Dŵr Cymru
Welsh Water

Draft WRMP24
Pre-consultation supporting information

February 2022

dwrcymru.com

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1. Introduction

At Welsh Water our vision is clear; "*to earn the trust of our customers every day*". Our purpose is to provide high quality, better value drinking water and environmental services, so as to enhance the wellbeing of our customers and the communities we serve, both now and for generations to come.

We know that customers rely on us to deliver high-quality, safe and reliable services every day, no matter what is thrown at us by the weather or other operational challenges. They also need to be able to trust us to be planning well ahead, to ensure those services are sustainable and resilient over many decades to come.

We are the sixth largest water company in England and Wales, supplying water and wastewater services to just over three million people. We operate a variety of water sources to supply our customers. Most of our water is supplied from our impounding reservoirs although we abstract significant volumes from lowland river sources such as the River Wye in southeast 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.

For operational purposes we divide our water supply area into three regions: North Wales, South West Wales and South East Wales. However, for water resource planning we further subdivide our three regions into 'Water Resources Zones' (WRZs). A WRZ is defined as the largest area in which all resources can be shared such that all customers, with some limitations, experience the same risk of supply failure.

Every five years we develop our Water Resources Management Plan (WRMP) which sets out how we will manage our water supplies across our supply area to meet current and future needs, over the next 25 years. Our current Plan (WRMP19) was published in March 2019 and we are underway developing our next Plan (WRMP24) for the period 2025 – 2050.

2. WRMP19 Overview

2.1. What is a Water Resource Management Plan?

WRMPs are statutory documents that all water companies must produce at least once every five years, and which play a crucial role in securing the public water supply for our supply area. Water resources planning is about trying to ensure there is enough water supplied to homes and businesses while protecting the natural environment. At the heart of this is our understanding of how much water we are able to take from rivers, reservoirs and groundwaters and supply to customers, not only in 'normal years' when we expect good supplies of rainfall across our supply area but also in periods of drought. Our forecast of water resource availability takes account of environmental factors and climate change that reduce the amount of water that can be sustainably taken from our water sources.

We need to balance this supply forecast, available during a drought, against the current and future demand for water using the best data available to us. However, there will always be some level of uncertainty around the accuracy of the data that we use in our supply and demand estimates, and we account for this within our supply demand balances.

We produce a future supply demand balance for each of our WRZs. Where the supply demand balance flags a potential shortfall, to resolve it we identify options that either reduce demand or increase supplies. Where the supply demand balance demonstrates that an area is in surplus, we can examine options that might be taken to meet wider objectives such as maintaining good drinking water quality, meeting Government policy direction or customer's wider preferences. The investment required is then fed through into our company business plan to seek the necessary funding.

2.2. Our WRMP19 Plan

Our Final WRMP19 identified three WRZs (Figure 1) that were forecast to be in deficit over the duration of the planning period, namely: Pembrokeshire, Vowchurch and Tywyn Aberdyfi.

