

# Revised Draft Water Resources Management Plan 2024 – Executive Summary

June 2023



## Executive Summary (The Executive Summary has been updated in line with amendments made to the Plan between draft and revised draft Plans)

### A. Introduction

#### i. Our Vision

Dŵr Cymru Welsh Water provides an essential public service to over three million people across most of Wales, and adjoining parts of England. We are the sixth largest of the ten regulated water and sewerage companies in England and Wales and are unique in that we are a not-for-profit business with no shareholders. This means we are guided solely by what is in the best long-term interests of our customers and the environment.

We have recently updated our Welsh Water 2050 vision document with a mission statement 'to become a truly world class, resilient and sustainable water service for the benefit of future generations'. The strategy describes our commitment to plan for the long-term, anticipating and responding proactively to the emerging risks and opportunities around our ability to deliver great service to customers and the environment, now or in the foreseeable future.

The service Welsh Water provides is essential to the health of people and the environment, and the normal functioning of everyday life. The Covid-19 pandemic has highlighted what we stand to lose when the services we often take for granted are disrupted by circumstances beyond our control. It is therefore essential that we do all we can to understand the risks to our service, mitigate them, and ensure that they remain at an acceptable level.

We are committed to working closely and collaboratively with the Welsh Government, our regulators, and other stakeholders as 'Team Wales', all in the context of the Wellbeing of Future Generations Act. We have a clear vision in Welsh Water, which is to earn the trust of our customers every day. This will not be achieved by great customer service alone but by also understanding our customers' needs and expectations and building future plans to meet these.

The basis for planning water resources is laid out in specific Welsh Government Guiding Principles and joint regulatory guidance. These documents are built upon and are directly linked to Government and regulatory authority legislation and policy.

The Environment (Wales) Act 2016 and the Well-being of Future Generations (Wales) Act 2015 work together to create modern legislation for managing Wales' natural resources and improving its social, economic, environmental, and cultural well-being. Together with the Planning (Wales) Act 2015, they form part of a wider initiative to create a legislative framework for sustainable development to secure the long-term well-being of Wales.

#### ii. The Water Supply to our Customers

Over the last 25 years, the quantity of water we supply to our customers has reduced from an average of over 1000 million litres per day (MI/d) to about 850MI/d today. This is down to reduced leakage and reduced demand from heavy industry and our customers increasing appreciation of the value of their water supply and subsequent reduction in their usage. Around 80% of this demand for water is from the major cities and towns of south Wales around Cardiff, Swansea, Newport, Bridgend, Carmarthen, and the surrounding Valleys.

Wales has a significant amount of rain: we estimate that our infrastructure captures only some 3% of the effective rainfall, leaving some 97% for agriculture and the environment, compared to the southeast of England where up to 50% is used for public water supply. Most of our water is supplied from our impounding reservoirs although we abstract significant volumes from our lowland river sources such as those on the Rivers Wye and Usk in southeast Wales, the Rivers Tywi, Cleddau and Teifi in southwest Wales and the River Dee in north Wales. Groundwater accounts for less than five percent of our supplies at a Company level but at a local level, may be the whole supply.

On the face of it then, we should not have a water resources problem in Wales, however, we need to continually review the future pressures on our water supplies.

We take a progressive approach to Water Resource Planning as successive WRMP timeframes overlap so that each 5-year plan is an update of the last, based upon new drivers such as revised government or regulatory guidance, customer priorities and improved evidence.

We have 23 discrete water supply systems across our operating region which we call Water Resource Zones. These are defined by the extent of the supply network that share the water resources within each zone, whereby the customers in each zone have the same level of service in response to drought conditions. Our water resource planning is based upon these zones. The figures below show our region and our water resource planning zones.



*Welsh Water Resource Zone Boundaries*

### i. The Water Resource Management Plan 2019

This Plan is built on our previous WRMP19 in which the key drivers were; the management of significant abstraction licence changes due to the implementation of the Water Framework and Habitats Directives, improvement to water resource resilience, and the mandating of demand management targets.

We set a target to reduce our overall company level of leakage by 15% by 2024-25 and we are on target to achieve this having made a c10.5MI/d reduction already. Of equal importance was the setting of a longer-term target to reduce the average per capita consumption (PCC) to 110 litres per person per day (l/p/d) by 2050.

Although our average household PCC has risen a result of the Covid-19 pandemic through an increase in home working and schooling and the associated behavioural change, with society moving back to more normal practices we are seeing demand patterns return towards pre-pandemic levels.

We have progressed the schemes to resolve these deficits in all three zones and this year's drought has emphasised the need for the Pembrokeshire scheme, in particular. Due to the dry weather experienced between March and July that left storage in Llys-y-Fran at a low level we installed a temporary pumping scheme at Canaston Bridge, which will be made permanent in 2023 in line with our WRMP19 plan.

