FINAL RESOURCES MANAGEMENT PLAN 2024

APPENDIX 5B – INVESTIGATING AND ACHIEVING SUSTAINABLE ABSTRACTION

Portsmouth Water Ltd
PO Box 8
West Street
Havant
Hants
PO9 1LG

October 2024

Contents

List of Figures

List of Tables

1 INVESTIGATING AND ACHIEVING SUSTAINABLE ABSTRACTION

1.1 Introduction

Our supply area operates as a single Water Resource Zone, extending through Hampshire and West Sussex from the River Meon in the West to the River Arun in the East, encompassing 868km^2.

We abstract an average of around 170Ml/d to supply approximately 320,000 properties with clean drinking water. This water is abstracted from one group of springs, one river and 19 borehole sites under abstraction licences from the Environment Agency. These abstractions are all from chalk aquifers.

We recognise the global importance of chalk aquifers and streams within our supply region and are committed to reducing the effects of abstraction on the environment and bringing enhancements where possible. In addition to the priority chalk habitat, our supply region also contains five Special Protection Areas (SPAs); four Special Areas of Conservation (SACs); 32 Sites of Special Scientific Interest (SSSIs); five National Nature Reserves (NNRs) and 26 Local Nature Reserves (LNRs). This is reflected in our vision, which recognises *Sustainable water supplies for our customers, which protect and enhance our environment* as one of our four priority areas.

As a result, our next business planning period Price Review 2024 (PR24) and Water Resource Management Plan (WRMP24) have commitments to firstly assess the effects of our current abstractions and secondly implement mitigation to protect and enhance the aquatic environment. Our work focuses on the following drivers:

1. Restore the effects of potential over-abstraction from aquifers and rivers.
2. Prevent deterioration in environmental status from growth in abstraction.
3. Prevent future deterioration due to environmental changes i.e. linked to climate change. (moving to proactive protection, rather than reactive).
4. Ensure no significant negative effects from proposed options as part of the WRMP24.
5. Prevent negative effects from temporary increases in abstraction (i.e. via drought permits).
6. Ensure our time limited licence variations are sustainable.

These drivers can be mapped to three core workstreams for PR24 which will primarily be delivered via our PR24 Water Industry National Environment Programme (WINEP)[1] and other investigations and assessments we have put forward. These workstreams are:

- Environmental Destination (including Licence Capping) **(WINEP Driver 1-4, Section 1.2)**
- Drought Permit Options **(WINEP Driver 5, Section 1.3)**
- Time Limited Licence Variations **(Driver 6, Section 1.4)**

This appendix has collated all these workstreams in one place to detail our approach to investigating and achieving sustainable abstraction, including our assumptions for our WRMP24 (WRMP24) and how we will manage risk. The appendix also provides additional information and explanation relating to a range of issues raised through the consultation of dWRMP24. This appendix has been structured as follows:

- **Section 1**: Details the background of the sustainable abstraction drivers for WRMP24 for the three core workstreams.
- **Section 2:** Details the WRMP24 planning assumptions for the three core workstreams.
- **Section 3:** Details the investigations, assessments and risk management linked to the three core workstreams

[1] The primary role of the WINEP is to provide information to water companies on the actions they need to take to meet the environmental legislative requirements that apply to water companies in England.

- **Section 4:** Summarises the timescales of the workstreams to feed into future planning.

Whilst not linked to abstraction, for PR24 we will also have the following workstreams linked to the Environment:

- PW08100008 WINEP implementation plan for Invasive non-native species (INNS)
- Continuation of our baseline catchment management work for raw water quality.

Further information is published in our PR24 Business Plan.

1.2 Environmental destination (including licence capping)

Our traditional approach to protecting the environment has been focused on what asset improvements are required in the next 5 to 15 years to deliver the improvements specified by the Environment Agency in the WINEP. Typically, this programme delivered schemes or sought to investigate potential issues with a view to feeding that information into our next WRMP and business plan round. The WINEP provided the actions required in the short-term to be compliant with environmental legislation. This process did not lend itself to considering a more collective longer-term approach for the Water Resource South East (WRSE) region, because it does not account for potential future scenarios including the impact that climate change might have on the availability of water in the longer term.

As a result, the Environmental Destination (including Licence Capping) is a driver that designs to capture the short- and longer-term needs of the aquatic environment via a series of short to longer term licence reductions.

For the rdWRMP24 these possible licence reductions form part of our baseline supply demand balance, which sees Portsmouth Water assume a series of licence reductions by 2050. As a result, a number of demand and supply schemes have been identified as necessary to meet the supply deficit by 2050 (please refer to the main rdWRMP24 for further information). Section 2.2 of this appendix details the licence reduction assumptions (i.e. volumes, profile of reductions) which feed into our rdWRMP24.

Whilst we have identified a scale of possible licence reductions in the rdWRMP24, there is a need to undertake detailed investigations and option appraisals into current abstractions to ensure the possible licence reductions meet the needs of the environment and to understand if they will bring the wider environmental benefits (and what other interventions may be needed). Section 3.2 provides detail on the further assessments and investigations required to quantify these potential licence reductions.

1.3 Drought permit options

Portsmouth Water have a Drought Permit Option in WRMP24 which will be used to support achieving a 1 in 500 drought resilience by 2039/40, with the option used up to and including 2040/41. There are outstanding assessments and reporting to complete to understand the impact of this option. Section 2.3 details the planning assumptions for WRMP24 and Section 3.3 details the further work planned to improve the confidence and acceptability of this option.

1.4 Time limited licence variations

Portsmouth Water has five time limited licence variations which are due for renewal in 2028. These variations are not time limited due to known environmental pressures, however as part of their renewal we are committing to confirming there are no negative environmental effects associated with their use. Section 2.4 details the assumptions in WRMP24 and Section 3.4 details the investigations and planned work to support these assumptions.

2 WRMP24 PLANNING ASSUMPTIONS

2.1 Introduction

Section 1 detailed the key drivers for investigating and achieving sustainable abstraction. Section 2 details the assumptions applied in the WRMP24 baseline supply forecast. The section covers the following key areas of:

- Environmental Destination (including Licence Capping)
- Drought Permit Options
- Time Limited Licence Variations

2.2 Environmental destination (including licence capping) scenarios

2.2.1 Overview

The Environment Agency (EA) completed a longer-term environmental water needs assessment as part of the Water Resources National Framework[2]. This work established a view on the potential licence reductions required by 2050 for rivers to meet their Environmental Flow Indicators (EFI). Unless proven to the contrary by local data driven evidence, the EA consider meeting EFI to be a requirement for a river achieving or maintaining "good ecological status". The EFI is defined by an Abstraction Sensitivity Band (ASB) allocated to each waterbody; ASB1 represents low sensitivity water bodies and under low flow conditions the percentage of allowable abstraction from natural flows is 20%; ASB2 water bodies are moderate sensitivity (15%); and ASB3 water bodies are high sensitivity (10%).

In response to the Framework, WRSE developed an environmental ambition method to establish a series of alternative longer-term 'futures' which can be used to derive an adaptive regional plan and hence identify a series of pathways through which these different outcomes might be delivered in practice. These futures represent different anticipated levels of environmental protection, which will help to move towards planning for proactive protection rather than retrospective remediation. The WRSE approach allows the issues to be mapped out and schemes to be identified to deliver water resource benefits that can be put forward by water companies to improve the resilience of the environment against future scenarios. This is a step change in approach from previous plans.

The sections below provide further information on how the approach to the environmental destination has evolved from that used for the WRSE emerging regional plan through to our WRMP24.

2.2.2 Approach to developing environmental destination for the WRSE emerging regional plan

WRSE used the EA Framework to inform the plausible environmental scenarios in the emerging regional plan, which was released for consultation in January 2022 (read more about the emerging plan here). Four scenarios were analysed during the development of the WRSE emerging regional plan:

- **Business as usual (BAU):** the same percentage of natural flows continues for the future. "Uneconomic" waterbodies, where reducing abstraction would imply a significant investment, were initially discarded. However, an additional scenario (BAU+) including them has been subsequently incorporated following local verification by the Environment Agency. For companies in other regions, local verification has sometimes reduced sustainability reduction figures. However, for Portsmouth Water the local verification resulted in higher levels of sustainability reductions. This has been discussed further with the Environment Agency, and we

[2] https://www.gov.uk/government/publications/meeting-our-future-water-needs-a-national-framework-for-water-resources

have been advised this is valid, as it reflects the high pressures on water resources in the Southeast of England and the presence of sensitive Chalk catchments.

- **Enhance:** a greater environmental protection for protected areas and Sites of Special Scientific Interest (SSSI) rivers and wetlands, and principal salmon and chalk rivers is achieved by applying the most restrictive ASB.
- **Adapt:** same ASB as BAU but a recovery to a lower standard is assumed in some heavily modified waterbodies.
- **Combine:** balances a greater environmental protection for protected areas, SSSI rivers and wetlands and principal salmon and chalk rivers with a view that good status (as defined under the Water Framework Directive) cannot be achieved everywhere in a shifting climate. Hence, adopts the Enhance ASB with a lower recovery to the EFI in some heavily modified waterbodies.

WRSE analysed the impact of these scenarios on the supply-demand balance of our region's water resource zones by establishing the potential changes to licensed quantities and therefore abstraction quantities. For Portsmouth Water, the reductions in abstraction ranged between 12 and 48 Ml/d, which were then used as a proxy for reductions in deployable output.

For the purpose of investment modelling and adaptive planning towards the development of the emerging regional plan, four environmental destinations were taken forward. This included the BAU+ (locally verified) and Enhance scenarios described above, but also two additional scenarios named 'Central' and 'Alternative'. Together, these were considered to reflect a suitable range of uncertainty in environmental destination. For Portsmouth Water, the plausible deployable output reductions used in the investment model and within the adaptive planning branches ranged between 6.1 Ml/d and 48.3 Ml/d.

Further detail on the assessments described above for the WRSE emerging regional plan is provided in Annex A and B of this document.

2.2.3 Approach to developing environmental destination for the WRSE draft regional plan and our dWRMP24

For the WRSE draft regional plan and our dWRMP24, we further developed the 2050 environmental destination scenarios using our Pywr water resources model and discussions with local and national leads in the Environment Agency. The scenarios also considered Environment Agency April 2022 guidance to water companies on its licence capping approach, which aims to prevent deterioration of water bodies under the Water Framework Directive (WFD) through licence reductions. A summary of our activities is provided below:

- October 2021: A meeting with the local Environment Agency team to discuss abstraction growth factors, WRSE environmental destination assumptions and a plan to develop agreed scenarios for testing within our new Pywr water resources model.
- November 2021: A meeting with the local Environment Agency team to discuss proposed 'High' and 'Medium' environmental destination scenarios for testing within Pywr. This included refinement of indicative licence reductions on an abstraction source basis for use within the model. The 'High' scenario was based on the ambitious Enhance and BAU+ (locally verified) scenarios. The 'Medium' scenario was proposed by us and refined with the Environment Agency; it assumes licence reductions that, at a water resource zone level, are representative of the BAU scenario described earlier.
- December 2021: We reviewed outputs from the Pywr model with the local Environment Agency team.
- January 2022: Through consultation with local Environment Agency and the WRSE Environment Agency representative, we agreed 'High', 'Medium' and 'Low' environmental destinations for use within the WRSE adaptive planning and investment model. This included the development of stepped profiles for sustainability reductions, with initial reductions commencing in the early 2030s and final reductions occurring around 2050.
- February 2022: We uploaded our environmental destination profiles to WRSE for modelling.

