Draft Water Resource Management Plan 2024

Annex 11: Monitoring our Adaptive Plan

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Version 1.0

from Southern Water

Contents

1. Introduction

This document forms an annex to our draft Water Resources Management Plan (dWRMP) and sets out our monitoring plan for our adaptive planning approach to help us track and identify which Supply-Demand adaptive pathway (or "Situation") we are likely to be following into the future and therefore the options and strategy we need to deliver to maintain our supply-demand balance.

We use adaptive planning to address our complex needs and future uncertainties/ This document sets out our approach to how we will monitor and report on the overlying drivers that constitute the adaptive planning decision tree that has been designed.

It briefly describes a background to adaptive planning, the 3 key future uncertainties forming our adaptive pathways along with our proposed metrics, timeline for decision points, summary of the root branch scenarios, and how we will report outcomes.

Using the 5-year cycle of Water Resource Management planning we can ensure progress on the adaptive plan is monitored and updated regularly and this will be undertaken through our Annual Review process.

By using the WRMP cycle it will also provide the necessary framework for consultation and engagement with stakeholders, regulators, and other water companies.

1.1. Our Adaptive Plan

For our dWRMP'24 we have continued to use an adaptive planning approach, having first adopted one in our 2019 plan. We have worked collaboratively with Water Resources South East (WRSE) and neighbouring companies to ensure our strategies address the range of uncertainties faced by the South East of the UK.

We recognise that the future is uncertain and that the size of our supply and demand challenge could vary. In adopting an adaptive planning approach, we aim to develop a plan that can respond to the challenges of the future and ensure that the supply and demand options we will deliver continue to provide safe and secure supplies of drinking water.

Alongside the regional assessment, our WRMP24 Problem Characterisation (Annex 3) has shown that we, and the wider south east region, face particularly significant supply demand risks relating to the impacts of three main drivers:

- Population growth
- Our Environmental Destination (sustainability reductions to abstraction licenses)
- Climate change impacts

Our decision to undertake an adaptive planning decision framework is driven by our Large Strategic Needs and High complexity as a consequence of these drivers and summarised by our Problem Characterisation Assessment (Annex 3) and detailed with our WRMP (Section 5.5).

Figure 1.1 summarises our adaptive planning approach for this plan. There are 9 different situations which represent different combinations of population growth, climate change and environmental ambition and which are expressed as different magnitudes of supply-demand deficit. The first branch point and decision point in 2030 is based on population growth forecasts, and the decision point in 2035 splits into

different situations depending on supply-demand deficits caused by climate change and the level of environmental ambition.

This situation tree is applied to every WRZ against the four different supply scenarios i.e. NYAA, 1:100 year DYAA, 1:500 DYAA and 1:500-year DYCP. Therefore, for every WRZ, we four sets of situational trees covering nine potential supply demand forecasts.

Whilst the range of uncertainty explored in our adaptive plan is driven by uncertainty due to climate change, population growth and environmental destination there are a number of other combinations of discrete forecasts that can also produce similar levels of deficits (e.g. an MDO scenario) . Therefore, the solutions being presented in our plan should be considered as not just answering these 9 specific combinations of uncertainty drivers but also a more general point that a given level of supply-demand deficit is best solved using this combination of solutions via our best value decision making.

A full description of how we have developed our adaptive planning scenarios is provided in WRMP section 5.5

Our plan starts with a Stage 1 Root Branch (2025 and 2030), at Stage 2 (2030 to 2035) the plan branches into with 3 branches determined by growth and Stage 3 (2035 and beyond) a further 9 branches determined by environmental destination, climate change impacts and growth.