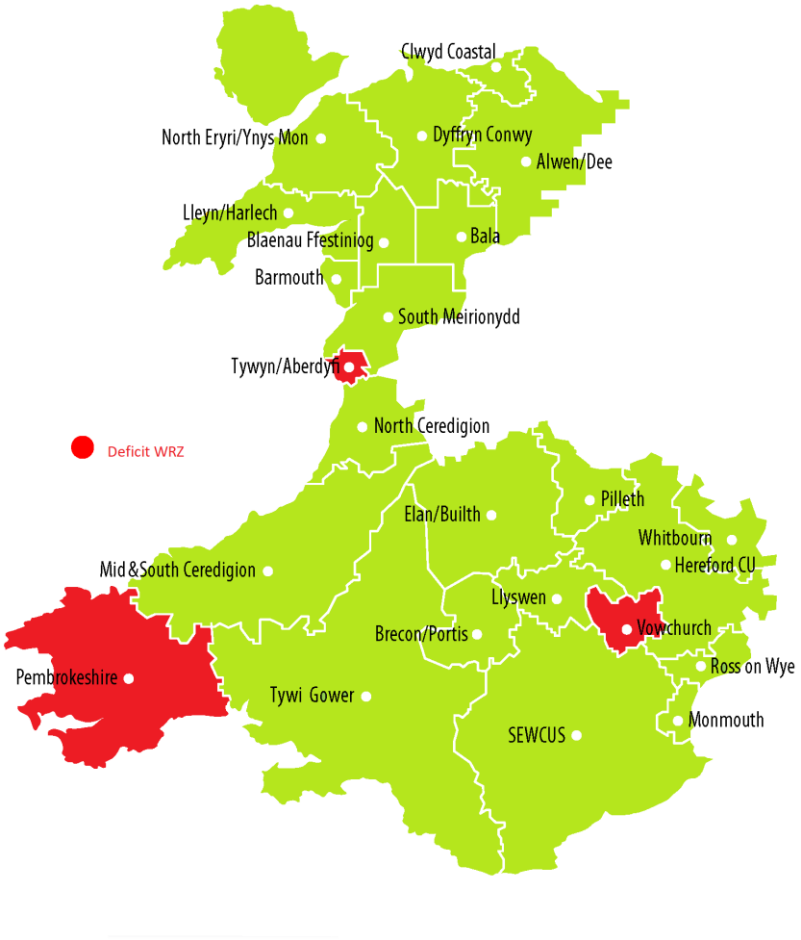

Figure 1 – WRMP19 Deficit Zones

A combination of supply side and demand management interventions were put forward to resolve the forecast supply demand deficits, an overview of these is given below:

2.3.Supply side schemes

2.3.1. Pembrokeshire WRZ

The supply shortfall was caused by reduced water availability following changes made to our abstraction licences for environmental improvements. Two schemes were identified to resolve the shortfall:

1) A 'pump back' scheme which enables us to increase the volume of water we can send from our Llysyfran impounding reservoir to the smaller Rosebush reservoir. Currently planned for completion summer 2022

2) Upgrades to our large river intake at Canaston on the Eastern Cleddau river to improve the efficiency of our operations. Currently planned for completion by late 2022/early 2023.

2.3.2. Vowchurch WRZ

The zone is reliant on a single groundwater source that is vulnerable to extreme droughts and so we are designing a link to the larger Herefordshire zone to improve this, with delivery by late 2023/early 2024.

2.3.3. Tywyn Aberdyfi WRZ

Concerns were raised over the drought resilience of the existing Afon Fathew source and so we identified a new abstraction from the Afon Dysynni to provide an alternative supply. Investigations into both the water quality of the new source and the yield of our existing source are planned for 2022-23 with delivery by 2025 pending the outcome of these studies.

2.4.Demand Management

2.4.1. Leakage

We have successfully delivered the 1st year of our 5-year plan to reduce leakage by 15% (26 Ml/d) from 2019/20 levels by 2024/25. This forms part of our longer-term ambition to achieve a 50% reduction from 2019/20 levels by 2050. We are currently forecasting a 10% reduction in leakage over AMP8.

2.4.2. Per Capita Consumption

PCC has risen by 5.2% against the three-year baseline position, which is in excess of our Final Determination Performance Commitment of a 1% reduction. In-year performance is 176 litres per head per day. There was a clear impact to PCC following the lockdown measures being introduced during mid-March 2020 and associated response to the pandemic.

An increase in daytime occupancy levels through a large increase in home working and schooling has meant that the consumption of water has shifted from non-household to household for many of our customers. Behavioural change has also been observed due to an increased focus on hand washing and spending more time at home. In addition, the usual weekday and weekend usage patterns are much less distinct during the periods of lockdown.

2.4.3. Project Cartref

Our Customer-Side Leakage and Demand Management programme has surveyed more than 60,000 properties to identify homes in which we can help with water consumption. During the periods where we were unable to enter homes due to COVID restrictions in Wales, we implemented a virtual audit. Despite this, we remain on track to deliver the committed outputs of this project for AMP7.

3. WRMP24 – Development

3.1.Overview

Our draft WRMP24 builds on our 2019 Plan, taking into account the updated guidance and guiding principles from Government and our Regulators, as well as operational experience gained from recent periods of dry weather in 2018, 2020 and 2021. This experience and subsequent investment in new infrastructure has allowed us to amalgamate two WRZs into one (Lleyn-Harlech and Barmouth) and so we now report on 23 WRZs in total (Figure 2). Our WRMP24 will also reflect the fact that we are a core member of the Water Resources West regional planning group, with a number of our WRZs included within the Emerging Regional Plan that was recently published. The following sections give a brief outline of the key elements that will drive the investment needs in our WRMP24:

3.1.1. Planning Guidance

Regulatory guidance now requires companies to derive a 'Best Value' rather than 'Least Cost' plan that places greater emphasis on delivering a wider range of benefits for our customers and the environment whilst ensuring a long term, resilient supply demand position.