- April 2022: We reviewed new guidance from the Environment Agency on its approach to licence capping and completed an in-house assessment of how our abstraction licences might be impacted, including identification of priority catchments for action.
- May 2022: Our Pywr model was used to understand the impact of the early 2030s licence capping relative to the 2050 environmental destination. We presented the results of the modelling and our initial catchment prioritisation work to the local Environment Agency. We also provided WRSE with new environmental destination profiles (incorporating licence capping) for use within the adaptive planning and investment model.
- June 2022: Following additional Pywr modelling and discussions with the local Environment Agency and the WRSE Environment Agency representative, we submitted final environmental destination profiles (incorporating licence capping) to WRSE.

The final environmental destination profiles used within the WRSE adaptive planning and investment model assumed the following:

- Initial deployable output reductions of around 5.5 Ml/d occurred in 2028–29, rising to 11 Ml/d by the early 2030s and 22 Ml/d by the late 2030s (for a 1-in-500-year drought condition). This represented our best estimate of licence capping impacts to prevent deterioration of water body status and the 'low' environmental destination pathway.
- The adaptive planning then assumed a decision is made in 2035 on the long-term environmental destination, with branching to allow us to follow either a 'low', 'medium' or 'high' destination. These destinations resulted in deployable output reductions of 26 Ml/d, 52 Ml/d and 107 Ml/d by the early 2050s, respectively. The impacts are greater than in the WRSE emerging plan because we used our Pywr model to translate the impact of licence reductions into an impact on water resource zone deployable output, which is the appropriate metric for water resources planning. The Pywr model is able to take into account the Hands Off Flow conditions on the River Itchen, which significantly reduces the availability of water for abstraction during droughts.

WRSE and Portsmouth Water were ambitious, selecting as our core, a pathway to the 'high' environmental destination scenario, consistent with the Environment Agency's BAU+ (locally verified) and enhanced scenarios. However, the environmental destination is very uncertain and the WRSE adaptive planning approach allows for this. We still considered different levels of long-term environmental destination ('high', 'medium' and 'low'), so that we can better adapt to a changing timetable for implementation and / or changing depth of deployable output sustainability reductions in the future to ensure protection for the environment.

Through the inclusion of the environmental destination scenarios within our process, we will deliver improved protection for the environment. This includes achieving and maintaining sustainable abstraction to 2050 (and beyond), taking account of climate change impacts and future demand for water.

2.2.4 Key consultation feedback on our dWRMP24 environmental destination

We consulted on our draft WRMP24 between 15 November 2022 and 20 February 2023. The key themes within the consultation responses are described below.

- Stakeholders have urged water companies to strengthen environmental protections and to go beyond mandated targets with respect to implementation of licence reductions. This includes earlier completion of WINEP investigations and options appraisals in addition to earlier licence reductions.
- Water company plans must drive environmental improvements with the aim to fully restore past damage, including over abstraction, noting that the environmental destination will restore flows.

We have considered this consultation feedback when shaping our revised environmental destination and our proposals for the WINEP investigations and options appraisals.

2.2.5 Updated environmental destination for our final WRMP24

Since the draft WRMP24 we have continued to review the environmental destination scenarios with the Environment Agency. Furthermore, we have considered the consultation feedback on our draft WRMP24.

Revisions to the potential magnitude of sustainability reductions

Since the draft WRMP24 we have updated the environmental destination licence assumptions for the low, medium and high scenarios. In the low scenario we have increased licensed quantities for three groundwater sites and our surface water site because they were incorrectly more constrained than the high scenario. Conversely, we have also reduced licensed quantities for our surface water site in the medium and high scenarios and raised the 'Hands off Flow' condition to better reflect the findings of the AMP7 investigations.

We shared the revised licence assumptions with local and national Environment Agency staff on 26 January 2023. In a meeting with the Environment Agency on 30 January 2023 there were no objections to the revised assumptions. The Environment Agency used an in-house tool to test our high scenario and the results indicated that it is likely to meet the objectives of its 'BAU+' and 'Enhanced' scenarios.

The licence assumptions were entered into a new joint Southern Water and Portsmouth Water Pywr model to recalculate the deployable output impacts, which were found to range between 39 Ml/d and 144 Ml/d depending on the scenario. Further detail is provided in Section 2.2.6 below. The impacts are greater than those in the draft WRMP24, largely driven by WINEP related adjustments to the licence assumptions for our surface water source.

Bringing forward potential sustainability reductions

We have considered requests to bring forward potential sustainability reductions within our environmental destination scenarios, including the point at which we move from a 'low' to a 'high' environmental destination (2039-40 in the draft WRMP24).

With respect to our own abstractions, we are working with the Environment Agency to manage these and the associated WFD no deterioration risks within Chalk catchments. Our short-term opportunity to control the amount we abstract from Chalk groundwater and surface water is to implement compulsory smart metering, which will allow us to reduce leakage and the overall demand for water. We are planning to roll out smart metering at the earliest opportunity, reaching completion by the mid-2030s. The success of our smart metering programme and the Government-led water efficiency interventions in reducing leakage and Per Capita Consumption (PCC) will have a strong influence on the timing of sustainability reductions in the 2030s; as will the rate of future housing growth. Through our annual reviews, we will monitor progress over time to determine whether the rate of potential sustainability reductions can be increased.

In addition to reducing demand for water into the 2030s, there are supply side options that can replace some of the existing Southern Water abstractions in the River Itchen and River Test catchments. These have been subject to adjusted implementation timescales for the final WRMP24:

- As Southern Water's Hampshire Water Transfer and Water Recycling Project (HWTWRP) has progressed, so too has the understanding of the risks and challenges involved in the delivery of such a large and complex infrastructure project. A detailed and comprehensive evaluation of the risks has been produced for the project, resulting in a forecast delivery in 2034 now considered the realistic date for the HWTWRP (compared with 2031 in Southern Water's draft WRMP24). Southern Water is working closely with regulators and other partners making every effort to mitigate these risks and deliver the project as quickly and efficiently as possible.

- We are currently building Havant Thicket Reservoir to allow Southern Water to reduce its abstractions within the Test and Itchen Chalk catchments. However, it takes time to build and fill a reservoir. It is now estimated to provide benefit from 2031-32 in the final WRMP24 instead of 2029-30 in the dWRMP24. The delay is the result of an opportunity to future proof the pipeline tunnel included within the approved scheme to accommodate the HWTWRP. The pipelines put inside the single tunnel would only initially be used by us to fill the reservoir with spring water and take water out again. They would not be used for recycled water unless, and until, the HWTWRP has received the official go ahead to proceed and has been constructed.

The change to implementation timescales, combined with the delivery risks associated with the ambitious smart metering programme and Government-led water efficiency interventions, is such that it will not be possible to bring forward sustainability reductions in the earlier part of our plan. Instead, it has been considered necessary to postpone the reductions in the late 2020s within the dWRMP24 into the 2030s within our final WRMP24. However, as previously stated, we will monitor progress over time to determine whether the rate of potential sustainability reductions can be increased.

A further constraint on bringing forward sustainability reductions is the need to investigate and confirm the licence reductions that are required as part of a best value solution for the environment. This includes reviewing environmental flow indicators to check they are suitably calibrated to support 'good' ecological status under the Water Framework Directive.

We have used the WRSE regional investment model to demonstrate that delaying sustainability reductions in the final WRMP24 is appropriate, via a sensitivity test. We applied a 17 Ml/d sustainability reduction from 2028-29 associated with the non-renewal of time limited licence variations, which effectively brings forward possible reductions under the environmental destination. This scenario solved within the model (i.e. water could be moved around so that the balance of supply and demand was maintained). However, this was only achieved by decreasing treated water exports to Southern Water with an equivalent increased reliance on Southern Water drought permits and orders to take more raw water from the Rivers Itchen and Arun. Whilst this would reduce the risk of impact of abstraction on the environment within the water catchments in our supply area, it would increase the risk of impacts within catchments in Southern Water's supply area. We will explore the need for a 'Regulation 19' approach as part of our AMP8 time limited licence investigations and assessments (see Section 3.4 for further information).

The WRSE regional investment model has demonstrated that our proposals are already ambitious in the earlier part of our WRMP24. We would not be able reduce abstractions in our highest priority catchments, such as the River Ems, until the 2030s. However, we have reviewed the potential to increase our ambition in the 2040s and 2050s.

Longer term opportunities to reduce local abstractions involve (i) receiving a treated bulk supply (an import) from Southern Water and (ii) increasing our take from Havant Thicket reservoir, supported by Southern Water's HWTWRP. Both options are dependent on the development of strategic schemes in the wider WRSE region that can supply Southern Water's Hampshire supply zones, freeing up water to supply our own customers. The South East Strategic Reservoir Option (SESRO) is identified as a key new supply of water in the revised draft WRSE regional plan, although it cannot be implemented until 2039-40 at the earliest. This means it will not be possible to bring forward the point at which we move from a 'low' to a 'high' environmental destination (2039-40).

The above notwithstanding, we have been able to increase our ambition in the 'medium' and 'high' environmental destination scenarios by reaching the full extent of possible sustainability reductions in 2044-45 and 2049-50 respectively, compared with 2053-54 in the dWRMP24. This is possible through increasing our reliance on the HWTWRP and the use of recycled water.

As we enter our next round of water resource planning (WRMP29), we plan to review all of our options appraisal work to date as well as considering new options such as moving our abstraction

locations lower down catchments, developing new surface water storage, and changing the levels of service we offer our customers. This may provide an alternative view of the best solution for the 2040s and beyond.

Bringing forward the programme of WINEP investigations and options appraisals

We need time and resources to investigate our catchments and use local data to define the 'sustainable' level of abstraction from each. That will allow the actual quantification of the impact of catchment licence capping and environmental destination requirements.

Working closely with our local and national Environment Agency colleagues, to enable adaptive planning within our WRMP24 and Business Plan, we have estimated the total impact of environmental initiatives to protect the Chalk to range between 39 Ml/d and 144 Ml/d. For context the average amount of water we currently need to put into supply is 170 Ml/d in the winter, rising to a peak of 240 Ml/d in a summer heatwave.

The range in potential reductions is obviously significant and drives very different investment scenarios in the WRMP24, so it is vital we achieve a higher degree of certainty to allow the necessary detailed planning to occur. That is why in our WINEP submission we are proposing our largest ever round of environmental investigations to get that necessary certainty.

The investigation programme we are proposing is not just looking at water quantity as a factor in the ecological status of a waterbody but intends to look holistically at water quality and habitat as well as water quantity. This will identify all the interventions necessary to protect our surface waters and catchments, potentially giving us opportunities to improve the status of waterbodies whilst retaining abstraction from our current sites.

With the timing of future planning cycles, we only have a short 2-year window to deliver these investigations to have time to encompass their conclusions into WRMP29 and PR29. Because every single one of our current sources derive water from the Chalk aquifer, our investigation programme needs to cover every one of our sites (21 sites assessed across 10 catchment units).

Managing the risk of WFD deterioration

The Environment Agency raised concerns about how the risk of WFD deterioration will be managed. We have now included a monitoring plan within our WRMP24 (see Appendix 10A of the WRMP). This includes an annual review of catchment abstractions including comparison with 'recent actuals' (the WFD related baseline).