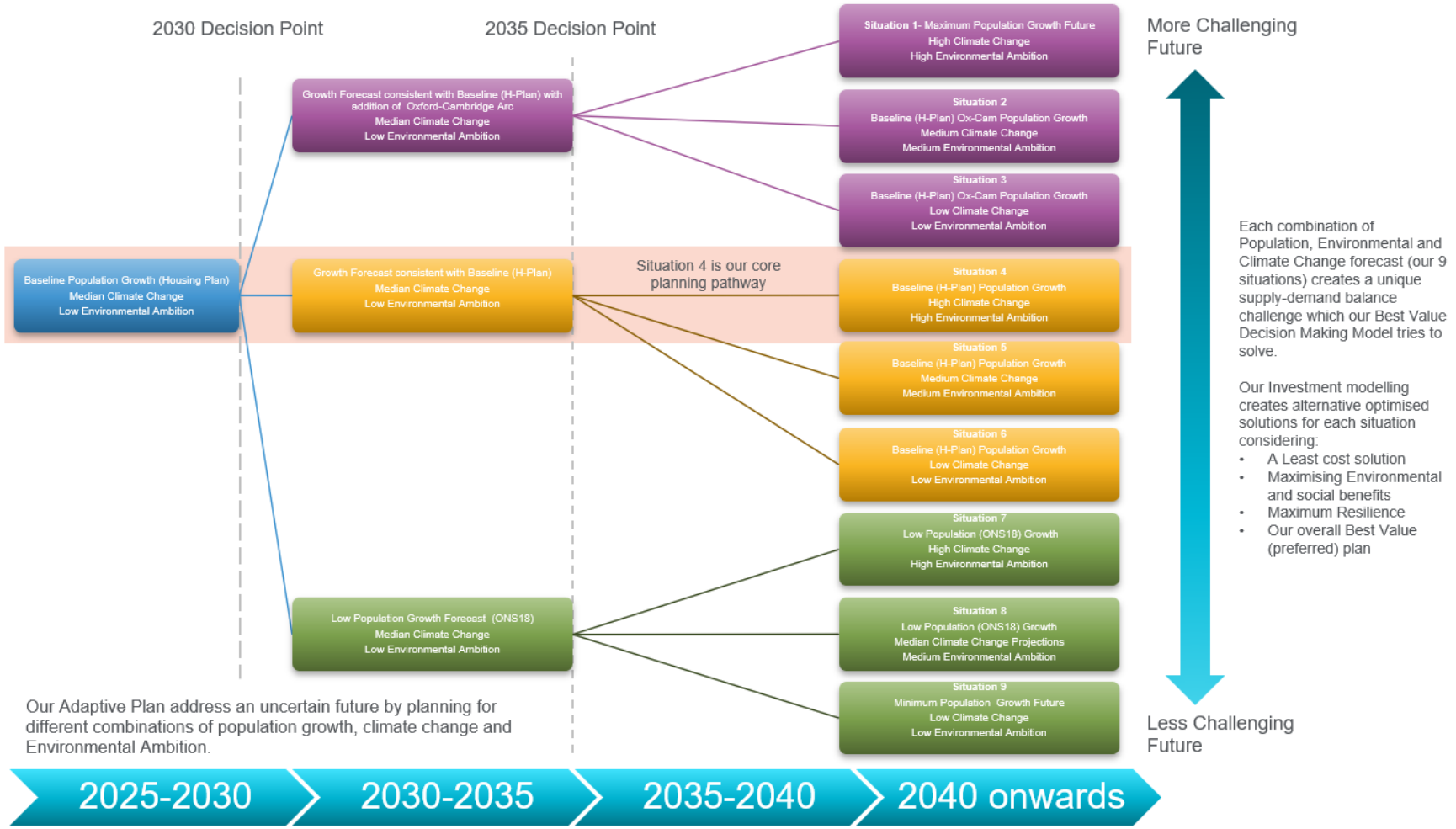

Figure 1.1 Summary of our adaptive planning approach

1.2. Background to Adaptive Planning and the WRMP

An adaptive planning approach is promoted by the National Framework and the Water Resources Planning Guidelines (WRPG) including the supporting supplementary guidance (EA, 2020.) It is consistent with UKWIR guidance (UKWIR 2016) as an advanced approach suitable for our strategic needs and complexity as evidenced by our problem characterisation. In accordance with the guidance and complexity of the uncertainty faced, we have chosen to use adaptive planning as a decision making tool (Section 12.6, (page 82) UKWIR 2016 UKWIR 2016).

The UKWIR 2016 guidance sets out a decision making process (Table 1) and risk based evaluation framework that we have followed during the developing of our WRMP and to inform the design of the decision making and investment modelling undertaken by ourselves and WRSE.

The framework is set out into the following phases:

- Data phase
- Modelling phase
- Refinement phase
- Reporting phase

The data phase involves:

- Stage 1 collate & review planning information & SDB balances etc.
- Stage 2 review list of unconstrained options
- Stage 3 problem characterisation - evaluate strategic needs & complexity.

It is during the data phases that the direction will need to be set for when the decision to diverge from the root are made and which branches are followed in 2030 and 2035.

As set out in the UKWIR 2016 decision making process guidance it is stages 1, 2 & 3 where we gather information to determine changes to previous forecasts and initial consideration of how to address any supply demand balance deficits.

To determine the adaptive pathways, we propose to make use of the WRMP problem assessment process to audit and document for each of our operational areas:

- Population Growth (demand side Problem Characterisation metrics D(a), D(b) and D(c))
- Environmental Ambition (supply side Problem Characterisation metric S(c))
- Climate Change Impacts (supply side Problem Characterisation metric S(b))

We plan to incorporate a yearly review of progress of our adaptive planning for each of the 3 drivers as part of the WRMP Annual Review updates as this is an essential update for reporting against our performance and delivery of programmes. This will also help facilitate frequent consultation with regulators and stakeholders on progress for the adaptive pathways.

Table 1 The development phases of a WRMP aligned with UKWIR decision making process

UKWIR 16/WR/02/10 WRMP19 Methods - decision making process: guidance	Consultation with regulators & stakeholders (is continuous for each stage) Need to agree formal times, such as dWRMP pre-consultation, when crucial influence times occur for decision making.
dWRMP data phase	stage 1) collate & review planning information & SDB (previous WRMP, changes to SDB, WRPG etc) stage 2) review list of unconstrained options
	stage 3) problem characterisation - evaluate strategic needs & complexity
dWRMP modelling phase	stage 4) select appropriate modelling method stage 5) identify and define data inputs to the models
	stage 6) undertake decision making modelling
dWRMP refinement phase	stage 7) stress testing and sensitivity analysis
dWRMP reporting phase	stage 8) reporting to summarise and input to the WRMP

2. Outline of the three key programmes for monitoring adaptive planning

The following section outlines the three adaptive planning drivers that will be under review and how we will monitor them to illustrate and understand the influences that cause particular adaptive pathway branches to be selected.