### iii. Objectives and Principles for the WRMP24

The objective of this Plan is to ensure that Dŵr Cymru Welsh Water will always be able to provide sufficient water supply to meet our customers' demand for water over the next 25 years by making our water supply systems resilient to drought, particularly in light of a changing climate. The plan uses best available evidence to formulate a set of actions through analysing future risks and identifying how we might need to adapt to different future circumstances. We have been guided by our regulators, interested parties and our customers in selecting the most appropriate solutions to the challenges we face.

Based on, and in response to regulatory guidance, the key and principles in developing our WRMP24 are that it will:

- Align with Long Term Delivery Strategies and outcomes
- Make substantive improvement to water demand management performance to support long term environmental policy and supply resilience
- Demonstrate that Welsh Water has enough reliable water resource and treatment capacity to meet future demand over the next 25 years
- Meet revised Government targets with respect to drought resilience and use industry leading tools to assess our ability to meet these
- Account for the latest climate change science using UKCP18 datasets and industry thinking within our assessments
- Actively engage with stakeholders and our customers in considering investment decisions
- Secure enough water for the environment over the long term by taking account of current environmental obligations laid out by our regulators as a minimum requirement and considering wider environmental interests
- Take a 'best value' approach to decision making around solutions to problems
- Robustly test our plans against alternative scenarios and where appropriate take an adaptive planning approach to mitigate future risk
- Consider the options available for trading water with 3rd parties
- Build our Plan into, and maintain consistency with, the 'Water Resources West' Regional Plan

The regulatory guidance provided for this round of planning has some different aspects and approaches with a key request that we set ambitious targets around demand management and more specifically around leakage and support to customers in reducing their water usage. The objectives for this Plan are:

- Leakage – 10% reduction during AMP8, 50% reduction (from 2017/18) by 2050
- Per Capita Consumption – reduced to an average of 110 l/h/d during a dry year
- Business demand – an 8% reduction by 2050 (Normal year demand from a 2019/20 position)
- Drought resilience – achieve 1 in 200 by 2029/30 and 1 in 500 by 2039/40

To achieve our drought resilience targets we assess our supply capability against the future demand for water. Where there is a deficit in capability, meaning that we have a lower level of resilience than required, then we examine both demand management and new supply options. We judge these not only on cost but their potential wider impact so that a 'best value' investment Plan is developed.

#### iv. Water Resource Resilience

Water resource resilience is a measure of our ability to meet demand during a specified severity of drought. This is assessed through a comparison of how much water resource we can rely on during a particular drought event compared to the expected demand for water from our customers at this time (known as the 'supply/demand balance').

Our current preferred level of service is to impose significant supply restrictions upon our customers, through an Emergency Drought Order (water rationing via standpipes/rota cuts) no more frequently than once every two hundred years, on average. i.e. the risk of these significant restrictions is no more than 0.5% each year.

The target for implementing Temporary Use Bans (formerly hosepipe bans) is once in twenty years on average and for non-essential use bans it is no more than once every forty years. Within the WRMP24 we set out how we plan to increase our level of drought resilience for significant restrictions to a 1 in 500 year on average standard (0.2% annual probability) within the 25 year planning period.

To understand the 'supply' element of the 'supply/demand balance' we calculate the amount of water we have available during a drought through system simulation using our water resource models. These provide a representation of our supply systems and allow us to understand their capability during drought. If this capability during a severe drought event, i.e. one that is likely to occur no more frequently than once every 500 years on average, is greater than customer demand plus leakage, then we have a Supply/Demand surplus and are resilient at that drought level.

We have gained far greater confidence in our understanding of drought resilience through a step change in the techniques we are now using. These being:

- The development of 60 new catchment models that better represent inflows to our reservoirs and rivers.
- Use of a new systems modelling platform, which provides a better representation of asset operation and demand
- The generation of 20,000 years of weather pattern data using statistical models to allow us to understand the impact and return period of drought events more severe than seen previously.

However, there is uncertainty around many of the factors used to assess both the supply capability within a water resource zone and the demand forecast and so, in addition, we add a factor within the supply/demand balances to account for this, known as 'Headroom'.

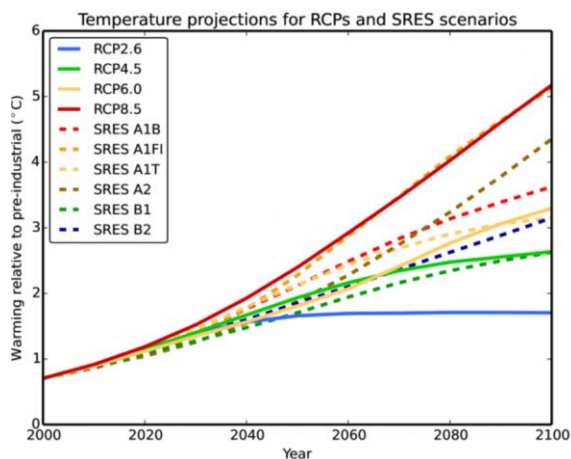
Where there is a supply/demand deficit, all feasible demand management and water supply enhancement options are developed with cost and benefit metrics calculated. A decision-making process is then followed to examine the trade-offs between performance metrics and generate a 'best value' societal and environmental plan.