Since the draft WRMP24, and within the WRSE investment model, we have capped the 21 Ml/d Havant Thicket related bulk supply to Southern Water to a small 'sweetening' flow of 1 Ml/d in a normal year (a typical year) scenario. We have also set the normal year benefit of the Source O Booster Upgrade option at zero Ml/d. Both adjustments more accurately reflect the proposed method of operation of the new system and also help to alleviate WFD related concerns.

In addition, we have explored the impact of restricting the normal year transfer rates for existing bulk supplies to Southern Water to realistic historic levels in the model via sensitivity testing. This is a more realistic representation of the real-world in the model and helps us to demonstrate that planned/existing bulk transfers to Southern Water (including the QRST Group) will not lead to increases in abstraction that could cause deterioration of water bodies under the WFD.

The sensitivity testing indicated that our existing 15 Ml/d export to Southern Water's Sussex North zone in the east can be restricted to 2.5 Ml/d in a normal year without causing deficits (a loss of supply to customers) in the supply demand balance of that zone. This is achieved by Southern Water increasing the output from a water recycling scheme and increasing other bulk imports. The sensitivity test indicates that the risk of deterioration of water bodies under the WFD is low.

The sensitivity testing indicated that our existing 15 Ml/d export to Southern Water's Hampshire zones in the west can be restricted to 2.5 Ml/d in a normal year scenario in most future years without causing deficits (a loss of supply to customers) in the supply demand balance of that zone. The exception is 2025-26, 2026-27 and 2027-28, where there are 9.2 Ml/d, 9.9 Ml/d deficits and 9.5 Ml/d, respectively.

A third sensitivity test was completed where both east and west existing exports were constrained to 2.5 Ml/d in a normal year (an 'in-combination' run). This gave the same results as the 'individual' runs described above, with no deficits in the Sussex North zone, and deficits in the Hampshire zones during 2025-26, 2026-27 and 2027-28.

The sensitivity testing indicates that abstractions and exports will need to be carefully managed to mitigate the risk of water body deterioration during AMP8. We will work with Southern Water and the Environment Agency to achieve this and will be a parameter we monitor in our monitoring plan (Appendix 10A). We will also report upon the bulk exports annually to regulators via the WRMP Annual Return.

Link to Ofwat common reference scenarios and Business Plan Long Term Delivery Strategies

In April 2022 Ofwat published its final guidance on what water companies should include in their long-term delivery strategies (LTDS), as part of their Business Plan submissions[3]. A number of 'Common Reference Scenarios' were developed, including a high and low scenario for abstraction reductions.

The Water Resources Planning Guideline[4] states that water companies should consider links between their WRMPs and Business Plans, including common reference scenarios. For this reason, we describe how our environmental destination scenarios map over to the Ofwat abstraction reduction scenarios.

For the Ofwat 'low abstraction reductions scenario' water companies should "assume only currently known legal requirements for abstraction reductions up to 2050". Our low environmental destination scenario is aligned with this Ofwat scenario, because it includes our best estimate of the licence capping that is required to prevent deterioration of water bodies under the Water Framework Directive.

For the Ofwat 'high abstraction reductions scenario' water companies in England should "use a scenario aligned with the Environment Agency's 'enhanced' scenario". Our high environmental destination scenario is aligned with this Ofwat scenario, because it is representative of the Environment Agency's 'enhanced' and 'BAU+' scenarios for our supply area.

Our WRMP24 and a wider range of WRSE model runs has been used to inform our Business Plan submission, which was submitted in October 2023.

2.2.6 Possible licence and deployable output changes

Table 2 presents the potential licence changes per individual abstraction source under the low to high environmental destination scenarios by 2050 in mega litres per day (Ml/d). These are the settings that were applied within the joint Southern Water and Portsmouth Water Pywr model to calculate deployable output impacts. These environmental destination licence settings are not requested within the regulator's WRMP24 table template and therefore they do not appear within our WRMP24 tables.

Table 1 presents the deployable output impacts of each environmental destination scenario at a water resource zone level by 2050, derived from Pywr modelling that uses the Table 2 licence settings. The Table 1 value of -122.23 Ml/d in the 'High (1 in 500 year)' row and the 'Possible impact on Portsmouth Water Average DO (Ml/d)' column matches the value in the WRMP24 tables (table 3a,

[3] https://www.ofwat.gov.uk/publication/pr24-and-beyond-final-guidance-on-long-term-delivery-strategies/
[4] https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline

row 7.3BL) for 2049-50. This confirms that our WRMP24 reported pathway follows the high environmental destination.

Table 1: Potential Portsmouth Water licence and deployable output changes under the high, medium, and low environmental destinations by 2050 in mega litres per day (Ml/d)

Scenario	Current Licence	Possible Licence	Portsmouth Water Average DO, excluding environmental destination (Ml/d) **	Possible Portsmouth Water Average DO, including environmental destination (Ml/d) ***	Possible impact on Portsmouth Water Average DO (Ml/d)
High (Normal year)	321.56	149.42	270.09	126.08	-144.01
High (1 in 500 year)	321.56	149.42	236.29	114.06	-122.23
Medium (Normal year)	321.56	219.10	270.09	187.45	-82.64
Medium (1 in 500 year)	321.56	219.10	236.29	165.88	-70.41
Low (Normal year)	321.56	237.27 *	270.09	208.02	-62.07
Low (1 in 500 year)	321.56	258.37 *	236.29	197.59	-38.70

***** The low environmental destination assumes there is a higher dry year licensed quantity, allowing increased abstraction relative to a normal / typical year.

** Includes AMP7 improvements, Southern Water River Itchen drought orders, temporary use and non-essential use bans, Havant Thicket reservoir and Source O booster upgrade. Excludes Source S drought permit. Abstraction ceases when River Itchen flows at Riverside Park gauging station reduce to 150 Ml/d and those at Allbrook and Highbridge gauging station reduce to 160 Ml/d.

*** Includes AMP7 improvements, temporary use and non-essential use bans, Havant Thicket reservoir and Source O booter upgrade. Excludes Source S drought permit and Southern Water River Itchen drought orders. Abstraction ceases when River Itchen flows at Riverside Park gauging station reduce to 220 Ml/d and those at Allbrook and Highbridge gauging station reduce to 224 Ml/d.

Table 2: Potential Licence changes per source under the low to high environmental destinations by 2050 in mega litres per day (Ml/d)

Source	WINEP investigation catchment	Current Licence	Possible licence (low destination – normal year)	Possible licence (low destination – 1 in 500 year)	Possible licence (medium destination)	Possible licence (high destination)
Source U	08PW100001	0.00	0.00	0.00	0.00	0.00
Source O	08PW100011	8.00	5.10	6.09	3.00	0.75
Source P	08PW100011	10.25	8.71	8.71	10.25	8.71
Source M	08PW100010	6.39	3.60	4.07	3.40	1.67
Source L	08PW100010	20.87	13.60	15.26	13.02	7.30
Sources QRST **	08PW100009	28.38	20.60	27.11	19.41	7.74
Source A*	08PW100005	43.61	26.00	32.70	26.00	21.00

Source	WINEP investigation catchment	Current Licence	Possible licence (low destination – normal year)	Possible licence (low destination – 1 in 500 year)	Possible licence (medium destination)	Possible licence (high destination)
Source D	08PW100004	1.75	1.75	1.75	1.75	1.75
Source C	08PW100004	18.76	18.70	18.76	15.00	7.04
Source E	08PW100002	0.45	0.10	0.10	0.00	0.00
Sources GFH	08PW100002 08PW100003	18.14	11.20	13.17	10.45	7.94
Source J	08PW100003	22.73	9.60	10.74	9.05	3.07
Source I	08PW100003	5.59	0.84	1.92	1.50	0.84
Source B ***	09PW100004	98.00	85.00	85.00	85.00	70.23
Source N	08PW100001	27.27	21.10	21.62	9.90	0.00
Source K	09PW100004	11.37	11.37	11.37	11.37	11.37
Total	n/a	321.56	237.27	258.37	219.10	149.42

* Abstraction from Source A follows a monthly limit profile. The current licence assumes 45.5 Ml/d Oct - May; 44.3 Ml/d June; 41.1 Ml/d July; 40.6 Ml/d August and 39.2 Ml/d September. The 'high' environmental destination scenario for the draft WRMP24 assumed 45.5 Ml/d October to May and 32.7 Ml/d June to September. For the final WRMP24 we have assumed a lower potential annual licence to better represent WINEP investigation findings and 2010-15 actual abstraction (21 Ml/d). We have also assumed higher WINEP related Hands off Flows (HoFs) (224 Ml/d for Allbrook and Highbridge and 220 Ml/d for Riverside Park), which reduces the amount of time we can abstract water. Furthermore, we have assumed that all Southern Water River Itchen drought orders will no longer be utilised.

** The Source S drought permit is excluded from the high environmental destination scenario as it is assumed permits will not be in use beyond the early 2040s.

*** The high environmental destination scenario assumes that Havant Thicket reservoir has been built and continues to be reliant on spring flows at Source B to help maintain levels in the reservoir.

We have undertaken initial testing to identify whether network interconnectivity is exacerbating the overall impact of licence reductions. We checked licence utilisation, and where spare licence remained. We then introduced theoretical network connections into the Pywr model to attempt to optimise licence utilisation.

This exercise demonstrated that most of the estimated impact of environmental destination on deployable output (as shown in Table 1) is the result of licence reductions. However, up to 10% of the impact might be reduced through network improvement schemes. We will explore this further via our comprehensive AMP8 WINEP option appraisal (see Section 3.2.1.3) and WRMP29 water resource zone integrity assessment. If appropriate, we will develop network improvement schemes for inclusion within our next WRMP (WRMP29) and business plan (PR29), to be funded via the appropriate investment driver.

2.2.7 Profiles of possible sustainability reductions

The adaptive planning approach within the WRMP24 explores a range of potential futures with respect to environmental destination. However, as per the draft WRMP24, all profiles begin with

sustainability reductions under a low environmental destination scenario, which seeks to address WFD no deterioration risks.

The low environmental destination scenario represents potential 'licence capping' impacts, which are entered into Row 7.3 BL of our WRMP24 tables. The impacts are not applied within Row 7.2 BL, because at this time we do not have any 'confirmed' deployable output reductions associated with WINEP or time-limited licence conditions. However, data in both 7.3BL and 7.2BL are applied to the WRMP24 baseline and addressed by the WRMP24 preferred plan.

The WRMP24 assumes that a decision on the environmental destination (high, medium or low) will be made as part of WRMP 2034 (WRMP34). This is the cause of the jump in sustainability reductions at the end of the 2030s on the profiles in Figure 1.

Three of the adaptive planning futures (situations 3, 6 and 9) assume that there are no further sustainability reductions once the low environmental destination has been reached. However, the remaining futures in Figure 1 assume that further sustainability reductions are applied, with situations 2, 5 and 8 reflecting a medium environmental destination and 1, 4 and 7 reflecting a high environmental destination. Of these, situation 4 is the reported pathway for our WRMP24 and is used to help define our preferred plan.

