goal of a zero CRI score as soon as possible. These include projects to comply with Regulation 26 disinfection requirements and a project to deliver a new carbon filtration unit at Cefn Dryscoed. Affordability, financeability, and deliverability constraints mean that all four elements of the strategy cannot all be implemented in AMP8, hence a number of schemes have been pushed back to AMP9. This means that our CRI performance remains at risk during the course of AMP8. The remaining enhancement activities are broadly spread evenly over the five year period.					
Critical assumptions/ sensitivities	Changes in drinking water quality legislation or the application of existing regulations may influence the optimal strategy for achieving a zero CRI score. Possible developments include new legislation for standards on PFAS and/or THMs					
Trigger points	Timing indeterminate, as depends in large part on policy development and resulting legislative processes.					
Partnership working and learning	We will be looking to share research and knowledge, e.g. via UKWIR, to improve our evidence base for tackling the emerging challenges, especially in relation to PFAS.					
References	See *Safe and High Quality Tap Water* and (Improved quality of tap water - treatment works for further details, especially in relation to the AMP8 programme.					

Table 28

Strategy for Acceptability of Water	
What are we going to achieve?	From a performance of 2.35 contacts per 1,000 resident population in 2022-23 we have set ourselves the ambitious challenge of achieving 1.0 per 1,000 resident population in 2030, and 0.5 by 2050.

Strategy for Acceptability of Water						
How much will be delivered from base?	Base will deliver no net improvement. External factors actually tend to drive deterioration in performance over time that cannot be countered easily, e.g. by operational changes or inexpensive interventions.[16] These include raw water quality deterioration (principally related to manganese concentrations), and the effect of ageing on our legacy network systems, notably the unlined cast iron mains. Enhancement expenditure will therefore be needed in order to deliver the required improvements.					
What are we going to do?	Contacts from customers on the acceptability of their drinking water quality arise from a complex and interacting multitude of factors that span the supply system all the way from activities in the catchments through to the final stages in the delivery network. Our strategy recognises that there is a degree of uncertainty around the effect on contacts numbers that each intervention will have either by itself or in combination with others, or how the features of the external environment that have a detrimental effect on our performance will slow our progress. We therefore adopt a cautious adaptive approach, making use of pilot studies and the exploration of possible innovations: our specific plans for AMP9 will evolve as we learn from new evidence in AMP8, but in broad terms our 25-year strategy comprises three high-level enhancement components: • manganese removal at water treatment works; • programmes involving targeted network interventions, including replacement of sections of pipework saturated with manganese; and • trunk mains conditioning upgrades.					
How much is it going to cost? (£m 2022-23 prices)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	118	108	84	77	72	459
Business Plan table reference	LS3.27 (part)					
Interactions with other outcomes	The improvements undertaken to deliver this outcome will make marginal contributions to CRI compliance and leakage performance.					
Rationale for profile of spend, including provision for AMP8	Our plans for AMP8 comprise two elements: • interventions that we know are required in all circumstances and will make a direct and immediate contribution to our performance. These including the optimisation of treatment works operations to ensure manganese levels are					

[16] Whilst we area aware of the drivers that have a negative impact on performance over time, quantifying them is not straightforward. In the interests of simplicity we are showing flat performance from base in business plan table LS2.

Strategy for Acceptability of Water	
	below 2ug/l, including the installation of cartridge filters, and works on distribution systems to optimise flushing velocity (e.g. installing cross-connections) and to replace manganese-saturated lengths of main; and • programmes of investigative work, including pilot studies and zonal studies, to inform the evolution of the strategy post-2030. These include analyses of the feasibility of reducing manganese in final water at some works to below 0.5ug/l, and testing the feasibility of automated trunk mains conditioning. Notwithstanding the affordability and financeability constraints that have limited the overall scope of our AMP8 plan, the achievement of significant reductions in customer contacts is a high priority and reaching our 2030 target will be a challenge. We have therefore scheduled all of the work that we know will deliver efficient improvements for AMP8, together with all of the investigative work that will be required to optimise the strategy for AMP9 and beyond. At present our assessment is that the analysis of treatment works optimisation to be carried out in AMP8 will produce a programme of improvements that will be implemented in AMP9 and 10, and the trunk mains conditioning will be ongoing. The network interventions have been back-end loaded to AMPs 11 and 12 to ensure that the treatment works programme is complete.
Critical assumptions/ sensitivities	Over the long term our strategy is sensitive to raw water condition, which in turn will be influenced by a number of factors, including climate change, land use, and progress on delivering land management improvements in the safeguard zones.
Trigger points where applicable	The completion of each AMP8 investigation and study will constitute a "mini-trigger point" because it will provide clarity on what decisions will be optimal for each component of the strategy going forwards. By the middle of the AMP period the range of uncertainties will be substantially narrowed and it will be possible to prepare a package of no-regrets schemes for AMP9.
Partnership working and learning	We will continue to look for opportunities to broaden and strengthen our various partnerships in raw water catchment. We will also remain alert to any potential innovations in relation to techniques for manganese removal in drinking water systems. Where possible, we will look to strengthen the effectiveness of existing arrangements with third parties that use the network, e.g. the fire services.
References	See See *Safe and High Quality Tap Water* and Improved acceptability of tap water - networks for further details, especially in relation to the AMP8 programme.

Table 29

Strategy for Protecting Raw Water Quality	
What are we going to achieve?	We will reduce the number of designated safeguard zones from 18 at the beginning of AMP8 to 13 by 2030 and 5 by 2040, then maintain it at that level thereafter.

Strategy for Protecting Raw Water Quality						
How much will be delivered from base?	Base will deliver no net improvement. External drivers tend to drive deterioration in raw water quality. In particular, the effects of climate change and the activities of other landowners and occupiers in catchments tend to have a detrimental effect. Enhancement expenditure will therefore be needed in order to deliver the required improvements.					
What are we going to do?	Our strategy comprises two strands: • the main element is working with relevant stakeholders on catchment management to deliver improvements in raw water quality; and • installing additional treatment stages to mitigate raw water quality risks where the feasible catchment management activities are nonetheless insufficient to achieve the necessary improvements to raw water quality.					
How much is it going to cost? (£m 2022-23 prices)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	27	41	25	-	-	92
Business Plan table reference	LS3.5, LS3.11 (part), LS3.29 (part), LS3.30					
Interactions with other outcomes	The improvements undertaken to deliver this outcome will contribute to CRI compliance and reductions in acceptability of water customer contacts.					
Rationale for profile of spend, including provision for AMP8	Expenditure on catchment management is expected to continue at broadly the same level over the 25-year period (before adjusting for ongoing efficiency assumptions). Although the zones being removed from `designated safeguard' status will become progressively more challenging and resource-intensive, we have reflected this in the profile of the outcomes achieved in each period. Our catchment management projects in AMP8 will confirm which zones fall into the category where catchment management alone is unlikely to deliver a sufficient reduction in the risks to raw water quality, and a treatment solution is therefore required. The investment in additional treatment stages is therefore scheduled for AMP9.					
Critical assumptions/ sensitivities	Our strategy assumes no change in legislation/regulations. There is scope for provisions to be made that would more strongly encourage or compel other landowners and occupiers in catchments to make changes to their activities and behaviours that would reduce the risks to raw water quality. This could lead to changes in our strategy for addressing some of the 13 zones that will remain outstanding at 2030.					
Trigger points where applicable	The timing of any trigger point driven by changes in legislation/regulation is indeterminate.					

Strategy for Protecting Raw Water Quality	
Partnership working and learning	Catchment management naturally lends itself to a partnership approach, and we already engage with a wide variety of organisations. However, we think there is scope to do more, and in AMP8 for example we will deliver a new suite of partnership projects within the Brecon Beacons Mega Catchment. See Improved raw water quality in drinking water catchments through green solutions, especially section 1.4, for further details. Potential initiatives to introduce market mechanisms in relation to nutrients and flooding could also make a significant contribution to catchment management.
References	In addition to Improved raw water quality in drinking water catchments through green solutions, see *Safe and High Quality Tap Water* for further details, especially in relation to the AMP8 programme.

Table 30

Strategy for Lead Pipe Replacement						
What are we going to achieve?	In the longer term we will eliminate all lead pipework in our area. By 2050 we will have addressed approximately half of lead supply pipes in place as at 2020.					
How much will be delivered from base?	Base will deliver no improvement. Each lead pipe replacement is a one-off enhancement project.					
What are we going to do?	We are will replace 100,000 lead supply pipes by 2050.					
How much is it going to cost? (£m 2022-23 prices)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	15	42	40	37	35	169
Business Plan table reference	LS32, LS3.33					
Interactions with other outcomes	Replacement of lead pipes will have a beneficial impact on leakage performance.					
Rationale for profile of spend, including provision for AMP8	As a result of affordability, financeability, and deliverability constraints we have chosen to cap the programme of lead replacement in AMP8. In anticipation of the required acceleration in the programme after 2030, work will be undertaken during AMP8 to evaluate options for overcoming resistance from customers and enhancing the efficiency of the programme.					

Strategy for Lead Pipe Replacement	
Critical assumptions/ sensitivities	Our strategy assumes no change in legislation/regulations. In the event of a tightening of the lead standards for drinking water an alternative strategy designed to accelerate the rate of pipe replacement might be required.
Trigger points where applicable	The timing of any trigger point driven by changes in legislation/regulation is indeterminate.
Partnership working and learning	We plan to utilise in full the opportunities for improving the effectiveness and efficiency of the lead pipe replacement strategy. These include working with housing associations and local government on retrofitting programmes. We will also continue to work with stakeholders in the Water Health Partnership to identify housing improvement initiatives in low-income areas in Wales where we can collaborate to provide cost-effective lead pipe replacement.
References	See *Safe and High Quality Tap Water* , and `*Working towards a lead-free Wales*' enhancement case for further details, especially in relation to the AMP8 programme.

2.2.2 A reliable short and long term water supply

In section 1.3.4 above we explained that our high level objective of securing reliability in water supplies, both in the long and the short term, will be measured by tracking:

- measures relating to long term demand management (leakage, per capita consumption, meters installed, and business demand); and
- measures that capture the potential for disruptions to supply (resilience of water network) and actual supply interruptions.

Base expenditure will substantially deliver the required leakage improvements, along with the targeted reductions in business demand. Below we set out the enhancement programmes in our core pathway, which address supply interruptions, per capita consumption, the metering programme, and network resilience. As is evident from the narrative there are considerable interactions between the LTDS outcomes and the programmes identified to achieve them. Individual components of the strategy are presented separately here for ease of reference. A fuller discussion of the broader picture that places the individual elements in a wider context can be found in `*A Reliable and Secure Water Supply*' (link).

Table 31

Strategy for reducing Supply Interruptions	
What are we going to achieve?	We will deliver a substantial reduction in supply interruptions, from an average of more than 20 minutes so far in AMP7 to 4.5 minutes in 2030 and 2 minutes by 2050.
How much will be delivered from base?	We have a number of operational initiatives currently under way, with which we are aiming to achieve a performance in 2025 of 8 minutes, comfortably better than any previous year. Beyond this, base expenditure will deliver no net improvement. Operational response has been `optimised' and no further benefits can be achieved from reacting to mains failures. This is particularly true as trunk

Strategy for reducing Supply Interruptions						
	mains begin to reach their end of life where operational responses are limited due to the size and impact of failures limiting the ability to re-zone, tanker or supply from alternative sources. Enhancement expenditure will therefore be needed in order to deliver the required improvement to meet our long term targets.					
What are we going to do?	The centrepiece of our strategy to meet our supply interruptions targets over the long term is the accelerated replacement of mains, particularly in those parts of the network comprised of asbestos cement mains. This is supplemented by investment in IT to support network optimisation control systems and studies to investigate the contribution of treatment works to supply interruptions performance.					
How much is it going to cost? (£m 2022-23 prices)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	67	68	93	90	51	368
Business Plan table reference	LS3.36 (part)					
Interactions with other outcomes	The improvements undertaken to deliver this outcome will contribute to leakage performance.					
Rationale for profile of spend, including provision for AMP8	The replacement of mains before the end of their anticipated lives will be ongoing throughout the 25-year period. Some AMP8 expenditure has been re-profiled to AMP9 to help to meet affordability, financeabiliy, and deliverability constraints.					
Critical assumptions/ sensitivities	We are assuming that mains deterioration rates remain largely stable, and will continue to monitor this over the coming years.					
Trigger points where applicable	Climate change is expected to have an impact on rates of mains failure, so any major update in climate forecasts could be a significant trigger point.					
Partnership working and learning	We will look for opportunities to work with third parties, potentially through UKWIR, to improve our understanding of the causes of supply interruption.					
References	See `*A Reliable and Secure Water Supply*' (link) and `*Investing to increase resilience in our water distribution network*' (link) enhancement case for further details, especially in relation to AMP8.					

Table 32

Strategy for reducing Per Capita Consumption						
What are we going to achieve?	We will deliver a reduction of 25% by 2050, compared with the 2019-20 baseline.					
How much will be delivered from base?	We are showing some improvement in per capita consumption from base expenditure.					
What are we going to do?	Our upscaled Cartref programme will deliver further reductions in per capita consumption through home audits, efficiency advice, home repairs and education.					
How much is it going to cost? (£m 2022-23 prices)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	15	15	12	19	44	106
Business Plan table reference	LS3.14					
Interactions with other outcomes	The metering programme (see below) will also make a significant contribution to the achievement of the planned reductions in per capita consumption.					
Rationale for profile of spend, including provision for AMP8	The upscaled Cartref 2 programme will be ongoing throughout the 25-year period. The higher expenditure projected for AMP12 is associated with the expectation that a significant step up in water efficiency activity will be required to achieve an increasingly stretching target, given that there will be no incremental contribution from the metering programme by this date since full saturation will have been achieved.					
Critical assumptions/ sensitivities	Per capita consumption is largely a function of human behaviour. It is not an `engineering output'. We therefore rely on assumptions as to the impact of specific measures on actual consumption, based on industry and company experience. In addition, we have built in the expectation that government measures on mandatory water labelling will be implemented during the course of AMP8.					
Trigger points where applicable	By the middle of AMP8 the Cartref programme will have been up and running for over five years. This is expected to provide an opportunity to carry out a rigorous evaluation to identify what works best and to modify the programme going forwards accordingly.					
Partnership working and learning	We will work with schools and communities to maximise the effectiveness of the programme. We will also work with partners such as through the Wales Water Efficiency Group to look at new ways of delivering savings. In addition, we are planning to undertake a behavioural science investigation in AMP8 to better understand how to target customer messaging and communication methods around metering for achieving reductions.					

Strategy for reducing Per Capita Consumption	
References	See A reliable water supply for the short and long term,the revised draft WRMP, and Reducing drought risks and improving customer visibility of usage for PCC management for further details, especially in relation to AMP8.

Table 33

Accelerated Metering Strategy						
What are we going to achieve?	We are going to increase the proportion of household customers who are metered and are charged on usage from approximately 51% by the end of AMP7 to 96% by 2050.					
How much will be delivered from base?	Base expenditure will not cover first-time meter installation.					
What are we going to do?	We are going to accelerate the trend towards measured charging by installing 'smart' meters on unmeasured properties during AMP8 by geographical area and proactively replacing `dumb' meters early with smart meters. This will increase the proportion of household properties fitted with meters to 79% by 2030, though a significant minority are expected to continue to wish to be charged on the unmeasured tariff for the time being.					
How much is it going to cost? (£m 2022-23 prices)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	125	75	5	19	13	237
Business Plan table reference	LS3.17. LS3.18, LS3.19, LS3.20, LS3.23, LS3.26					
Interactions with other outcomes	The metering programme will make a significant contribution to the planned reductions in leakage and per capita consumption. It is expected to reduce demand by nearly 100Ml/d by 2050.					
Rationale for profile of spend, including provision for AMP8	The metering programme is concentrated in the first half of the 25-year period because the benefits are required early to contribute to leakage and PCC reductions, and thereby to support the maintenance of drought resilience. Our revised draft Water Resources Management Plan (see link) has considered a number of metering strategies and concluded that whilst a delayed meter rollout offers cost savings, this is outweighed by the need to spend more on expensive water efficiency and leakage options in the meantime. It also reduces the likelihood of achieving the long-term target for PCC of 110 l/h/d.					

Accelerated Metering Strategy	
Critical assumptions/ sensitivities	As the implementation of the programme is largely within our control, there are no major critical assumptions or sensitivities as regards delivery. However, the effect of the strategy is sensitive to the assumptions regarding the effect of metering on leakage and PCC, and the extent to which this would be sustained by customers in the long term.
Trigger points where applicable	None
Partnership working and learning	A number of other companies are already in the process of rolling our `smart' meters, so we will have an opportunity to learn from their experiences, both in relation to scheme design and cost, and also in relation to the impact. We are working with meter manufacturers to understand the most appropriate pathway to shifting from AMR to AMI meters, and investigating the use of long-range wide area networks and IoT technology.
References	See A reliable water supply for the short and long term,the revised draft WRMP, and Reducing drought risks and improving customer visibility of usage for PCC management for further details, especially in relation to AMP8.

Table 34

Resilience of Water Network strategy						
What are we going to achieve?	At the end of AMP7 we expect there will still be 429,000 residents served by critical water treatment works with no alternative supply. We will progressively reduce this number to zero by 2050, including a reduction to 383,000 by the end of AMP8.					
How much will be delivered from base?	Reducing the number of people reliant on critical supply systems with no alternative means of supply invariably entails new capital works of one sort or another. We are therefore not expecting to achieve any improvement from base.					
What are we going to do?	The optimal solution to the absence of alternative supplies varies from one system to another. In general the optimal interventions we have identified comprise one or more of the following elements: • trunk main interventions, including cross-connections between supply systems; • water treatment works interventions, including addressing single points of failure; and • duplication of critical components at pumping stations.					
How much is it going to cost? (£m 2022-23 prices)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	54	173	237	230	129	823

Resilience of Water Network strategy	
Business Plan table reference	LS3.36 (part)
Interactions with other outcomes	Delivery of the strategy for this outcome will contribute to the planned reduction in supply interruptions.
Rationale for profile of spend, including provision for AMP8	Expenditure in AMP8 has been capped to a limited number of schemes in line with the overall affordability, financeability and deliverability constraints that we face. Future expenditure is based on interventions at optimum timing either to coincide with assets reaching their end of life making interventions no/low regrets, or following a programme of investigations and feasibility studies to further define requirements.
Critical assumptions/ sensitivities	Some of the cost estimates are based on high level assumptions of solutions and costs, especially for the latter years of the plan, and are subject to further refinement once we have carried out a number of feasibility studies planned for AMP8?
Trigger points where applicable	The most significant trigger points are likely to be the preparation and/or updating of our zonal studies which identify prioritised locations for mains repair / replacement. The timing of these varies from zone to zone.
Partnership working and learning	We plan to work with government and customer groups to ascertain true resilience risk appetite, once we have more mature evidence on the appetite for resilience risk and the costs of options for risk reduction. We also plan to develop more sophisticated multi-criteria analysis tools, currently in `proof of concept', which would enable us to identify more cost-efficient options to deliver network resilience as part of a more informed and robust PR29 LTDS.
References	See A reliable water supply for the short and long term,the revised draft WRMP, and Increasing resilience of tap water supply - network capacity and connectivity for further details, especially in relation to AMP8.

2.2.3 Protecting and improving the environment

Our strategy for achieving the high level objective of protecting and improving the environment dominates our LTDS. It is the largest component. It is also the most complicated, because every one of our 800+ wastewater catchments is different and the interaction between local climate, topography, system configuration, and the nature of receiving waters requires careful consideration. There is also the greatest margin of uncertainty around how we will achieve the high-level objective and over what timeframes, in part because the legal and regulatory backdrop is not fully settled. We are very conscious that there is significant scope for `getting it wrong', so we have approached this element of the core strategy with caution and fully expect it to be adapted as new information and priorities emerge. For AMP8 we have therefore prioritised no/low regrets investment alongside ongoing investigations, and identified solutions which can be built on in a modular way if required to expand in the future.

Given the intricate inter-relationships between the seven outcomes that we have chosen in order to express our Ambition, we have sub-divided our adaptive core pathway into four distinct programmes that align to the strategic inputs of the DWMP and WINEP/NEP, namely:

- **SOs**, addressing the two SO outcomes (`harm' and `spills') and contributing to our targets for `total pollution incidents'. The SO programme overlaps with both the DWMP and the NEP/WINEP;
- the remainder of the **DWMP**, addressing `internal' and `external flooding' and the remainder of `total pollution incidents';
- the remainder of the **NEP/WINEP**, addressing river water quality improvements associated with phosphorus reductions; and
- resilience, which addresses the seventh outcome, namely `**resilience of critical wastewater assets**'.