2.1. Population Growth

The population growth forecasts for our dWMRP24 are based on and developed from the work undertaken by Edge Analytics (2020) and are calculated from population and housing growth forecast from multiple sources, such as multiple local government Local Plans and ONS data combined with per capita consumption (PCC) and per household consumption (PHC) forecasts. The development of the demand forecast is described in Section 5.2.1 of the dWRMP24.

Using the growth forecasts, WRSE (2021) determined population growth scenarios to be used for the Adaptive Plan to form the decision points for 2030 and 2035. The scenarios that form the decision tree are:

- Maximum growth (part of a high scenario from 2035)
- **Baseline** growth (housing plan) - the root branch from 2025 onwards
- **Baseline** growth incorporating Oxford-Cambridge arc * (part of a high scenario from 2030)
- ONS18 growth forecast (part of a low scenario from 2030)
- Minimum growth (part of a low scenario from 2035)

* The OxCam ‘Arc’ covers 26 Local Authority Districts which has been identified as an area of huge economic growth located in the Northern area of WRSE (Edge Analytics, 2020.) Although the OxCam Arc is outside Southern Water operations it is within WRSE and WRE and population growth there is likely to influence option availability for our plan.

The growth projections for each of our WRZ (WRSE, 2021 Demand Forecast) are presented in Table 2.

Table 2 Maximum and minimum increase in dwellings projected for 2100 at the WRZ level for Southern Water, WRSE (2021)

WRZ number	WRZ code	WRZ name	WRSE Minimum growth	WRSE Minimum growth scenarios	WRSE Maximum growth	WRSE Maximum growth scenario
1	HAZ	Hampshire Andover	18%	ONS-18-Low-L	77%	Completions-5Y-H
2	HKZ	Hampshire Kingsclere	12%	ONS-18-Low-L	75%	Housing-Req-H
3	HWZ	Hampshire Winchester	20%	ONS-18-Low-L	67%	Housing-Plan-r-H
4	HRZ	Hampshire Rural	29%	ONS-18-Low-L	90%	Completions-5Y-H
5	HSE	Hampshire Southampton East	13%	ONS-18-Low-L	61%	Completions-5Y-H
6	HSW	Hampshire Southampton West	16%	ONS-18-Low-L	54%	Housing-Req-H
7	IOW	Isle of Wight	25%	ONS-18-Low-L	59%	Housing-Plan-r-H
8	SNZ	Sussex North	28%	ONS-18-Low-L	76%	Completions-5Y-H
9	SWZ	Sussex Worthing	35%	ONS-18-Low-L	85%	Housing-Need-H
10	SBZ	Sussex Brighton	15%	ONS-18-Low-L	66%	Housing-Need-r-H
11	KME	Kent Medway East	28%	ONS-18-Low-L	82%	Housing-Plan-r-H
12	KMW	Kent Medway West	23%	ONS-18-Low-L	92%	Housing-Plan-P
13	KTZ	Kent Thanet	36%	Completions-5Y-L	85%	Housing-Req-H
14	SHZ	Sussex Hastings	24%	ONS-18-Low-L	61%	Housing-Need-H
	SWS	**Southern Water**	**24%**	ONS-18-Low-L	**68%**	**Housing-Need-r-H**
	WRSE	**WRSE region**	**20%**	ONS-18-Low-L	**71%**	**Housing-Need-r-H**

2.1.1. Population Growth metrics

We normally assess population growth forecasts each WRMP cycle. The next update should be undertaken for dWRMP29 and will be incorporated into our WRMP demand forecasts. This update will be used to support and determine the adaptive planning decision point for population growth in 2030. A key comparison is to be made with the above table to determine how and if the population forecast for each WRZ has altered for 2100.

We continually monitor changes in PCC (l/h/d) against our demand forecasts in the Annual Review, where we compare PCC against previous years, the WRMP demand forecasts and our water efficiency

delivery. The annual monitoring and reporting of PCC provides regular updates against the forecast PCC that will be available to inform the data phase preparing towards each new WRMP (Figure 2.1)