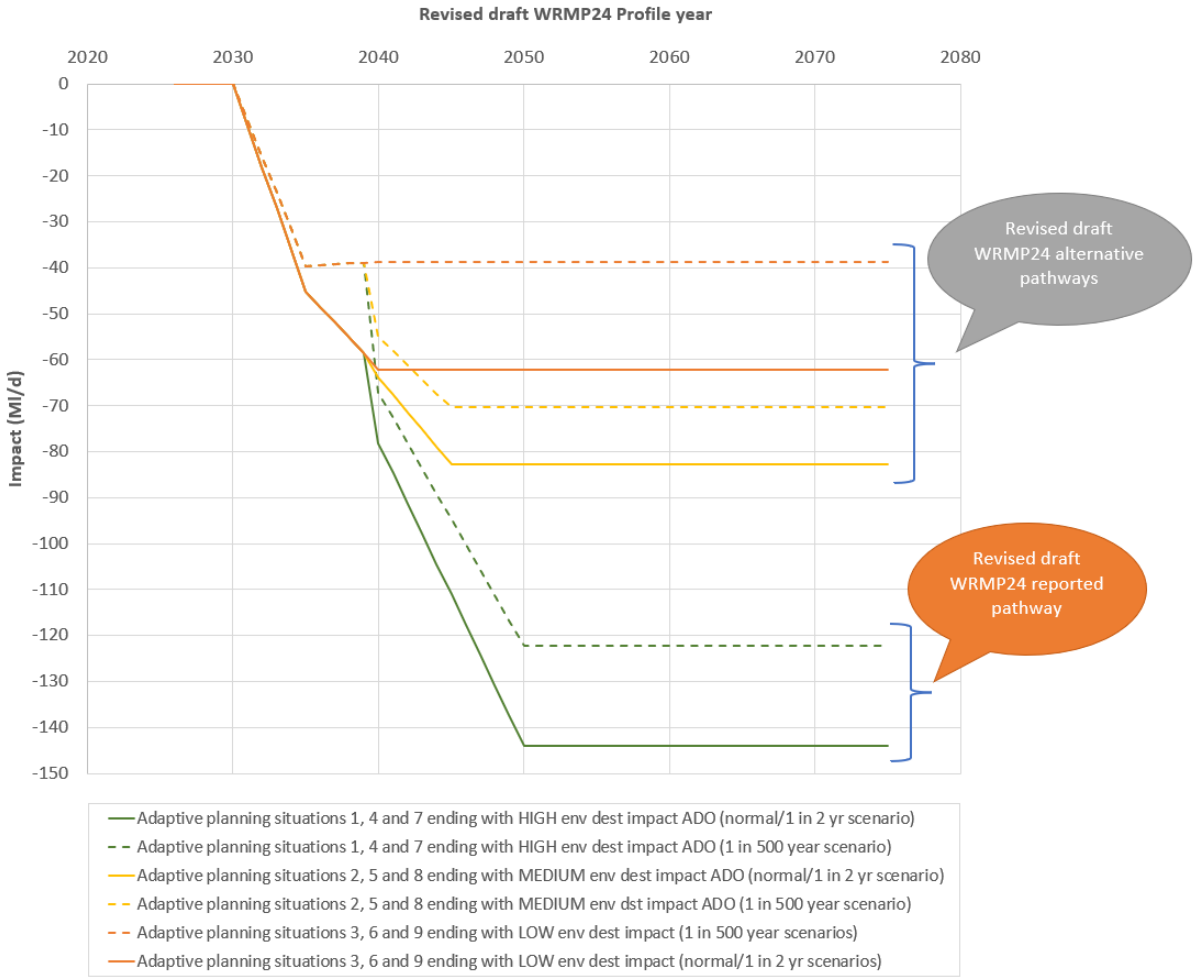


Figure 1: Alternative and reported pathways for environmental destination

2.2.8 Benefits of sustainability reductions

The sections above detail the possible licence reductions which are detailed in the WRMP24. Prior to the WINEP investigations, it is not possible to fully quantity the benefits of these reductions, but the expected benefits would be improved ecological potential or status and resilience due to increased water within the environment. The WINEP investigations will seek to quantify the expected benefits of the sustainability reductions and seek to maximise the benefits via the review of catchment and nature-based solutions. We will seek to establish the expected environmental outcomes prior to the WINEP investigations starting.

2.3 Drought permit options

We have one drought permit option (Source S) in our WRMP24 which we would seek to use to meet a 1 in 500 drought resilience until 2040/41. As part of our work to be Drought Application Ready, we have prepared an Environmental Assessment Report (EAR) which has been provided to the Environment Agency. The document details the possible environmental effects of the option implementation and what mitigation could be required.

Further assessment on the expected yield, environmental impact and mitigation is required, including use of the Environment Agency's recently updated East Hampshire and Chichester groundwater model. In our WRMP24 we have assumed that we can achieve similar yields to those proved in the 1990s, and that the drought permit will be granted. The approach to addressing data gaps and risks is provided in Section 3.3.

We ran two sensitivity tests within the WRSE investment model to understand the reliance of our plan upon the drought permit option. The first reduced the benefit of the option by 50% and the second excluded the option from our plan altogether.

Both runs failed to solve, demonstrating our reliance upon this option at the start of WRMP24 to maintain resilience to extreme drought. A single year (2025-26) with a deficit appeared in both the '50%' benefit and 'exclude' runs, with a magnitude of 1.7 Ml/d and 3.4 Ml/d, respectively. In later years the loss of part or all the drought permit is replaced by bringing forward the implementation year of the Source O booster upgrade to release conjunctive use benefits associated with Havant Thicket Reservoir; from 2033-34 to 2032-33. We will reassess the benefits of implementing the Source O booster upgrade in an earlier year as part of our next WRMP (WRMP 2029).

2.4 Time limited licence variations

As detailed in Section 1, we have five time limited licence variations which expire on the 31/03/2028. Within our WRMP24 baseline we have assumed that these time limited variations are renewed. There is an interdependency between the renewal of these licenses and the findings of our catchment investigations, with the investigation findings providing evidence to support the renewal applications.

These licences are summarised in Table 3 which detail the assumptions used in WRMP24. Overall, some variations increase abstraction in comparison to the non-time limited licence component (and therefore increase deployable output) and some reduce abstraction and/or water available for public water supply (and therefore reduce deployable output in comparison to the non-time limited licence).

We have accounted for the risk of time limited licences not being renewed via sensitivity analysis which assumes the time limited licence is not renewed. This is covered via supporting Appendix 9A although a summary of the outcomes has already been provided in Section 2.2.5; it is considered that the non-renewal of the licence variations would increase the need for Southern Water drought orders and permits in the River Itchen and Arun catchments.

We are committed to ensuring these time limited variations are sustainable and therefore within Section 3.4 we detail the planned investigations and assessments to confirm this.

Table 3: Summary of the time limited licence variations

Licence	Source	Variation	Influence on WRMP24
10/41/520101	Source U	Variation has a condition for an hourly abstraction rate of 126 cubic meters. The variation also reduces the daily and annual abstraction volumes from 4,545 and 1,363,636 to 3,024 and 1,103,760 cubic meters respectively. Furthermore, the variation allows the source to be used for river augmentation purposes (River Ems).	Supply forecast uses the lower abstraction rate and continued river augmentation i.e. we assume renewal of the variation.
10/41/542108	QRST Group.	The variation allows for an increase in the aggregate daily licence quantity from 31,000 cubic meters a day to 41,000 cubic meters per day. The time limited variation does not alter the annual licenced quantity.	Supply forecast uses the higher abstraction rate i.e. we assume renewal of the variation.
11/42/25.2/50	Source C	Variation allows for abstraction from an additional borehole and increased daily abstraction rate from 28,000 to 31,500 cubic meters per day. There is no change in annual volume.	Supply forecast uses the higher abstraction rate i.e. we assume renewal of the variation.
11/42/28.3/15	Source F & G	Variation allows for abstraction from an additional borehole, but there is no change in daily abstraction or annual abstraction volumes. The variation also allows the source to be used for river augmentation (River Meon).	Assume use of the additional borehole is continued along with river augmentation i.e. we assume renewal of the variation.
SO/041/0027/004	Source N	The variation is for an augmentation into the River Ems at 13 litres second when river flows fall below 15 l/s and continue until natural flow exceeds 38 l/s. When augmentation is active, abstraction is halted from the source.	Supply forecast assumes a reduced public water supply due to augmentation i.e. we assume renewal of the variation.

3 INVESTIGATIONS AND ASSESSMENTS

3.1 Introduction

This section details the proposed investigations and assessments put forward over Assessment Management Plan 8 (AMP8) (2025-3030) and AMP9 (2030-2035) to support the WRMP24 planning assumptions as detailed in Section 2 and to detail our approach for achieving sustainable abstraction.

3.2 Environmental destination (including licence capping) assessments

Section 2.2 details the possible licence reductions which feature in the WRMP24. To quantify these licence reductions, we are proposing a range of catchment based, water resource investigations over AMP8 and AMP9 to assess the short- and longer-term sustainability reductions identified in the WRMP24 baseline.

The investigations will assess the extent of licence reductions (and Deployable Output loss) and what other nature-based solutions could be implemented to maximise environmental benefits. These investigations will be delivered via the WINEP and covers all abstraction sources in our region. These investigations have a range of drivers which include WFD, Environmental Destination and designated site drivers (i.e. Habitats Directive, NERC and SSSI).

The catchment-based investigations put forward for Environmental Destination are included in Table 4 and presented visually in Figure 2. All Portsmouth Water abstraction sources will be investigated which will inform any short to longer term sustainability reductions in abstraction and identify what other interventions are needed.

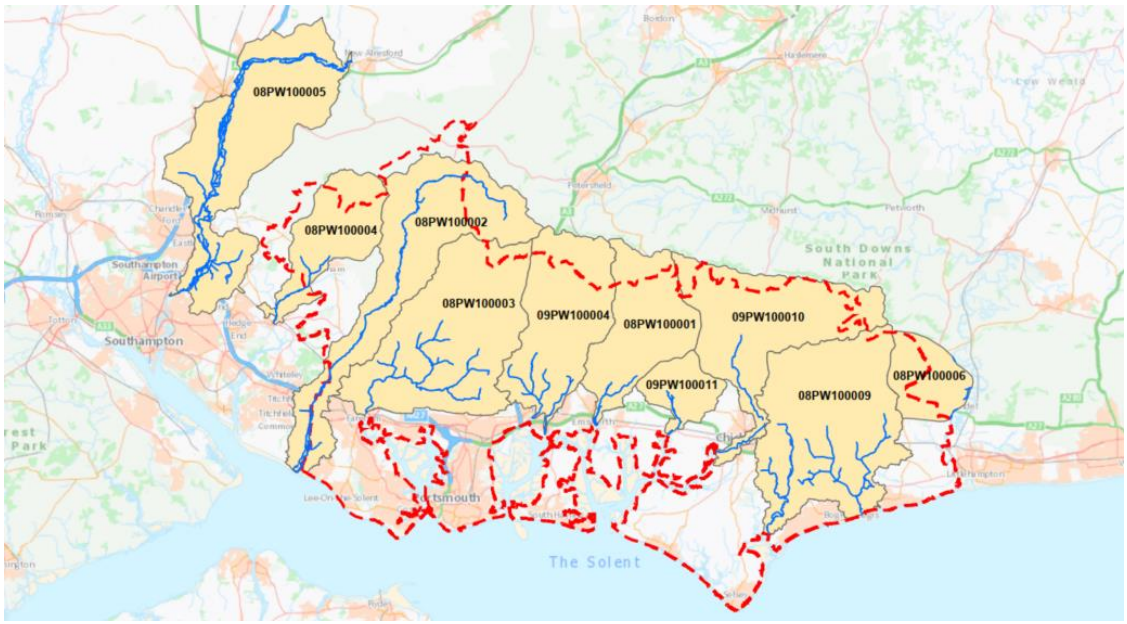


Figure 2: Location of the catchment based WINEP investigations proposed

During the development of the WINEP, Regulators expressed concern regarding the phasing of WINEP investigations which were considered to delay the delivery of abstraction reductions and increase the risk of environmental deterioration.