It should be noted that this grouping has been chosen because it was considered to be the best way of presenting our strategy from a long term perspective. In our *`PR24 Business Plan 2025-30: Stepping up to the challenge'* (WSH03 - link), which necessarily focuses upon just the AMP8 programme at a more granular level, a somewhat different categorisation is used. The results of both approaches reconcile to the structure of the business plan tables.

The strategy for each of the four components is presented below.

Table 35

Strategy for SOs						
What are we going to achieve?	We are going to deliver `no harm' from all SOs by 2040, maintain that level of performance thereafter, and achieve an average of less than 10 spills per SO by 2050					
How much will be delivered from base?	No improvement will be delivered from base. Ongoing external influences (e.g climate change, urban creep) work in the opposite direction.					
What are we going to do?	We are going to implement schemes at (or related to) the 1100 SOs that are currently potentially causing harm when they spill.					
How much is it going to cost? (£m 2022-23 prices)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	393	1303	1193	601	560	4051
Business Plan table reference	LS4.8, LS4.9					
Interactions with other outcomes	The implementation of the SO programme will also have a positive impact on wider river water quality (though not on the specific river water quality common performance comitment, which captures reductions in phosphorus discharges from wastewater treatment works). It will also impact on our `other DWMP' programme of work (see below) to reduce sewer flooding (internal and external) as both programmes involve increasing sewer network capacity.					

Strategy for SOs	
Rationale for profile of spend, including provision for AMP8	Expenditure on the SO programme in AMP8 is targeted at the highest priority sites, but is also constrained by affordability, financeability and deliverability considerations. It also includes allowance for investigations to ensure that best value is achieved in the subsequent stages of the programme. The remainder of the programme to eliminate `harm' is phased evenly between AMPs 9 and 10, and the expenditure required to maintain the 100% performance target against an expected backdrop of tougher criteria for achieving `no harm' is spread roughly equally between AMPs 11 and 12.
Critical assumptions/ sensitivities	The programmes have been compiled based on the completion of DWMP modelling for a subset of catchments, and extrapolation to the rest of our area, together with the requirements of the NEP. Costings are primarily based on `grey' solutions, but it is expected that blue/green solutions will emerge as a result of investigations to be carried out in AMP8 and become more competitive on price as the sector learns from earlier experiences and innovative approaches are developed. Accordingly we have assumed a progressive increase in the proportion of green solutions over the course of the 25-year period.
Trigger points where applicable	The SO programme will be under review on an ongoing basis throughout AMP8 as different ways of tackling the challenge of meeting the outcomes are explored, the potential role of innovative solutions is evaluated and we look for ways to work efficiently with potential partners and other third parties. Particular trigger points include any updates in climate change forecasts that produce a step change in the range of forward-looking assumptions, and any unexpected changes in growth trends.
Partnership working and learning	We see considerable potential for working in partnership with third parties in the SO programme, especially in relation to the design and trialling of green solutions. There is also abundant scope for innovation to play a major role in delivering better solutions when viewed through the prism of our `multi-capitals approach'. Minimising environmental harm from storm overflows describes in section 4 the Tredegar catchment case study which provides a good example of what may be feasible. We are also keen to explore the potential role of market mechanisms, and collaboration at a local level to address infiltration from highways (see section 2.4 below).
References	See Protecting and improving the environment, and Minimising environmental harm from storm overflowsfor further details, especially in relation to the AMP8 programme. Our overall Storm Overflows Strategy is set out here (link).

Table 36

Other DWMP	
What are we going to achieve?	We are going to eliminate serious pollution incidents, and reduce to a minimum pollution incidents and internal and external flooding.

Other DWMP						
How much will be delivered from base?	We have plans to deliver some improvement from base in AMP8, notably in internal and external flooding. Thereafter, however, we have assumed some deterioration from base as a result of ongoing external influences (e.g climate change, urban creep) which work in the opposite direction and tend to drive worse performance.					
What are we going to do?	We are going to implement a varied package of interventions targeting specific parts of our wastewater networks where pollution and flooding risks are highest. These include rising mains and trunk sewers, especially those located within or very close to rivers. Network monitoring and management, deploying smart control techniques where appropriate, will also be a focus.					
How much is it going to cost? (£m 2022-23 prices)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	220	182	171	161	151	886
Business Plan table reference	LS4.2, LS4.14, LS4.15, LS4.51					
Interactions with other outcomes	Much of the SO programme described above is also driven by the DWMP modelling, so any changes as it is developed and refined may impact on both programmes and the associated LTDS outcomes.					
Rationale for profile of spend, including provision for AMP8	The proposed profile of expenditure reflects a number of considerations. These include: • the urgency of certain interventions, the notable example being the South East Coastal Sewer project; • the financeability, affordability and deliverability constraints in AMP8, which have led to us capping the AMP8 programme and pushing a number of schemes back into AMP9; and • the fact that our DWMP modelling covers a subset of our catchments, and we have relied to a degree on extrapolation. Pushing back elements of our programmes about which we are less certain reduces the risk of `regret' by providing us with the flexibility to adapt in time.					
Critical assumptions/ sensitivities	The programmes have been put together based on the completion of detailed DWMP modelling for a subset of catchments, and extrapolation to the rest of our area. As with the SO programme, our projections are largely based on grey solutions initially, but with an expectation that green solutions will increasingly play a part over the course of the 25-year period.					
Trigger points where applicable	The preparation of the next DWMP during AMP8 will constitute an important trigger point, as will any updates in climate change forecasts that produce a step change in the range of forward-looking assumptions, and any unexpected changes in growth trends.					

Other DWMP	
Partnership working and learning	Where there are further opportunities to reduce flooding risks through partnerships or local market mechanisms over and above the relationships we have already established we will explore them. In particular, we would like to work with government and other organisations to implement a wet wipe ban in Wales, as this could have a material impact on blockages and therefore flooding and pollution incidents, which could in turn enable elements of our programme to be downsized or deferred. We would also like to work with planning authorities and developers to promote SuDS and appropriate locations for development to minimise the impact on our networks.
References	For further details, See Protecting and improving the environment, the DWMP (Drainage and Wastewater Management Plan | Dŵr Cymru Welsh Water (dwrcymru.com), Protecting multiple adjoining SSSIs near the SECS main , and Reducing risks of serious pollution incidents

Table 37

Other NEP/WINEP						
What are we going to achieve?	We are going to deliver a major improvement in river water quality - notably by reducing the amount of phosphorus discharged into rivers - alongside the other varied outputs of the NEP/WINEP programmes.					
How much will be delivered from base?	We are not expecting to achieve any improvement in river water quality from base.					
What are we going to do?	We are going to implement the list of schemes specified under the NEP and the WINEP by NRW and EA respectively.					
How much is it going to cost? (£m 2022-23 prices)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	575	784	285	0	0	1643
Business Plan table reference	LS4.4, LS4.17-18, LS21-25, LS4.29 (part), LS4.31-32, LS4.35, LS4.36 (part), LS40, LS45, LS49					
Interactions with other outcomes	This programme interacts with our net zero and biodiversity outcomes, and potentially with tap water quality compliance index and acceptability of water, since improvements in river water quality could in some circumstances reduce risks to raw water quality.					

Other NEP/WINEP	
Rationale for profile of spend, including provision for AMP8	Known requirements have been profiled across a 15-year period, with the size of the AMP8 programme capped in accordance with affordability, financeability and deliverability constraints. Zero expenditure has been entered for AMPs 11 and 12, as the requirements for longer term NEP programmes have not yet been identified.
Critical assumptions/ sensitivities	As at the time of writing the NEP has not yet been finalised. However, it is not anticipated that any further required changes will have a material effect on the aggregate size of the programme. As noted above, the NEP/WINEP obligations for AMPs11 and 12 will not be known for some time, so for the purposes of the core pathway these are assumed to be zero, in the knowledge that a positive and sizeable programme is `more likely'.
Trigger points where applicable	The post-2030 NEP/WINEP programmes may be re-visited by NRW/EA towards the end of AMP8, so 2029 is a likely trigger point. Changes in legislation or policy by Welsh Government or regulators are also a potential trigger, e.g. in relation to the scale of 'Team Wales' impacts and the extent to which rollout of `polluter pays' principles means that other sectors make a bigger contribution.
Partnership working and learning	This component of our strategy offers extensive opportunities for effective partnership working at a local level. We already have many examples of effective co-operation but we think there are opportunities to go further. For example, there is scope to work in partnership with relevant parties where new bathing water designations (including inland sites) are planned, or where there is an aim to improve designations at existing sites to `good' or `excellent'. Also there may be opportunities to use market mechanisms to deliver better nutrient management in certain localities.
References	See `*Protecting and improving the environment*' investment case, and the `*Enhancing the environment through NEP/WINEP driven environmental investigations and programmes*' enhancement case for further details, especially in relation to the AMP8 programme.

Table 38

Strategy for Resilience of Critical Wastewater Assets	
What are we going to achieve?	We are going to eliminate the risk of any of our critical wastewater assets being flooded in a 1 in 30 year flood.
How much will be delivered from base?	The expected effects of climate change will continually `raise the bar' for achieving this outcome, as the magnitude of a `1 in 30 year' flood will become progressively more severe. We are therefore not expecting to achieve any improvements in this measure from base.
What are we going to do?	We are going to install flood defences at over 62 sites (or implement equivalent risk mitigation measures).

Strategy for Resilience of Critical Wastewater Assets						
How much is it going to cost? (£m 2022-23 prices)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	9	24	22	21	20	95
Business Plan table reference	LS4.55					
Interactions with other outcomes	Delivery of this strategy will contribute indirectly to the achievement of our ambitions for pollution incidents					
Rationale for profile of spend, including provision for AMP8	Implementation of this element of our strategy has been spread evenly across the 25-year period, save that we have capped AMP8 expenditure in recognition of affordability, financeability and deliverability constraints and prioritised statutory constraints.					
Critical assumptions/ sensitivities	The programme is sensitive to future climate change modelling updates. A step change in what a 1 in 30 year flood means at a local level could expand or contract a scheme considerably. In addition, in some areas our assets are effectively protected by local authorities: we are assuming they will continue to maintain the same level of resilience, and not change their strategies in a way that would allow flooding to increase.					
Trigger points where applicable	Climate change forecast updates					
Partnership working and learning	We are exploring with local authorities and FCERM strategy groups the opportunities to work in partnership on flood risk. If they go ahead, some of these schemes could protect our assets as well as surrounding local communities, thereby negating the need for us to protect our site specifically. We are using aerial drones to take more accurate surveys of our sites to better model flood impacts and develop more efficient flood defences.					
References	See Protecting and improving the environment.					

2.2.4 Wider environment and social value

Our fourth high level objective recognises the important role we play in delivering wider social value, notably for the environment, specifically in relation to the achievement of net zero and our contribution to biodiversity. Our approach to the 25-year strategy for each is set out below.

Table 39

Net Carbon strategy						
What are we going to achieve?	We will achieve net zero carbon emissions by 2040 at the latest.					
How much will be delivered from base?	Many of the `easy wins' in delivering carbon reductions have already been implemented. However, we are forecasting further improvements from base associated with: • further de-carbonisation of the grid; and • potentially through the development of low carbon construction materials. Further progress will require enhancement expenditure in particular areas.					
What are we going to do?	We are going to achieve our target through a combination of schemes . These include: • green fleet; • de-carbonisation of energy use (hydro, solar, wind, fuel cells etc); and • offset of embodied carbon.					
How much is it going to cost? (£m 2022-23 prices)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	38	145	141	-	-	325
Business Plan table reference	LS3.39, LS4.58					
Interactions with other outcomes	Our carbon strategy interacts with most components of the core pathway, as practically all our activities have carbon implications.					
Rationale for profile of spend, including provision for AMP8	AMP8 spend has been capped in line with affordability, financeability and deliverability constraints. The remainder of the programme is broadly spread evenly (before the application of efficiency assumptions) between AMPs 9 and 10. The combination of different types of intervention means that the programme can adapt to new information on the future levels of CO_2 that need to be addressed and the efficacy of different elements of the strategy.					
Critical assumptions/ sensitivities	The strategy is sensitive to the types of activity we carry out under the other enhancement programmes. For example, the extent to which we are able to deliver the transition from `grey' to `green' solutions under the SO programme could have a material effect on carbon emissions. Similarly, we are relying on expectations regarding the rate of decarbonisation of the grid, and forecasts of the path of convergence of the prices of low carbon and traditional building materials. In addition, high level assumptions have been made around embedded carbon and the benefits from schemes such as tree planting and peatland restoration.					

Net Carbon strategy	
Trigger points where applicable	Our `Net Zero Strategy' is under review on an ongoing basis. However 2027 can be viewed as an important trigger point as updated knowledge and narrowing uncertainty about the future will enable us to re-optimise the strategy going forwards..
Partnership working and learning	Hydrogen technology offers the theoretical prospect of a major transformation in long term energy strategies. Wales has many characteristics that could in time make it suitable for large scale hydrogen production. We will be keen to work with prospective partners in any potential developments, not just from the perspective of providing the water services required but also in terms of utilising the outputs from such developments to further our own objectives.
References	See Protecting and improving the environment, and Improving our frontier performance on net zero carbonfor further details, especially in relation to the AMP8 programme.

Table 40

Biodiversity strategy						
What are we going to achieve?	The primary focus of our strategy will be to meet the multiple objectives agreed with NRW (see PR24 Business Plan, section 9.3). In the course of doing so, we would expect to record significant improvements against our LTDS outcome for biodiversity, once it is fully defined and implemented (see section 1.3.6 above).					
How much will be delivered from base?	There is a good prospect that some improvements can be delivered from base, but until the information is available to calibrate the metric, we cannot be specific.					
What are we going to do?	Our biodiversity strategy provisionally covers a wide range of different types of activity, including investigations, interventions in SSSI and INNS areas, and river habitat improvements such as fish passes. In addition, as a matter of course, wherever we are undertaking significant works in a relevant location we will take the opportunity to improve biodiversity as part of our scheme where possible.					
How much is it going to cost? (£m 2022-23 prices)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	10	67	35	7	6	126
Business Plan table reference	LS3.2, LS3.6, LS3.11 (part), LS4.29 (part), LS4.36 (part), LS4.37 (part).					
Interactions with other outcomes	Delivery of this outcome interacts with elements of the NEP/WINEP programmes. In addition, wherever we carry out significant works we will take the opportunity to improve diversity as part of the scheme.					

Biodiversity strategy	
Rationale for profile of spend, including provision for AMP8	This element of our strategy is subject to considerable uncertainty. Much depends on the outcome of investigations that are scheduled for AMP8. Significant works have therefore been tentatiively scheduled for AMPs 9 and 10, broadly following the profile of the NEP/WINEP, but this is very much subject to review during the course of AMP8. Also, as we expect to see significant NEP/WINEP programmes in the latter half of the 25-year period, it is likely that there will be a commensurate step-up in biodiversity programmes as well. In other words, the `tailing-off' shown above may be giving a slightly misleading picture.
Critical assumptions/ sensitivities	Save for the AMP8 expenditure on investigations, the above figures should be regarded as indicative only at this stage.
Trigger points where applicable	Completion of the AMP8 investigations, expected by 2028.
Partnership working and learning	Almost all our biodiversity work over the last 10 years has been undertaken in partnership with a public body such as NRW, or an environmental trust like RSPB. We will build on these partnerships to progress biodiversity improvements to both aquatic and terrestrial environments. Where possible we will continue to leverage third party funding to maximise the impact of our activities. The business plan presents an example of an initiative which exemplifies what can be achieved through partnership working and co-funding (see `Dee River 'LIFE' Project' in section 9.3 of the PR24 Business Plan).
References	See Protecting and improving the environment, for further details.

2.2.5 Short Term Enhancement Programmes

As well as the long term programmes that comprise the core pathway of our long term delivery strategy there are a number of miscellaneous shorter-term or one-off interventions that fall within the scope of our strategy, but relate to AMP8 only. These are listed below for completeness, together with the enhancement[17] expenditure that is planned for 2025-30:

- drought resilience (£73m) (see Reducing drought risks and improving customer visibility of usage for PCC management A reliable water supply for the short and long term, and Increasing resilience of tap water supply - network capacity and connectivity for details);
- leakage redution (£5m) (see A reliable water supply for the short and long term for details);
- resilience of critical water assets (£5m) (see WSH17-Costs Wholesale Water CW1-CW21 (table CW3) for details); and
- miscellaneous (Cwm Taf DPC and visitor centres) (£25m) (see WSH17-Costs Wholesale Water CW1-CW21 (table CW3) for further details).

Together these account for **£108m** of expenditure in AMP8.

In addition, as noted in section 1.3.2 above, there are some elements of our long term strategy for which the uncertainty around what the requirements will be post-2030 and therefore what interventions we may have to consider is so wide that we have not attempted to put any figures on the possible commitment involved. These include:

[17] Note that some programmes include both base and enhancement expenditure: only the part that relates to enhancement is shown here

- our obligations under the 1975 Reservoirs Act, which will require an investment of £70m in AMP8 and most likely further significant expenditures in subsequent AMP periods as the 10-year cycle of dam safety inspections proceeds - see Increasing safety of impounding reservoirsfor further details; and
- security (physical and cyber) (£34m) (see Increasing physical and cyber security for further details).

Together these account for **£104m** of expenditure in AMP8.

2.3 Summary of Core Adaptive Pathway

2.3.1 Overview of Strategy and reconciliation with business plan tables

Our core pathway is summarised below.

Table 41

High level objective	Outcome	AMP8	AMP9	AMP10	AMP11	AMP12	Total
Safe and high quality drinking water	Tap Water Quality Compliance Risk Index	65	56	19	18	17	176
	Acceptability of Water	118	108	84	77	72	459
	Protecting Raw Water Quality	27	41	25	-	-	92
	Lead pipe replacement	15	42	40	37	35	169
A reliable short and long term water supply	Supply interruptions	67	68	93	90	51	368
	Per capita consumption	15	15	12	19	44	106
	Accelerated metering	125	75	5	19	13	237
	Resilience of water network	54	173	237	230	129	823
Proteting and improving the environment	SOs	393	1,303	1,193	601	560	4,051
	Other DWMP	220	182	171	161	151	886
	Other NEP/WINEP	575	784	285	-	-	1,643
	Resilience of critical wastewater assets	9	24	22	21	20	95
Wider environment and social value	Net carbon	38	145	141	-	-	325
	Biodiversity	10	67	35	7	6	126

High level objective	Outcome	AMP8	AMP9	AMP10	AMP11	AMP12	Total
Sub-total		1,729	3,084	2,362	1,280	1,099	9,555
	Short term enhancements	108	-	-	-	-	108
	AMP8 component of uncertain long term programmes	104	-	-	-	-	1,104
Total		1,942	3,084	2,362	1,280	1,099	9,767
Sum of business plan tables LS3 and LS4		1,942	3.084	2,362	1,280	1,099	9,767

All figures are expressed in 2022-23 prices.

At more than £10 billion over the 25-year period the strategy represents a significant step-up in expenditure from previous AMP periods. This is reflected in the implications of the strategy for household bills (see section 2.3.2 below), which are set to increase by over 50% within 10 years and remain above that level thereafter.

The profile of expenditure reflects the approach we have taken to our long term delivery strategy and the constraints we face. The enormous challenge of addressing SOs is a dominant feature. We considered the option of a larger programme earlier, but we chose to schedule the bulk of the work to AMPs 9 and 10 so as to benefit from greater certainty around what can be delivered through blue/green solutions. The AMP8 SO programme is therefore limited to the highest priority sites where the impact on potential harm to the receiving waters is greatest and we can be confident the solutions proposed are optimal.

Our NEP/WINEP obligations are also substantial. We will make meaningful progress in delivering the required outputs during AMP8, but have capped the programme to a level commensurate with our affordability, financeability and deliverability constraints.

Where there is greater certainty as to how we are going to achieve our ambitions and programmes and we can proceed on a no-regrets basis (e.g Acceptability of Water) the planned expenditure is loaded more towards the earlier years.

2.3.2 Bill impact of core adaptive pathway

The following table provides a summary of the bill impacts of the core pathway.

Table 42

Year	2024-25	2029-30	2034-35	2039-40	2044-45	2049-50
Average household bill - water and wastewater (£s 2022-23 prices)	463					
Cumulative change due to enhancement programmes (£s 2022-23 prices)		+118	+230	+272	266	+256
Change from 2024-25		+26%	+50%	+59%	+58%	+55%

The bill impacts have been calculated using our LTDS bills model. Details of our methodology and the assumptions used are presented in the table commentary for LS7 (WSH23 - Long-term strategies LS1-7). Note that, in accordance with Ofwat guidance, the above figures include the additional charges that will be levied in the future in respect of our Cwm Taf DPC project. Also, for the avoidance of doubt, we have not assumed that any element of our core pathway would be delivered through DPC, but we retain an open mind to alternative delivery routes where they can be shown to offer greater benefits for customers.