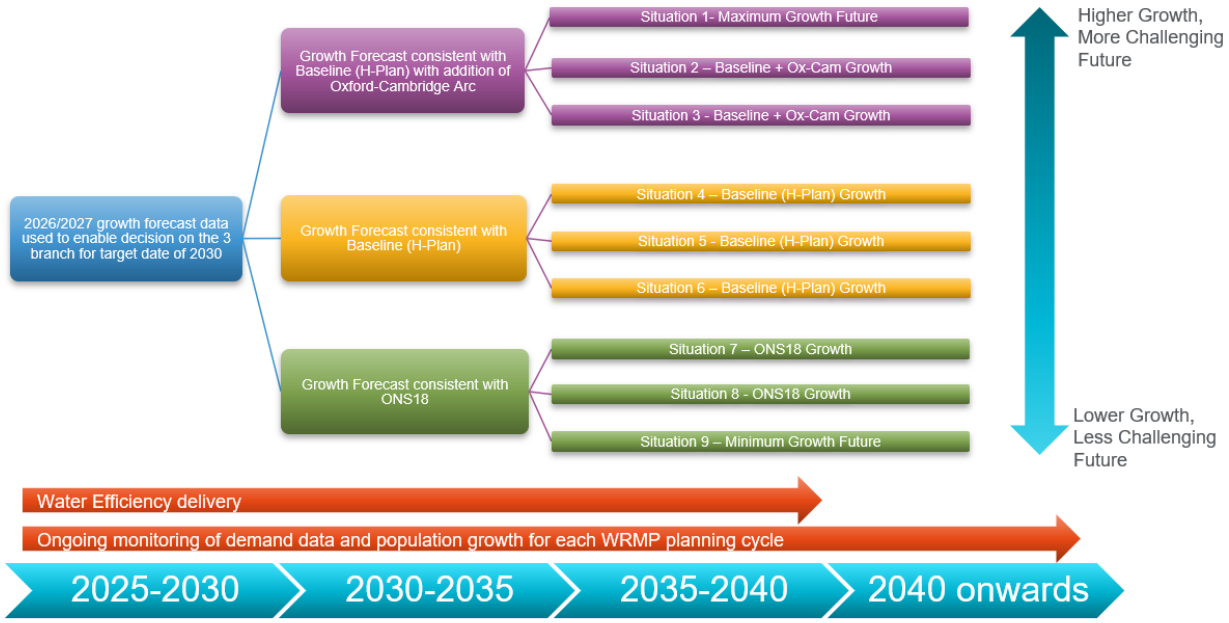

Figure 2.1 Summary of Adaptive Plan metrics, monitoring and decision points for the Population Growth Uncertainty Driver

2.2. Environmental Destination

Our Environmental Ambition is to ensure that all our abstractions are sustainable. We have described the possible range of solutions, including abstraction licence changes and other mitigations such as river enhancement that we might need to implement in our Environmental Ambition for 2050 (Section 5.3.7 dWRMP24).

Because of the large uncertainty associated with some of the key supply and demand drivers we face we developed an adaptive planning approach with WRSE that aims to tackle the uncertainty in our supply demand balance.

In the Emerging Regional Plan published in early 2021, the adaptive planning approach proposed adoption of the “Central” environmental destination scenario as a core pathway up to 2040. Thereafter the adaptive plan branched between “Central”, “Enhanced” and “Alternative” scenarios. This reflects the range of potential supply reductions policy, stakeholder and customer choices which by 2040 should define which environmental pathway we will follow.

For the draft WRSE regional plan, and our draft WRMP we have adopted a revised adaptive planning approach. Instead of the branching being primarily policy driven, we have instead simplified our Environmental Ambition into three scenarios, High, Medium and Low which reflect the magnitude of supply-demand balance impact (Table 3). This allows greater flexibility in our approach because individual licences changes can be considered and tailored at a source or water body level as

appropriate. The uncertainty range of supply-demand balance impacts in those reductions is still covered within the three scenarios.

Presently there is a lot of uncertainty about both the quantity and location of abstraction licence changes we will need to deliver to protect the environment and therefore the potential impacts on our water supplies. We are addressing this through our wide-ranging Environmental Investigation (WINEP) Programme over the next five years, and by 2027 we expect to have finished investigations into the sustainability of most of our water sources. This will allow us to work with the Environment Agency, Natural England and other stakeholders to make robust, evidence-based decisions around the scale of abstraction reductions and other mitigations required to protect and restore the environment and improve its resilience to climate change. The conclusion of our WINEP investigations and options appraisal between 2024 and 2027 will therefore be critical to informing the likely Environmental Destination Pathway we are likely to follow.

2.2.1. Environmental Destination monitoring points

We assess the impact of sustainability reductions to deployable output in Ml/d and the timing of those reductions under the different environmental scenarios. The details of planned and modelled reductions for the different scenarios are presented in Annex 9 Protecting and Enhancing the Environment. Progress with the sustainability work programmes will be updated through our WINEP investigations and reported in our Annual Review.

Our WINEP investigations will inform us in advance of the adaptive plan decision point of which Environmental Destination Scenario we are likely to be following and we will have greater certainty in the magnitude of deployable output reductions for dWRMP29.

The critical dates and mechanisms for reviewing our Environmental Destination are set out in Table 4 and Figure 2.2.