The preferred programme of solutions is then tested against potential futures to identify any need for an adaptive plan that would lead us to deliver an alternative programme.

## v. Supply Assessment - Climate Change

Guidance asks that we use UKCP18 climate impact data but that we should agree our approach to the assessment with Regulators, given the wide choice of climate change data sets related to future emissions and global temperature rise.

We have agreed with NRW to use a 'medium emission' scenario (RCP6.0) within our preferred investment plan, but that we will test our plan against a 'high emission' scenario (RCP8.5) to examine whether we may need to adjust our long-term investment should the future climate follow a path of greater warming and lower rainfall (See the Figure below).



This approach meets Welsh Government's requirements and Ofwat's 'high' common reference scenario. Ofwat also require a 'Low' emission common reference scenario (RCP2.6)

A large number of climate outcomes have been produced for each emission scenario and we use a representative sample of these to understand the possible range of impact on our supply capability. The impact on supply is taken as the central outcome from the sample with uncertainty/variance used in calculating the 'Headroom' allowance.

The climate change impact has increased in all zones from the WRMP19 assessment which was made using UKCP09 data. In WRMP19, climate change was forecast to reduce our supply capability in SEWCUS by 4.3% at 2050. In WRMP24, the equivalent impact at 2050 is 6.3% for a Medium emissions scenario, increasing to 9.2% under a High emissions scenario.

## vi. Environmental Factors

Guidance asks that the Plan should "deliver a protected and improved environment and provide benefit to society. You should demonstrate that your plan provides overall positive environmental benefit."

NRW's National Environment Programme (NEP) and the equivalent WINEP in England, identify the investigations and subsequent changes that need to be made to our abstraction licences to meet environmental obligations, including the Habitats and Water Framework Directives. The NEP in AMP6 and AMP7 resulted in significant expenditure to manage the impact of reductions in licence volumes at a number of our river abstractions.

In England, the Environment Agency has defined a policy whereby it seeks to limit abstraction licence quantities to that used over the recent past to meet the 'No Deterioration' requirements of the Water Framework Directive legislation, particularly under a changing climate.

NRW are taking a different approach in Wales, and we have committed to work with them, through research in AMP8, to understand the potential future impact on river flows under climate change and how this may affect ecological needs.

Through the development of our PR24 NEP and WINEP, we have no plans to reduce our abstraction licence volumes during AMP8 period. Studies completed in AMP7 as requested under our WINEP, show that abstraction at Leintwardine, alone, may not significantly impact local river flows below environmental flow targets, however, this may be the case when other upstream abstractions are considered in tandem, particularly under low flow conditions. We will undertake further investigations into the sustainability of our Leintwardine abstraction, considering other upstream influences, so that we can assess the need for licence reductions. We will deliver schemes to resolve the impact of necessary licence reduction during AMP9.

We are mindful however that the future long-term sustainability of our raw water sources is an area of significant uncertainty particularly under a changing climate and so we are by seeking funding for our largest ever programme of water resource environmental investigations during AMP8. This will be a significant piece of work which demonstrates our environmental integrity and will also allow us to link the quantity with quality initiatives on the rivers from which we take water and develop catchment-wide solutions.

#### vii. The Water Balance and Demand Forecasting

The approach taken to demand forecasting is similar to that used in developing WRMP19. Our base year is 2019/20, as less impacted by the pandemic customer behavioural change. The way in which we account for the water that leaves our Water Treatment Works through to our customers taps, including for any leakage from our distribution system and on our customers premises, is called the 'Water Balance'.

Following our internal end of year audit process for 2021-22 we engaged in a comprehensive review of the water balance including data components, methodologies and reported outcomes for both Leakage and PCC. This process has resulted in the identification and implementation of a number of improvements across data sources and reporting methodologies, and human resources that contribute to our performance outcomes.

The impact of these changes are significant and have led to a greatly improved understanding of true performance and a subsequent need to restate reported performance for prior years in this AMP period.

The changes have resulted in an increase in the estimation of leakage, and reductions in consumption. Whilst this has a small impact on distribution input and PCC at the start of AMP8, this has added to the savings needed to achieve the planned 15% leakage reduction by the end of AMP7 through our leakage recovery programme. The demand forecast for AMP8 starts from this revised position. We have also subsequently updated our demand forecasts within the revised dWRMP24 to account for this.

AMP8 leakage savings will be greater than 18MI/d while long-term leakage savings have also been adjusted to meet the 50% reduction target by 2050. The average dry year Per Capita Consumption of our customers at the start of AMP8 is 148 l/p/d with the same aspiration for reduction in PCC to 110 l/p/d by 2050.