We have not tested the acceptability of this long-term bill profile with customers specifically. The difficulty that customers have in forming and expressing meaningful views about long-term proposals in research are well documented. In our Phase 2 research on long term outcomes, however, we did show simplified long-term bill profiles, and customers expressed a preference for gradually increasing bills, over 'front loaded' or 'back loaded' bill increases, as being the most 'fair' to current and future customers. The LTDS bill profile above rises gradually and then flattens and drops off, but as this is the core pathway, the reality is that bills are likely to continue to increase. Suppressing expenditure and hence bills in AMP8 and AMP9 would in all likelihood necessitate unacceptable and possible unaffordable bills in AMPs 10, 11 and 12.

The magnitude of the potential bill increases illustrated in the above table is a major cause for concern. Our region contains some of the most income-deprived communities in the UK, and a significant proportion of our customers already struggle to pay their current bills. We are an industry leader in the take-up of `social tariffs', with over 120,000 of our 1.4 million households benefiting from deep discounts on the bills they would otherwise pay. However, we believe we can and must do more to mitigate the effects of the planned bill increases over the next 10-15 years.

We have or are planning a number of initiatives to improve support to customers that struggle to pay their bills, including our new Cymuned scheme targeting assistance to working families (see WSH03-Main PR24 Business Plan document Section 12.5 (link) for further details). We will aim to hold our principal social tariffs, Helpu and Helpu 365, constant in real (CPIH) terms going forwards. Albeit that this would mean the majority of customers seeing bill increases accelerating faster than the average percentage increases shown in the above table, we believe this ambition helps to ensure that the strategy is broadly affordable across the totality of our customer base.

2.3.3 Exclusions from core adaptive pathway

It is worth re-iterating that the core pathway as presented above is not intended to represent a `most likely' view of how we will achieve our 2050 ambitions. Rather, it is the strategy that comprises interventions that will be required in all scenarios and can be described as `no- or low-regret'. A number of components of a `most likely' pathway are excluded. For example, we only have visibility of known NEP/WINEP requirements today, and are therefore showing zero expenditure from 2040 onwards. In fact, there is a reasonable prospect that new obligations will emerge over the coming

years, which would tend to increase enhancement expenditures in the latter years of the 25-year period. Similarly, we can be near-certain that significant expenditures will be required arising out of future dam safety reports, and it seems highly unlikely that the period post-2030 will not see a fresh tranche of SEMD obligations.

Consequently, the bill profile presented above should be regarded as contingent on the restrictive assumptions that have been made, especially in the latter years which currently show a slight fall. Further, whilst the table shows modelled changes compared with the 2024/25 baseline due to the enhancement programmes that comprise the core pathway, it does not show the effect of other influences. For example, assumptions such as the weighted average cost of captial have been held constant throughout the period, and no allowance has been made for changes in base expenditure such as the effects of future capital maintenance requirements arising out of the investments made in the earlier years of the strategy.

2.4 Alternative Pathways

We are preparing our strategy against the backdrop of considerable uncertainty about the future. Whilst we are focused on delivering what we know we have to in any plausible scenario, we have a responsibility to think carefully about the implications of potential changes in circumstance, especially as we are expecting to enter a period characterised by rising household bills. Customers and stakeholders in general will wish to know that we are planning judiciously for significant eventualities.

2.4.1 Approach to preparation of alternative pathways

Scope

Long term horizon-scanning is one of our most important planning functions. For the purposes of developing our alternative pathways we considered a number of possible long term scenarios and evaluated their potential impact. Full details are set out in section 3.5 below. In summary, terms we considered:

- the Ofwat common reference scenarios for climate change, technology and demand;
- the `most likely' scenario for each of the WRMP and the DWMP;
- the prospect of tightening of various legal and regulatory standards;
- the effect of a step change in the activities of relevant third parties, potentially in collaboration with us and government/regulators;
- the potential for the development of markets; and
- a worsening of the prevalence and frequency of freeze/thaw events; and
- the effect of our assumptions on the development and availability of low carbon materials not being realised.

Over the course of 2022 and the first part of 2023 the range of possible scenarios was reviewed and evaluated on an ongoing basis. This process included periodic board discussions as well as consultation with regulators and other stakeholders. A potential `long list' of alternative pathways emerged, to which we applied the following criteria:

- how likely is the scenario to occur?
- to what extent does an efficient response require a long lead time? and
- how material is the potential impact? For this purpose we applied a cut-off of £500m of totex (2022-23 prices) over the period of the LTDS.

From this process we arrived at five well-developed alternative pathways which have been incorporated into business plan tables LS3a (for water) and LS4a-d (for wastewater). These are presented in the following section.

We also describe a number of additional alternative pathways that have been the subject of our deliberations but which are not sufficiently well-developed or remain too uncertain to be presented as fully-costed alternative pathways. Nonetheless, they are an important part of the development of our strategy and may come to play a more definitive role as our strategy evolves in the years leading up to the 2029 price review. They will therefore continue to be part of our thinking as our strategy moves forwards towards the 2029 price review.

Bill impacts

For each alternative pathway we have assessed what the likely incremental effect on the average household bill would be in 2022-23 prices, following the methodology set out in the LTDS guidance.

Decision years and trigger years

We have endeavoured to present definitive conclusions as to the decision years and trigger years for our alternative pathways. However, as with many aspects of long term planning, the parameters that determine `*the latest point in time when a decision would need to be taken about whether the alternative adaptive pathway is followed*' and `*the most likely point in time at which the strategy moves to the alternative pathway, based on scenario testing*' are themselves are subject to uncertainty. This is especially the case for us, as our strategy includes no large discrete items to which commitments would have to be made many years in advance of the point at which the capacity was expected to be required or the interconnection was expected to be needed. Rather, our programmes largely comprise multiple, relatively small schemes, which can be modified, augmented or downsized as decision points approach. In addition, some of our programmes are fungible, so potential delay or re-evaluation in one area can be offset by bringing forward projects in other areas if necessary to stay on track with the relevant performance pathway.

Likelihood

Our assessments of likelihood are inherently subjective, and were derived through a process of internal debate and challenge. We expect that as circumstances change some will rise and others will fall.

2.4.2 Alternative pathways - costed

Table 43

Alternative Pathway 1 - Tightening of Drinking Water Standards	
Brief description	Although the UK is no longer a member of the EU it is open to the Welsh Government to adopt new EU drinking water requirements in order that standards continue to align with best practice across Europe. Should it choose to do so, there are two significant changes in prospect, namely: • a limit on PFAS concentrations in drinking water; and • new restrictions on concentrations of THMs.
Likely timing	In order to ensure that standards remain in step with the relevant EU directives new legislation would likely be passed during AMP8, and the resulting enhancement programmes would likely last through AMPs 9 and 10, i.e up to 2040.
Critical assumptions	For the purposes of developing this alternative pathway we have made a number of assumptions, notably: • there would be a `group limit' value for PFAS of 0.5µg/L, in addition to limits for 16 individual PFAS of 0.1µg/L each;

Alternative Pathway 1 - Tightening of Drinking Water Standards						
	• the PFAS standard would be met by installing GAC at the 45 water treatment works that do not yet have it, which would have ongoing operating cost implications as well as up-front capital requirements; • we would have to achieve a THM concentration of no more than 50µg/L at the customer tap, which would imply a concentration as the water leaves the treatment works of no more than 25µg/L. This would mean a requirement for schemes at 28 treatment works where the current concentrations are above this level. Investments would typically involve a resin ion exchange stage, but the optimal solution would vary from site to site.					
Expenditure implications (2022-23 prices £m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	n/a	339	370	-	-	709
Impact on average household bills (End of AMP vs core pathway)	-	£11	£22	£18	£13	
Probability	Our judgement is that the probability of drinking water standards being tightened as described is 75%.					

The incremental expenditures associated with this alternative pathway are presented in business plan table LS3a.

Table 44

Alternative Pathway 2 - Tightening of Wastewater Permits (Including Sludge)	
Brief description	Although the UK is no longer a member of the EU it is open to the Welsh Government to adopt new EU urban wastewater treatment requirements in order that standards continue to align with best practice across Europe. Should it choose to do so, there are two significant changes in prospect, namely: • tighter standards at some wastewater treatment works, e.g in relation to nutrients, microplastics, and phosphorous; and • restrictions on the spreading of sludge to land.
Likely timing	In order to ensure that standards remain in step with EU urban wastewater directives new legislation would likely be passed during AMP8 and the resulting enhancement programmes would commence in AMP9.
Critical assumptions	For the purposes of developing this alternative pathway we have made a number of assumptions, namely: • it would be possible to spread the implementation of schemes to address tightening of wastewater standards across AMPs 9 and 10; • we would respond to restrictions on the spreading of sludge to land through a combination of installing low temperature drying at 4 major sites (AMPs 9 and 10) in order to reduce the volume of sludge and contracting with third parties for incineration (ongoing).

Alternative Pathway 2 - Tightening of Wastewater Permits (Including Sludge)						
Expenditure implications (2022-23 prices £m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	n/a	195	179	34	37	446
Impact on average household bills (end of AMP vs core pathway)	-	£9	£13	£12	£10	
Probability	It seems highly likely that the Welsh Government will wish to bring standards in Wales into line with best practice in Europe, albeit that there may be uncertainty over precise timing. Our judgement is therefore that the probability of wastewater standards being tightened as described is 90%.					

The incremental expenditures associated with this alternative pathway are presented in business plan table LS4a.

Table 45

Alternative Pathway 3 - Effect of Adverse Climate Change Scenario on Flooding and Spills from SOs						
Brief description	Our DWMP modelling generates forecasts of when wastewater catchments would either flood or generate spills from SOs based on a range of inputs and assumptions, notably as to the future effects of climate change. In line with Ofwat guidance we have assessed the potential effect of the `high' climate change scenario, that is to say the `UKCP18 probabilistic projections, RCP8.5, 50th percentile probability level' for land, and the `UKCP18 marine projections, RCP8.5, 50th percentile probability level' for sea levels. In order to counter the impact of the more extreme weather events a very large programme of investment would be necessary to prevent the performance of wastewater networks from deteriorating significantly.					
Likely timing	The next round of DWMP modelling, scheduled for the second part of AMP9, will provide a clearer picture of the likely prospects for our wastewater networks of climate change developments. However, it is possible the margins of uncertainty around the future path of climate change and its effects remain wide. Evidence to support a more definitive response may not become established until the 2030s or beyonw.					
Critical assumptions	Our assessment of the capacity impacts is based on our DWMP modelling. Assumptions are built into the extrapolation from the catchments we have analysed in detail to the whole of our area. Cost estimates have been chosen to be consistent with the main SO programme, and also build in the expectation that there will be a steady shift in emphasis from `grey' to `green' solutions during the course of the 2030-50 period.					
Expenditure implications (2022-23 prices £m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	n/a	723	1,006	1,180	1,420	4,329
Impact on average household bills	-	£23	£52	£81	£111	

Alternative Pathway 3 - Effect of Adverse Climate Change Scenario on Flooding and Spills from SOs						
(end-AMP vs core pathway)						
Probability	There is uncertainty regarding the future path of climate change forecasts, and how quickly they will shift in response to new evidence and analysis. As the preparatory work for the next DWMP is not very far away we have placed a probability of 25% on this pathway. Clearly there is also a possibility that a modified version of this pathway could become a potential prospect as well.					

The incremental expenditures associated with this alternative pathway are presented in business plan table LS4b.

Table 46

Alternative Pathway 4 - Effect on the SO Programme of a `Team Wales' Collaboration Approach						
Brief description	As set out in Part One above, if we can unleash the power of effective collaboration with third parties there is the prospect of a much more efficient route to the achievement of our Ambition. Nowhere is the potential greater than in the design and delivery of the large SO programme necessary to deliver our target outcomes for river water quality, flooding, and pollution incidents. We have identified a range of opportunities for collaboration. These include: • implementing a joined-up approach to solutions allowing us better opportunities to address the biggest impact on SOs which would otherwise be outside our control, e.g using developer funding to offset highway run-off rather than directly diverting run-off from a new property; • more sharing of costs between contributors to SO spills (e.g highway agencies); and • introduction of market mechanisms to manage surface water flooding. The Welsh government has an important role in facilitating greater collaboration and using its powers to ensure that the policy framework is conducive to the application of a `Team Wales' approach.					
Likely timing	There is scope for different elements of this pathway to occur at different times. However, as the shape and size of the SO programme post-2030 becomes clearer with the next DWMP cycle the conditions will be in place to prompt and foster a major step-up in collaboration, including the trialling and implementation of market mechanisms. We have therefore selected 2028 as the the `decision year' for this pathway, with effects starting to manifest themselves from 2030 onwards.					
Critical assumptions	For the purposes of estimating the effect of the Team Wales collaboration approach on our SO programme we made a number of assumptions. These included: • a 10% saving from stakeholder cost-sharing, including the use of funding from developers that would otherwise go to limiting surface run-off from new properties to implement higher value highway drainage schemes; and • a 10% saving from stakeholders taking on greater responsibility for surface water management (e.g local authorities limiting urban creep).					
Expenditure implications (2022-23 prices £m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	n/a	-37	-310	-171	-137	-655

Alternative Pathway 4 - Effect on the SO Programme of a `Team Wales' Collaboration Approach						
Impact on average household bills (end-AMP cs core pathway)	-	-£1	-£11	-£15	-£17	
Probability	Based on our current engagement with Welsh government and other relevant stakeholders our judgement is that this pathway has a likelihood of approximately 50%. This is a `blended' assessment as certain elements are considered to have a better chance of materialising than others. For example, collaboration around targeting interventions on high priority locations (e.g highways versus small developments) is viewed as more likely than not. On the other hand, the ability or willingness of some wider stakeholders to contribute financially to SOs as a consequence of their actions (e.g local authorities sanctioning `urban creep') is seen as less likely.					

The incremental expenditures associated with this alternative pathway are presented in business plan table LS4c.

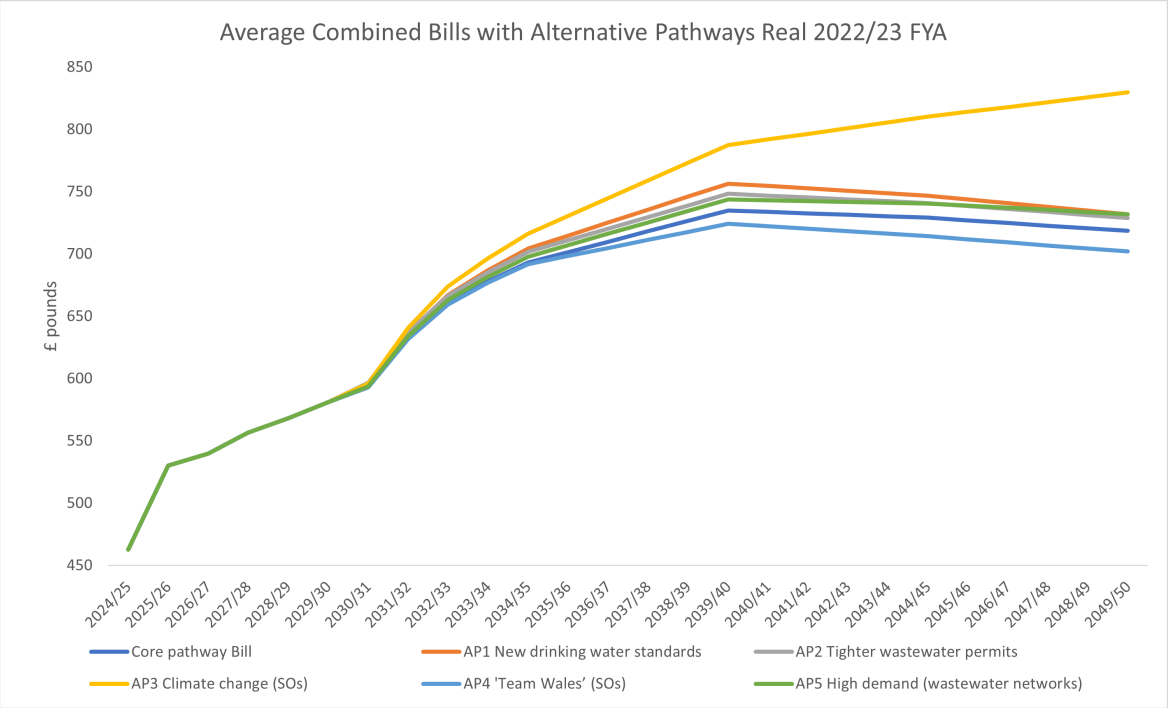
Table 47

Alternative Pathway 5 - Adverse Demand Impacts on Wastewater Networks						
Brief description	Our forecasts for demand and property growth are based on the judgements that we make having regard to all the evidence available to us, including past experience. The housebuilding rates prepared by local authorities have typically been at a much higher level. There is therefore scope for an upward step change in demand projections without any changes in policy or legislation. We have adopted the Ofwat `high' scenario for the purposes of driving this alternative pathway. Higher demand and properly growth forecasts mean greater surface water run-off, putting further pressure on our wastewater networks and putting at risk our performance on harm to rivers from SOs, flooding, and pollution incidents. This alternative pathway is derived from the DWMP and augments the SO investment programme to the extent necessary to offset those risks.					
Likely timing	There is scope for this pathway to become a realistic possibility at any time, as and when a fundamental change in direction in housebuilding rates is observed. The first potential decision year is 2028, when the next cycle of DWMP planning will be well advanced. Should there be sufficient evidence to justify elevated growth rate assumptions going forwards this would trigger an increase in the expenditure necessary to deliver the SO programme throughout the remaining 20 years of the LTDS period.					
Critical assumptions	We have adopted the Ofwat `high demand' scenario, as set out in the LTDS guidance and as presented in the business plan tables (line LS6.6).					
Expenditure implications (2022-23 prices £m)	AMP8	AMP9	AMP10	AMP11	AMP12	Total
	n/a	150	141	130	127	548
Impact on average household bills	-	£5	£9	£11	£13	

Alternative Pathway 5 - Adverse Demand Impacts on Wastewater Networks						
(end-AMP vs core pathway)						
Probability	We have assigned an overall probability for this alternative pathway of 50%.					

The incremental expenditures associated with this alternative pathway are presented in business plan table LS4d.

The bill impacts of our alternative pathway, together with the core pathway, are illustrated below.



As noted above, the exclusions from the core pathway (and by implication the alternative pathways) in the latter part of the 25-year period would be expected to mean higher bills in AMPs 11 and 12, so the downward trajectories after 2040 should be viewed with caution.

2.4.3 Alternative pathways - other

As noted above, in addition to the alternative pathways that we have costed and presented in the business plan tables, there are a number of other alternative pathways that we have developed and which are presented below in narrative form. These have been assessed and will be monitored alongside those presented in section 2.4.2 above. In general they are either insufficiently material in isolation, viewed as having a comparatively low probability, or subject to such margins of uncertainty across several dimensions that presenting costed pathways would be too speculative at this stage. It is likely that at least some of these will develop into firmer prospects that warrant consideration of more detailed analysis in future updates of our LTDS and WW2050. We are also conscious of the fact that we tend to concentrate in our long term planning on the `known unknowns' and that as yet `unknown unknowns' could significantly alter the future landscape in a way that warrants a fundamental re-evaluation of some of our alternative pathways.

The 14 most significant `narrative' alternative pathways are presented below.

WRMP Most Likely

Our draft WRMP was re-published in June 2023. In accordance with the relevant guidance it adopts a `most likely' central view of our long term supply-demand balance position, and provides an optimal least-cost pathway for addressing forecast deficits. It therefore differs in important respects from the LTDS, which acknowledges the ranges of uncertainty we face about the future, and requires that our core pathway focus only on `no/low-regret' interventions that would be required to achieve our Ambition in all plausible scenarios.

The revised draft WRMP therefore differs from the LTDS in a number of respects. For example, it includes some £200m of leakage enhancement expenditure that is not included in the core pathway. However, our modelling projections show that the vast bulk of this would occur in AMPs 11 and 12. This does not reach the £500m threshold we chose for our more detailed, costed, alternative pathways, but in any event it will be re-considered carefully when we update our forecasts in the next WRMP cycle and prepare our LTDS for PR29.

DWMP Most Likely

Like the WRMP, the DWMP is prepared on the basis of central projections about the future, which differ in important respects from the `no/low regrets' interventions that are incorporated in our core pathway. Most significantly, in our core pathway the NEP/WINEP programmes only last into AMP10, and we are showing no NEP/WINEP expenditure in AMPs 11 and 12 in the core pathway. It is possible that once confirmed these programmes could herald a new multi-billion pound programme of improvements to the environment, but we are not yet in a position to provide a well-developed considered view of what might be involved. We expect that the uncertainty around NEP/WINEP commitments in AMPs 10-12 will have narrowed somewhat by the time we enter the next DWMP cycle during AMP8.