Table 3 Summary of deployable output impacts for each Environmental Destination Scenario

	1 in 500 Deployable Output Reductions by 2050 for each branch (Ml/d)		
WRZ	**Low**	**Medium**	**High**
HAZ*	-12.40	-11.61	-15.54
HKZ	-4.16	-4.16	-4.63
HRZ	-3.45	-3.45	-3.45
HSE*	0.00	0.00	-20.49
HSW*	0.00	0.00	0.00
HWZ*	-6.68	-12.8	-22.71
IOW	-8.06	-11.02	-14.25
SNZ	-6.76	-6.8	-8.23
SBZ	-6.48	-20.99	-39.44
SWZ	-7.86	-17.87	-19.72
KME	-20.27	-48.51	-48.51
KMW	-3.31	-22.42	-22.70
KTZ	-7.86	-17.87	-19.72

SHZ	-1.56	-1.56	-1.56

Table 4 Summary of Key Environmental Destination Monitoring Points

Review Mechanism	Date of Review
Review of Environmental Policy and Water Resource WINEP emerging and confirmed outcomes reported in WRMP Annual Review	Annually
Conclusion of AMP7 and AMP8 WINEP studies	2024-2027
Environmental Destination Update and Confirmed Sustainability reductions for WRMP29	2027-2029
Start of mitigations associated with 2027 WINEP investigation and Options Appraisal	2030 Onwards
Environmental Destination Update and Confirmed Sustainability reductions for WRMP34	2030 Onwards
Adaptive Branching point for Environmental Destination	2035

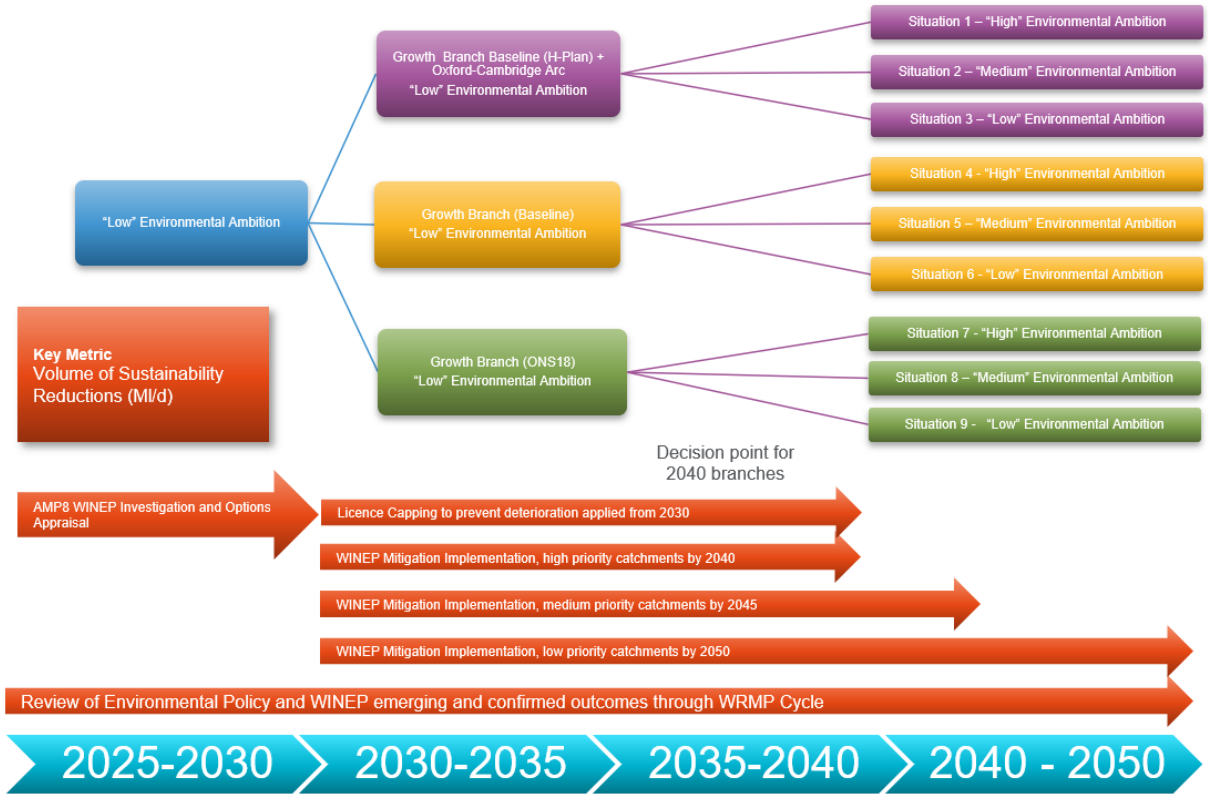

Figure 2.2 Summary of Environmental Destination driver decision point and metrics

2.3. Climate Change Impacts

Along with the reductions in deployable output delivered through achieving our Environmental Ambition, we expect that climate change will be the other major supply side driver of reductions in Water Available for use (WAFU).

For our dWRMP24 the climate change impacts have been assessed based on the on UKCP18, RCP8.5 dataset. 28 climate scenarios (based on the regional and global circulation models) have been assessed in our supply forecast to address uncertainty. In the present adaptive pathway, root and branch decision tree, there are 3 different climate change impact forecasts as listed below:

- High Climate Change impact (2035)
- Median Climate Change impact - the root branch from 2025 onwards
- Low Climate Change impact (2035)

These are based on the median, regional severe and low severity outcomes from the regional climate change modelling

2.3.1. Understanding the Impacts of Climate Change

To assess and monitor the impacts of climate change on water supplies we need to take a multifaceted approach to make adaptive planning decisions, including a robust narrative supported by risk assessments, data and complex water resources modelling.

Understanding the latest forecast of climate change is essential and we continue to utilise climatic data, models, reports provided by Met Office and other hydrological data services.