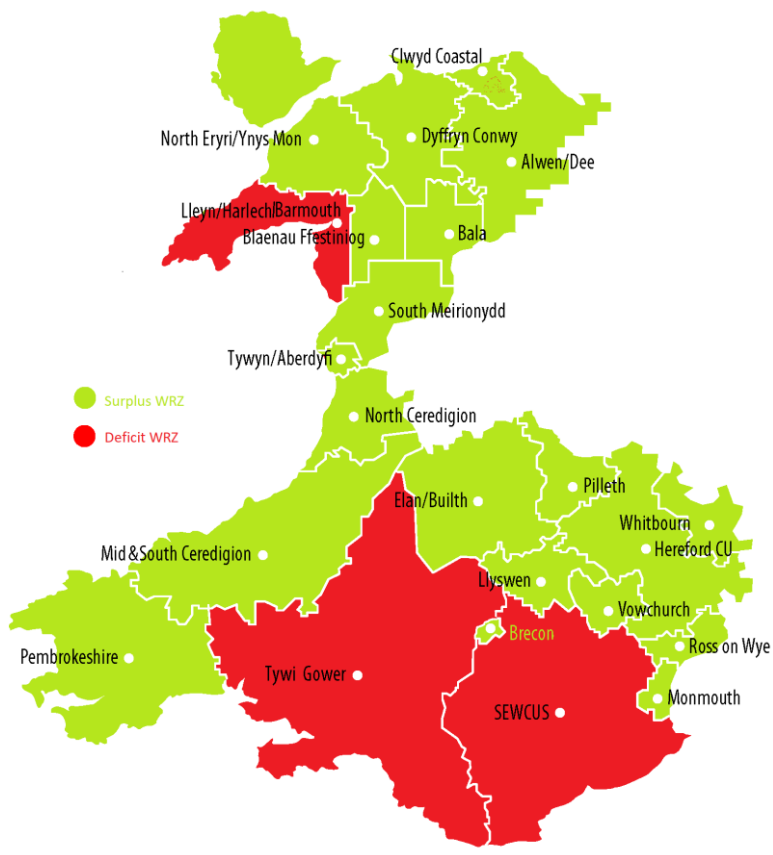
External consultants, Edge Analytics, have developed population and property forecasts following best practice guidance. The data used has been derived from Local Planning Authority projections as published by Welsh Government and apportioned to our water resource zones. New connection estimates have been projected from local development plans combined with GIS data. Occupancy is modelled using past observed trends for different property types at the WRZ level.

Household demand has been generated from a technique called multivariate regression and is built from detailed household water use surveys. The modelling accounts for demographics, house type, property and population forecasts and weather parameters.

Non-household demand forecasts are based upon the models developed for WRMP19 by CACI consultants. Non-households are split into 14 economic-based sectors and the model updated for recently observed demand data at WRZ level, with future projections taking account of econometric and climate change factors. Our strategy to reduce demand is outlined in section C below.

viii. The Supply/Demand position

Our initial Supply/Demand balances have been generated for each of the 23 water resource zones. We undertake these balances over both an annual period to understand the reliability of water resources from a hydrological perspective and during a peak demand week to understand our ability to treat and deliver enough water to our customers during the summer months. Three zones (see Figure below) are not resilient to our preferred 1 in 200, moving to 1 in 500, year level of drought resilience under a medium emission climate change scenario within the 25-year period to 2050. The Tywi Gower zone (deficit up to of 28MI/d), the South-East Wales Conjunctive Use System (SEWCUS) zone (deficit up to 44MI/d) and the Lley Harlech–Barmouth zone (deficit up to 0.5MI/d). The SEWCUS and Tywi Gower zones are the most populous with the four zones in deficit having just over 70% of our total population served. The deficit in the Lley Harlech–Barmouth zone is small and past 2040 to meet the higher level of resilience target.





## ix. Defining a Best Value Investment Programme

Guidance expects solution decisions to be based not solely on cost but taking account of wider range of social and environmental factors. Our approach is to align the Plan to our long-term delivery strategy with a key feature being the demand management policy which has been directed by Government, regulators, and customer expectations. This includes performance commitments on leakage and PCC as well as resilience to drought. To meet these targets and expectations we have set over-riding policies in AMP8 and 9 to reduce customer side leakage and water use.

We have initially taken a least cost approach to the delivery of our demand management strategy and examined the sensitivity of this programme of works. For example, we appraised five alternative metering delivery programmes. We have used the Strategic Environmental Assessment (SEA) of the Plan to understand if any options or alternatives have a significant negative impact on 17 wide ranging factors that cannot be mitigated. The thinking is, that where an option cannot be re-designed or re-worked to avoid the impact then we would remove it from the Plan and implement a less impactful, though potentially more costly, option. However, there is little differentiation in the SEA between demand management options and with these in place, our Plan to resolve zonal deficits is straight forward.

In line with guidance, we have taken an adaptive planning approach whereby, our preferred Plan does not only consider what we think is the 'most likely' future, regarding planning assumptions. We have also looked at a wide range of 'alternative future' scenarios to understand whether we are able to meet objectives under less likely but plausible potential futures and what our response will be if different future scenarios materialise.

Our policy led demand management programme is a key element of our preferred plan within all zones and acts to improve water resource resilience over time. This provides a 'no regrets' solution to reduce customer-side leakage and will help our customers to reduce usage.