3.1.2. Climate Change

Since the publication of our Final WRMP19, the Met Office has published the next set of climate projections for the UK. The United Kingdom Climate Projections 2018 (UKCP18) uses newer, high resolution climate models and the latest IPCC emission scenarios. The improvements in the modelling are considered by the Met Office to increase the confidence in the ranges of future climate over the UK. The general trends projected for the UK over the 21st Century are broadly consistent with the previous projections, UKCP09, with a tendency towards hotter drier summers and warmer, wetter winters into the future.

3.1.3. Resilience to Extreme Drought

In our WRMP24 we will set out the investment needed to be able to offer a higher level of service to our customers for the imposition of restrictions (standpipes/rota cuts) during an extreme drought. We now aim to offer our customers an annual probability of 0.5% (1 in 200) risk of such restrictions being needed but will also present how we plan to improve this level of service over time to just a 0.2% (1 in 500) risk every year.

3.1.4. Demand management

We will be putting forward an ambitious range of demand management measures to meet the challenge from Government and Regulators to continue being as efficient as possible with our water use. Our WRMP24 will also account for the customer behaviour changes experienced during the Covid-19 pandemic and the implications this has for both the short and long-term forecasts of customer demand for water.

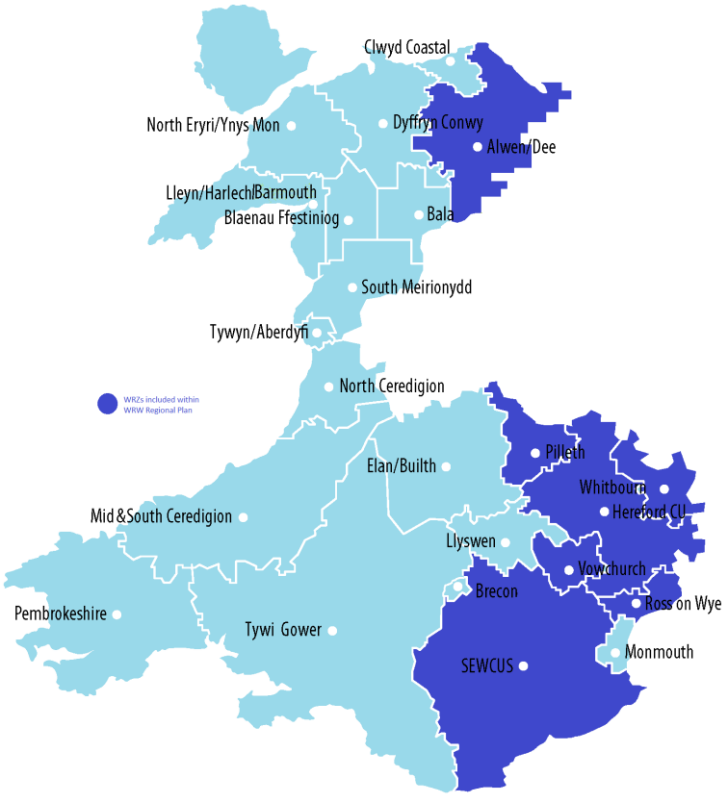

Figure 2 – WRZs for WRMP24 with those zones in the WRW Regional Plan highlighted in dark blue

3.2.Problem Characterisation

An important early step in building a water resources plan is to assess the size and complexity of the planning problem, a process known as 'problem characterisation'. The problem characterisation scoring is based on assessing the complexity and the strategic risk presented by the needs identified in each WRZ. Both scores are expressed as either low, medium or high. The scores are then combined to create a single 'concern' classification for each zone. Building upon the methodology from WRMP19, additional information was included within the assessment for this plan, namely:

- WRMP19 supply demand balance position
- Drought Resilience (Moving to higher LoS – 1:200 to 1:500 for extreme measures)
- Climate Change – use of updated UKCP18 products and impact of different emissions scenarios
- Operational experiences during recent dry periods
- Areas that experienced high demands during recent periods of hot, dry weather that means a 'critical period' supply demand scenario may be appropriate
- Updated hydrological inflows and stochastic timeseries