Fish Passes

We have many thousands of assets which may be a barrier to fish migration. This, in turn, can have a detrimental effect on river ecological health. There is a potential for a requirement to address all potential blockages to fish caused by our assets, independently of the NEP process. This could happen as early as AMP8, though it is likely that a period of several years would be allowed to implement the necessary changes. Our assessment is that this could involve an investment programme well in excess of £100m, which would have a material upward impact on bills. However, as there are numerous sites, and each one is unique, there is a wide range of uncertainty around this high-level assessment. We have carried out some initial assessment of the potential complexity of solutions, and are continuing to refine potential options and indicative costs. The increasing attention focused on river water quality in Wales suggests that the likelihood of this pathway coming to fruition is quite high, potentially within the next decade or so.

Wet Wipe Ban

The flushing of wet wipes into the wastewater network is a common source of blockages, which in turn can cause pollution incidents and flooding. We have used public messaging to try to persuade customers to dispose of wet wipes appropriately. However, with the backing of a legal ban on the disposal of wet wipes to sewers we think a material improvement in performance could be achieved. However, it does not appear that the necessary legislative change is likely to be made in the near future, and although we think the case is strong there is no guarantee it will be made at all during the period of the LTDS.

As well as uncertainty regarding the potential timing of any wet wipe ban, it is too early to have any confidence in indicative estimates of what its cost impact would be. We are certain it would make a significant difference, simply because of our own operational evidence as to the role wet wipes play in sewer blockages, pollution incidents and flooding events. However, detailed analysis would

be required to arrive at reasonable estimates of the percentage reduction in wet wipes in sewers likely to be achieved as a result of the proposed legal changes, together with an assessment of how this would affect the level of blockages and thereby improve our flooding and pollution performance in a way that allows investment we would otherwise have made in the network to be deferred, cancelled, or diverted to address other causes of flooding and pollution. We are confident, though, that if a wet wipe ban were introduced it would have a meaningful downward effect on the future path of bills.

Smart Wastewater Networks

Our strategy is dominated by the multi-billion pound SO programme. If the application of `smart' network technologies can offer additional options to address problems or reduce the cost of others it may be possible to deliver the programme more efficiently. At present our experience to date is that the scope to make significant improvements is limited: we have more single input networks characterised by steep topography, so the scope for wastewater to be stored temporarily within the network is regarded as minimal. However, as the potential dividends from smart network initiatives are so high we will keep a close eye on developments in this area and will be keen to investigate and/or trial any potential smart solutions as and when they appear to be feasible options.

Flood Protection by Third Parties

Many of our assets are protected by flood defences owned and operated by third parties such as Natural Resources Wales or the Environment Agency. There is the potential for flood defence policies and funding to change at those third parties which may mean flood defences being abandoned, not maintained or not enhanced to the threat of climate change which would impact the resilience of our systems. We may then need to invest in our own flood defences to protect sites. There may also be benefits where a third party builds a new flood defence that benefits our asset, negating the need for us to protect the site. There is recent precedent for policy change where the UK Government chose to prioritise flood defence of urban areas resulting in a number of rural flood schemes being defunded. We are not aware of any concrete proposals in this area but flood defence funding has been subject to uncertainty. As flooding risk continues to climb the policy agenda we will ensure we participate in any dialogues that could bring about significant changes to third party activity in flood protection in order to take any opportunities to realise benefits for our customers, and ultimately to ease any upward pressure on bills.

Supply Pipe Adoption

The question of transferring responsibility for supply pipes from customers to water undertakers has been the subject of discussion for a number of years. There is no expectation that legislation to bring this about will be enacted in the immediate future, but it will remain a potential trigger for an alternative pathway for so long as it is a policy option.

Should the change be made it would have significant effects, both positive and negative. The additional responsibility would permanently increase our expenditure obligations as we would be solely responsible for maintaining and replacing supply pipes. At the same time it could open up new opportunities to detect and reduce leakage, which may offer cheaper ways of moving towards our 2050 target than some of the activities we would otherwise be carrying out. It could also provide us with more direct control over the implementation of the lead pipe replacement programme.

Inability to Dose Phosphoric Acid

As set out in Part One, the goal of achieving a `lead-free Wales` is expected to take several decades at the planned rate of supply pipe replacement, which is constrained by affordability and financeability constraints, as well as the high proportion of customers with lead supply pipes who do not want them replaced. In the meantime the health risk from unlined lead pipework is mitigated by the dosing of phosphoric acid at treatment works.

However, the use of phosphoric acid dosing going forwards may become increasingly untenable. There is a growing general concern with the use of chemicals in water treatment, and pressure to minimise their use may increase. The dosing of drinking water with phosphorous could also come to be viewed as anomalous against the backdrop of the objective of removing it from wastewater (and at considerable expense). In addition, phosphoric acid is increasingly difficult to source and is becoming more expensive. There may come a time, therefore, when it is necessary to accelerate significantly the lead pipe replacement programme. This would, *inter alia*, entail measures designed to overcome customers' reluctance to work with us in replacing supply pipes, which may require policy initiatives and possibly legislation at a governmental level. Should such acceleration be required the costs of replacing the final c200,000 lead supply pipes in Wales would be significant and would have a material upward effect on household bills.

Acceptability of Water - Third Party Impacts on Network (Collaboration)

As we bear down on the number of customer contacts (see section 2.2.1 above) an increasing proportion of the residual events will be associated with third party involvement with the water network (e.g fire authorities, developers, and unauthorised third party use). We have been exploring ways of bringing about closer and more effective collaboration. As the incremental cost of reducing contacts over the plan period is high, there is potential to achieve significant savings on our core pathway, which would ease the upward pressure on average household bills. However, further detailed investigations are required, there will need to be close engagement with relevant stakeholders, and it will be necessary to consider the feasibility of various options for reducing these types of events.

Changes to Abstraction Regime

At present we are not required to assess the effects of potential abstraction licence reductions on the rivers on which we rely (except for the comparatively small part of our area that is situated in England). However, we are mindful that the future long-term sustainability of our raw water sources is an area of significant uncertainty, particularly under a changing climate, and so in AMP8 we are proposing to examine this issue in more detail. This could give rise to changes in some of our abstraction licences, which could raise supply/demand balance issues that lead to a requirement to invest in alternative sources. We consider that the most likely timing of possible changes in abstraction licences is the early part of AMP9, potentially necessitating expenditures in AMP9 and possibly AMP10. However, the nature and magnitude of this eventuality are subject to considerable uncertainty, although this will be substantially reduced as we work through the investigations programme.

Raw Water Deterioration

There is a significant possibility that climate change and changes to land use will bring about a significant change to raw water quality. Higher temperatures can result in increased levels of organics in raw water, which has the potential to overload filtration processes at water treatment works leading to a requirement for additional coagulation dosing. The extent to which this is a realistic prospect varies from site to site. Our modelling suggests that expenditure in excess of £100m may be required across 9 sites, spread across AMPs 9-12. Additionally, changes to agricultural practices (in part also driven by climate change but also by market economics and government policy) could see additional threats to raw water quality. Land that is currently largely pastoral could be opened up to arable use, increasing the risk of pesticides and other contaminants in our raw water sources. We have assigned a relatively high probability to this pathway, and will keep it under review as we move into the AMP8 period.

Net Zero Carbon Costs

As set out in section 1.3.6 above, we are targeting net zero across the whole of our business by 2040. Our strategy makes assumptions as to the development and cost of low carbon materials (e.g concrete, steel, etc) that would be utilised in our capital investment and operational activities. We have observed a partial closing of the gap in unit price between low carbon materials and the standard alternatives, but this is threatened by the prospect of higher rates of investment in the industry post-2025, and therefore greater demand for those products. If the market is unable to deliver in line with our unit cost assumptions it is likely that we would have to incur additional costs in offsetting in order to achieve our goal of carbon neutrality.

In addition, our strategy relies on assumptions regarding the rate at which the national grid will be de-carbonised, which is outside of our control. There is a risk that these expectations are not met or are delayed, which is a further source of risk to our net zero strategy.

We will be in a position to take a view in AMP10 on whether offsetting will be required to achieve net zero in 2040. Costs would be incurred from that period onwards into AMPs 11 and 12. The magnitude of the resulting costs depends on the extent to which low carbon materials remain more expensive than the standard alternatives, but we estimate it could easily run to seven figures across the latter years of the strategy period, which would have a material positive effect on the level of the average household bill.

Water Collaboration

Section 2.2.2 above presented our strategy for achieving the desired reduction in the number of designated safeguard zones, including expenditure of £96m over the period covered by the LTDS. There is scope to reduce this amount if relevant landowners can be encouraged or required to adopt different behaviours, e.g. in the use of pesticides. Changes to requirements on farmers in Wales imposed by the Welsh Government could strengthen direct accountability and incentivise different approaches to land use. This could result in improved overall catchment conditions and reduce our costs, potentially by as much as two-thirds. Until these changes are bedded in and there is more clarity as to their likely effects we will be unable to estimate with any confidence how the core pathway will be affected.

Nutrients Markets

We have observed that market approaches to nutrient management offer the possibility of delivering benefits. There is a need to develop proposals on how markets could be implemented in practice, including market structure and governance. Other examples such as emissions trading systems and biodiversity credit schemes offer useful working examples of functioning markets that can further environmental objectives. Over the coming years we will continue to monitor and consider the potential for nutrient markets in our catchments, and where appropriate carry out more detailed feasibility work with a possible view to designing a trial scheme. We are keen to be one of the leaders in this field. At present the uncertainties surrounding this scenario are too wide to enable us to offer a view on the possible timing or potential effect of adopting nutrient markets. However, since they would only be implemented if they offered a more efficient way of managing nutrients than the default, the expectation would be that they would facilitate lower household bills by 2050.

2.5 Monitoring Plan

Our LTDS is not a rigid blueprint for the future. It is a considered and coherent view that will adapt as and when information and circumstances change. We intend to embed the process of monitoring and evaluation into our existing strategic governance processes.

Board Leadership

As set out in Part One, long term strategic planning has been a core function for our Board since we became a wholly-owned subsidiary of Glas Cymru in 2001. Board agendas cover a range of strategic issues throughout the year, and since 2015 the Board has met every year for a dedicated `Strategy Day' in the autumn. This provides a bespoke opportunity to review the company's long term strategies (including WW2050 and, from next year, the LTDS) in the light of the latest developments, to carry out `horizon-scanning' in respect of certain issues, and to engage in fresh debate on future objectives and priorities. For example, as set out in section 3.6 below, the company's future strategic course has been adjusted from time to time over the past 20 years or so, and in each case this has taken place as a result of board deliberations.

Evolution of the LTDS will be an ongoing process for the company in the coming years, but two standout processes in our annual cycle will play a central role in driving this forward.

Monitoring the LTDS - the Role of the Annual Performance Report

After the end of each year we publish two significant documents on our performance. Our Annual Report and Accounts presents the material we are required to prepare in accordance with our statutory obligations, as well as additional disclosures that we choose to make. These include a statement of our progress against WW2050.

Our Annual Performance Report is prepared in accordance with Ofwat's detailed regulatory reporting requirements, and provides all the information it requires to carry out its functions.

There is a degree of overlap between the two documents.

From 2025 onwards our Annual Performance Report will include a bespoke section on the LTDS - `Progress and Update'. This will:

- set out our latest performance on the LTDS outcomes to which we have committed;
- ,report on our progress against the enhancement activities that comprise our strategy;
- disclose any major changes in the assumptions underpinning the core pathway;
- explain if and how the strategy will adapt as a result of performance metrics deviating from plan;
- provide commentary where relevant on upcoming decision and trigger points;
- provide an overall update on how the strategy has adapted in the last year; and
- looking forward, describe any major changes in the nature and prospects of our alternative pathways.

Driving the LTDS Forwards

Following the annual summer reporting cycle we will work on preparing the ground for the Board's monitoring of the LTDS, alongside its monitoring of WW2050. The precise content and format will be a matter for the Board, but we would expect to include it as part of the annual business planning cycle. This would include analysis of what has changed since the previous strategic update, taking on board the contents of the `*LTDS - Progress and Update*' report in the latest Annual Performance Report, and putting forward options for modifying the strategy, including the principal alternative pathways, as appropriate. There will be particular focus in the next few years on the likelihood of needing to move to an alternative pathway at PR29. Depending on the position in their respective cycles, the strategic frameworks would also fall within the scope of the relevant workstreams.

Increasingly, we would expect the Board to be looking beyond 2050, especially in relation to the implications of climate change and the long term prospects for water resources.

By building the evolution of the LTDS into our governance and reporting cycles, we will ensure that adaptive planning is embedded in our business processes. This will put us in a good position to deliver a strong LTDS at PR29 which in turn will enable us to produce a high quality business plan for AMP9.

3. Part Three - Rationale

The purpose of this Part, as set out in the guidance for long term delivery strategies[18] is to present a more in-depth description of the methodologies we developed and applied for the purposes of preparing our LTDS, and thereby to demonstrate why our strategy is the best way of delivering our ambition.

Overview

Our strategy brings together all the factors and elements that are relevant to the establishment of an integrated holistic plan for navigating the challenges and uncertainties we face in the future in the way that we consider best meets our Vision. It has been prepared alongside our pre-existing WW2050 policy framework, which itself continues an established practice of looking to the long term in order to inform our strategic direction of travel and adapting to take into account new information and shifting priorities. Though focused upon our long term ambitions it is very much grounded in the realities of the position we find ourselves in today, including our performance successes, our shortcomings, and our immediate challenges. In a number of respects the tramlines of the strategy are marked out for us by the legal and regulatory framework which which we operate, with compliance being a top priority. In others the strategy effectively incorporates the specific methodologies of the strategic frameworks, the outputs of which dominate the enhancement programmes of our core and alternative pathways, as presented in part two.

Throughout, wherever we were faced with ranges of choices we applied best practice asset planning principles in order to inform our proposals. Details are set out in Our approach to investment planning. We took a rigourous though pragmatic approach to optioneering (see section 3.1 below), and applied our established methodologies for costing (section 3.2). We carefully weighed up various considerations in addressing choices of programme sequencing and profile, including deliverability, financeability, affordability, and the important issue of achieving inter-generational fairness (section 3.3). A particular challenge was navigating the wide range of uncertainties that characterised many elements of the strategy (section 3.4), and in order to inform our thinking we subjected the strategy to specific scenario modelling (see section 3.5).

As set out in section 1.1 above, the LTDS is the latest step in a line of long term strategic statements, stretching back to our acquisition by Glas Cymru in 2001. In section 3.6 we explain ho it differs from recent strategy events, namely WW2020, PR19, and the 2019 WRMP. Finally, during the course of preparing the LTDS, we took on board the feedback provided by Ofwat following an early presentation of our LTDS in January 2023. A summary of how we addressed the main issues raised is presented in section 3.7.

3.1 Approach to Optioneering

The process of designing and shaping the programmes that comprise our strategy varied from one component to another, but all drew upon a combination of the following:

- the application of firm **legal obligations**. For LTDS outcomes such as the tap water quality compliance risk index, for example, the options available to compile the strategy were substantially dictated by the requirements of the statutory drinking water quality standards themselves;
- the outputs of the **strategic frameworks,** each of which follows its own prescribed methodology for its specific purpose. The WRMP follows a well-established methodology and takes a 25-year timeframe to the evaluation of the options for balancing demand and supply of water to customers. The DWMP is comparatively new, and the methodological focus differs somewhat between England

[18] See *PR24 and beyond: Final guidance on long-term delivery strategies* (page 13) which can be found here

- where the common objective is focused on reducing the frequency of spills from wastewater networks - and Wales, where there is more emphasis on the effect of network spills on harm to receiving waters;

- the use of **cost benefit analysis (CBA)**. Where presented with a range of potential choices we applied our CBA framework to inform our decisions. This included the application of a multi-capitals approach to costs and benefits over a period of 30 years in the form of CBA models that incorporate the outputs of our Service Measure Framework. In this way we have been able to make the choices that deliver best value when looked at from a wider social and environmental perspective. Full details are set out in section 7 of Our approach to investment planning;
- careful consideration of the extensive **uncertainties** that characterise the period of the LTDS, and the importance of embedding **adaptive planning** principles in our optioneering where appropriate. A prime example is our strategy for delivering our ambition for the `acceptability of water'. We know that performance is influenced by the complex interaction between drivers operating throughout the system from catchment through to customer connection, but our strategy recognises that we cannot know exactly what effect each potential intervention at different stages in the system will have either by itself or in combination with others. We therefore begin by carrying out the interventions that we know will deliver significant improvements in all possible scenarios, with a view to incorporating the findings from them into subsequent refinements of the strategy; and
- an important part of our adaptive planning approach and the management of uncertainty is the potential role of future **innovation**. By definition we cannot be certain what new solutions will become feasible as a result of future innovation, but we can take an informed view of where the focus of innovative energies is likely to be (such as the exploration of nature-based solutions) and incorporate this into our judgements around future pathways. For example, the standout component of our 25-year strategy is the multi-billion pound programme of works at SOs, first to eliminate `harm' to rivers, and subsequently to achieve the target of no more than 10 spills per annum. We have already seen innovations in this area, but we believe there is scope for many more, especially in the progressive transition from `grey' to `green' solutions that we have built into our projections. In essence, we are assuming that the learning points from early schemes and investigations will inform better ranges of choices for subsequent schemes, thereby enabling the programme to `flex' and `adapt' as we progress. Clearly, though, there remains uncertainty over the precise directions that future innovative breakthroughs will take to shift the set of feasible choices available to us over time.

3.2 Approach to Costing and Efficiency

Our approach to costing the programmes that comprise our strategy is designed to draw on the widest range of relevant and reliable information and is intended to deliver efficient estimates of expected expenditures in line with recognised best practice.

Full details are set out in section 5 of Our approach to investment planning. In summary, we have accumulated a large amount of information drawn from our own experience of costs in the past and cost intelligence provided through other reliable channels, e.g. our supply chain partners. Most of this is captured in our Unit Cost Database (UCD), which is constantly being updated and is used to inform both short- and long-term planning. For the costing of items that are new to us (e.g. certain types of metering technology) we use specialist external consultancies. Wherever possible we have benchmarked our programme costings against external sources.

As with all costing strategies we recognise the importance of taking into account the uncertainties around cost estimates, which would be expected to be greater the further into the future projections are being made. For certain types of activity for which we have extensive historical experience the confidence intervals around our estimates are comparatively narrow. For others, especially those

involving technologies that are new or relatively untried the range is wider. Where appropriate allowance is made for risk and contingency. However, the overwhelming proportion of expenditure envisaged under the programmes in our strategy relates to types of scheme where we have extensive experience, and can therefore be confident in our cost estimates.

We reinforce this, however, by benchmarking our figures where possible with valid and available comparators. We do this at the `micro-level' through use of cost consultants with experience elsewhere in the sector, and from a more `top down' perspective' by making use of the the extensive submissions made by all water companies to Ofwat, which helps to inform our benchmarking activities.

3.3 Approach to Sequencing and Profile

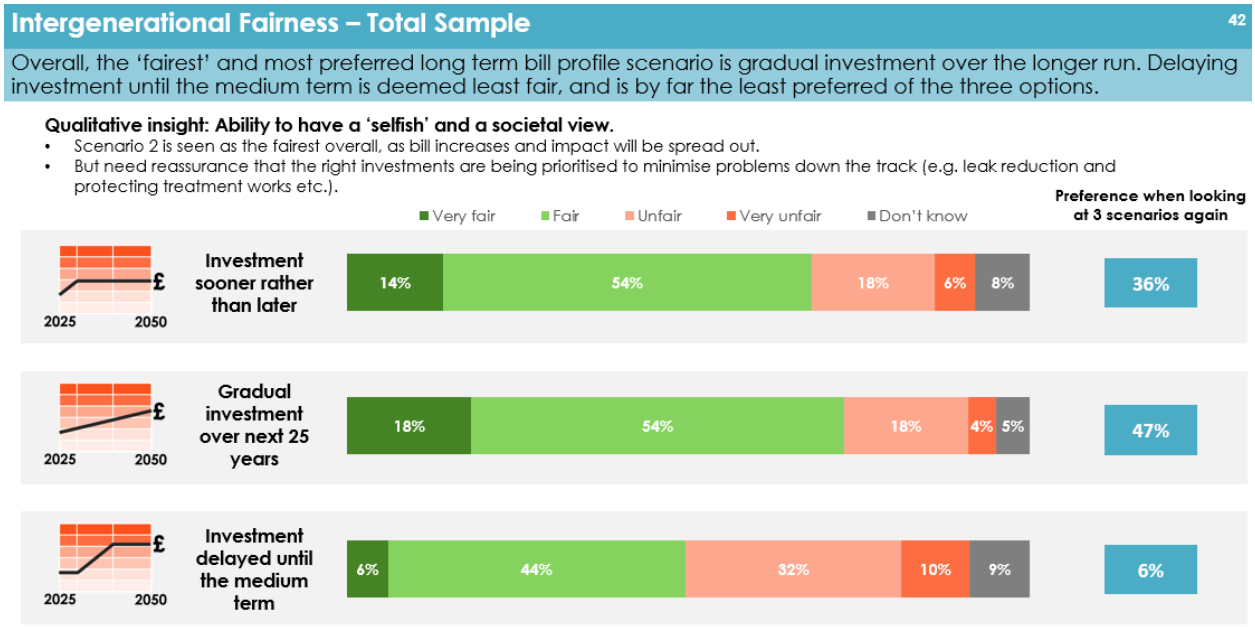
During the course of preparing our LTDS the issues relating to the sequencing and profile of our strategy required extensive consideration and analysis, due to the complex interaction between the various constraints we faced and the objectives we are trying to achieve. We are impatient to deliver on our ambitions, as are many of our stakeholders, especially in relation to the elimination of harm to rivers and improvements in river water quality, but it is not feasible to do everything at once. The final view is the outcome of a number of iterations, and reflects the considerations set out below.