Where this policy does not secure resilient water supplies, we have looked at additional 'Best Value' options to ensure that each of our zones is resilient. To support our approach, we have used a number of decision tools to help in our investment decision making.

## x. Customer and Stakeholder Engagement

Given our unique business model and the requirement of guidance, we have taken a collaborative approach to plan development through active engagement with regulators, stakeholders and customers.

To ensure acceptance of the WRMP24, we have held regular monthly progress meetings with NRW and EA to review and agree processes and planning assumptions. We have undertaken dedicated formal pre-consultation meetings with OFWAT, The Consumer Council for Water (CCW), NRW, EA and ran a full pre-consultation exercise contacting over 300 stakeholders including National and Regional environmental interest groups and all local authorities. Environmental engagement has also been completed through presentations to the DCWW Independent Environmental Advisory Panel.

Customer Engagement has included qualitative and quantitative preference survey work as well as in depth questioning of an online community over 4 weeks, to better understand customer rationale. We also held a series of online roadshows with the Water Resource West member companies and more recently consulted on our draft WRMP. This was a 14 week consultation including a dedicated stakeholder engagement event. We received over 200 comments and representations from 13 organisations on our draft WRMP24 which we have considered and accounted for with in this revised draft and in our Statement of Response. We have also written to each organisation regarding their individual comments.

## B. Learning from the Drought of 2022

### i. The drought event of 2022

Between March and August 2022, Wales received just 56.7% of its expected rainfall, the third driest six-month period since records began in 1865. In August, Wales received just 38% of its average monthly rainfall with heatwaves in both July and August leading to very high demand for water especially in the tourist areas of west Wales.

The outcome of this has been very low reservoir storages across most of south Wales and parts of northeast Wales, culminating in the first restrictions being placed on our customers since 1989, whereby on the 19th August a Temporary Ban on Water Use (formerly known as a 'Hosepipe Ban') came into effect in our Pembrokeshire WRZ.

Experience gained through this drought period has substantiated the asset investment decisions made in our WRMP19 and current scheme delivery and supports with good evidence the need for the asset investments presented in this plan. The following sections describe the key schemes.

### xi. The Pembrokeshire zone

We were aware of the supply risk in Pembrokeshire with investment in two schemes identified in the WRMP19. The upgraded link main between Preseli water treatment works from the Llys-y-Fran reservoir was completed earlier this year and has been vital in securing supplies to the local area. In addition, we accelerated the delivery of our planned Canaston Bridge scheme, through installation of a temporary solution. This has significantly reduced the rate of drawdown of the Llys-y-Fran reservoir but with the severity of this year's drought demand management measures were required aligned to our level of service promises. With both schemes fully operational we are confident that the zone is resilient to a 1 in 200 year drought event without the need for emergency drought orders.

### xii. The Tywi Gower zone

Although customer restrictions were put in place, we have been closely monitoring the areas of the Tywi Gower zone supported by the Crai and Ystradfellte reservoirs where levels fell to low levels at a time when we had abundant supplies in the much larger Brienne reservoir. However, the assessment in this plan shows that the areas supplied by these reservoirs will need water resource reinforcement to maintain supplies in the most extreme droughts. These schemes are now planned for delivery early in the AMP8 period. In the meantime, we will continue to take operational actions where possible to manage the risk and low level of resilience.

### xiii. The South East Wales (SEWCUS) zone

We have similar concerns around low levels in the 'high level' reservoirs in the SEWCUS zone. Our experience from the summer of 2022 and improved modelling has confirmed the pinch points in these areas of the system. This provides strong evidence for needing the schemes presented within this plan which will enable us to better balance the available water resource across the zone.

## C. Our Proposed Plan

To meet customer and stakeholder aspirations, the WRMP24 sets challenging targets for future demand management in line with the expectations of our regulators, stakeholders and customers. We plan to effectively target our investment to support our customers in managing their demand for water and to reduce leakage across all our water resource zones in an effective manner. This will provide benefit to the environment, water supply resilience and opportunity to meet future growth. Where, necessary, we also propose to invest in strategic network schemes that will maximise the use of available water resources so that every water resource zone is resilient to severe drought in line with proposed targets. This will again not only add resilience to drought but also against asset outages and against an uncertain future climate.

### i. Demand Management

Demand reduction options are driven by industry policy, customer and stakeholder expectations and build upon the work to date in managing demand through leakage reduction and water efficiency. Customer engagement has shown support for reducing leakage, seeing this as a 'social contract' between us and our customers, whereby customers will respond to the requirement to reduce demand if we play our part through reducing leakage.

The water companies in England have set themselves a goal of tripling the pace of leakage reduction in the period 2020-2030, to match the same level of improvement achieved over the past thirty years (1990- 2020). This is set within a longer-term ambition to halve leakage from 2020 levels by 2050.

We have used current costs and benefits data to assess our leakage reduction options and it is clear that a step change in approach is required to cost effectively meet increasingly challenging targets with our conventional 'find and fix' costs increasing as we attempt to trace ever smaller leaks.