Our approach to monitoring climate change for the purposes of the adaptive planning decisions is based on the following main components:

- dWRMP – Climate Change Vulnerability and impact of Climate Change on water supplies deployable output
- Southern Water Climate Change Adaptation Report 2021
- Met Office data, models and reports.

2.3.2. dWRMP24 Supply Side Climate Change Assessment and Vulnerability Assessment

To determine the supply side impacts of climate change we have followed a consistent approach with all WRSE companies, as set out in WRSE (2021). This included the development of a sub-set of the stochastic climate replicates of rainfall and Potential Evapotranspiration (PET) to create 28 climate change scenarios used within our own and WRSE water resources numerical models.

This approach is described in detail within the dWRMP24 technical report in section 5.3.2 and Annex 8. We have also assessed each of our WRZs vulnerability to climate change impacts of each of our 14 WRZ's. We will report and continue to assess the trends and uncertainty of the impacts of climate change at each Annual Review through reviewing the updates to the latest available UKCP datasets.

Table 5 Summary of Climate Change Vulnerability

Climate Change Vulnerablity	WRZ	Comments
highly vulnerable	HSW, HSE, SNZ and KTZ	Western Area high vulnerability influenced by flow conditions on River Test, Itchen and Rother (will be linked to environmental ambition).
medium vulnerability	SWZ, SBZ, SHZ and KMW	
low vulnerability	HKZ, HAZ, HRZ, HWZ, IOW and KME	

For each WRMP planning cycle we will review the vulnerability of our Water Resource Zones to climate change and where required we will update our forecasts on the potential range of climate change impacts on deployable output through our supply side Water Resource Modelling.

Primarily this will be based on the range of potential changes to precipitation and temperature available in the UK climate projections (UKCP) datasets. We will use a range of projections to explore the uncertainty.

Because of the comparatively long timescales over which climate change is expected to operate (compared to the water resource planning cycle) and the natural variability of the climate we will need to look at projections and trends over several planning cycles to characterise its impact and its effects on deployable output which may be less obviously visible than other climatic events such as extreme weather (e.g. heatwaves, droughts, floods). However, we recognise that these events themselves can also be difficult to directly attribute to climate change alone.

Our adaptive plan branches on the expected Supply impacts we might face under median, and regional “high” and “low” impacts (Table 6). A potential comparison metric would therefore be to use the modelled DO impact of climate change as a metric to assess which climate change adaptive branch we are potentially following.

There remains a large uncertainty in the trajectory of climate change impacts and future trends will be influenced by policy choices, some of which are yet to be made.

Table 6: Summary of forecast climate change impacts on DO (1:500 DYAA Ml/d) and uncertainty by WRZ.

WRZ	2040			2060			2075		
	Median	CC06	CC07	Median	CC06	CC07	Median	CC06	CC07
HAZ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HKZ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HRZ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HSE	-17.92	-28.99	-14.50	-25.08	-40.58	-20.30	-30.46	-49.28	-24.65
HSW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HWZ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IOW	0.24	0.2	0.37	0.34	0.28	0.52	0.41	0.34	0.63
KME	-7.56	-12.49	-13.62	-10.59	-17.50	-19.07	-12.86	-21.25	-23.16
KMW	0.00	0.00	-0.87	0.00	0.00	-1.22	0.00	0.00	-1.48
KTZ	1.96	2.80	2.15	2.74	3.92	3.01	3.33	4.76	3.65
SBZ	0.16	1.86	0.78	0.22	2.60	1.09	0.27	3.16	1.33
SHZ	-1.73	-2.93	-2.53	-2.42	-4.1	-3.55	-2.94	-4.98	-4.31
SNZ	-6.29	-6.63	-6.69	-8.81	-9.29	-9.37	-10.7	-11.28	-11.38
SWZ	0.32	0.63	0.52	0.45	0.88	0.73	0.55	1.08	0.89

We will therefore use the median climate change impacts from our water resource modelling as one guide of the likely trajectory of climate change and will compare that to the range of supply forecast impacts.

2.3.3. Climate Variables

We recently published our Climate Change Adaptation Report which describes the climate risks we face to carrying out our essential services and the mitigations we are developing. It is available on our web page (5670_climatechangeadaptation_2021_v13.pdf (southernwater.co.uk). In our review we've used the latest scientific climate forecasts (UKCP18) for medium and high emissions scenarios in order to understand how prepared we are to deal with potential climate change shocks and stresses.

Our adaptation report highlighted four key climate drivers that we're already experiencing the impacts of, and which we expect to increase in severity and/or frequency over the coming years:

- Increased temperature and more extreme variations in temperature
- Less rainfall or longer dry periods (drought)
- More rainfall, or more intense rainfall (including an increasing number of extreme storms and lightning strikes)
- Sea level rise

For each of these drivers we propose to undertake the following monitoring, both to support our WRMP adaptive planning but also as part of wider climate change monitoring.

Increase in average temperature.

The UKCP18 projections suggest that, in a world of 2°C global mean warming, the UK will experience, on average, 1 to 2°C higher annual temperatures by the end of the century compared to the baseline period (1981–2010). The South East of England will experience higher warming with average summer temperatures increasing by 3 to 4°C relative to the 1981–2010 baseline.