Affordability

Our strategy envisages a significant and sustained increase in enhancement expenditure compared with recent history, which will inevitably feed through into higher bills, both for households and non-households. We start from a position where we know that a majority of customers consider their water and wastewater bills to be good value for money. Our research also confirms that a majority are willing to pay more to finance improvements they value. However, a significant proportion of our customers already struggle to pay their bills at the current level. Many are also resistant to the prospect of higher bills in the future.

We have long recognised the difficulties that water and wastewater bills pose for some of our customers, especially those on low and fixed incomes, and have a long track record of tariff-based and other initiatives to provide support to targeted groups. Well in excess of 100,000 households already benefit from lower bills, financed by a combination of contributions from other customers and financial support from us. We will continue to look for ways of further enhancing our affordability packages. For example, we are aiming to be in a position to make a commitment that our flagship household social tariff, HelpU, will rise by no more than inflation over the course of the AMP8 period. This depends on the outcome of the PR24 process and the final determination in December 2024. Further details of the initiatives we are planning are set out in section 12.5 of the Business Plan (link).

Notwithstanding the challenges around obtaining meaningful views from customers on long-term preferences, in our phase 2 research for the LTDS we explored customers' views on the profile of future investment and bills. A significant majority expressed a preference for investment to take place either sooner rather than later or gradually over the next 25 years (see below).



See WSH30 - `*Customer engagement and research*' (link) for further details.

We also received strategic steers from the PR24 Forum. In connection with the SO programme, for example, it stated:

`*We recognise the significant investment estimated to be required to address the problem of SOs causing ecological harm and recognise the need to take a phased approach in order to manage the impact on customer bills.*.'

It also made clear that it expects us to maintain and enhance the range of support we offer to customers that struggle with their bills, including payment options, financial support and social tariff options.

Fairness between generations

Closely related to the overall question of affordability is the trade--off between the size of bills today and in the longer term. In principle, it is open to a company to defer bill increases by financing more of today's expenditure through growth in the RCV, leaving a bigger share to be paid for through future bills. Alternatively, today's customers could be asked to pay a higher proportion of current investment expenditure, which would mean flatter RCV growth and less to be paid by future generations.

For us, inter-generational fairness is achieved by taking an approach that seeks to ensure that the level of bills at any one point in time reflects the service being provided and the benefits being delivered. We do this by seeking to take a neutral stance when setting:

- our PAYG rates - the proportion of expenditure in the year to be recovered straight away through bills. We select the `natural' rate that divides expenditure into that which relates to the delivery of services today, and the remainder which reflects investment in the future; and
- our RCV run-off rates - the proportion of the RCV to be recovered from customers in a year. We select the `natural' rate that seeks to reflect the expenditure on asset maintenance and replacement that would be necessary to maintain the capability of the asset stock to deliver services at a constant level.

By choosing the natural rates for PAYG and RCV run-off we seek to ensure that each generation faces bills that reflect the services and benefits it receives, and there is no systematic cross-subsidy between one generation and another.

For the purposes of modelling the impact on bills of our strategies we used assumptions which are consistent with those used for our AMP8 projections. With potential changes in the profile of capital expenditure we did consider whether these assumptions needed to be adjusted. We found that there were arguments in both directions, so on balance in the interests of simplicity we chose to keep them unchanged. As we approach each AMP period we will have a better view of potential movements in the natural rates of PAYG and RCV run-off rates, and so will be able to make adjustments if required to adhere to our overall goal of inter-generational fairness.

Financeability

Our current financial position is robust, and we benefit from some of the highest credit ratings in the sector. However, a significant and sustained increase in the rate of enhancement expenditure poses a challenge. Part of the incremental expenditure will be financed on a `pay as you go' basis by customers but the remainder will be added to the RCV to be financed by customers over a longer period through a combination of the allowed return on capital and the `RCV run-off rate', and in the meantime paid for by the raising of new debt. This, in turn, will tend to push up gearing and tighten interest cover ratios, in turn putting pressure on our credit ratings. It is important that we maintain our ratings, because any downgrades would tend to push up our cost of debt, which ultimately means higher bills for customers with no commensurate benefit. This imposes a constraint on the rate at which we can step up enhancement expenditure.

Deliverability

The third consideration is the extent to which a significant and sustained increase in the rate of enhancement expenditure can physically be delivered by us and our partners. This is not just a question of whether we can scale up our planning, design and construction capabilities. Many of the high growth elements of our strategy are common across the whole industry, e.g. our SO improvement plans. There is therefore a risk that the markets for certain types of input could tighten considerably, not just in materials and equipment, but also in specialist expertise as well. We have put in place strategies to manage the challenge of scaling up our deliverability capabilities for the AMP8 period (see section 13.8 of the business plan (link). However, the potential consequences of trying to go too far too fast do impose a constraining influence on the profile of our programmes.

Our Decisions

The initial iterations of our strategy involved a more significant step-up in enhancement expenditure in the early years of the period. However, it was clear from our indicative modelling that this would have led to:

- a sharp rise in bills in AMP8, followed by a flatter profile thereafter;
- potential financeability concerns in AMP8, because of the additional strains on our financial ratios; and
- heightened risks around deliverability and our supply chains.

Accordingly, we made a conscious decision to cap the enhancement expenditure programmes in AMP8 at the level at which it is presented in Part Two above. See Part 5 below for a description of the board's processes and decisions. This meant making decisions to defer expenditure in certain areas.

It has also meant that our projections show a further steep increase (>50%) in enhancement expenditure in AMP9, followed by reductions in AMPs 10, 11, and 12. We have given careful thought to whether the same constraints that have led to the capping of expenditure in AMP8 might warrant a further iteration in the profile of the strategy, with some expenditure deferred into AMP10, thereby further smoothing the profile. We have made the decision to leave the profile as it is for the purposes of the LTDS. We know that circumstances will change, the strategy will adapt as uncertainties narrow and new as yet unanticipated factors emerge. There is also uncertainty around quite how binding

each of the constraints will be, e.g. to what extent our supply chain successfully accommodates the expected step-up in activity during AMP8. Rather than make 2028 decisions through a 2023 lens, therefore, we have chosen to leave the size of the programmes in AMP9 as they are, recognising that as they stand they would pose a fresh challenge, but we will be better equipped and informed to make the necessary decisions nearer the time.

Sequencing of Individual Programmes

In general, the components of our strategy as described in Part Two consist of modular programmes that straddle several AMP periods. We have given careful thought to how the individual projects in each should be sequenced, and in particular which should be put forward as firm proposals for delivery in AMP8. There is no single criterion that has determined our sequencing choices in every case. Rather, decisions have been made on the basis of four distinct criteria:

- **best value first**. For a number of programmes (e.g. the SO improvement programme) individual projects vary in terms of their cost and the benefits they offer. All else equal the higher benefit/lower cost schemes have been earmarked for earlier delivery;
- **scope for regret.** For each scheme careful consideration is given to the possibility that the scope or timing of the project turns out to have been sub-optimal when looked at with the benefit of hindsight in the future. There are many potential reasons for this. The possibility of new standards in the future (or new regulatory interpretations of existing ones) could mean it is better to wait, or design the scheme in anticipation of the new standard, rather than risk the possibility of having to make two separate interventions at different times in a way that turns out to be more costly. It may be better to delay a scheme until it can be delivered alongside a major capital maintenance project. Where there is a choice between making a required improvement through a `tried and tested' (possibly `grey') approach, or an alternative relatively untested but ultimately more beneficial (and possibly `green') approach, there may be merit in delaying whilst the necessary pilots, trials, or investigations have been carried out in order to narrow the uncertainty and thereby provide more clarity to the options available. In general, the AMP8 programme comprises schemes over which we have near-total certainty that the scope for regret is minimal;
- **urgency**. In some cases schemes have to be scheduled earlier rather than later for the simple reason that there is no choice. This is the case, for example, where improvements have to be made to meet legal obligations which have a hard deadline; and
- **programme interactions**. There are schemes which, of themselves, would not necessarily meet the criteria to be scheduled early, but they play an important role in enabling other interventions such that when considered in the round there is a sound case for bringing them forward.

Evidently there may be considerable uncertainty around the factual basis for the application of these criteria. Similarly, we know from experience that unforeseen events (`unknown unknowns') can intervene and alter significantly the balance between the choices we face. Ultimately a degree of judgement may be required in arriving at the decisions we make.

3.4 Approach to Uncertainty

The way in which we approach and manage uncertainty is one of the cornerstones of our general high level approach to long term planning, and our methodology for developing the LTDS in particular. The experiences of the last few years have provided good examples of developments that were to all intents and purposes completely unexpected (e.g. the Covid-19 pandemic, the knock-on effects of the war in Ukraine), as well as others that were conceivable, but did not feature in `central forecasts' (e.g. higher rates of inflation and interest rates).

Sources of uncertainty run through all facets of our long term planning, whether they relate to climate, societal, economic, technological, or service delivery. Our job is to manage them in the manner that we consider best meets our overall objectives, in particular by committing our precious resources only where and when we are as confident as we can be that they will deliver the best possible value. We do this in the following ways in particular:

- we seek to **understand** the sources of uncertainty as best we can. For example, we maintain a `watching brief' on policy and scientific developments both in the UK and elsewhere to ensure that we are well-informed as to possible future changes in standards and what they could mean for us. Our Independent Environmental Advisory Panel is one example of how we work closely with experts and regulators in this regard. These insights have helped inform the specific scenarios discussed below;
- we aim to **respond** to sources of uncertainty by doing what we can to manage them or limit their potential to bring about outcomes that cause regret. We proceed cautiously, committing resources only where we are reasonably certain they will take us forward or reduce uncertainty. To this end, we make extensive use of desktop investigations, where appropriate, we seek to draw upon experiences from elsewhere, both inside the water sector and outside, and we use pilot studies to test approaches in order to inform and refine the subsequent programmes.

3.5 Scenario Testing

As noted above, one of the tools we deploy to understand the effects of uncertainties so that we are better placed to manage them is the testing of our strategy against different plausible scenarios. These span a wide range of types of influence, including political, environmental, social, technological, legal, and economic. We recognise that, in principle, there is an infinite number of scenarios that we could consider, and there is a need to be selective. The approach we have adopted is to select scenarios that, when taken together, broadly define the envelope of potential futures that our strategy will have to navigate. This includes the scenarios we have explicitly modelled, as set out below, as well as others that represent `variations on a theme' and are of a smaller order of magnitude, or relate to the more distant future and are as yet insufficiently defined. It also includes the scenarios that have been explored at a more detailed level within the particular scope of each of the WRMP and the DWMP. In the interest of brevity they are not replicated here.

We recognise that none of the scenarios we look at today will come to pass *exactly*. In seeking to `trace' the boundaries of the set of plausible futures we have therefore sought to make choices that are representative. We consider that the six `common reference scenarios' meet this criterion for climate change, technology, and growth. To these we have added two company-specific choices, each of which captures one of the significant potential features of the uncertain future that we face:

- **changes to legislation or regulatory policy**. We would not, of course, expect legal standards to stand still over a 25-year period, especially in the light of the experience of the last 25 years. But there are real and significant changes in legal and/or regulatory standards that are in view, and need to be taken into account in the development of our strategy;
- the **full adoption of a `Team Wales' collaborative approach.** This can be defined as: the impact on our strategy and the bills paid by our customers should the stated ambition of a 'Team Wales' approach fully come to be realised. This would entail the universal application of 'polluter pays' principles, the creation of fair markets to drive allocations of certain rights and responsibilities, and the full adoption by all decision-making bodies in Wales of social and environmental costs and benefits.

The results of our scenario testing are summarised in business plan tables LS5 and LS6 in terms of the impact on the core pathway. Details of each are presented below.

Table 48

Scenario 1 - Climate Change High							
Description	The specification for this scenario follows the definition set out in the Ofwat guidance. We adopt the following: • Land: UKCP18 probabilistic projections, RCP8.5, 50th percentile probability level. • Sea level: UKCP18 marine projections, RCP8.5, 50th percentile probability level.						
The sensitivity of the core pathway to the scenario	For wastewater, the core pathway is highly sensitive to this scenario. In the absence of alternative pathways the effects of the more extreme weather events that are associated with this scenario would overwhelm many of our wastewater networks. This would increase the number of flooding events and pollution incidents, and would set back our programme of addressing the number of SOs causing harm to rivers. For water, the position is more nuanced. There is no single standout component of our strategy that is very sensitive to this scenario. Rather, in part because of our comparatively healthy supply-demand position owing to our leakage and demand reduction plans, our judgement is that there would be multiple, comparatively small-scale, impacts across our strategy. Some would have a positive effect on expenditure, some negative, and some of the impacts would manifest themselves in changes in base expenditure. For the purposes of the LTDS, in the absence of any large-scale impact of this scenario on expenditures, we have not identified and costed any material alternative pathways.						
How the strategy would adapt to the scenario	The strategy would adapt primarily through the ongoing refinement and updating of our DWMP modelling and the alternative pathway followed as a result. Early results suggest that a very large programme of additional investment would be required running into several billions of pounds. In effect, the already substantial programme of works at SOs in particular would need to be further augmented, not just because the planned schemes would have to be larger, but also because interventions would be required in additional catchments where our networks would otherwise be able to cope. This is represented by alternative pathway 3, presented in section 2.4.2 above.						
Outcomes delivered in this scenario	The outcomes delivered in this scenario are unchanged from those achieved through the core pathway. The strategy adapts in order to meet the overall Ambition.						
Effect on Expenditure Projections (£m, 2022-23 prices)		AMP8	AMP9	AMP10	AMP11	AMP12	Total
	Water	-	-	-	-	-	-
	Waste	-	723	1,006	1,180	1,420	4,329
	Total	-	723	1,006	1,180	1,420	4,329

Scenario 1 - Climate Change High	
How, under this scenario, the strategy is likely to deliver fairness between current and future customers	As set out in section 3.3 above, we seek to ensure that the level of bills paid by each generation of customers broadly reflects the service being provided and the benefits being delivered. Fairness between current and future customers would be delivered under this scenario because the profile of bills would adapt in line with the alternative pathway.
Business Plan Tables Reference	LS5.4, LS6.4

Table 49

Scenario 2 - Climate Change Low	
Description	The specification for this scenario follows the definition set out in the Ofwat guidance. We adopt the following: • Land: UKCP18 probabilistic projections, RCP2.6, 50th percentile probability level • Sea level: UKCP18 marine projections, RCP2.6, 50th percentile probability level
The sensitivity of the core pathway to the scenario	We have given careful thought to the implications of the low climate change scenario for our strategy, and in particular the effects of less extreme weather events than are predicted in central or `high' climate change scenarios. For water supply, our forecast supply /demand position is fairly strong, and our strategy does not envisage any major water resource projects. This scenario therefore does not enable the postponing or down-sizing of any significant investment. For wastewater the principal route by which the scenario would impact the strategy is through the programme of SO upgrades. In principle, an expectation of less extreme weather events could enable schemes to be designed slightly smaller. However, as the programme gets under way in AMP8 and accelerates through AMP9 - i.e the front end of the 25-year period - it is unlikely that there would be sufficient confidence in this scenario to support such modifications, as the path of the future effects of climate change will continue to be subject to uncertainty. The prospect of implementing a `once-in-a-generation' scheme at a site, only to have to return a few years later to augment it because it is not big enough is highly unattractive. The modest potential savings from having downsized the original scheme are therefore unlikely to be considered worthwhile.

Scenario 2 - Climate Change Low	
	Overall, therefore, the core pathway is largely insensitive to this scenario.
How the strategy would adapt to the scenario	As the sensitivity of the core pathway to the scenario is negligible the strategy would not adapt in any significant way.
Outcomes delivered in this scenario	The outcomes delivered in this scenario are unchanged from those achieved through the core pathway.
Effect on Expenditure Projections (£m, 2022-23 prices)	n/a
How, under this scenario, the strategy is likely to deliver fairness between current and future customers	n/a
Business Plan Tables Reference	LS5.3, LS6.3

Table 50

Scenario 3 - Demand high	
Description	The specification for this scenario follows the definition set out in the Ofwat guidance. We adopt the growth forecasts derived from local plans published by local authorities as used in the WRMP, in line with the water resources planning guidelines.
The sensitivity of the core pathway to the scenario	For wastewater, the core pathway is sensitive to this scenario. Higher demand and properly growth forecasts mean greater surface water run-off, putting further pressure on our wastewater networks and putting at risk our performance on harm to rivers from SOs, flooding, and pollution incidents. In the absence of alternative pathways the effects of the greater urban run-off associated with this scenario would overwhelm many of our wastewater networks. For water, the position is more nuanced. Higher growth impacts the business in a number of ways, but the core pathway is essentially unaffected because none of the programmes are driven by growth *per se*.
How the strategy would adapt to the scenario	The strategy would adapt primarily through the ongoing refinement and updating of our DWMP modelling and the alternative pathway followed as a result. Early results suggest that a material uplift in investment would be required in wastewater catchments to offset the impact of this scenario on the achievement of our target outcomes. This is represented by alternative pathway 5, presented in section 2.4.2 above.

Scenario 3 - Demand high							
Outcomes delivered in this scenario	The outcomes delivered in this scenario are unchanged from those achieved through the core pathway. The strategy adapts in order to meet the overall Ambition.						
Effect on Expenditure Projections (£m, 2022-23 prices)		AMP8	AMP9	AMP10	AMP11	AMP12	Total
	Water	-	-	-	-	-	-
	Waste	-	150	141	130	127	548
	Total	-	150	141	130	127	548
How, under this scenario, the strategy is likely to deliver fairness between current and future customers	As set out in section 3.3 above, we seek to ensure that the level of bills paid by each generation of customers broadly reflects the service being provided and the benefits being delivered. Fairness between current and future customers would be delivered under this scenario because the profile of bills would adapt in line with the alternative pathway.						
Business Plan Tables Reference	LS5.6, LS6.6						

Table 51

Scenario 4 - Demand Low	
Description	The specification for this scenario follows the definition set out in the Ofwat guidance. We adopt the growth forecasts derived from ONS projections on population and households.
The sensitivity of the core pathway to the scenario	The core pathway is essentially unaffected because none of the programmes are driven by growth *per se*.
How the strategy would adapt to the scenario	As the sensitivity of the core pathway to the scenario is negligible the strategy would not adapt in any significant way.
Outcomes delivered in this scenario	The outcomes delivered in this scenario are unchanged from those achieved through the core pathway.
Effect on Expenditure Projections (£m, 2022-23 prices)	n/a

Scenario 4 - Demand Low	
How, under this scenario, the strategy is likely to deliver fairness between current and future customers	n/a
Business Plan Tables Reference	LS5.5, LS6.5

Table 52

Scenario 5 - Technology high	
Description	The specification for this scenario follows the definition of `faster technology' set out in the Ofwat guidance, and includes: • smart water supply network by 2035; • full smart meter penetration by 2035; • new wastewater approach by 2040; • low emission HGVs and fleet by 2030; • carbon-free baseload electricity by 2035; • open access to relevant datasets by 2035; • no cost difference between low-carbon and traditional building materials by 2035; • reliance on non-digital backups to protect from cybercrime by 2050.
The sensitivity of the core pathway to the scenario	We have given detailed consideration to the sensitivity of the core pathway to this scenario. In the round, our assessment is that it is quite limited. There is no standout `win' which would significantly `move the dial' on our core pathway. Rather, we have identified a number of modest effects on the business, but most of these affect base expenditure rather than enhancement, so the core pathway is broadly unaffected. With some exerting a positive effect and others a negative one we did not see a case for seeking to quantify what would likely be a very modest overall impact on the core pathway, and certainly not sufficient to warrant consideration of an alternative pathway. Our analysis of the sensitivity of the core pathway to this scenario included the following assessments. • **automatic detection of potential leaks** - leakage expenditure is primarily in base expenditure; • **real time asset condition information** - this would have an impact on our maintenance frequencies, but this is base expenditure; • **full smart meter penetration** - our comparatively strong supply/demand position means that this would have minimum impact; • **monitoring and advanced forecasting of localised surface water rainfall** - this would have limited benefits for us due to our topography and network layout (see section 2.4.3 above in relation to smart wastewater networks);

Scenario 5 - Technology high	
	• **low emission HGVs and fleet/carbon-free baseload electricity/relative cost of materials** - as we are targeting a net zero position by 2040 in any event these timeframes have a minimal impact; • **protection from cybercrime** - we acknowledge the potential need for non-digital backups to support web-based systems but do not think the impact would be significant. We also considered the possibility of `open data policies' but in the absence of a more specific definition we were unable to identify a meaningful way of costing the potential effect. In any event, it seemed likely that any impact would be concentrated on base expenditure rather than enhancement.
How the strategy would adapt to the scenario	As the sensitivity of the core pathway to the scenario is comparatively limited the strategy would not adapt in any significant way, though there could be multiple small scale adaptations.
Outcomes delivered in this scenario	The outcomes delivered in this scenario are unchanged from those achieved through the core pathway.
Effect on Expenditure Projections (£m, 2022-23 prices)	n/a
How, under this scenario, the strategy is likely to deliver fairness between current and future customers	n/a
Business Plan Tables Reference	LS5.8, LS6.8

Table 53

Scenario 6 - Technology low	
Description	The specification for this scenario follows the definition of `slower technology' set out in the Ofwat guidance. It is defined by the same elements as the `faster technology' scenario described above, save that the dates by which some of the technological milestones are reached are put back by 5, 10, or 15 years.
The sensitivity of the core pathway to the scenario	The core pathway is essentially unaffected, for the same reasons set out in relation to the `technology - high' scenario. For some, there is sensitivity to the scenario in base expenditure, but not the enhancement programmes. For others, the strategy is largely invariant to the technological change for other reasons, and for others still (e.g our net zero strategy) the assumption is over-ridden by a feature of our strategy.