Our proposed leakage strategy is closely aligned to metering policy whereby 'Smart' metering will not only support our customers in reducing their demand for water but will also enable us to target customer supply pipe leakage which is becoming an increasingly large proportion of total leakage. We proposed to make 10% leakage saving in AMP8, of which a significant proportion will be saved on our customers' pipes. The leakage reduction will follow a profile from 191MI/d in 2025 down to 104 MI/d by 2050 to meet our long-term delivery strategy outcomes.

We are also continuing with our detailed investigations into 'background leakage' supported by the Ofwat Innovation Fund project which Welsh Water are leading. Background leakage is defined as a summation of all leaks which are too small to find using techniques currently available. Estimations of background leakage vary across the industry, with current understanding suggesting that it could represent over two thirds of total leakage by 2050. It is important that we understand the true level and of background leakage so that innovative technologies and data science can be employed in future strategies.

### ii. Metering

Our metering policy is to deliver a large-scale programme of customer metering from AMP8 onwards. Our approach to customer metering in WRMP19 and AMP7 is largely reactive, responding to customers' demand to switch to a meter (meter optants), installing in newly built properties, and replacing faulty/damaged meters (reactive replacements). Metering is promoted as an option to reduce bills for low occupancy low-income households. Approximately 47% of our customer base is metered (March 2021) compared to an industry average of 63%.

Our meters are mostly manually read, as are the meters that will be installed over the course of AMP7. Based on the plans that were submitted at PR19, by the end of AMP7 we will have the second lowest level of meter penetration in the sector.

However, the advance of smart metering in other sectors, and the control it gives consumers over usage, is driving customer expectation of this functionality for their water service. It is unlikely that customers in 2050 will consider our current approach to be acceptable and therefore change is required.

From 2025 we propose to move to a strategy of installing 'Smart' meters on unmeasured properties by geographical area. In the first instance these will be unbilled meters and will remain so until there is a change of occupier; this approach is known as 'progressive metering'. We have used a bespoke investment model to examine the cost benefit ratios for a number of delivery options for both Automatic Meter Reading (AMR) type meters and Advanced Metering Infrastructure (AMI) meters. Based on evidence, AMR solutions are currently most cost effective, but this is largely dependent on the cost of data network infrastructure used in integrating AMI type meters.

We are investigating the implementation of AMI ready meters and the pathway between AMR and AMI in AMP8 through discussions with meter manufacturers. Investigations into use of Long-Range Wide Area Networks and IoT technology are ongoing along with procurement of meters. We have asked for manufacturers views on potential pathways between AMR and AMI and we will be refining our strategy over the coming 2 years prior to meter delivery.

Through our strategy we will increase the level of metering to 79% by the end of AMP8 and 96% by 2050 (no water company has yet to achieve 100%) and the demand forecasts include savings achieved from both better data and communication with customers and the identification of leakage on customer's properties. The metering strategy is forecast to reduce overall demand by 37.23 Ml/d by the end of AMP8 and 96 .01 Ml/d by 2050.

### iii. Water Efficiency

Achievement of the 110 l/p/d PCC target using only physical water efficiency interventions such as water saving devices, home audits, leaky loos and greywater recycling/rainwater harvesting would be prohibitively expensive, which is why the delivery of our 'Smart' metering programme is critical to achieving this target.

Our long-term targets are only met with support from Government mandatory water labelling along with a range of efficiency interventions such as water saving devices, home audits, leaky loos fixes and encouragement of behaviour change. It is recognised that an understanding of behavioural change is key to the achievement of long-term target. It may take some time to develop a detailed, comprehensive behaviour change campaign and strategy and there are some fundamental questions around how this is best delivered through water companies, governments or third parties. We are planning to undertake behavioural studies in AMP8.

A number of organisations including regulators would like to see increased our support and commitment to non-household customers in improving water efficiency to reduce waste. A number of opportunities exist, taking on some of the lessons learnt from our existing Cartref strategy, but adapting it to support small and medium-sized businesses We have developed a programme of measures that will support the reduction of business demand by 8% (of normal year demand) by 2050.