The results of the WRMP24 review are shown in Figure 3. Although very few zones score as either 'Amber' or 'Red', this is largely in part driven by the low complexity scoring in that the concerns identified, and the likely solutions, are well understood. Taking our Mid & South Ceredigion zone as an example, in Figure 3 it scores as 'Low' under the Problem Characterisation methodology but in Figure 5 we are indicating that it will likely be a forecast deficit zone. Our recent dry weather experience in the zone has shown us that our reservoirs will draw down quickly and that we are also vulnerable to short term peaks in demand, something the "Staycations" of 2021 exacerbated. We therefore have a detailed understanding of the issue and are designing options that will target the pinch points in the zone, therefore under the scoring system the 'problem' will not be complex to resolve.

Based on the assessment it is recommended that extended decision-making methods are adopted in SEWCUS due to a combination of the scale and complexity of the planning problem. For other WRZs, traditional decision-making methods remain appropriate, supported where necessary by scenario testing to explore any key uncertainties that could materially influence the Best Value Plan.

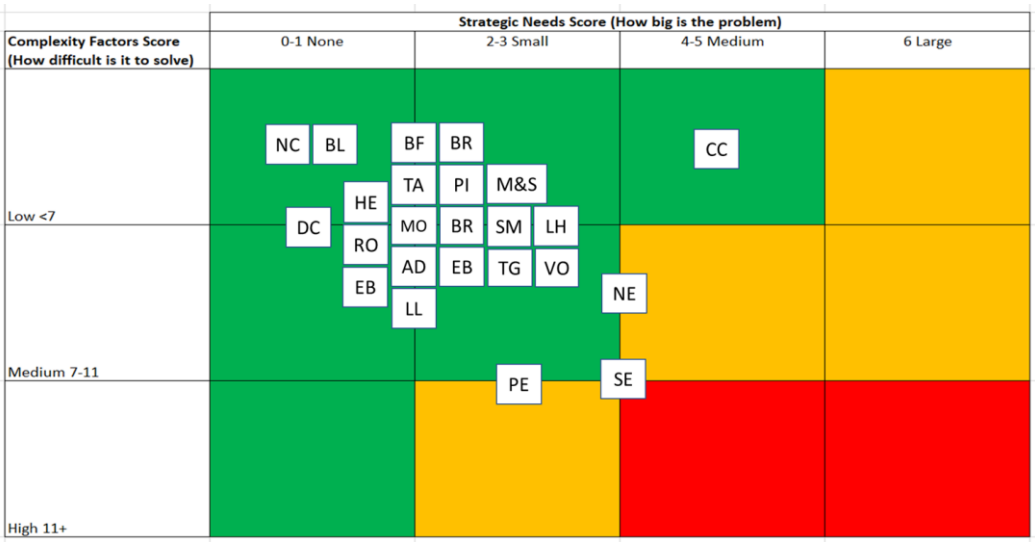

Figure 3 – WRMP24 Problem Characterisation

3.3.Climate Change

One of the most significant areas of uncertainty in our 2024 Plan is the impact of climate change upon our supply capability and the investment that will be required to adapt to the changing weather patterns we are likely to see. To ensure our plan is robust we will be estimating the impact of the new UKCP18 Regional and Global climate change projections, under both the medium emissions (RCP6.0) and high emissions (RCP8.5) scenarios. This is in line with the expectations of both Welsh Government (as set out in their Guiding Principles[1]) and Natural Resources Wales[2].

We have updated our Basic Vulnerability Assessment (Figure 4) which has identified that compared to the WRMP19 position, more WRZs should be placed in the 'medium' category and therefore subject to a more detailed climate change assessment. In practice this means that we will model 32 climate change scenarios for these zones classified as High vulnerability, using more than one evidence source as required by guidance. The 32 scenarios are made up of 12 UKCP18 'Regional' projections and 20 'Probabilistic' projections.

The UKCP18 Probabilistic Projections are considered to provide the most comprehensive assessment of climate change uncertainty across the UKCP18 product range but do not reflect the outputs from the latest global and regional climate modelling by the UK Met Office, which the 'Regional' projections do. For those WRZs classified as Medium or Low vulnerability we will model just the 20 UKCP18 'Probabilistic' projections, although we may also model the UKCP18 Regional projections for those Medium vulnerability WRZs that are either forecasting a supply demand deficit or would be part of the solution for providing water to a deficit WRZ. Where a zone is classified as "Climate Change Resilient" then no climate scenarios are modelled as we have high confidence levels that there will always be sufficient raw water availabile to meet our supply needs.