Scenario 6 - Technology low	
How the strategy would adapt to the scenario	As the sensitivity of the core pathway to the scenario is negligible the strategy would not adapt in any significant way.
Outcomes delivered in this scenario	The outcomes delivered in this scenario are unchanged from those achieved through the core pathway.
Effect on Expenditure Projections (£m, 2022-23 prices)	n/a
How, under this scenario, the strategy is likely to deliver fairness between current and future customers	n/a
Business Plan Tables Reference	LS5.7, LS6.7

Table 54

Scenario 7 - Changes to legislation or regulatory policy (company-specific scenario)	
Description	The statutory frameworks within which we operate are constantly evolving. In the last 20 years we have seen multiple changes in laws, regulations, licence/permit conditions, and regulatory guidance. Many of these have had profound implications for the services we deliver. The following 25 years will undoubtedly see further evolution in our legal and regulatory frameworks. Clearly we cannot know what form this will take and what implications it will have, but it is important that we test our strategy against a realistic set of assumptions. Accordingly, we have formulated a scenario that combines potential legal changes that affect both water supply and wastewater, and which are considered highly likely to come into effect during the period covered by the LTDS (albeit that there is uncertainty over the most likely timing and the precise standards that will be adopted). The scenario is defined as follows. We have used the draft EU legislation on the assumption that the Welsh government is likely to want to match best practice on the continent: • two significant changes would be made to **drinking water standards**. A group limit value for **PFAS** would be imposed of 0.5µg/L, in addition to individual limits for 16 individual PFAS of 0.1µg/L each. Also, a **THM** concentration of no more than 50µg/L at the customer tap would become a requirement; and • similarly, two changes would be made to **environmental standards for wastewater**. Tighter limits would be imposed on discharges from wastewater treatment works in respect of nutrients (85% removal or 6mg/l), and phosphorous (90% removal or 0.5mg/l). There would also be limits on microplastics. The new standards would also apply to smaller works than is the case at present. In addition, there would be new restrictions on the spreading of sludge to land. In all four cases we assume the legislative and/or regulatory change would be made during AMP8, for implementation from the start of AMP9 onwards.

Scenario 7 - Changes to legislation or regulatory policy (company-specific scenario)							
The sensitivity of the core pathway to the scenario	For both water and wastewater the core pathway is sensitive to this scenario: • as it stands, drinking water in many of our supply zones would be at risk of failing both the new PFAS and THM standards (although we are undertaking further monitoring to obtain a more accurate picture). This would impact our CRI performance and could attract regulatory enforcement action; • numerous wastewater treatment works would breach their discharge permits under the new requirements, impacting our discharge compliance performance commitment and potentially attracting enforcement action; and • sludge disposal routes on which we rely would no longer be available, necessitating a change in strategy.						
How the strategy would adapt to the scenario	For water, the strategy would adapt to this scenario by programming in a set of targeted investments in specific zones to ensure compliance with the new standards was achieved. Precise scheme selection would vary from zone to zone, and would take into account potential interactions and synergies with other elements of the core pathway. However, in general we expect that the achievement of the new standards would require installation of GAC and resin ion exchange treatment stages at a number of works. This is represented by alternative pathway 1, presented in section 2.4.2 above. For wastewater, the strategy would adapt to this scenario by programming in a set of targeted investments at relevant treatment works to meet the revised standards, and installing low temperature drying at four sites to address the sludge restrictions. This is represented by alternative pathway 2, presented in section 2.4.2. above.						
Outcomes delivered in this scenario	The outcomes delivered in this scenario are unchanged from those achieved through the core pathway. The strategy adapts in order to meet the overall Ambition.						
Effect on Expenditure Projections (£m, 2022-23 prices)		AMP8	AMP9	AMP10	AMP11	AMP12	Total
	Water	-	339	370	-	-	709
	Waste	-	196	179	34	37	446
	Total	-	534	549	34	37	1,154
How, under this scenario, the strategy is likely to deliver fairness between current and future customers	As set out in section 3.3 above, we seek to ensure that the level of bills paid by each generation of customers broadly reflects the service being provided and the benefits being delivered. Fairness between current and future customers would be delivered under this scenario because the profile of bills would adapt in line with the alternative pathways.						

Scenario 7 - Changes to legislation or regulatory policy (company-specific scenario)	
Business Plan Tables Reference	LS5.6, LS6.6

`Team Wales'

The common company vision seeks to establish the water sector in Wales as a model of effective collaboration. The Welsh government is supportive of this approach, and encourages multi-agency 'Team Wales' working between water companies and third parties, including co-funding where appropriate.

We are under no illusions that this will be straightforward: putting in place the conditions to foster more effective collaboration will be hard. We are also conscious that exploring a scenario that potentially generates a lower cost alternative pathway is somewhat contrary to the Ofwat guidance. However, such is the prominence that is given to potential collaboration in both our Vision and the objectives of the Welsh government and other stakeholders we think our LTDS would be incomplete without some consideration of it. We believe that the potential savings for customers and wider society are significant - and therefore worthy of consideration given the scale of additional investment likely to be required to achieve the collaboratively agreed environmental outcomes.

Table 55

Scenario 8 - Full adoption of `Team Wales' collaborative approach	
Description	Under this scenario there would be extensive collaboration with third parties on potential solutions across a wide range of the challenges that we face. The `polluter pays' principle would apply in all relevant situations, and markets would be created to ensure the optimal allocation of rights and responsibilities (e.g. covering surface water volumes, nutrients). Decisions of local authorities and other public bodies would be guided by (and bound by) a full consideration of social and environmental costs and benefits. Opportunities for working in partnership, e.g with landowners and other organisations in water supply catchments, would be exploited in full.
The sensitivity of the core pathway to the scenario	For water supply the core pathway is modestly sensitive to this scenario. The principal area of interest relates to the management of water catchments and safeguard zones, where collaboration and partnerships can have a beneficial effect on raw water quality. This may reduce the need for expensive treatment and improve drinking water quality compliance at the tap. Collaboration can also deliver benefits in the areas of water efficiency and leakage. For wastewater the core pathway is particularly sensitive to this scenario. The full adoption of a `Team Wales' approach would both enable the demands on our wastewater networks to be optimised, and provide a wider range of solutions for addressing harm to rivers from SOs, phosphate and nutrient loads in rivers, pollution incidents, and flooding, in turn delivering lower bills for our customers.
How the strategy would adapt to the scenario	The strategy would adapt in multiple ways, both for water supply and wastewater. At this stage we are not able to quantify with any degree of confidence the effect of full adoption of a `Team Wales' approach in a number of areas, including water catchments, water efficiency, and phosphate/nutrient loads on rivers.

Scenario 8 - Full adoption of `Team Wales' collaborative approach							
	However, through our DWMP modelling we are able to take a reasonable view on the way in which the strategy would adapt to this scenario in respect of SOs, and we have been able to prepare a costed alternative pathway as a result. On the basis of a number of initial broad brush assumptions, we calculate that a material *reduction* in the size of the SO programme would be feasible. This is represented by alternative pathway 4, presented in section 2.4.2 above, and the cost implications are shown below.						
Outcomes delivered in this scenario	The outcomes delivered in this scenario are unchanged from those achieved through the core pathway. The strategy adapts in order to meet the overall Ambition.						
Effect on Expenditure Projections (£m, 2022-23 prices)		AMP8	AMP9	AMP10	AMP11	AMP12	Total
	Water	-	-	-	-	-	-
	Waste	-	-37	-310	-171	-137	-655
	Total	-	-37	-310	-171	-137	-655
How, under this scenario, the strategy is likely to deliver fairness between current and future customers	As set out in section 3.3 above, we seek to ensure that the level of bills paid by each generation of customers broadly reflects the service being provided and the benefits being delivered. Fairness between current and future customers would be delivered under this scenario because the profile of bills would adapt in line with the alternative pathway.						
Business Plan Tables Reference	LS5.10, LS6.10						

3.6 Comparing the LTDS with Previous Long Term Strategies

As we explained in Part One above, our LTDS continues a long tradition of strategic long term planning that goes back to 2001, when we became the wholly-owned subsidiary of Glas Cymru. Whilst each strategy, plan, statement, or vision can be traced back to the previous `strategic event', a process of evolution has taken place as circumstances have changed, new challenges have emerged, and priorities have shifted.

This latest strategic statement can be seen as an evolution of recent strategic events, namely Welsh Water 2050 (2018) and its update (2022), together with the AMP7 Business Plan (April 2019 re-submission) and the 2019 WRMP. We set out below the principal differences between our LTDS and each of these strategic events.

Welsh Water 2050

The LTDS and WW2050 address slightly different questions. The LTDS asks: what is the company's strategic view of its long term ambitions and what is the best strategy to deliver them in a range of plausible future scenarios. WW2050 identified 8 key challenges that we would face in our long term planning, and set out the 18 strategic responses that we would need to pursue to meet them. Nonetheless, they dovetail with one another very closely, and comparisons are valid. The LTDS has obviously been prepared some 5 years after WW2050, and over a year following the WW2050 `review and update'. There are three principal differences, all of which reflect shifts in priority rather than brand new ideas:

- the LTDS places greater emphasis on **SOs** and their effect on river water quality. This reflects increased concern and interest in recent years amongst customers and other stakeholders, which in turn is manifesting itself in the form of hard regulatory requirements;
- similarly, the company now has an explicit target to be **net zero** by a certain date, which is a more specific objective than the corresponding strategic response in WW2050. Again, this reflects the fact that carbon emissions have moved up the public agenda in the last few years and the aspirations expressed previously have now crystallised into firm objectives with timescales and deadlines; and
- the adoption of targets to reduce **leakage** by 50% and **per capita consumption** by 25% by 2050 have elevated what was an important component of WW2050 into a cornerstone of the LTDS.

Long term performance commitments at PR19

At PR19 our business plan included targets for performance commitments to 2045. For most of our LTDS outcomes the 2050 targets are similar to, or consistent with, the PR19 plans. The only exceptions are as follows:

- we now plan to be more ambitious in delivering improvements in acceptability of water. Whereas at PR19 we were proposing to reduce it to 1.0 contacts per 1,000 resident population we are now targeting 0.5 by 2050. Recent research by Ofwat suggests that customers place a high value on improvements in this measure, and from 2025 it will become a common performance commitment for the whole industry, so we are keen to deliver the improvements that will bring us into line with other companies;
- at PR19 we planned to replace over 150,000 lead pipes between 2025 and 2045, whereas we are now targeting 100,000 by 2050. The slower pace of the programme in the LTDS reflects the realisation that many customers' reluctance to consent to replacement of their supply pipes imposes a constraint on the rate at which we can make progress; and
- we are now planning to be much more ambitious on pollution incidents and flooding (both internal and external), in line with the priorities customers have expressed and the strategic steers from the PR24 Forum.

WRMP19

The 2023 draft WRMP incorporates updated information in respect of a number of respects, including more recent climate change forecasts. In addition, it reflects:

- the impact of the **Environment Act 2021**. Although it applies in England rather than Wales, it mandated a number of supply and demand management targets for companies with which we have sought to ensure comparability;

- the greater consensus between regulators and customers on the need for enhanced ambition on **demand management**, which in turn has prompted us to produce our Smart Metering strategy; and
- the move to an increased level of **drought resilience**. We had just started assessing what a 1 in 200 level meant for our water resource capability in the 2019 Plan, and we have now improved our understanding of this with the aim to increase our level of resilience to 1 in 500 by 2040.

3.7 Response to Ofwat Feedback

In January 2023 we presented an early summary of our LTDS to Ofwat, and received written feedback in a letter dated 3rd April 2023. A number of positive comments were made, but Ofwat raised a number of concerns. The four principal ones are listed below, together with how they have been addressed in this final version of our LTDS document.

Table 56

Ofwat Concern	Company Response
We did not see sufficient and convincing evidence that you are developing a core pathway in line with our definition. The core pathway should set out low-regret investments, ie those that can deliver outcomes efficiently under a wide range of plausible scenarios, or need to be undertaken to meet short-term requirements. It should also include investment required to keep future options open or is required to minimise the cost of future options.	Our core pathway has been developed in line with the guidance definition. It only includes no/low-regret investments and those required to meet short-term requirements. We have no discrete large projects where the potential for regret is high: rather, our core pathway comprises modular programmes consisting of small-scale schemes that can be adapted in response to new information and learning.
...you should note it is essential that only plausible scenarios are used to develop the core and alternative pathways. We noted from your presentation that you are considering a number of wider scenarios, including around future legislation and standards, societal attitudes and expectations, and the extent of third-party contribution to joint challenges. Wider scenarios should be measurable factors with clear and observable metrics that can be used to define decision and trigger points.	We have restricted consideration of the scenarios used to develop the core and alternative pathways to plausible scenarios only. See Part Two above. We acknowledge the requirement that wider scenarios should have clear and observable metrics. It could be argued that this does not apply in full in the context of our `Team Wales' scenario. However, as this is an important component of our LTDS, and in time it has the potential to manifest itself in observable metrics, we chose to include it nonetheless.
We saw only limited evidence that you are testing the common reference scenarios for technology in line with our guidance. We expect you to use the technology scenarios to test the sensitivity of options to different futures and justify the optimal timing and sequencing of activities in your strategy.	We looked in considerable detail at the sensitivity of the core pathway to the common reference scenarios for technology, and indeed this was discussed at the Board on more than one occasion. We also looked at th possibility of a bespoke technology scenario. Our findings are presented in section 3.5 above.
We saw only limited evidence that you are considering long-term performance improvements from base expenditure. It is important that you develop your own forecasts of improvements expected from base expenditure	We have given careful thought to the performance that can be achieved over the long term from base expenditure. For some performance commitments we are showing improvements from base (e.g. leakage). For others we think a flat profile is more realistic (e.g. phosphorous reduction). For a small number, where we are faced with an increasingly challenging environment (e.g. flooding), we are projecting a small hypothetical deterioration in performance from base expenditure alone.

4. Part Four - Foundation

Part One described our ambitions for 2050 and how we had arrived at them, drawing on input from customers and other stakeholders. In Part Two we presented our strategy for achieving those ambitions, and how it could adapt to changing circumstances. Part Three explained why our strategy is the best way of achieving our ambitions. In line with the guidance[19] in this Part we present the **foundation** of our LTDS - the assumptions, inputs, and parameters on which the strategy is based. As these change over the coming years, so will the strategy adapt in response, so that we remain on track to deliver our ambitions in the way that best meets our objectives. Our LTDS is not a rigid blueprint for the future: it is an considered and coherent view that will change when the information changes. This section provides insights into the factors that would bring this about.

We provide an overview of the planning assumptions on which our strategy is based (section 4.1 below). These include external parameters, our internal assumptions, and the performance improvement we expect to be able to deliver without incurring enhancement expenditure. This is followed with a recapitulation of the biggest areas of uncertainty that affect our strategy (section 4.2).

4.1 Planning Assumptions

4.1.1 External Parameters

We have prepared and costed the LTDS on the basis of the following general assumptions about the external environment within which we operate:

- the macroeconomic backdrop steadily improves, such that by the beginning of AMP9 UK **GDP growth** reverts to its pre-financial crisis long term trend of more than 2%. This supports a return to a rate of growth of long run **productivity** in comparator sectors of 1% between 2030 and 2050;
- in turn, **household incomes** show modest real growth across the 25-year period, and there is no further widening of income inequalities that could make our affordability challenges even more acute;
- **input prices** beyond the end of AMP8 remain constant in real terms, except where explicit assumptions are made to the contrary (e.g the falling unit cost of low carbon building materials);
- the **cost of finance** remains in line with the assumptions Ofwat has asked us to incorporate in line with its `early view' of the WACC;
- the mix of skills we require from **labour markets** continues to be readily available;
- more broadly, **supply chain capacity** remains adequate to absorb the planned step-up in expenditure in AMP8, and also the further steep increase in AMP9;
- the **preferences of our customers** remain broadly stable;
- **government and regulatory policy** remain unchanged, other than where specifically allowed for in our alternative pathways;
- the strategy is not undermined by significant **external shocks** such as wars, natural disasters or major pandemics;
- **demographic trends** relating to our area are broadly in line with consensus forecasts, including general population growth, occupancy levels and tourism levels; and
- the **condition of the natural environment** will change only in line with the forecasts we have explicitly made (e.g. for climate change and raw water deterioration).

[19] See *PR24 and beyond: Final guidance on long-term delivery strategies* (page 13) which can be found here

In short, we have adopted a set of general assumptions that may be described as fairly `neutral'. However, as a risk management business we are always alert to the fact that they are all subject to potentially significant and sudden deviations, and aim to establish and safeguard our preparedness for all eventualities.

4.1.2 Internal Assumptions

In addition, there are a number of planning assumptions we have made that are internal to the company:

- in addition to the 11% **cost efficiencies** that are built into the near-term AMP8 programmes [20]we have applied a one-off 6.5% across-the-board reduction in all unit costs in the LTDS from the beginning of AMP9. This reflects our view of the additional efficiencies that will become apparent as a result of the extensive investigations, pilot studies, and innovation initiatives we are expecting to carry out in AMP8;
- we have assumed that **asset health** is maintained at the same level from the end of AMP8 onwards, and that the projections of our deterioration modelling are broadly accurate;
- there are no `unknown unknowns' regarding the **resilience** of our systems, assets, and governance: that is to say, that we have a good understanding of the range of threats to resilience, and therefore that the plans we have made will address the priority risks;
- our track record of **innovation** continues to deliver in ways that enhance our ability to deliver our objectives [21]. For example, we have built into our projections for the SO programme an assumption that innovation will enable us progressively to increase the proportion of `green' solutions over the course of the LTDS period, thereby scaling down the use of `grey' solutions; and
- expenditure on **growth** is broadly self-financing as a consequence of Ofwat's future approach to price reviews. As a result, no specific enhancement allowance is required (other than in respect of the impact of general urban creep on surface water drainage, as set out in section 2.4.2 above).

4.1.3 Performance from base

We have given extensive thought to the degree to which our LTDS outcomes can be achieved from base expenditure, without a need for specific enhancement expenditure. We note the expectation in the guidance that companies should be able to deliver *improvements* from base, and in many respects we think this is feasible.

However, we have come to the conclusion that the issue is more complicated than this, and have found that the answer varies from one outcome to another. Also, we know that `base' is fixed as a concept, but not necessarily as a constant level of expenditure (as illustrated, for example, through Ofwat's approach to cost assessment modelling which estimates expenditure as a function of changing cost drivers). In that context, strictly speaking `performance from base' cannot be considered in isolation from issues regarding how `base' evolves over time, notably in relation to `real price effects' and `frontier shift'. Without placing `performance from base' in this wider context there is scope for double-counting or `under-counting' potential improvements.