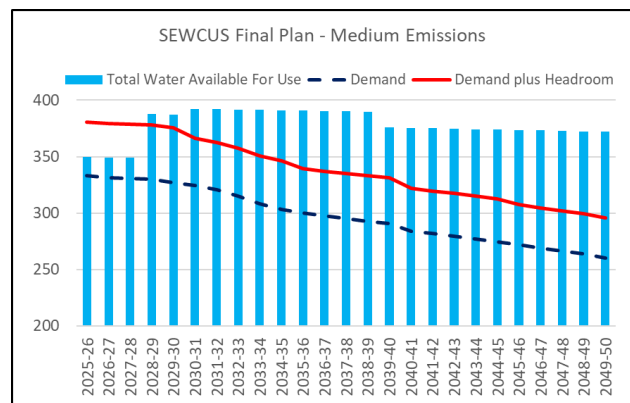
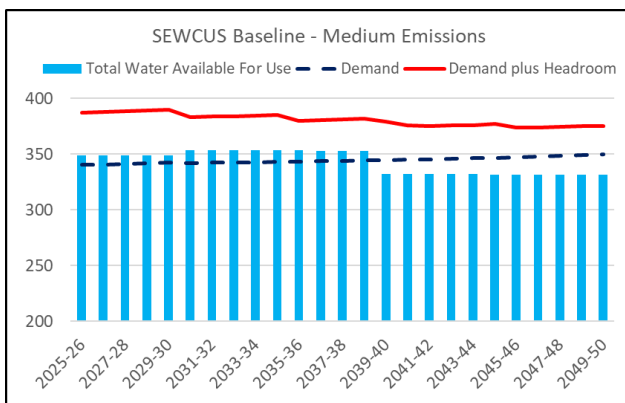
#### iv. SEWCUS

Our WRMP19 showed the SEWCUS system to be resilient under worst historic drought conditions, such as those experienced in 1976 and 1984, and likely to be resilient to a 1 in 200-year drought. However, using more accurate catchment and system models with greater granularity has identified variations in resilience across the zone, particularly when stressed by extreme drought. Under these conditions the 'high-level' reservoirs will have lower relative storage than Llandegfedd (the key 'low-level' reservoir). The existing network connectivity is the limiting factor in our ability to better balance water resource between the two systems.

Evidence during the 2022 drought supports the model findings with the links between our 'low' and 'high level' systems were at their maximum capacity during the majority of the event. These models demonstrate that during a severe drought, it will be the lack of storage in our Taff Fawr and Taff Fechan reservoirs that would cause failures to meet customer demands. This restriction is exacerbated by climate change and the supply capability, when set against our forecast baseline demand for water and an allowance for uncertainty, shows that we will not meet resilience targets. The range of options considered include:

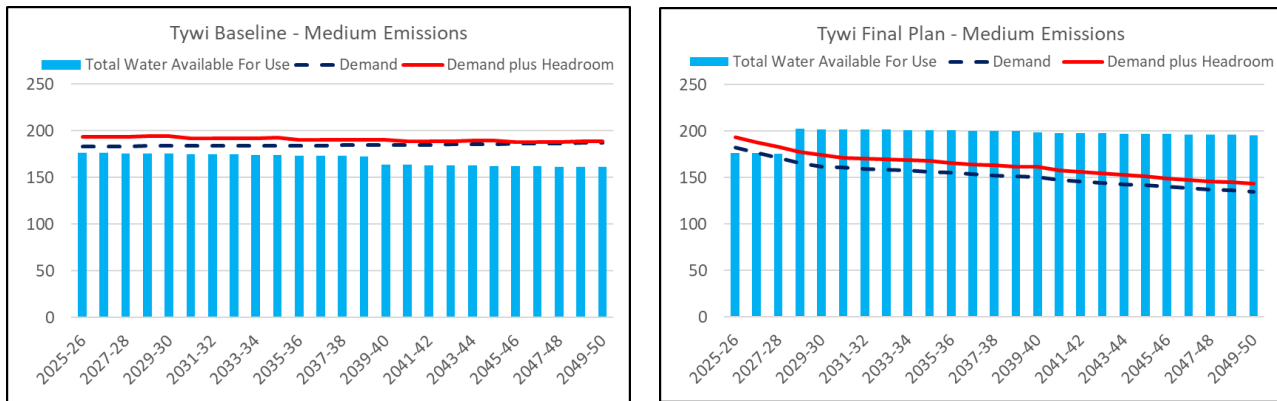
- Additional demand management
- Network enhancement to optimise and balance water resources
- Making use of existing disused sources or under-used abstraction licences
- Raising reservoir levels

Based on both cost and the benefits provided by the schemes the preferred solution The solutions are schemes to increase the capacity of the network and allow us to reduce the flow down the Llwynon trunk mains, with low water quality risk. The figure below shows how these schemes, alongside demand management benefits secure a high level of drought resilience across the zone. The overall benefit to WAFU of the network enhancement schemes is 39Ml/d at a capital cost of c£20.3m which provides good value. Modelling indicates high utilisation of the schemes even in less severe dry years. The schemes also provide additional resilience to the high-level system works outages which will be needed in delivering the Cwm Taff scheme.



## v. Tywi Gower

The position in the Tywi Gower zone is similar to that of SEWCUS with the WRMP19 indicating the system to be resilient but improved evidence has identified network connectivity limitations under extreme drought and climate change conditions.



The baseline supply/demand deficit is around 28MI/d MI/d by 2050 due to localised water resource deficits. There is sufficient total water resource across the system with Brianne reservoir underutilised currently, however, neither Crai nor Ystradfellte reservoirs are sufficiently resilient to drought. Our preferred set of solutions is to reduce demand in line with our demand management strategy to reduce leakage and PCC and to reinforce the areas supplied by both Crai and Ystradfellte through increased connectivity to the Felindre system. Demand management alone is not sufficient to overcome the resource deficit in these localised areas.