High vulnerability	Medium vulnerability	Low vulnerability	Climate change resilient
NEYM Pembrokeshire SEWCUS	Barmouth Clwyd Coastal Lleyn Harlech N Ceredigion Tywyn Aberdyfi Alwen Dee South Meirionydd Mid & South Ceredigion Tywi Gower Dyffryn Conwy	Bala Blaenau Ffestiniog Hereford CU Pilleth Brecon	Elan-Builth Llyswen Monmouth Ross on Wye Vowchurch Whitbourne

Figure 4 – Results of the WRMP24 Basic Vulnerability Assessment

4. WRMP24 – Provisional Supply Demand Position

We have completed our supply capability modelling for the High and Medium vulnerability zones and when combined with the first draft of our demand forecast, the provisional results of our initial supply demand balance assessment are summarised in Figure 5. We need to refine this work before finalising and taking these through audit, but our modelling to date shows that moving to a higher level of drought resilience and the incorporation of updated climate change data, are the key drivers for water resource deficit within our

[1] The Welsh Government Guiding Principles for Developing Water Resources Management Plans (WRMPs) 2022, (December 2021)
[2] Addendum on UKCP18 scenarios for use in Water Resources Management Plan 2024 (Wales), (May 2021)

supply area. The likely scale and timing of the shortfalls means that investment in new assets will be required alongside our enhanced demand management policies.

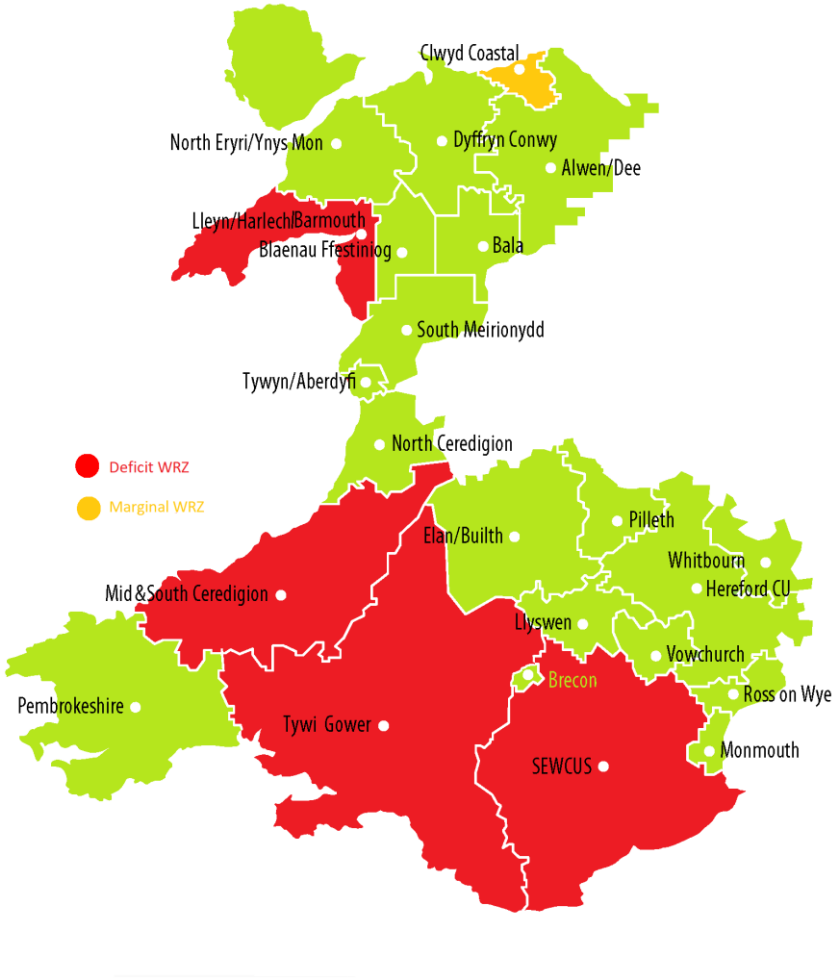

Figure 5 – Provisional deficits zones for our Draft WRMP24

5. WRMP24 – Options Appraisal and Decision Making

5.1.Optioneering

Our options appraisal work, and our customer and stakeholder engagement, has taken place in parallel with the development of our supply demand balances. We do this to inform the key areas of interest for our Plan and to support the development of guidance from our Regulators. We produce an initial set of supply demand balances for each WRZ to identify those areas where solution development is likely to be required so work can begin on the options appraisal process. Figure 6 shows a high-level overview of the process we follow to produce a set of feasible supply side options that are deliverable, will provide water resource benefit and will not negatively impact upon the environment.