There are a number of factors that would tend to facilitate improved performance from base expenditure on any particular outcome. These include:

- specific technological improvements beyond those reflected within any downward adjustment to base expenditure associated with `frontier shift';

[20] See ` *WSH50 - Our approach to investment planning*' (link) for full details

[21] See section 4.3 of the business plan(link).

- operational innovations made either by us or elsewhere in the sector, that can be rolled out across our operations without significant cost; and
- the routine replacement of old, potentially less efficient assets (e.g. pumps) with newer versions that are cheaper to run.

There are also a number of factors that would tend to drive deteriorating performance from base on any particular outcome, to the extent not explicitly allowed for in forward-looking base expenditure allowances at price review. The principal two types of influence are as follows:

- incremental tightening of the legal and regulatory standards with which we are expected to comply. These can be requirements specific to our status as a water company, such as tightening of discharge permits or changes in the interpretation of existing obligations by our regulators. But they can also be the effects of general requirements in a multitude of areas, such as traffic management or health and safety; and
- adverse movements in the general environment in which we operate. Climate change is the standout example, not just for its effects in driving the more extreme weather events that have posed particular challenges for our operational performance in recent years, but also in roundabout ways, such as the contribution it is making to the deterioration in raw water quality.

We have considered what the net effect of these conflicting drivers is likely to be going forwards. We have examined historical trends, both for ourselves and for the rest of the sector. We note that some performance improvement over the AMP5/AMP6 periods was achieved from base as performance commitments and ODIs became a central component of the regulatory regime, but that the rate of improvement appears to have tailed off since the beginning of AMP7. It appears that most `easy wins' may already been achieved. This chimes with our own experience on certain performance commitments (e.g. acceptability of water), where we have largely exhausted the available scope for incremental achievements without incurring capital expenditure.

We have concluded that the effect of the opposing influences on performance from base described above can be expected, in broad terms, to cancel one another out going forwards. Accordingly, we have assumed that:

- in general, with certain exceptions (see below) performance from base will remain **constant** over the period to 2050;
- for three performance commitments where we are targeting a `perfect score', we consider that the detrimental influences on performance from base will outweigh the beneficial, so that the net impact on performance from base will be **negative**. The performance commitments in question are: tap water compliance risk index (target zero), discharge permit compliance (100%), and serious pollution incidents (zero). In each case we have analysed the likely effects of the deterioration in operating environment and have identified the enhancement interventions required to maintain `perfect score' performance; and
- for one performance commitment in particular, we are targeting a **positive** trend in performance from base, namely leakage. As set out in section 1.2 above our performance on leakage has not been as good as we would have wished in recent years, and we are working hard to get it back on track. Going forwards, we are cautiously confident that continuous and steady improvement can be achieved, partly through the ongoing effects of the improvements we are making now, and partly as a by-product of other initiatives and programmes, including those targeting improvements in interruptions, lead, and PCC. We are also showing improvements from base expenditure in PCC and some asset health measures early in the period.

4.2 Material Sources of Uncertainty

As set out in Part Three above, the way in which we approach and manage uncertainty is one of the cornerstones of our general high level approach to long term planning, and our methodology for developing the LTDS in particular. We pinpoint below the principal sources of uncertainty around our strategy that will be uppermost in our minds as we go forwards, and explain how we have duly accounted for it.

Societal

We are very conscious that we are leaving behind a comparatively stable period for water and wastewater services and the level of bills faced by customers. Even on a `no/low regrets' basis, our strategy shows a 50% increase in bills over the next two AMP periods, and if anything this is likely to be an under-estimate of the `most likely' pathway (given, for example, that we have adopted Ofwat's `early view' of the WACC, which is increasingly looking like it will be an under-estimate). We know that, when asked, customers and stakeholders express support for our plans and appear to be tolerant of the prospect of rising bills.

However, we know that public perception and attitudes can shift. Once the reality of the higher bills necessary to finance the improvements begins to have an actual rather than a hypothetical impact on customers the future landscape may look different. Resistance and dissatisfaction could prompt suggestions of slowing the pace of improvements, and a re-think on relative priorities. Alternatively, having constrained the pace of improvements precisely because of concerns around affordability (amongst other things) if we find that higher bills are more acceptable than we had anticipated, there could be a case for accelerating certain elements of the strategy in order to bring forward the delivery of the expected benefits.

Of course, we are always obliged to meet our statutory obligations and the requirements of our regulators that follow, so in one sense any shifts in societal influences may not have a direct and immediate impact. However, over the long term the legal and regulatory framework within which we operate will itself evolve in line with societal expectations. The customers that pay the water and wastewater bills are the same people that elect the governments that make the laws and appoint the regulators.

We are satisfied that our strategy is both robust and flexible to these uncertainties. Most of our programmes are modular, and can be `dialled up or down' with minimal scope for regret. We have `inked in' the progress that we plan to make on each of our LTDS outcomes during the AMP8 period, but will be in a position to re-evaluate the balance and shape of our strategy going forwards well in advance of our submission of the PR29 business plan.

Climate change

For over 20 years climate change and the uncertainty it brings has been a feature of price reviews and a consideration for long term planning. It's prominence has steadily grown, such that it is now `front and centre' of this latest 2024 price review. However, despite the huge growth in climate research and the extensive modelling that is available, the future path of global warming is subject to a considerable margin of uncertainty, as are the predictions of the resulting consequences.

We have based our strategy - especially the elements captured by the WRMP and the DWMP - on the latest information available from official sources. There is ample scope for that information to change materially over the next 5-10 years as the latest effects of global warming are measured and the science is refined. This could have profound implications for our strategy, especially in relation to the ability of our existing wastewater networks to cope with extreme rainfall, and the resilience of our water resource position to drought.

Again, however, these are major strategic uncertainties over which we keep an ongoing `watching brief'. We are confident, therefore, that we will continue be in a position to evaluate the potential need for adaptations to our strategy, and in the meantime that we will commit resources only to interventions that will be required under our strategy in all plausible scenarios.

Economic

Planning for the long term means taking a view - implicit or explicit - on what the economic backdrop will be over the course of the period. Since the 2008 financial crisis the UK economy has been sluggish by comparison with the decades that preceded it. Productivity growth has been low or non-existent, and GDP growth has been well below 1% on average, by comparison with 2% or more previously.

There is no shortage of views on what has caused the apparent slowdown in general economic growth, and what could be done about it. From our perspective it matters considerably for our long term plans. If the UK economy growth were to revert to a trend growth rate of 2% per annum it would be 45% bigger by 2050 than it would be if growth were just 0.5% per annum. That has enormous implications for the water and wastewater services that society will want and be able to afford. As set out in 4.1.1 above, we have assumed that 2% real GDP growth will resume from 2030 onwards, but this is highly uncertain, and we will need to adapt our plans if the reality turns out to be different.

Technological

The uneven progress of technological change and the way it is harnessed to deliver particular innovations in our sector is another of the major uncertainties in our strategy. We have anticipated the rollout of specific known technologies in our projections where appropriate (e.g smart metering), as well as innovations (e.g green solutions in our SO programme). What we cannot account for in our strategies, however, is the potential for major and unexpected `disruptive' technologies. For example, a major breakthrough in nuclear fusion that delivers on that technology's potential would fundamentally alter the parameters within which water and wastewater services are delivered.

We have always been receptive to the potential for technological progress and innovation to improve our ability to meet our objectives. In making our assumption of a 1% year-on-year improvement from productivity growth/frontier shift (see section 3.2 above) we have taken what some might consider to be an optimistic stance on the potential for technology to deliver additional benefits during the 25-year period. We have a track record in promoting and participating in innovative developments that can be deployed to this end. In 2022 we refreshed and brought up to date both our Innovation Strategy and its innovation 'Journey Plans' (Innovation Strategy 2022 Final version.pdf). These will continue to be updated and integrated with our strategies as we move forward. In this way we aim to be in a position to adapt our plans quickly and efficiently in response to changes in technology and its potential to facilitate improvements in the services we deliver.

`Unknown unknowns'

Whilst we work hard to explore the potential scope and impact of the `known unknowns' that will impact our strategy, we also have to be alert to the potential for developments that `come from left field', and work to be as ready as we can for any eventuality so that we are best-placed to respond flexibly and efficiently.

5. Part Five - Board Assurance

As set out in section 1.1 above, our Board has maintained a continuous long-term focus since our acquisition by Glas Cymru in 2001. Free from any short-term pressures to please shareholders we have been able to maintain a long term perspective in our strategic thinking throughout.

Nonetheless, the updating of WW2050 in 2022 and the preparation of the long term delivery strategy have provided an opportunity to strengthen further our long term planning framework and to drive change throughout the business so as to embed more firmly a long-term mindset. Board leadership has played the driving role in this process.

The formal assurance of the long term delivery strategy is included within our comprehensive board assurance statement, see `*WSH04-Assurance Statement*' (link). For ease of reference the full text of the relevant extract is replicated below.

4. Long Term Delivery Strategy

Ofwat assurance requirement

That 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.*

That the board has challenged and satisfied itself that the 2025-30 business plan implements the first five years of the long-term delivery strategy.

The board should provide evidence of where it has challenged company management and an explanation of the process it has used to arrive at the view that its strategy is the best it can be.

We set out our response to each of these requirements in turn:

Reflects a long-term vision and ambition that is shared by the board and company management

Our long term strategy is set out in our Welsh Water 2050 document. We first published Welsh Water 2050 in 2018. This has been updated and was reissued in March 2022.

This document outlines our view of the long term trends and risks that we anticipate will impact our business in the long term, and the 18 strategic responses we have identified to mitigate those risks.

In addition, for PR24 we have produced a separate Long Term Delivery Strategy document, in accordance with the requirements for PR24.

The Board has been involved in setting the long term strategy for the company throughout the PR24 planning period. This included:

- · Discussion of long-term context as part of strategy sessions in Nov '21 & Nov '22, and receiving a presentation from the CEO of the Royal Meteorological Society, Liz Bentley, in September 2020
- · Review of the overview of our approach to the LTDS in November 2021
- · Presentation of draft LTDS conclusions at March '23 Board meeting
- · Approval of LTDS document outline and Exec Summary at May '23 Board meeting
- · Approval of the final LTDS at September '23 Board meeting.

Is high quality, and represents the best possible strategy to efficiently deliver its stated long-term objectives, given future uncertainties

The Board is confident that the strategy is of high quality, having been closely involved in setting all aspects of the long-term strategy reviewing and challenging proposals from relevant experts within the business, supported where appropriate by external consultants. The Board is very experienced in providing oversight and direction for long term strategies. Welsh Water 2050, the company's own long-term strategy, originally published in 2015 was updated at the start of the PR24 process to provide a benchmark for the PR24 long term delivery strategy.

The options, sequencing and profile of the LTDS, as set out in the 'Rationale' section of the document, demonstrate the approach taken to ensuring the LTDS represents the best possible strategy.

The key consideration for the Board has been getting the right balance between investment to protect the environment, improved service and greater operational resilience to climate change, and affordability of bills for customers, the deliverability of larger investment programmes and the financial resilience of the company. The Board has reviewed these important criteria on several occasions over the past two years, as detailed in Appendix 1. We recognise that the future is characterised by significant uncertainty,

so we are only committing in the near term to the things we have to do in all plausible scenarios and we are putting significant resources into investigations and research to ensure that we make the best-informed decisions in the next phase of the strategy.

Will enable the company to meet its statutory and licence obligations, now and in the future

The Board has considered long-term targets for performance commitments and associated investment and bill impacts, including those which are expected to be required in order to continue to meet statutory and licence obligations, and customer expectations.

Is based on adaptive planning principles

The LTDS has been produced in accordance with adaptive planning principles that will allow for variations in the pace of delivery if necessary.

Has been informed by customer engagement

The LTDS reflects the outcome of the company's programme of customer engagement, the Board's role in the oversight of this is set out in section eight of this statement.

The LTDS targets for 2050 for water supply interruptions, acceptability of water, pollution incidents and internal sewer flooding were adjusted at the March 2023 Board meeting, in response to customer views that we should be more ambitious in our targets for those measures.

The phase 2 research found that customers would generally prefer that bills increase gradually over time rather than they be higher in the shorter term and lower in the longer term or vice versa, given the need for higher investment in the future. The bill profile over the 25-year period broadly reflects this finding.

Has taken steps to secure long-term affordability and fairness between current and future customers

The Board has reviewed the bill impacts arising from the LTDS, and considers that the profile provides an appropriate balance between current and future customers. In particular, use of the "natural" Pay As You Go rate supports inter-generational fairness of bill impacts.

The Board has considered the overall strategy for the period to 2050, and considers that the level of investment proposed for the AMP8 period to 2030 provides an appropriate balance between current and future bill payers.

The Board considered the overall level of bill increase required through the LTDS, and the extent to which that is affordable to customers. The Board also considered the appropriate phasing of investment, so as to avoid disproportionate bill impacts in particular AMPs.

The increase in investment during the AMP8 period compared to the current AMP7 period is mostly attributable to enhancement expenditure rather than base expenditure (which, due to efficiency, falls in real terms in AMP8). Enhancement expenditure is not recovered from bill payers when it is spent, instead it is recovered over a longer period and spread between current and future generations of bill payers. On that basis, the Board considers that the level of investment proposed for AMP8 provides an appropriate balance between current and future bill payers.

That the board has challenged and satisfied itself that the 2025-30 business plan implements the first five years of the long-term delivery strategy.

The Board confirms that the 2025-30 plan will implement the first five years of the long-term delivery strategy.

The first indicative AMP8 investment plan prepared by the company's asset planning function identified capital expenditure of some £5 billion. Management supported by the Board has over the past two years revised the investment programme downwards to the proposed £3 billion by deferring to later AMP periods, that which could be deferred, and ensuring that expenditure included in any one AMP period is on a 'no regrets' basis.

The Board has also used the company's long-term plan, Welsh Water 2050 as a benchmark for challenging the LTDS and the 2025-30 business plan.

The board should provide evidence of where it has challenged company management and an explanation of the process it has used to arrive at the view that its strategy is the best it can be

The LTDS has been discussed at Board at eight separate meetings through the period of development of the PR24 plan, systematically working downwards from high level outcomes to specific issues. Examples of challenges made to company management include:

- The appropriateness of the climate change scenario included in the core pathway.
- The inclusion of alternative pathways for example:
  - Tightening of drinking water standards primarily around PFAS and disinfection by-products;
  - Tightening of wastewater standards including spreading of sludge to land;
  - More adverse climate change induced rainfall events resulting in more sewer flooding and increased CSO spills.
- The removal of new Hydrogen manufacturing driving a need for new raw water sources as an alternative pathway, as it was considered developments in this area would be self-financing.
- Increasing the ambition of delivering Storm Overflow "No Harm" earlier.
- The long-term performance improvements deliverable from base expenditure.
- The adequacy of investment to deliver net zero carbon ambitions.

Appendix - PR24 Forum Strategic Steers

This Appendix reproduces in full the final version of the `PR24 Forum Strategic Steers', issued on 18th September 2023 by the Welsh Government

PR24 FORUM STRATEGIC STEERS – Dŵr Cymru Welsh Water

CONTEXT

This is a communique under Water Price Review 24 Forum (PR24 Forum) – Terms of reference May 2022 Terms of Reference – PR24 (ccw.org.uk). Water companies are expected to consider Communiques in the development of their Long-Term Delivery Strategies and Business Plans. The companies will be responsible for developing their Long-Term Delivery Strategies and five-year Business Plans and capturing the steers received from customers and the Wales PR24 Forum, and effectively translating these high-level priorities into actionable and measurable plans.

Where those plans materially deviate from positions expressed in Communiques, the relevant water company commits to provide a written explanation to the Forum explaining the reason for that deviation. Ofwat is also expected to consider and take into account Communiques as part of the price review process. Ofwat commits to explain how it has taken the communiques of the Forum into account when publishing its decision.

The Price Review Forum (PR24 Forum) aims to deliver a collaborative approach among government, regulators, water companies and wider stakeholders in Wales to provide strategic steers that will guide and inform the development of water companies' Long-Term Delivery Strategies and Business Plans and provide views on the priorities for the sector in Wales.

The PR24 Forum has focussed on the priorities and themes set out in the Welsh Government's Strategic Priorities Statement to Ofwat. Forum members have provided challenge, views and feedback to the water companies as they develop business plans and Long-Term Delivery Strategies.

An extensive programme of investment by the water companies is required over the next 25 years and beyond. The PR24 Forum recognises that trade-offs are necessary between investment and affordability. To do this effectively investment and activities must be phased over the short, medium, and long term, and kept under review to ensure business plans deliver in a way which achieves pace and scale of investment whilst being affordable, deliverable, and financeable.

STRUCTURE OF THE STEERS AND EXPECTATIONS

As set out in the PR24 Forum terms of reference, Welsh stakeholders will have scope to help shape the companies' Long-Term Delivery Strategies and – consequently – their five-year business plans. This is why, in 'Creating tomorrow, together', Ofwat suggested there may be scope to implement a collaborative approach. This would allow early engagement on the high-level outcomes, capture the priorities of the companies' stakeholders and customers, and feed these into their business plan development processes. It would also provide a forum where customer views that have been captured, through company-level customer research and engagement, could be discussed and incorporated into these high-level outcomes.

This document sets out the output of the work of the Wales PR24 Forum and is structured as follows:

1. Steers from Welsh Ministers in respect of water company investment for PR24 and beyond
2. Joint vision

3. Strategic priorities
4. The PR24 Forum high level priorities
5. Strategic steers from the PR24 Forum
6. Company specific steers from the PR24 Forum

STEERS FROM WELSH MINISTERS IN RESPECT OF WATER COMPANY INVESTMENT IN WALES 2025-2030 AND BEYOND

Given the increased focus on water quality and water company performance, Welsh Ministers:

Recognise the contribution water companies make to Wales's economy, both nationally and locally, noting that, aside from the large investment, the water companies are large employers.

Recognise the scale of the challenge facing the water sector, the array of issues with which the water industry is contending and the need for increased investment which would need to be sustained over the long-term. Ministers acknowledge the likely scale of investment needed to deliver the National Environment Programme and want to see investment prioritised based on delivering the maximum improvement to the environment in terms of reducing harm taking account of customer and stakeholder expectations around harm and impact, delivering best value for customers.

Acknowledge, with some disappointment, the anticipated customer bill increases arising from increased investment with some concern on the impact this might have on households already facing a cost-of-living crisis. Ministers emphasise the need to sustain and, where possible, enhance effective social tariff schemes to support those customers struggling to pay their bills. These arrangements should be coordinated with other utility providers and relevant authorities wherever possible to optimise benefit and help target support quickly to those who need it most.

Note that water company delivery on the ground should take account of long-term goals, community and economic needs, including the need to decarbonise and to meet statutory requirements.

Note that, in terms of the current water sector model, and the associated regulatory framework, the balance needs to be better struck to meet the current and future needs of customers and the environment jointly.

Want to ensure every penny of investment delivers for customers, communities, and the environment whilst avoiding creating or exacerbating inequality; and keen to maximise investment/funding and encourage organisations to work together better.

JOINT VISION

The water companies developed the following joint vision for the water sector in Wales which was discussed and endorsed by Forum Members:

We will establish the water sector in Wales as a model of **effective collaboration** for delivering **excellent performance** against the backdrop of the climate and nature emergencies.

We will work with communities, stakeholders and regulators to **co-create and deliver solutions in the most efficient way over the long-term** having taken full account of the needs of our customers, the environment and society. We will seek to reflect the diversity of the people we serve in our workforce.

We will both engage and inform customers, helping them to play their part in addressing future challenges. We will always be responsive to their changing needs and expectations, paying particular attention to customers in vulnerable circumstances.

We will deliver **excellent drinking water quality**, working in catchments to protect raw water quality. We will **upgrade our network** to ensure it is fit for the future and resilient to current and future threats.

We will support a **thriving environment**in our rivers and seas by effectively managing and treating wastewater, upgrading treatment and network capacity where required and dealing with changing rainfall patterns. We will achieve net zero carbon emissions and seek to go further.

We will harness **innovation** and adapt to the world as it changes, while keeping bills as affordable as possible. We will provide a world-class, resilient, and sustainable water service for future generations.

WELSH GOVERNMENT STRATEGIC PRIORITIES

The Strategic Priorities Statement to Ofwat, Programme for Government and the themes for the long-term vision for water in Wales in the Water Strategy for Wales set out the high-level Strategic Priorities which have shaped discussions.

Water for nature, people and business – We want to ensure the people of Wales and our future generations continue to benefit from our natural resources. We must evolve and constantly challenge ourselves to find new ways for Wales to grow sustainably, increase resilience and manage our natural resources efficiently.