This has resulted in moving investigation of all catchments into PR24, apart from 09PW100004.

The EA completed its assessment of phasing proposals in July 2023 based on the steer by the Secretary of State. Portsmouth Water originally phased 2 schemes to be undertaken in AMP9 that had

a primary driver of WFD_NDINV_WRFlow. The Environment Agency reported that the phasing of these WFD drivers is not in line with the steer from the Secretary of State and therefore our request to phase the 2 schemes in AMP was not accepted for phasing.

However, Portsmouth Water will continue to discuss the phasing of the schemes with Environment Agency Area and National Operation Teams regarding potential evidence to support these actions being delivered within AMP9. These conversations may continue as appropriate and if assessments and justifications are accepted, these will be subject to the relevant WINEP alterations process agreement and sign off to move them in to AMP9.

Section 3.2.2 details how Portsmouth Water plan to manage and mitigate this risk.

There are three additional WINEP schemes which will support and compliment the catchment-based investigations which include:

- **08PW100006:** Investigation into the environmental effects of Source S drought permit option (linked to Section 3.3). The outputs of which would support and compliment the catchment-based investigation 09PW100001.
- **08PW100007:** Regional WRSE investigation which is designed to work in conjunction with company led WINEP schemes. Key output of the investigation would be options appraisal of alternative supply schemes.
- **08PW100008:** A companywide INNS implementation scheme

The following sections provide further detail on the scope of the investigations and how risk would be managed.

Table 4: WINEP Catchment Investigations for Environmental Destination and Licence Capping

WINEP Action ID	Delivery Period	Investigation Name	Main River catchment	Joint / partnership Investigation
08PW100009	PR24 (AMP8) 2025-30	Catchment based Water Resources investigation into Source T, Source Q, Source S and Source R (the QRST Group).	Arundel SSSI, Swanbourne Lake, Aldingbourne Rife, Lidsey Rife	N/A
08PW100010	PR29 (AMP9) 2030-25	Catchment based Water Resources investigation into Source L and Source M	River Lavant	N/A
08PW100011	PR29 (AMP9) 2030-25	Catchment based Water Resources investigation into Source P and O.	Chichester Harbour, Bosham Stream	N/A
08PW100001	PR24 (AMP8) 2025-30	Catchment based Water Resources investigation into Source N and Source U (the LMNOP Group) – This also includes Source M due to interlinks with the River Ems catchment.	River Ems	N/A
09PW100004	PR29 (AMP9) 2030-25	Catchment based Water Resources investigation into Source B, Source K	Hermitage Stream	N/A
08PW100002	PR24 (AMP8) 2025-30	Catchment based Water Resources investigation into the Source F[5], Source H, Source E	River Meon	N/A
08PW100003	PR24 (AMP8) 2025-30	Catchment based Water Resources investigation into Source G, Source J and Source I	River Wallington	N/A
08PW100004	PR24 (AMP8) 2025-30	Catchment based Water Resources investigation into Source C and Source D	River Hamble	N/A

[5] The PR19 scheme for Source F (7PW200003) only considered the source in isolation and needs to be reviewed against the wider abstractions and influences on the River Meon. The outcome of this investigation will be completed by 2025 but with recommendations to include these within the Meon Catchment Investigation and Options Appraisal for PR24.

WINEP Action ID	Delivery Period	Investigation Name	Main River catchment	Joint / partnership Investigation
08PW100005	PR24 (AMP8) 2025-30	Water Resources investigation into the River Itchen (including Portsmouth Water's Source A)	River Itchen	Southern Water (lead)
08PW100006	PR24 (AMP8) 2025-30	Water Resources investigation into the Drought Order (Source S) and Southern Water Drought Order scheme.	Arundel SSSI, Swanbourne Lake, Aldingbourne Rife, Lidsey Rife	Southern Water (lead)
08PW10007	PR24 (AMP8) 2025-30	Regional Environmental Destination Options Appraisal	Regional	WRSE Regional Scheme

3.2.1 Scope and output of investigations

3.2.1.1 Scale of investigations

The WINEP guidance[6] indicates that regulators support the inclusion of investigations where they reduce uncertainty and see quicker or better delivery of Environmental Destination. It is proposed that for the WINEP schemes in Table 4 that detailed investigations are undertaken in AMP8 and AMP9 for the following reasons:

- Prior to AMP8, most of Portsmouth Water's abstraction sources have not been subject to recent water resources investigations[7] and therefore it is considered that detailed investigations are required to ensure the assessment of current and future effects of abstraction.
- Environmental Destination may result in significant Deployable Output (DO) losses and therefore require significant investment needs in the medium to long term. As a result, it is critical to ensure investment is optimal. This equates to between 39 to 144 Ml/d by 2050. For context the average amount of water we currently need to put into supply is 170 Ml/d in the winter, rising to a peak of 240 Ml/d in a summer heatwave.

Therefore, in line with the WINEP guidance, the proposed investigations would be classified as 'Detailed investigations into specific schemes which could significantly increase ambition'.

3.2.1.2 Investigation scope

The detailed scope of the investigations will be developed with Regulators ahead of AMP8 (via the Action Specification Form (ASF) but will be based on the following key themes:

- Investigations will align to the WINEP 3-tiered outcomes relevant to that investigation driver to ensure transparency to the process and provides a better understanding of the WINEP outcomes for the environment, customers, and communities. This would be agreed prior to the investigation commencing.
- Investigations will be at the catchment level to ensure the investigations review and assess all cumulative influences on the aquatic environment (i.e. wider catchment pressures), rather than consider abstraction sources in isolation to ensure the best outcomes.
- Investigations will include a review of any barriers to fish passage in the catchment which may hinder ecological status. This element has been added to the investigations to cover a concern raised by the Environment Agency.
- Investigations will quantify the extent of Deployable Output losses to provide greater certainty on any required investment.
- Investigations will form a working group with regulatory and non-regulatory stakeholders (i.e. farmers, NGO's). We would seek to engage at an early stage with all relevant stakeholders. This process will be used to identify co-funding to allow the earlier delivery of schemes.
- Investigation will use the Environment Agency East Hants and Chichester groundwater model and the River Test & Itchen Groundwater model, which encompasses our company supply zone. These models are currently being updated and will be the best available tool for optimising the benefit of sustainability reductions within a groundwater catchment.
- Where relevant the assessment methods will consider the assessment needs of designated sites and features. This will include a review of Environmental Flow indicators for each catchment against relevant flow indicators (for example assessment against the most sensitive flow constraints for designated sites).
- Prior to the investigations a scoping exercise will be completed in consultation with the Regulators to agree on the conceptual pathways, key risks to be investigated, the most

[6] Water industry national environment programme (WINEP) methodology - GOV.UK (www.gov.uk)

[7] Aside from the Source F which was a PR19 WINEP scheme but regulators have agreed for its inclusion in PR24 as part of the wider catchment based investigations.

appropriate assessment methodologies/tools and the outcomes of the investigation. The outcomes of the scoping exercise will inform the ASF.

- Investigations will consider the PR24 WINEP guidance (or any further updated guidance) applicable to the investigation driver.
- Where relevant, investigations will need to ensure the needs of all aquatic habitat are assessed, such as areas of wet peat.

3.2.1.3 Options appraisal

The outcome of the investigation will be to assess what interventions are required to deliver the required environmental outcomes. If the investigations show that abstraction is a constraint (in whole or in part), then options appraisal would be undertaken. The outcome would largely fall into one of four core categories:

- An abstraction source is subject to a licence reduction.
- A nature-based solution is implemented to bring wider environmental benefits.
- An abstraction source is subject to a licence reduction and/or a nature-based solution.
- An alternative supply option is considered (which may include relocating the source further downstream).
- A combination of all the above.

This outcome would be identified via a detailed options appraisal. The following section provides further detail on the options appraisal process.

It is expected that options appraisal will be conducted between 2025 and 2033 with an initial options appraisal undertaken between 2025 and 2028 for the first set of investigations, with a second phase in 2030 to 2033. This is to reflect the phased approach to the investigations between the AMP8 (2025-2030) and AMP9 (2030-2035) planning periods.

Whilst the catchments are separate investigations the options appraisal would consider wider strategic options to meet the requirements of the environmental destination and other environmental drivers. The options appraisal will also utilise existing data from WRMP24 options appraisals for supply side schemes and the outputs of the WRSE Environmental Destination WINEP investigation (WINEP Action ID 08PW10007 in Table 4). The key themes of the options appraisal include:

- The appraisal of options for delivery will focus on the review of wider social and environmental benefits and consider the effects on resilience and affordability. The detailed scope of the options appraisal will be confirmed via the Action Specification Forms in due course.
- Use of our Pywr water resources model to investigate the impact of potential sustainability reductions on the integrity of our WRZ and the need for local network improvements to overcome any restrictions. It is anticipated these improvements will be introduced as options within WRMP29 and WRMP34 and our associated business plans.
- A full range of catchment and nature-based solutions (C&NBS) will be considered. This includes catchment management and river restoration to bring wider benefits, such as reduction in flood risk, pollution, improved biodiversity and supporting catchment to adapt to climate change.
- Co-funding to bring wider benefits and increased speed of delivery.
- Customers priorities to ensure options align with customer preferences.
- Natural Capital and Environmental Net Gain in option development and assessment.
- Consideration of the wider social and environmental benefits (as per the EA's WEO Metric spreadsheet or the latest assessment method) and Portsmouth Water's Vision Statement and WRMP/WRSE requirements.

The output of the options appraisal will result in potential options which will be included for WRMP29 and WRMP34 as potential options for consideration. The solutions are expected to have a Ml/d

volumetric benefit. We may consider catchment trials where we need to generate evidence on the suitability of catchment and nature-based solutions.

3.2.1.4 Options delivery

We would seek to implement options as soon as possible to reduce the timescales of meeting our environmental obligations. Within options appraisal between 2025 to 2028, consideration of the residual uncertainty within the AMP9 investigation (2030-2035) will need to be considered to reduce the risk of sub optimal investment. For example, we want to avoid the proposal of a network transfer scheme to offset abstraction without knowing the full extent of deployable output losses at alternative / donor sources. This is now considered to be less significant as only 1 investigation is in AMP9 (2030-35), with all others brought forward to AMP8, therefore three will be less residual uncertainty for AMP9.

We would however seek to implement no regret options in AMP8 and AMP9, subject to funding. Options which are considered no regret include staged licence reductions or C&NBS. During AMP8 we will seek co-funding and delivery to ensure a prompt delivery of options and schemes. Please see Section 4 for further information on timescales.