As part of our monitoring we will review and report on the seasonal average mean air temperature for June July and August (summer) compared to long term trends.

Decrease in summer rainfall (drought.)

We expect to see more prolonged periods of reduced rainfall in future, particularly in summer. Changes in seasonal rainfall will potentially affect river levels, with lower river levels in summer impacting water resources and water quality. Below shows projected changes to summer rainfall in the RCP4.5 scenario. By the end of the century, there is a: 50% chance of a 20-30% drier than average summer and a 10% chance of a 50-60% drier than average summer.

We will review and report on the seasonal average precipitation rate for June July and August (summer) compared to long term trends.

More rainfall, or more intense rainfall (increased storminess.)

The frequency of short, high-intensity rainfall events is likely to increase in both summer and winter. Overall, winters are likely to be wetter, potentially resulting in higher groundwater levels and associated flooding and increased flows to Wastewater Treatment Works (WTWs).

By the end of the century for 2°C and 4°C scenarios there is a 50% chance of a 10–20% wetter than average winter and a 10% chance of 50–60% wetter than average winters when compared with a 1981–2010 baseline.

We will review and report on the average precipitation rate for January, February and March (winter) compared to long term trends.

Sea level rise.

Our region has a long coastline and the main centres of population lie along the coast. Some areas are close to current sea level and in a few cases, below mean high water levels. Several borehole sources are relatively close to the shoreline and in conditions of extreme drought are vulnerable to salt water contamination. Sea-level rise is therefore likely to have an impact on our operations, both water and wastewater. Sea levels around the UK, including in the South East, will continue to rise well beyond 2050 under all future emissions scenarios.

We will review and report on the time-mean sea level anomaly which is available from the Met Office State of UK Climate Annual Review and any updates from the UKCP18 related to global and UK sea level predictions.

Heatwave

Extreme heatwaves will become more common and intense in the future. For both climate scenarios, by mid-century a normal summer will reach temperatures of 30–35°C.

We will review and report on heatwaves experienced and use Met Office reports to determine if climate change attributed events are becoming more frequent or changing in intensity.

Met Office

We will use the latest scientific evidence, models and climate data available from the Met Office to help determine if changes to the average weather patterns are being attributed to climate change. The sources for review as part of the adaptive planning monitoring are:

- UK Climate Projection (UKCP) and UKCP18.
  This is the set of tools and data we use to determine statistical climate scenarios and projections. In our dWRMP we are using a range of impacts based on Representative Concentration Pathway (RCP) 8.5 (RCP8.5) taken from UKCP18. This represents a future of high greenhouse gas emission. Presently the Met Office does not have a planned timeline for when the current dataset, UKCP18 will be updated and it continues to be enhanced and upgraded. We will ensure that as we updated our forecast climate change impacts each planning cycle we will adopt the latest available projection dataset from the UKCP or any successor.
- Climate Change Attributions Studies are produced by the Met Office to determine if extreme weather events are caused by climate change, such as the July 2022 heatwave.
- State of UK Climate Annual Review, published by the Met Office in the International Journal of Climatology provides a review of the UK weather and climate for each calendar year within an historical context. It is based on observed climate datasets, assess trends, variations, and extremes.
- WRMP Annual Review – for our WRMP annual reviews we have been reporting on the average temperature and total rainfall levels between April and September from 1910 to 2022 for the South East region of the UK to determine if the year can be classified as

"normal" or "dry" under our planning scenarios. We also now actively use the EA Hydrological Catchment Rainfall series data as part of our drought monitoring and these provide a consistent long term rainfall record back to the 1890's with which we can assess departure from long term trends.

Using data and studies available from the Met office, such as Climate Change Attribution reports, and State of the UK Climate Annual Review we will extend this weather conditions review to consider any weather events attributed to climate change and monitor as outlined in the Climate Change Adaptation Report, including the average summer temperatures, average summer rainfall, and average winter rainfall for the South East. This will help us reflect on any statistically distinct weather and climate conditions experienced.

We will undertake this review each hydrological year (each Autumn) and report its summary findings as part of our annual WRMP reporting. Figure 2.3 summarises then key metrics and decision point for the climate change driver.