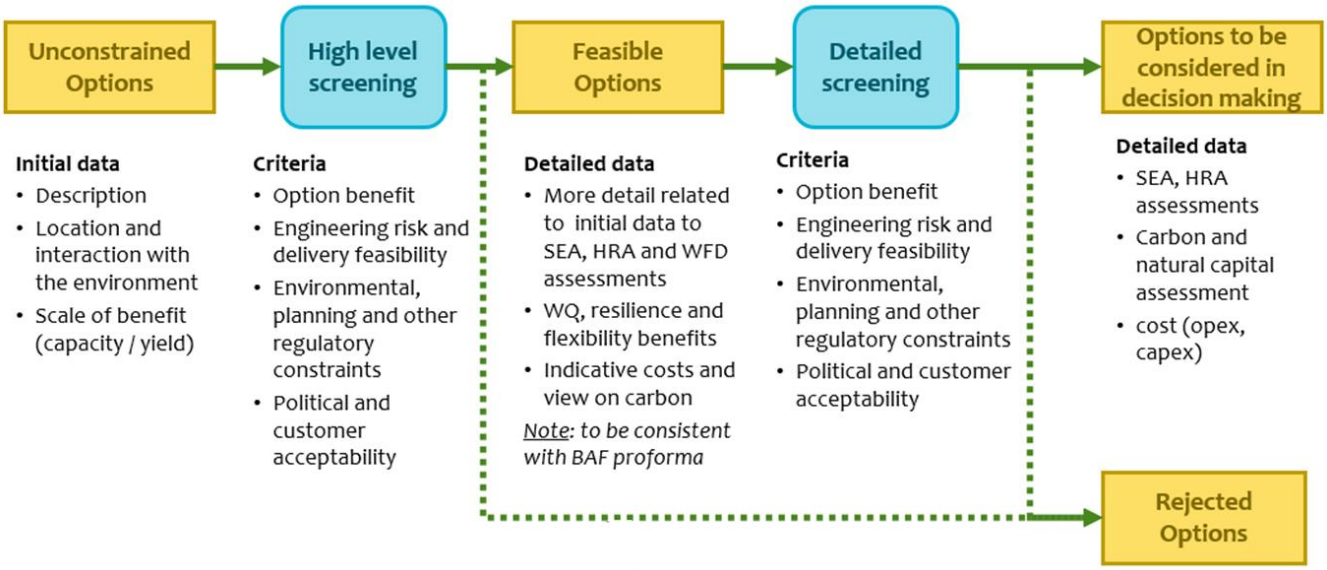

Figure 6 – Overview of the Optioneering process

5.2.Decision Making

A significant improvement from our 2019 Plan is in the way we propose to understand what a "Best Value" plan looks like for both our customers and the environment. This moves us away from taking a "Least Cost" approach that derives the 'cheapest' solutions to the supply demand problem without looking at the wider benefits that could be gained from the Plan. Through taking account of a wider set of factors at the start of our decision-making process we will deliver multiple benefits from our preferred schemes, such as supporting our carbon neutrality targets. To guide us through our decision-making process there are a number of key principles we will adopt:

- Conduct detailed customer and stakeholder engagement to understand their views and preferences for our options
- Undertake a detailed options appraisal process, including SEA/HRA/WFD/NCA, to generate a set of costed, feasible supply side and demand side options
- Utilise the UKWIR Industry Standard "Economics of Balancing Supply and Demand" (EBSD) and the "Best Value Decision Making Framework" methodologies
- Review against Welsh Government objectives as set out in the Environment (Wales) Act, Water Strategy for Wales and the Wellbeing of Future Generations Act
- Ensure our options are aligned with Welsh Water's PR24 priorities, our 2050 vision, our Drainage and Wastewater Management Plan and our Biodiversity Plan

6. WRMP24 – Manging Risk and Uncertainty

We plan to undertake a range of scenario and stress testing to help address those key risks/uncertainties within our WRMP24. The purpose of stress testing is to show how the plan might change under different circumstances.