Improving the way we plan and manage our water services- The importance of balancing short-term needs with the necessity to safeguard the ability to also meet long-term needs is a key sustainable development principle and particularly in relation to managing our water environment.

Delivering excellent service to customers - Ensuring access to fair and affordable water and sewerage services, both for people and businesses, is a key priority for the Welsh Government. In particular, we are concerned about the level of water charges and the impact of increases on those customers who are least able to pay.

Protecting and improving drinking water quality - the supply of potable water to our homes, businesses and industry is a vital service, supporting economic activity and protecting public health and the environment. We will act to maintain the current high standard of our public drinking water quality. Water companies must maintain and build on good practice and where required, make improvements to ensure we have clean, wholesome, safe and reliable drinking water quality.

21st century drainage and sewerage systems- Drainage and sewerage systems in Wales are a critical but often overlooked asset. We want sewerage and drainage infrastructure for both wastewater and surface water to be well managed and maintained in an integrated way, with sufficient capacity to manage the demand placed on it and without causing pollution or sewer flooding of people's homes. Deteriorating performance of sewerage assets poses a significant risk to water quality and we want to see a structured approach to the planning and maintenance of the sewerage and drainage network.

Supporting delivery - The role of the regulators in encouraging and incentivising water companies to deliver for their customers and the sustainable management of our natural resources is central to our vision for water in Wales. We expect our regulators to work proactively and constructively with each other and with other key partners to ensure effective decision making, joined up regulatory approaches, to reduce regulatory burdens where appropriate and to hold companies to account, utilising all enforcement tools as necessary.

PR24 FORUM HIGH LEVEL PRIORITIES

The greatest business planning challenge is the trade-off between maintaining affordable bills and a deliverable and financeable plan whilst also delivering much needed investment to meet current environmental standards, future environmental need linked to climate change, and build resilient water and wastewater infrastructure that will effectively support current and future generations of Wales. The investment from PR24 must improve our environment, our economy, our communities

for the people and our planet, now, and for the future. The Welsh Government ambition is to build a fairer, greener and stronger and ever more successful Wales where no one is left behind and no one will be held back.

The following sets out priorities identified and informed by discussion at the PR24 Forum which have taken place over the last year or so. They are also informed by various PR24 documents from the organisations represented.

Climate and Nature Emergencies

Climate change is an urgent global issue requiring universal action. The Climate Change Committee (CCC) has advised that this decade must be a decade of action in Wales. The PR24 cycle is a vital timeline to achieve this as it delivers water companies' investment from 2025-2030. It is also the first price review since the Senedd introduced the net zero by 2050 target into legislation. The Welsh Government Biodiversity Deep Dive identified actions to protect and effectively manage at least 30% of our land, freshwater and sea for nature by 2030. This reinforces the need to take ambitious and integrated action to put nature on the path to recovery and reverse biodiversity decline. Given that climate change and biodiversity loss are two sides of the same coin; we cannot tackle one without also addressing the other.

The viewpoints provided by PR24 Forum members make clear that when planning for how to reach our net zero targets, water companies should consider two shifting contexts: environmental conditions and finance / affordability. First, climate change is impacting catchment and source water composition and sufficiency. For example, the Drinking Water Inspectorate (DWI) highlights the degrading of the chemical and biological composition of the catchment and source water which can impact the ability of treatment works in Wales to supply wholesome water. Second, Natural Resources Wales (NRW) has worked with companies to identify an evidence-based list of statutory obligations and national priorities. NRW is concerned that water companies may be unable to fully fund statutory obligations required for legal compliance as identified in the National Environment Programme (NEP) while maintaining affordable bills for customers and ability to deliver the programme. This risks environmental harm from water companies' operations and raises questions of how to balance affordability and urgency. Difficult choices are required about the prioritisation of essential work under the NEP to maintain delivery for nature and the climate. We expect business plans to prioritise in line with company specific steers.

The role of nature-based (NBS) and catchment-based solutions (CBS) has emerged as a critical avenue to address both climate and nature emergencies, whilst still delivering for customers. A step-change is needed to allow the move to more sustainable solutions whilst ensuring the required level of environmental protection is secured. Ofwat highlights that they are putting plans in place to facilitate this step-change for nature-based solutions (NBS) in particular (see *Appendix 9: Expenditure Allowances* of Ofwat's final methodology).

Environment

Our water sector and the ecosystem services they rely on must deliver for both people and nature. Issues of pollution, storm overflows, phosphates, temperature increases, and flow reductions are placing significant pressures on the water environment. The state of water quality is receiving intense media scrutiny.

Rapid progress is required to ensure resilient drainage systems which protect the environment and support people and the economy of Wales. The companies Drainage and Wastewater Management Plans (DWMPs) evidence must be used to strategically assess and address these issues in conjunction with work already done (and other statutory plans) to assess high spilling assets. Companies need to act now, ahead of and during PR24 to set out and deliver a clear prioritised pathway to a sustainable and resilient drainage and sewerage network.

Resilience

The threats facing the water sector are complex and constantly evolving. In the PR24 cycle, water and wastewater services will need to be ready to grapple with a complex set of existing and emerging risks. The PR24 Forum members highlighted the risk of more extreme weather changes relating to frequency and intensity of flooding, prolonged dry weather and freeze/thaw incidents, plus cyber security, reservoir safety, energy and chemical resilience as key risks for PR24.

To build resilience most effectively, a collaborative and agile approach is essential. Ofwat also suggest that water companies' five-year plans should include scheduled decisions on certain issues where certainty is likely to increase between now and PR29. Water Resources Management Plans (WRMPs) and DWMPs have resilience at their core, so there is an opportunity to use these planes to deliver efficiently.

Consumer Council for Water CW highlighted the current context of the cost-of-living crisis and affordability considerations for customers. The consumer representative highlighted importance of comprehensive assistance and adapting the provision of help to short term and long-term challenge to ensure climate change resilience in the long run. This was echoed by the companies. Building resilience will need to be done with these factors in mind, to achieve the most cost-effective and cost-efficient approach.

Customers expect reliable water and wastewater services now and in the future. Expectations need to be managed to ensure that the resources these services rely on are not used unsustainably.

Asset health

Effective management and maintenance of companies' assets is a crucial element of achieving resilience in the water and wastewater sector in Wales and to prevent increased risk to the environment due to asset failure. This is particularly important given the population growth and ageing infrastructure combined with more extreme weather. Ofwat's final methodology emphasises the importance of forward-looking asset management, with a greater focus on asset stewardship for the long term. This includes forward planning for obsolescence of assets and necessary asset upgrades under the Security and Emergency Measures Direction 2022.

The DWI highlights a need for investment in source to tap planning as a result of assets and ageing infrastructure that are no longer able to cope or effectively cater to changes in our environment, demographic and customer expectations. Additionally, reducing discolouration of water is likely to be a prominent asset health investment cost, which remains the most common reason for customers contacting companies with water quality concerns.

The impact of asset health on the environment and services for customers may only become apparent in the longer term. Companies should provide assurance on how they are assessing and managing risks associated to their assets, from network to natural assets (such as the catchments that support raw water supply). Companies should demonstrate a clear understanding of the health of their existing assets including interdependencies, trends in the long-term, and how this impacts levels of overall resilience. This should be costed with an indication of future investment pressures._

Customers and communities

A key priority raised by PR24 Forum members is achieving a balance of long-term, investment requirements with customer affordability. The cost-of-living crisis is leading to an increase in the number of customers struggling to pay their water bills and the number of customers eligible for financial support. At the same time, there is an increasing number of customers who are struggling but currently do not qualify for financial support by way of a discounted bill. To support customer affordability, CCW proposes an option to establish a single water affordability scheme across England and Wales. This would ensure a consistent approach whereby costs are shared between contributing customers across England and Wales.

The scale of investment needed for PR24 is one not seen since privatisation, with water companies assessing that, given the nature and extent of demands, the required investment needed is many times higher than in previous price reviews. It is therefore imperative that water companies prioritise and phase investment to ensure bills can be maintained at an affordable level while also enabling them to finance and sustain their operations and meet their environmental obligations. Recognising the investment required, it is also vital that companies can sustain social tariff support to protect financially vulnerable customers from bill rises.

The PR24 Forum also emphasised the need for collaboration and customer engagement throughout the PR24 process to promote transparency and build public trust. For example, it is the priority of the independent customer challenge groups to ensure that a collaborative approach is adopted whereby customers are engaged and their feedback is incorporated into water company business plans. The need for a collaborative and transparent approach is also reflected in Ofwat's final methodology for PR24 which requires water companies to hold two 'your water, your say' meetings, which provide an opportunity for customers, and for community and wider stakeholders to challenge companies on their plans directly in an open forum._

The Well-being of Future Generations (Wales) Act 2015

The Well-being of Future Generations (Wales) Act 2015 is a central pillar of the policy landscape in Wales. The Act requires bodies in Wales to think about their long-term impact of their decisions, to work better with people, communities, and each other to protect the environment and future generations in Wales. The Welsh Government expects the PR24 process to reflect the goals and ways of working set out in the Act, and that water companies adhere to the Act.

NRW highlights the imperative to act now in the face of the climate and nature emergencies. While it is recognised that bill increases to address these challenges may not be welcomed by customers, it is imperative that water companies address current challenges effectively to avoid significant financial and environmental burdens being placed on future generations. Significant investment is required now to meet net zero targets, improve reservoir and dam safety, tackle storm overflows and improve wastewater treatment works and to adopt the learning from recent droughts, storms and freeze/thaw events.

The DCWW independent customer challenge group also emphasised the need for a Wales-specific narrative to ensure that the interests of Wales are being accurately reflected and incorporated throughout the PR24 process.

PR24 FORUM STRATEGIC LEVEL STEERS

The PR24 Forum sets out the following strategic steers:

Climate, nature and environment

- We expect companies to comply with their legal obligations to achieve compliance., guided by company specific steers. Companies should, when supported by customers/stakeholders and where it represents good value for money, exceed these legislative requirements and deliver wider environmental and social benefits while carrying out their functions.
- We expect companies to explore and maximise collaboration and co-funding opportunities with other sectors, for example closer partnerships with local authorities on flood and coastal erosion risk management programme (FCERM), to better align investment and collective ambition on surface water management, network capacity, addressing storm overflows and improving asset health.
- We expect companies to accelerate innovation opportunities to deliver more, quicker, and in a cost-efficient manner.

- We expect companies to seek out opportunities for efficiencies and synergies in solutions to deliver across multiple areas including improved outcomes for consumers, reducing drinking water quality risk and benefits to the environment.
- We expect companies to deliver at scale and pace to address the climate and nature emergencies during PR24, prioritising action based on delivering the maximum improvement to the environment in terms of reducing harm.
- We expect companies to have a clear roadmap for delivery for investment proposals which go beyond PR24.
- We expect business plans to be evidence based, but pursuit of perfect evidence must not prevent action now. (Ofwat's final methodology for PR24 sets out expectations on evidence for PR24 business plans.)
- We expect companies to investigate the impact of their assets and where further evidence is required, to act, in time to inform planning for PR29.
- We expect companies to take advantage of alternative approaches, innovation and collaborative partnerships to actively identify opportunities to accelerate investment before and during AMP8.
- We expect companies to address problems at source; prioritise their effort on the greatest environmental impact and prioritise nature-based solutions, while recognising that some outcomes may take longer to deliver than traditional solutions.

Resilience

- We expect companies to demonstrate how their business plans take account of learnings from weather events, cyber threats, and supply chain challenges, in particular how they have adapted their approach to mitigate against future events.
- We expect companies to prepare business plans which demonstrate the current and future resilience of water and wastewater services is understood and managed through a robust, adaptive, and evidence-based approach.
- We expect companies to enhance the resilience of their assets and operations to flood and coastal risk and to meet the requirements of their role as a Risk Management Authority (RMA) under the Flood and Water Management Act 2010.
- We expect companies to meet obligations under the relevant regulations and legal obligations, including SEMD, Critical National Infrastructure and cybersecurity.
- We expect companies to invest in their water supply infrastructure in particular reservoirs in response to the Balmforth Review.

Asset Health

- We expect companies to improve their asset health to address the risks to drinking water quality and compliance.
- We expect companies to improve their asset health to ensure assets do not pose a risk to the environment.
- We expect companies to improve their asset health to support planned and future growth.
- Companies should provide the PR24 forum members with their assessment of where replacement rather than maintenance provides the best value for customers in the short, medium and long term.

Customers and communities

- We expect companies to demonstrate how their plans have changed in response to customer, stakeholder and PR24 Forum feedback and what elements of concerns will remain unaddressed.
- We expect companies to work with CCW and the sector to support and demonstrate coordinated action on comprehensive and effective affordability support measures, which address a wide range of customer needs and circumstances now and in the future.

COMPANY SPECIFIC STEERS - Dŵr Cymru Welsh Water (DCWW)

Bills and affordability

- We expect DCWW to continue to offer flexible payment arrangements and other mechanisms to help customers to pay their water bill and avoid falling into debt.
- We expect DCWW to indicate how a range of financial assistance options have been considered and how they have worked with the sector and CCW.
- We expect DCWW to remain flexible and open to adapting to new approaches and challenges.
- We expect DCWW to support ongoing effective promotion of assistance to customers now and in the future. In doing so companies should have regard to the recommendations of the CCW independent review of water affordability, additional emerging water assistance proposals and ongoing good practice highlighted by CCW.
- We expect DCWW to maintain and increase where possible the level of affordability support provided through social tariffs.

Climate, nature and environment

- We expect DCWW to prioritise environmental interventions that provide the maximum environmental benefit, in accordance with the approach agreed in the Better River Water Quality Taskforce and the First Ministers' River Pollution Summits.
- We expect DCWW to reduce its discharges from wastewater treatment works in Special Areas of Conservation (SAC) sensitive areas to the levels deemed consistent with healthy river water quality, alongside other contributors on an agreed 'fair share' basis.
- We expect the company to achieve 90% of the phosphorus reduction required on a 'fair share' basis by 2030, and 100% by 2032.
- We expect the company to pursue the adoption of nature-based solutions and partnership working. The company should also seek innovative solutions and identify and implement (where appropriate) alternative ways of managing nutrients.
- We expect DCWW to deliver improvements where identified as contributing to reasons for not achieving good ecological status (RNAGs) – following the prioritisation approach to address environmental harm.
- We expect DCWW to reduce the use of Storm Overflows (SOs) prioritised on the basis of delivering the maximum improvement to the environment in terms of reducing harm. This also applies to currently unpermitted SOs.
- We expect DCWW to work together with NRW to implement an approach to permitting all SOs by 2030 with completed ecological assessments and a plan for reducing ecological harm in line with the wider investment approach.
- We expect DCWW's performance on SOs to be monitored and incentivised based on reducing ecological harm and not on average spill numbers. Reductions in the numbers of spills are welcome but are not in themselves the priority for action, which should be focused on identifying and addressing SOs causing the greatest impact on the environment.
- We recognise the significant investment estimated to be required to address the problem of SOs causing ecological harm and recognise the need to take a phased approach in order to manage the impact on customer bills, financing and deliverability.

- We expect all DCWW assets to be classified against criteria set out in NRW's Storm Overflow classification guidance by 2030.
- We expect DCWW to invest to increase the proportion of SOs causing no harm (or 'very low' harm) to the environment to 100% by 2040 at the latest including all currently unpermitted SOs. We expect the company to achieve 60% by 2030, and 80% by 2035.
- We expect DCWW to work with local authorities to maximise opportunities from the flood risk management programme where projects can directly or indirectly support the SO programme. We expect the company to be an exemplar on surface water management in Wales.
- We expect DCWW to enhance monitoring, in line with commitments from the Better River Quality Taskforce, supporting development of future AMPs and the long-term goal of smart networks making best use of technology and real time control.
- We expect DCWW to seek a more stretching target for pollution incidents and do not want to see the biggest water company in Wales falling behind the rest of the industry. Forum members have concerns over declining performance and DCWW ambition to reduce pollution incidents over PR24.
- We expect pollution reduction to be firmly embedded in the values and operational practice of the company.
- We expect the company to target:
  - A 4-star EPA assessment
  - Zero category 1 and 2 pollution incidents
  - A reduction in category 3 pollution incidents
  - 100% compliance on wastewater treatment works discharge permits and abstraction licences.
- We recognise the overall excellent quality of bathing waters in Wales and do not wish to see any deterioration.
- We expect DCWW to operate and maintain their infrastructure to help ensure the current overall level of bathing water quality in Wales is sustained over the long-term.
- We expect DCWW to develop evidence to ensure investments are targeted to meet new bathing water designations and to address risks to deterioration of assets; to work in partnerships to achieve good/excellent water quality; to always consider and prioritise catchment based and nature-based solutions where appropriate.

Customer service and customer satisfaction

- We expect DCWW to improve its performance on key service measures in the short-term where it is performing poorly on a comparative basis.
- We expect DCWW to make significant improvements to performance levels between now and 2050, phased across AMPs to minimise impact on customer bills to achieve:
  - Water supply interruptions: 2 minutes
  - Internal sewer flooding: 120 events
  - External sewer flooding: 1300 events
- We expect DCWW to increase resilience to extreme weather that may affect short-term performance against these measures.
- We expect DCWW to target a top-3 position in the industry on overall customer satisfaction (C-Mex).
- We expect DCWW to target a top-3 position in the industry on developer customer service rankings table (D-Mex).

Drinking water quality

- We expect DCWW to improve its performance on CRI to bring it back to at least the average of other water companies by 2025 and maintain this over the long-term, while seeking to make further improvements. The Forum is disappointed with DCWW performance on the DWI's Compliance Risk Index (CRI) measure.
- We expect DCWW to improve its performance on discolouration, taste and odour contacts. It should target an improvement to 1.0 customer contacts per 1,000 by 2030, and a further 50% improvement to 0.5 by 2050, spread evenly across AMP periods.
- We expect DCWW to work towards a 'lead free Wales'. DCWW should aim to replace an additional 10,000 lead pipes by 2030, and 100,000 by 2050, investing evenly over the AMP periods to manage deliverability and maximise opportunities for innovation and efficiency to accelerate the programme where possible.
- We expect DCWW to revisit its ambition as more information becomes available on the most effective strategies for securing customer approval, and on how to maximise cost efficiency.
- We expect DCWW to work with partners such as local authorities and social housing providers on retrofitting programmes.

Water Resources and demand

- We expect DCWW to move all water supply zones to a 1 in 500-year level of resilience to drought.
- We expect DCWW plan for investment for water resources, and drought resilience at PR24 should be consistent with its final Water Resources Management Plan.
- We expect DCWW to demonstrate how it has learned from the experiences of prolonged dry weather, peak demand, heatwaves, and droughts of 2018, 2020 and 2022.
- We expect DCWW to reduce leakage by 15% by 2025, a further 10% during PR24 and by 50% by 2050 (against a 2017/18 baseline).
- We expect DCWW to encourage customers to reduce consumption, to achieve a 6% reduction during PR24 and to 110 litres per capita consumption by 2050 and set out a comprehensive water efficiency plan to meet these targets.
- We expect DCWW to collaboratively lead on behaviour change campaigns on respecting water resources especially during periods of prolonged dry weather and the recovery from such periods.
- We expect DCWW to encourage non-household customers to reduce their usage, recognising the wide variety of types and sizes of business customer. The target should be set in accordance with the WRMP, making an appropriate assumption about background increase in demand from economic growth, and adjusting for new large industrial water users.
- We expect DCWW to seek further reductions in leakage where possible as tackling leakage is a priority for customers.

Reservoir Safety

- We expect DCWW to continue with its multi-AMP programme of upgrading reservoirs to meet new regulatory standards and adapt to climate change, in accordance with risks identified in the rolling programme of Section 10 inspections.
- We expect DCWW to ensure that any dams identified and classified as 'high-risk' are prioritised for safety and resilience improvements to address this as an immediate priority.

- We expect DCWW to strengthen resilience to low likelihood and high impact events, particularly against the background of climate change and the resulting more frequent extreme weather.
- We expect DCWW to develop an integrated and quantified approach to their risk and resilience assessment ahead of PR29 to assist with the prioritisation of further necessary investment over the long-term.

Biodiversity

- We expect DCWW to be ambitious in its proposals to improve biodiversity given its extensive landholdings and the nature of the business. It is in a position to make a significant contribution to achieving national targets set by NRW.
- We expect DCWW to support national targets for at least 30% improvement of protected sites and habitats by 2030, 30% improvement of condition of SSSI, SAC and RAMSAR sites, and 10% improvement of woodland from unfavourable to favourable condition by 2030.

Greenhouse gas emissions

- We expect DCWW to reduce total greenhouse gas emissions (operational and embedded) emissions by 90% by 2030 (against a 2010 baseline), and to zero by 2040.

Dŵr Cymru
Welsh Water

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