3.2.1.5 Option environmental assessments

Due to the supply demand deficit identified in the baseline WRMP24 (partly resulting from the possible licence reductions detailed in Section 2.2), several supply and demand options have already been identified as preferred options in the WRMP24. Our WRMP24 options are largely demand related (leakage and water efficiency) and therefore would be expected to benefit the aquatic environment by reducing demand on abstraction. However, there are several supply related options included within the WRMP24, which include The Source O booster upgrade and Source S Drought Order.

As part of the WRMP24 these options have been subject to a Strategic Environmental Assessment, Habitats Regulations Assessment (HRA), Water Framework Directive (WFD) Assessment, Biodiversity Net Gain (BNG) Assessment, Natural Capital (NC) Assessment and Invasive Non-Native Species (INNS) Assessment.

Environmental effects on the aquatic environment can occur at both the construction and operation stage and some can be short term, for example limited to the construction phase or during discrete phases of maintenance, while others can be long term for the operational lifespan of the infrastructure (for example, the option could result in a longer-term increase in abstraction which may impact Environmental Destination objectives).

At all stages, Portsmouth Water will work to ensure that adverse effects are mitigated as much as possible and will use appropriate and site-specific information to help inform approaches. This could include consideration of the designated sites conservation objectives, information on local nature recovery networks, local wildlife sites recommendations for enhancement and restoration. Latest guidance and advice such as Natural England's 'Standing Advice for Protected Species' or Historic England's 'Lakes and water features', will also be drawn upon when required as well as Portsmouth Water's own policies and procedures.

The Monitoring Plan which forms part of the Environmental Assessments details what monitoring is needed to further quantify any potential environmental effects of these options already considered in the WRMP24.

In addition to the options put forward in the WRMP24, the options which may be identified via further options appraisal linked to the WINEP investigations (3.2.1) will require a range of investigation and assessments to ensure there is no significant effects on the environment from their construction or implementation. Some of these assessments will come through processes linked to

development of options via the planning system such as Environmental Impact Assessment (EIA), or associated assessments such as Heritage Impact Assessment, but there will also be furthermore detailed assessments undertaken during more detailed option design phases relating to Natural Capital, Biodiversity Net Gain, as well as Invasive Non-Native Species. It will be important to utilise and adhere to relevant guidance prevailing at that time, but it is likely to include guidance such as Historic England advice notes, guidance by Environment Agency, as well as from Natural England.

It is important to recognise that the Portsmouth Water WRMP will not operate in isolation - it will have clear linkages to a range of other water company plans, Drainage Water Management Plans, Drought Plans and Strategic Reservoir Options. There will also be a need to work with colleagues in other water companies, for example to produce a cohesive Protected Landscape Mitigation Strategy, particularly for those areas which are considered our most important landscapes, as well as undertake further significant work on the amelioration of landscape impacts. We will also need to continue to work with colleagues in regulatory bodies such as Environment Agency, Natural England and Historic England and Local Authorities to meet our obligations, but also help achieve other environmental goals where we can. For example, we recognise the importance of peatland habitat and the need to wet peat and help achieve the objectives of the England Peat Action Plan.

Any supply options which form part of WRMP24 will be subject to detailed design and relevant environmental assessments.

3.2.2 Managing risk and delays

Our initial WINEP submission had a phased WINEP approach, splitting the investigations equally between PR24 and PR29. This phasing raised concerns from regulators about risk and delays to delivering environmental outcomes. Following regulator feedback and discussions we now have nine investigations in PR24 and one in PR29, which therefore reduces these concerns. However, our approach to managing risk still applies and is detailed in the following sub sections.

3.2.2.1 Water Framework Directive risks

Our regulators have expressed concern that the phasing of investigations over AMP8 and AMP9 may result in deterioration in Water Framework Directive (WFD) water body status due to growth in abstraction. The key concern is the QRST Group where the is a potential risk of abstraction growth due to an export to Southern Water.

Southern Water confirmed that it does not intend to increase the average amount taken in a normal year via the bulk supply. However, to manage the potential WFD no deterioration risks, we will monitor utilisation of the bulk supply with Southern Water and the Environment Agency via regular technical meetings and our WRMP annual review process. This includes reporting on the level of abstraction relative to the WRMP24 low environmental destination assumptions for the QRST Group. The relevant assumptions are provided in Table 2 of Appendix 5B (section 2.2.6) for both normal year conditions and dry year / drought conditions. The assumptions for the dry year / drought condition will be relevant when we experience dry years and multiple dry years.

The annual review process, together with the inclusion of a 'low' environmental destination as minimum, ensures that our plan prevents WFD related deterioration of water bodies. Since the dWRMP24 we have also since committed to undertake the catchment-based investigation into the QRST Group sources in AMP8 (2025-30), rather than AMP9 (2030-35).

We are also implementing significant demand reductions over AMP8 and AMP9 which will reduce abstraction and therefore reduce the risk of WFD deterioration.

3.2.2.2 River Ems mitigation

The River Ems catchment has been included within the AMP8 No-deterioration investigation scheme with outcomes being reported before 2030 as this is one of our priority catchments (08PW100001). We are seeking early start funding to ensure a prompt delivery of the investigation on the River Ems in AMP8. Our low environmental destination profile assumes that licence capping will take place in AMP9 to prevent deterioration in WFD water body status. The high environmental destination assumes compliance with Environmental Flow Indicators (EFIs) and therefore supports WFD objectives of reaching good ecological status. We aim to agree the investigation scope with the EA by December 2023 and undertake procurement by June 2024. This would allow the investigation to start in July 2024. The early start funding (if approved) would allow the investigation to start 9 months ahead of PR24. We have also begun engagement with relevant stakeholders, such as Friends of the Ems.

The River Ems is also part of the CaBA Chalk Stream Flagship Project. The Project is funded by Portsmouth Water and has been led by the Arun and Rother River Trust (ARRT) as part of a collaborative approach to investigating and assessing our catchments. The Project intends to investigate and report on the ways in which ecological pressures are assessed and regulated. It will include multiple pragmatic recommendations to bring about the ecological recovery and good health of our chalk streams. The project has included stakeholder input from the Environment Agency, ARRT and Friends of the Ems and landowners among others.

3.2.2.3 Source F

There was concern raised regarding Source F as it was included as an AMP7 investigation with the risk of short term WFD deterioration. The EA recently confirmed the evidence of no growth in AMP8 was satisfactory for Source F. Despite this conclusion, we have committed to report on the combined levels of abstraction at Sources F and H within our future annual reviews to identify how this compares with the recent actual 2010 to 2015 annual average abstraction.

Source F is included in the proposed AMP8 WINEP to address AMP9 risks, licence capping is applied within the low environmental destination during AMP9 and EFI compliance is applied within the high environmental destination by 2049-50. The outcomes of the AMP8 Conservation of Habitats and Species Regulations 2017 investigations, along with all other WINEP investigations will be considered in the preparation of our WRMP29. If reductions in abstractions are required for AMP9, or further into the Plan, these will be included in our baseline supply forecast.

3.2.2.4 River Itchen

Southern and Portsmouth Water's abstractions which influence the River Itchen were subject to an AMP7 WINEP investigation which assessed the effects of abstraction against Common Standards Monitoring guidance. The WINEP scheme has now progressed into AMP8 for a joint options appraisal with Southern Water and South East Water.

3.2.2.5 Options appraisal

There is concern that detailed investigations may delay the identification and delivery of options, such as alternative supply options or C&NBS to allow the licence reductions to occur. This will be mitigated by:

- Inclusion of an environmental destination WINEP scheme (08PW10007) in PR24 (for AMP8 delivery) which will comprise appraisal of options over the WRSE region to allow the earlier delivery of sustainability reductions. This WINEP scheme is primarily focused on options appraisal, and it is designed to feed into the 2029 regional plan and therefore our WRMP29.
- Running the options appraisal of the catchment-based investigations in parallel to the investigation to allow co-funding and earlier delivery of measures to be identified.

- We will seek co-funding and co-delivery of schemes and would seek to implement no regret options towards the end of AMP8 into AMP9.

Further detail is provided in Section 3.2.1.

3.3 Drought permit options investigations and assessments

As detailed in Section 2.3 our WRMP24 baseline considers the use of the Source S drought permit until 2040-41. Over AMP8 we will be undertaking the following assessments to improve the confidence in the option but also the potential environmental effects and required mitigation. These actions are in response to concerns raised by the Environment Agency and Natural England.

3.3.1 Option yield

The Environment Agency has expressed concern over the potential yield for the Source S drought permit. The Source S drought permit identifies an increase of abstraction from the currently licensed 2.5 Ml/d, back to the original capacity of 11 Ml/d. We have previously analysed historic data, which confirmed that the source has been pumped at over 10 Ml/d for extended periods in the past. Most significantly, the source was operated at an average abstraction of 9.9 Ml/d for 85 days between July-September 1992 which is considered one of the most severe droughts in the historic record, with groundwater levels similar to the 1973 groundwater drought. Further analysis of the draw down curve shows that it is considered highly likely that the source could achieve the yield quoted in the drought permit, unless there is a notable increase in the rate of drawdown at higher abstraction rates. It would only be possible to investigate this risk by carrying out a pump test under low groundwater conditions. We undertook further analysis of fissure horizons, and this was reported in the latest version of the Source S drought permit Environmental Assessment Report.

We are committed to investigating in further detail the requirements, costings, and viability for a pump test at this site, taking into consideration the ability to carry out investigations without impacting neighbouring sites during peak demand, during dry weather. We will seek to undertake testing as part of the AMP8 WINEP scheme (08PW100006). We will continue to work with the Environment Agency and Natural England on this matter. The proposed programme is:

- December 2023: Agree scope of study with the Environment Agency and Natural England and any permits and monitoring required.
- Jan 2024 to December 2027: Undertake assessment and reporting. This will be subject to hydrological conditions as a prolonged dry period is needed to confirm the assessment. The outputs are required to be ready for the next Drought Plan and WRMP29.

3.3.2 Environmental assessment and mitigation

In March 2022 Portsmouth Water submitted a draft Environmental Assessment report (EAR)[8] to Regulators which detailed the environmental effects of the option implementation and the required mitigation. Over AMP8 this EAR will be updated based on:

- Regulator feedback on EAR submitted in March 2022
- Outputs of Environmental Assessments from WRMP24 (i.e. SEA and HRA)
- Outputs of the AMP8 WINEP investigation which seeks to assess the combined effects of Portsmouth and Southern Waters combined drought permits. This is Portsmouth Water WINEP Action ID: 08PW10006.

The output of the investigation will provide greater certainty of the environmental effects and the required mitigation which will inform options appraisal and selection for WRMP29. It will also make

[8]Source S Drought Permit Environmental Assessment Report. Drought Management plan. March 2022.

use of the Environment Agency's recently updated East Hampshire and Chichester groundwater model.

The scope of the investigation will also include an assessment of the effects on species abundance linked to water quantity within the Site of Special Scientific Interest. This scope addition reflects representations from Natural England on our dWRMP24.

3.4 Time limited licence investigations and assessments

Section 2.4 details our time limited licence variations which are assumed as being renewed in the WRMP24 baseline. In AMP8 we plan to seek renewal via engagement with the Environment Agency. These licences have time limited variations due to the period of time in which they were applied for, rather than known environmental effects. However, we are committed to ensuring our abstraction does not impact the environment and therefore as part of the licence renewal we would undertake investigations to assess the potential effects of the variation on the environment. This would be undertaken via a detailed investigation which would be expected to be completed in time to align with WRMP29 options appraisal.