Given the range of uncertainties that our WRMP24 has to address, it is likely that we will need to develop an Adaptive Plan that presents the impact on our investment decisions from a range of potential futures that might occur such as customer demand behaviour or response to climate change.

We will present 'Alternative Future Pathways' within our Plan and test our proposed solutions against these. The aim is to ensure that our Plan is flexible in adjusting to the scale of future uncertainty. Figure 7[3] illustrates how alternative pathways around the core pathway are developed in relation to areas of uncertainty.

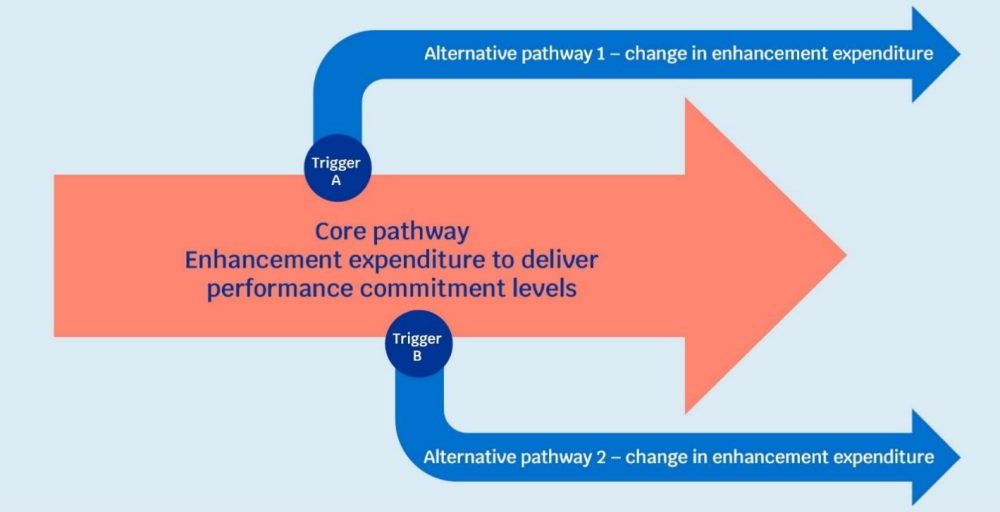

Figure 7 - Core and alternative pathways

6.1.Provisional Preferred Schemes

As set out in Section 4, the development of our supply demand balances is currently provisional with work still be completed. We have reasonable confidence in the early indictors for where we may see forecast deficits and these will require a mix of demand and supply options to resolve. Our thinking to date is that the focus of our draft WRMP24 is likely to be on demand management through implementation of a number of key company policies, ensuring that these are supported by our engagement work. Initial indications from a high-level understanding of the costs and benefits of our supply and demand schemes is summarised below:

6.1.1. Demand Management

- Further leakage reduction during AMP8
- Further reduction between 2030 to 2050 – 50% of 2019-20 levels by 2050
- Progressive metering policy which will increase meter penetration across our domestic customers

6.1.2. Supply Side (Current 'front runner' options)

- Network and pumping station upgrades SEWCUS WRZ
- Network uprating in Tywi Gower WRZ
- Upgrade pumping stations and WTW in Mid & South Ceredigion WRZ

[3] Figure taken from p.18 of "*PR24 and beyond: Long-term delivery strategies and common reference scenarios"* (Ofwat, November 2021)

7. Next Steps

Our Water Resource Management Plan will be developed over the next nine months with a draft submitted to Welsh Government in September 2022. Collaborative working is at the heart of what we do and so we would very much value your thoughts on the development of our draft WRMP24.

To share your views with us please contact us by the 21st March 2022 at: water.resources@dwrcymru.com

We will be presenting an overview of our draft 2024 Plan at the Water Resources West Stakeholder Workshop on the 9th February 2022. This is a virtual workshop and so if you're interested in attending then you'll need to register at the link below:

https://eqcommunications.createsend1.com/t/ViewEmail/j/81E4A26475527FA12540EF23F30FEDED?alternativeLink=True