From the set of available options, network investment is the best value option that provides long-term resilience across the zone, as shown in the figure above right. The plan for Tywi Gower not only meets the current day target of meeting resilience to 1:200 year droughts but generates increased capability to meet at least a 1:500 drought resilience by 2030 through demand management activity. As with all zones, this mitigates risk around future climate change impact pathway, customer usage behaviour, and environmental needs.

## vi. Lleyn Harlech–Barmouth

Without any investment, the Lleyn Harlech – Barmouth zone is resilient to Droughts with a return period between 1:200 and 1:500 years and does not meet the higher resilience target by 2039/40. The deficit is small growing from around 0.2 to 0.5MI/d by the end of the Planning period. The demand management strategy is more than sufficient to overcome this deficit, but the risk may increase under different future scenarios.

## vii. Testing the zonal Plans

Our Plan is based on long term forecasts of supply and demand needs and meets our objectives under the 'most likely' future environmental and social circumstances that we might encounter. The long-term impact of leakage and customer usage policies generates an increased water resource surplus which over time provides greater resilience, enhanced benefit to the environment and can mitigate against future uncertainty.

There are some key assumptions within our Plan that could change into the future which may require additional investment to address. Our regulators have asked that we explore the impacts of this through stress testing of our plans to a range of plausible future scenarios, including Ofwat's PR24 Common Reference Scenarios.

The outputs from this testing have informed the makeup of our 'core' pathway of investment that would be required under all possible future scenarios. We have also identified alternative pathways due to potential significant deviations from our 'most likely' pathway.

Against our most likely pathway, we have tested five alternative pathways:

- 1) High environmental destination – assumptions as per 'most likely' but with DO reduced by 5% from 2030 and 10% from 2040
- 2) Low demand savings - assumptions as per 'most likely' but with our assumed savings in customer usage reduced by 50%
- 3) High environment + climate change– assumptions as per 'most likely' but with DO reduced by 5% from 2030 and 10% from 2040, high emissions scenario RCP8.5
- 4) Low climate change– assumptions as per 'most likely' but using the low emissions scenario RCP2.6
- 5) Compound High– assumptions as per 'most likely' but with DO reduced by 5% from 2030 and 10% from 2040, high emissions scenario RCP8.5, assumed savings in customer usage reduced by 50%

From the above, it's clear that scenarios 3 and 5 will have the largest impact upon our supply demand position.

We have appraised all our WRZs against the above alternative scenarios, both individually and in combination, to understand what, if any, additional schemes are required over and above that set out in our 'most likely' investment pathway. To ensure our 'Core' pathway contains all the required 'no regrets' investment we have also tested our Plan against 'Low' scenario criteria, notably incorporating the impact to our supply capability of lower-than-expected climate change.

Our testing has identified that of our 23 zones, there are 5 (SEWCUS, Tywi Gower, Clwyd Coastal, Llyn-Barmouth, Pembrokeshire), where additional future investment may be required to maintain our drought resilience under the most extreme alternative futures explored.

Our analysis for the five zones demonstrates that no large, long lead time schemes are needed as part of an adaptive Plan and there are available options to meet the most extreme future scenarios, if these occur. These scenarios demonstrate that we are able to meet objectives under less likely but plausible potential futures and where this is not the case, we are able to adapt our Plan to resolve any shortfalls against these and the implications. Our preferred plan including adaptive pathways, therefore, provides a robust, cost-effective investment programme for the future.

## D. Board Assurance

WRMP Guidance requires an assurance statement from our Board to Ofwat and NRW/EA confirming that:

- We have met our obligations in developing our plan
- Our plan reflects the Water Resources West (WRW) regional plan, which has been developed in accordance with the national framework and relevant guidance and policy, or provides a clear justification for any differences
- That our plan is a best value plan for managing and developing your water resources so that we are able to continue to meet our obligations to supply water and protect the environment, based on sound and robust evidence including costs.

Jacobs consultants have acted as our independent auditors, to undertake assurance of our draft WRMP24 to determine if any elements of our approach are likely to be materially inconsistent with WRMP technical guidelines and Welsh Government's guiding principles. Jacobs have also considered how Ofwat's strategic priorities for PR24 are reflected in the WRMP.

The Jacobs assurance letter to the Welsh Water Board is included as Appendix 3 and confirms that:

- We have met our obligations in developing our plan
- Our plan reflects the Water Resources West (WRW) regional plan, which has been developed in accordance with the national framework and relevant guidance and policy, or provides a clear justification for any differences
- Our plan was developed according to the Water Resources Planning Guideline (WRPG) guidance for developing a best value plan for managing and developing your water resources, and is based on sound and robust evidence including relating to costs
- Our plan adequately reflects the Welsh Government's guiding principles and Ofwat's key themes for the 2024 price review and that the processes incorporated appropriate levels of quality assurance
- Our documentation is consistent with the processes reviewed
- Data tables are competently sourced and processed.