For WRMP24 and beyond we are targeting ambitious demand reductions which would seek to reduce our reliance on the time limited variation. We are committed to working with the Environment Agency to ensure the time limited variations are only renewed if they are still required. This would be tracked and reported on via our WRMP Annual Return.

We will be investigating the water catchments associated with our time limited licence conditions under our AMP8 WINEP during 2025 and 2026. This will improve our understanding of the environmental impact of the licence conditions and the WFD 'no deterioration' risks. If the WINEP investigations demonstrate there is a risk of water body deterioration, then under Regulation 19 of The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, we will need to demonstrate that:

- All practicable steps are taken to mitigate the adverse impact on the status of the body of water.
- The reasons for the modifications or alterations, or for the sustainable development activities, are of overriding public interest" and / or "the benefits to the environment and to society of achieving the environmental objectives are outweighed by the benefits of the new modifications or alterations, or of the sustainable development activities, to human health, to the maintenance of human safety, or (in the case of modifications or alterations) to sustainable development.
- The beneficial objectives served by the modifications or alterations, or by the sustainable development activities, cannot, for reasons of technical feasibility or disproportionate cost, be achieved by other means which are a significantly better option.

If needing to take a Regulation 19 route to maintain secure supplies of water for Portsmouth Water and Southern Water, we will work closely with Southern Water and the Environment Agency in developing the required documentation.

3.5 The Regional Plan and Catchment schemes

Catchment schemes for the Arun and Western Streams and East Hampshire were developed in line with the Water Resources South East (WRSE) methodology for the Emerging Regional Plan. However, they were excluded from the subsequent Draft Regional Plan and our draft WRMP24 on the grounds that they do not provide a deployable output benefit, in line with the regulator's Water Resource Planning Guideline (WRPG).

The guidance in the WRPG has been updated since the draft regional plan was published, and catchment schemes can now be included within regional plans and statutory WRMPs even if there is

no deployable output benefit, so long as they improve best value metrics. The schemes selected in the WRSE Regional Plan and included within our WRMP24 tables are as follows:

- Portfolio 1 (Standard): Arun and Western Streams: This portfolio consists of 19 individual options. This includes 1 flow augmentation and licensing options, 2 knowledge exchange, education and agricultural activity options, 3 natural water retention measures (including NFM and wetland creation) options, 9 nutrient and sediment reduction options, 1 river restoration option and 3 terrestrial habitat creation/management options.
- Portfolio 1 (Standard): East Hampshire: This portfolio consists of 15 individual options. This includes 1 flow augmentation and licensing option, 5 nutrient and sediment reduction options, 7 river restoration options and 2 terrestrial habitat creation/management options.

The catchment schemes are only selected at the end of the Regional Plan (in 2075) because, at present, there is no deployable output benefit associated with them. However, we recognise that their selection advises that catchment schemes can form part of the next Best Value Plan and WRMP29. We will continue to work with WRSE to improve the characterisation of catchment schemes (including deployable output benefits) via the AMP8 WINEP described above in this 'Investigations and Assessments' section.

The draft WINEP option appraisal outputs for catchment options will be available by March 2027 for inclusion within the WRSE investment modelling towards the next regional plan and WRMP29. If required, these options will be refined following the consultation on our WRMP29 and updated prior to finalisation of our WRMP29.

Whilst the implementation of WRSE catchment options is not funded in our PR24 Business Plan, this will not prevent us from contributing towards catchment work during AMP8. We will continue to seek opportunities to support 'no regrets' catchment work. For example, we are part of the Arun and Western Streams Catchment partnership (A&WSCP) on the River Ems to create and develop the River Ems Chalk Restoration Scheme. This work will evaluate opportunities and design catchment-based schemes where possible. With A&WSCP, we will work with land owners to develop catchment and river restoration proposals and seek funding streams that are available for delivery that supports water resource improvements.

Catchment Schemes to improve chalk streams across the East Hampshire Catchment will also be undertaken with the East Hampshire Catchment Partnership.

4 OVERVIEW TO TIMESCALES

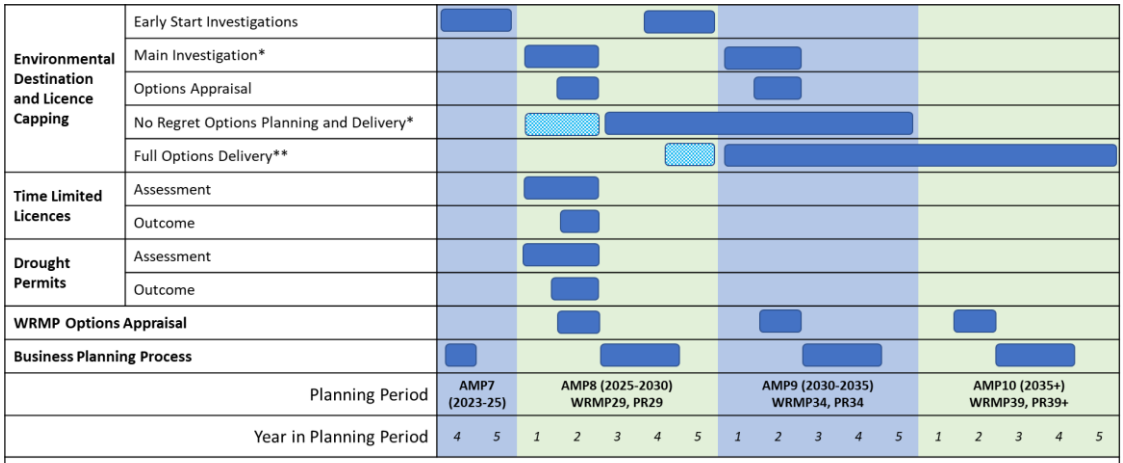
4.1 Overview

We recognise the need to protect the environment by investigating changes to our licences to better reflect water availability in catchments and reduce any impact from abstraction. However, reducing abstraction from rivers and aquifers can only be achieved at a rate that is matched by cost-efficient investment to reduce demand and / or develop alternative sources of water. We have set out our proposed short-, medium- and long-term actions below in the following sub sections.

The overarching timescales are presented in Figure 3 which detail the proposed actions over AMP8 and beyond and how they align to the various WRMP and Business Planning Processes. Which in summary include:

- For the remainder of AMP7 (2024-25) we will prepare for our environmental destination (with licence capping) investigations, with a focus on the River Ems catchment.
- AMP8 (2025-2030) we will investigate priority catchments for environmental destination and licence capping, time limited licences and drought permits, all to align with WRMP29 and PR29 Business Plan timescales. We will also seek to implement no regret options delivery in AMP8 where possible.
- AMP9 (2030-35) the remainder of the environmental destination and licence capping investigations will be concluded. The outputs to align with WRMP34 and PR34 Business Plan. This period will also include further no regret options delivery and preparations for full options delivery in AMP10 onwards.
- AMP10 onwards (3035+) we will implement full delivery of options to meet environmental destination and environmental objectives by 2049-50.

Figure 3: Overarching timescales linked to achieving sustainable abstraction



*Only 1 catchment will be investigated in AMP9, with all other's concluding in AMP8
**No-Regret options delivery during AMP8 and AMP9 is prior to the final investigations are concluded. These investments would considered to be those which are not dependant upon the AMP9 investigations outputs. These options are considered to be licence reductions and catchment & nature based solutions. *Planning marked by cross hatch and solid fill is delivery.*
***Final options delivery would be in AMP10 and beyond following the conclusion of the investigations

4.2 In the short term (up to 2025):

The following section details the short-term actions we plan to undertake:

- We do not have any immediate actions that are required to meet current regulatory requirements (i.e. confirmed and likely sustainability changes to licences to be implemented in Asset Management Plan Period (AMP7)).

- We are seeking early start investigations for the River Ems catchment as it is our highest priority catchment investigation. We will also be confirming our investigation scope with regulators and stakeholders via our Action Specification Forms.
- We will continue discussions with the Environment Agency regarding opportunities for any flexibility in meeting future licence capping related reductions to support optimal solution development and reduce the risk to our supply demand balance.

4.3 In the medium term (2025–2033):

The following section details the medium-term actions we plan to undertake:

- **Environmental Destination and Licence Capping:** We will investigate the sustainability of our permanent licensed abstractions and undertake options appraisals during AMP8 for higher priority catchments, with all catchments being completed by the end of AMP9. We believe that a catchment-wide approach needs to be taken alongside water resource zone level considerations to ensure that a best value strategy is identified and progressed in AMP8 and beyond.

  The investigation will also include the appraisal of options to identify the optimal environmental solution per catchment. We expect that a catchment solution will involve a combination of staged licence reductions in parallel with nature-based solutions (e.g. removal of barriers to fish passage), supply network improvements and demand management measures, to provide best value for the environment and society.

  Where possible we would seek to implement, with co-funding where needed, no regret options delivery which is expected to include abstraction reductions and catchment & nature-based solutions earlier than 2033. With full options delivery starting post 2033. The output of the investigations between 2025 and 2033 will be timed to algin with WRMP29 and WRMP34 to ensure funding is captured in the relevant business plans.

- **Drought Permit Options:** We will undertake further yield and environmental assessments of the drought permit option to confirm the viability of the option. The outcome is to align with WRMP29 Options Appraisal.

- **Time Limited Licences Variations:** We do not have any time limited licences, although we do have time limited conditions on some of our permanent licences that expire in 2028 (sources C, F, G, U, N and the QRST Group). Therefore, we will review the sustainability of these licence variations with the Environment Agency during AMP8. The outcome is to align with WRMP29 Options Appraisal.

4.4 In the longer term (2034 to 2050 and beyond):

The following section details the long-term actions we plan to undertake:

- We will determine the environmental destination path that is required to achieve the best value for the environment and society based on the evidence from AMP8 and AMP9 work.
- We will continue to consult with customers, regulators and stakeholders on a regular basis to help guide our journey to the environmental destination, including via the WRMP and Business Plan cycles.
- The approach and actions described above will ensure that our proposed actions (now and in the future) are cost-effective and affordable, provide overall environmental improvement, and provide good value to the environment and our customers. They will help us to fulfil our WFD regulations obligations and support the achievement of environmental objectives for water resources in River Basin Management Plans by supporting the journey to good ecological status.
- We will deliver the options required to meet the environmental drivers identified between 2025 and 2033.

ANNEX A METHOD STATEMENT: ENVIRONMENTAL AMBITION

Method Statement: Environmental Ambition

November 2022

Title	Method Statement: Environmental Ambition
Last updated	November 2022
Version	Draft Regional Plan version
History of Changes made to this version	Amendments following the emerging regional plan consultation to update the methodology, results and next steps ahead of the publication of the draft regional plan.
Author	Sarah Green
Approved by	Meyrick Gough
WRSE Director Approval	Meyrick Gough

Email: contact@wrse.org.uk

For the full library of WRSE Method Statements, please visit wrse.org.uk/library.

A consultation on the WRSE Method Statements was undertaken in Autumn 2020 – the consultation details can be viewed on the WRSE engagement HQ platform at https://wrse.uk.engagementhq.com/method-statements.

Table of Contents

Executive Summary

Water Resources South East (WRSE) is developing a multi-sector, regional resilience plan to secure water supplies for the South East until 2100.