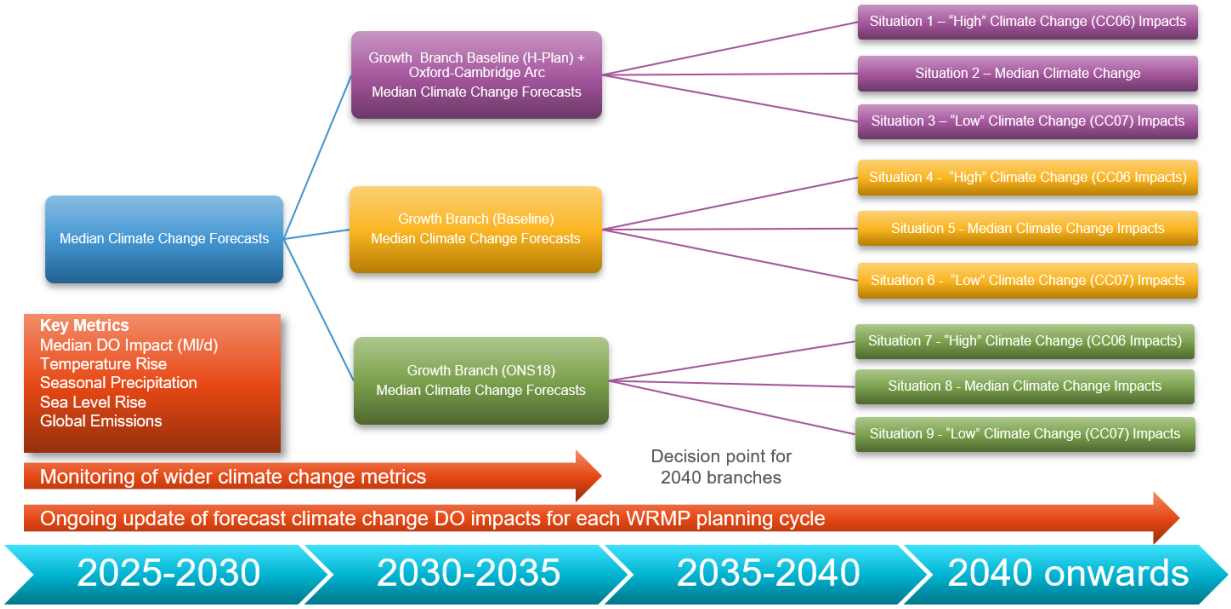

Figure 2.3 Summary of the key metrics and decision points for the climate change driver

3. Our Proposed Timeline for decision points

We combine these three programmes into an integrated table (Table 7 below) which indicates when data from the 3 programmes must be available for future 5 year cycle of WRMPs on when decisions need to be made on the root branch pathway.

Table 7 summary of integrated monitoring plan against required decision points for our adaptive plan

Planning Cycle	Decision Timing	Environment Destination	Growth progress	Climate Change impacts
PR19 / AMP7		WINEP investigations & Options appraisal		Ongoing review of climate variables
PR24 / AMP8	2026/2027 growth data **must** be available to enable decision on the 3 branch decision for target 2030	WINEP investigations & Options appraisal conclusion 2026/2027 WINEP data is available	Water Efficiency Delivery	Ongoing review of climate variables
PR29 / AMP9 - **2030 Target branch for growth**		WINEP & Highest Priority catchments implementation of solutions / or interim measures	Water Efficiency Delivery	Update of resource modelling, impact and vulnerability assessment for WRMP29
PR34 / AMP10 - **2035 Target** branch for environment ambition and climate change impacts		WINEP & Highest Priority catchments implementation of solutions	Water Efficiency Delivery	Update of resource modelling, impact and vulnerability assessment for WRMP34 The Western Area WRZ's highly vulnerability to climate change will partially be determined by environmental ambition outcomes for the R. Test, Itchen & Rother.
PR39 / AMP11		medium priority implementation		
PR44 / AMP12		lowest priority implementation		
PR49 / AMP13 - **2050 Target** for GES		**Good Ecological Status by 2050**		
PR54 / AMP14				
PR59 / AMP15				
PR64 / AMP16				
PR69 / AMP17				

4. Reporting Outcomes

Through our WRMP Annual Review process we will include a section on adaptive planning, where we will reflect and report on growth, environmental destination and climate change impacts in relation to the conditions and scenarios included on the decision tree.

This yearly update will ensure the data is collated and readily available for critical decision points in the WRMP planning cycle such as the pre-consultation, modelling and refinement phases.

We will ensure progress on the adaptive plan is monitored regularly against the 5 year cycle of the WRMP and will provide the necessary framework for consultation and engagement with stakeholders, regulators, and other water companies.

5. Interface with Delivery

The first five years of our adaptive plan identifies the investment needed across all pathways for both a “least cost” and “best value” planning approach. These options will need to be delivered regardless of which future pathway we eventually end up following.

The first five years of the plan will also include any no regrets preparatory work for options that we expect could be needed in future years to keep future options open. This will reduce overall risk for options that are delivered over long timescales.

The investment in water resources that is needed will be included in our Long Term Delivery Strategy for our 2025-2030 business plan.

Our monitoring plan includes annual update of our proposed metrics to allow them to be considered and reported on within our WRMP annual review. The trigger points we have included align with the completion of our WINEP programme for Environmental Ambition and the planning cycle for our WRMP and Business Plan.

6. References

- Edge Analytics, WRSE, 2020 Population and Property Forecasts, Methodology
- Environment Agency WRPG supplementary guidance - Adaptive Planning (published 02/09/2020)
- Southern Water 2021. Climate Change Adaptation Report
- UKWIR, Reference UKWIR, 2016, WRMP 2019 methods – Decision Making Process: Guidelines, Report Ref. No. 16/WR/02/10, UK Water Industry Research Limited.
- UKWIR, Reference UKWIR, 2016, WRMP 2019 methods – Risk Based Planning, Report Ref. No. 16/WR/02/11, UK Water Industry Research Limited.
- WRSE, 2021. Method Statement: Climate Change – Supply Side Methods Updated version August 2021
- WRSE, 2021. Method Statement: Demand Forecast Version 5 August 2021.