We have prepared method statements setting out the processes and procedures we will follow when preparing all the technical elements for our regional resilience plan. We have consulted on these to ensure that our methods are transparent and as far as possible, reflect the views and requirements of customers and stakeholders.

Figure ES1 illustrates how this environmental ambition method statement will contribute to the preparation process for the regional resilience plan.

Environmental ambition is a term that was introduced through the Environment Agency's Water Resources National Framework document, published in March 2020. The term refers to the consideration of actions to build environmental resilience to future challenges, such as drought, flooding, raw water quality decline, climate change, impact from invasive non-native species, land use change, and impacts from run off. This information is important to understand to ensure we can leave the environment in a better place for future generations.

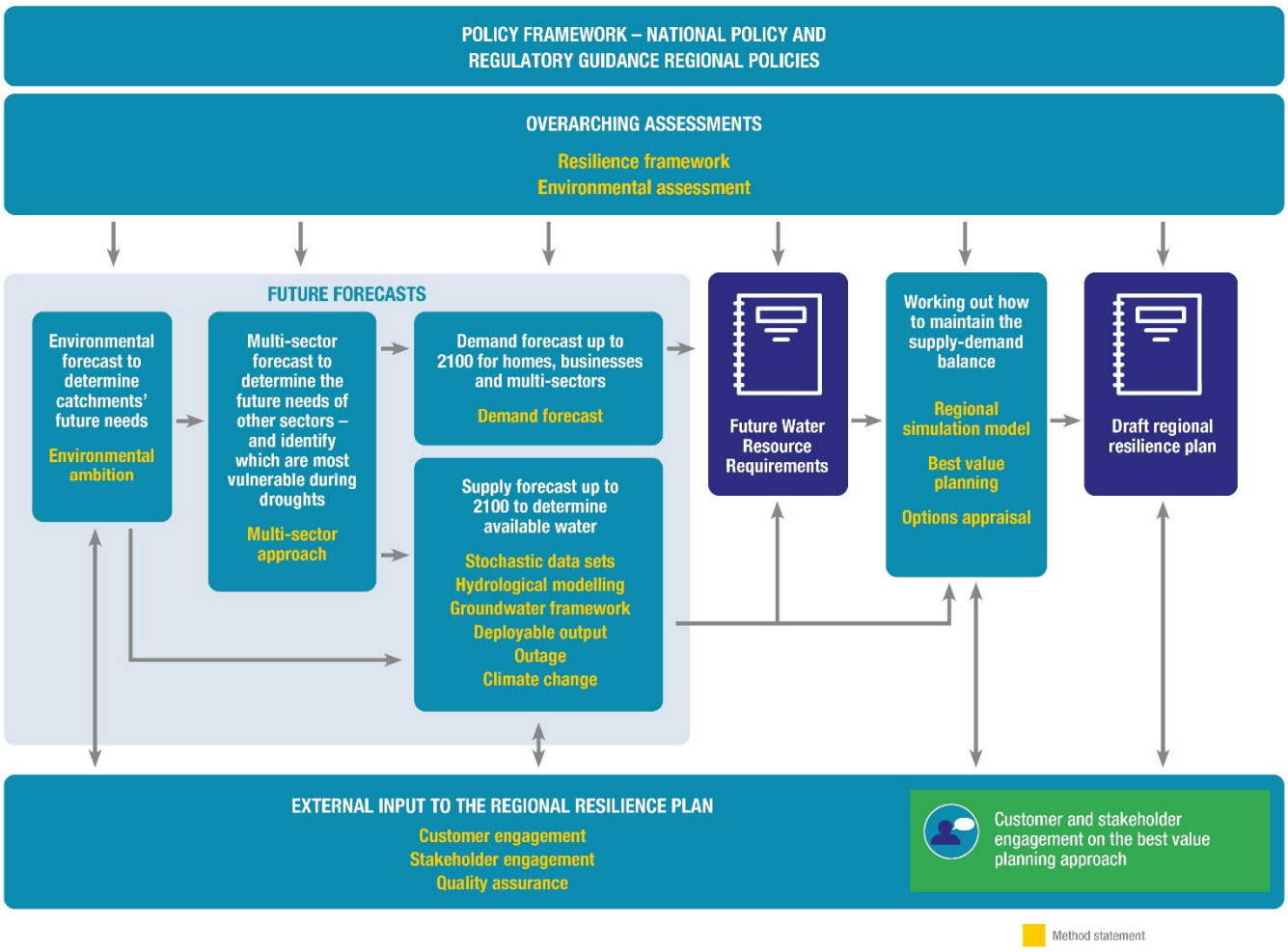
The current regulatory guidance on environmental ambition or "environmental destination" is evolving as regulators, water companies and stakeholders iteratively work through the challenges faced. Due to the changing nature of how environmental ambition is represented in the regional plan, this method statement gives an overview of the current approach and outlines the proposed next steps.

Understanding how much water can be abstracted from the environment in a sustainable way, now and in the future, is crucial when developing a regional plan. In the past the

regional plan has taken account of the supply and demand forecasts, but not the longer-term needs of the environment.

This method statement outlines how sustainability reductions have been calculated and incorporated into the regional plan. The Environment Agency has recently completed a longer-term environmental water needs assessment as part of the Water Resources National Framework, and this work has established potential licence reductions which are outlined in this Method Statement.

Figure ES1: Overview of the method statements and their role in the development of the WRSE regional resilience plan



1 Environmental Ambition

1.1 Planning for the future water requirements of the region requires an understanding of the issues and challenges that the region faces today and those that it could face in the near and long-term future. This understanding helps improve the decisions around what are the best set of options to develop now and in the future. There are many competing pressures on a range of environmental objectives, surface water sources and groundwater sources. The development of environmental ambition aims to set out a path to secure environmental resilience, enable all activities to thrive, and secure future water supplies for all uses.

1.2 Historic planning approaches have always included forecasts for demand and supply. The future requirements of the environment were constrained to those outcomes defined through the Water Industry National Environment Programme (WINEP). This resulted in the requirements for the environment being restricted to an anticipated set of activities over the next 5 to 15 years. This process meant that the future, longer-term impacts to the environment and, therefore, the resilience of the environment, were never fully represented in plans. Working alongside the Environment Agency, WRSE is developing a longer-term forecast for the environment, setting out our 'environmental ambition' for the region.

1.3 The development of the region's environmental ambition combines the knowledge and understanding of the existing pressures across the 32 catchments in the South East of England from assessment methods and the river basin management plans, coupled with the knowledge of the companies and stakeholders to develop a series of potentially shared solutions. WRSE has worked and continues to work alongside the Environment Agency and other regulators and stakeholders to develop and test the environmental ambition scenarios discussed in this method statement. This shared understanding will help to ensure a more resilient environment for the future.

1.4 The development of our environmental ambition will align with Government policies including the Defra 25-year environment plan, as well as the Environment Bill and Agriculture Bill. These are likely to significantly change the environmental regulatory framework that has been worked to in the past, particularly relating to resilience of the environment to provide clean and plentiful water, biodiversity net gain and carbon neutrality as well as working to improve wellbeing, recreation, and heritage.

1.5 This method statement sets out the development of WRSE's approach to environmental ambition undertaken to date, and the steps we will continue to take to develop our environmental ambition for the region.

1.6 The development of a regional environmental ambition will require different activities in the short-term and compared to the medium- and long-term depending on how the climate and landscapes change in the region over time. The implementation profiles of abstraction reductions within catchments will be continually reviewed over the coming years to incorporate collaborative catchment prioritisation work with regulators and stakeholders, as well as the outcomes from future regulation and policy changes, WINEP investigations and the adaptive regional planning approach.

2 Environmental Ambition scenarios

Overview

2.1 The purpose of this Environmental Ambition Method Statement is to outline the approach undertaken to develop the environmental ambition scenarios which will be used to derive an adaptive regional plan which can encompass a range of possible futures.

2.2 Due to increasing future sustainability reductions, the levels of environmental protection are likely to be much greater than current levels. This enables us to move towards planning for proactive protection rather than retrospective remediation of our vulnerable water ecologies, which includes over 41% of the world's chalk streams.

2.3 Our approach is a step change to how environmental ambition has been incorporated in regional planning historically, and the adopted approach has been developed in collaboration with water companies and regulators, with consultation with stakeholders and customers.

2.4 Our approach will allow us to target existing and future environmental issues and identify potential opportunities and schemes to deliver water resource and water quality benefits in the future. These opportunities can be put forward to the water companies and other sectors to help improve the resilience of the environment under the modelled future scenarios in the regional plan.

Integration with regulatory requirements

2.5 The historic water company approach to protecting the environment has been focused on what improvements are required in the next 5 to 15 years to deliver the improvements set out in the Water Industry National Environment Programme (WINEP). Typically, this programme delivers schemes and seeks to investigate potential issues which might then feed into the next round of water company business plans.

2.6 The WINEP investigations drive more detailed local studies being undertaken which provide a forum to discuss the current pressures; collect relevant data; create a better understanding of how the system works; and the reasons for environmental failures and then agree a set of actions to be implemented.

2.7 Whilst the WINEP provides the actions required in the short-term to be compliant with environmental legislation, the process does not lend itself to considering a more collective longer-term approach as the approach doesn't account for potential landscape changes or the impact climate change might have on the availability of water in the future. For this reason, there is a need to use other approaches to provide the additional information required.

Current requirements

2.8 The protection of our current habitats is set out in European and UK legislation. The water industry along with the regulators have been investigating and implementing catchment and source based solutions through WINEP for several decades.

2.9 Typically these investigations focus on source abstraction investigations and potential reductions. Following the Water Framework Directive (WFD) a number of other issues, beyond just flows, were identified that prevent some water bodies reaching good ecological status. Therefore, a number of broader catchment-based schemes have been implemented by other sectors and the water industry to tackle water quality issues, invasive species, river restoration as well as licence reductions.

2.10 These investigations and solutions continue to be delivered through the WINEP process. Historic investigations also serve as a good source of evidence for previous investigations. Therefore, the environmental process will seek to integrate the immediate issues that need to be addressed in the catchment with the potential future issues of the region.

Future requirements

2.11 The proposed approach to define the longer-term requirements of the catchments, by our environmental regulators, is to use flow indicators (Appendix 1).

2.12 We propose to determine the future, longer term, requirements of the environment through our current understanding of the catchment processes, evidence collated, local knowledge obtained from the catchment workshops, the environmental assessment tool, resilience criteria, landscape changes, water quality trends and potential future flow targets. As these different data streams are uncertain, we will generate a number of potential future environmental requirements by creating a number of environmental scenarios.

2.13 These are highly uncertain, therefore, WRSE will choose scenarios that provide boundaries between what we currently know we need to protect and what might be required under more extreme scenarios. We will examine the future environmental scenarios set out by our regulators as well as those developed by water companies on the basis of local investigations.

2.14 Flow indicators do not address the quality aspects within a catchment. Therefore, where there are long term trends on water quality parameters such as nitrate, phosphates, pesticides, etc we will use this information to predict what quality aspects might influence the catchments in each of the scenarios and therefore what catchment solutions might be available to address or arrest these longer-term trends.

2.15 Our environmental assessment approach is set out in Method Statement 1329 WRSE Environmental Assessments, which describes how we intend to use the approach to help assess the overall regional resilience plan.

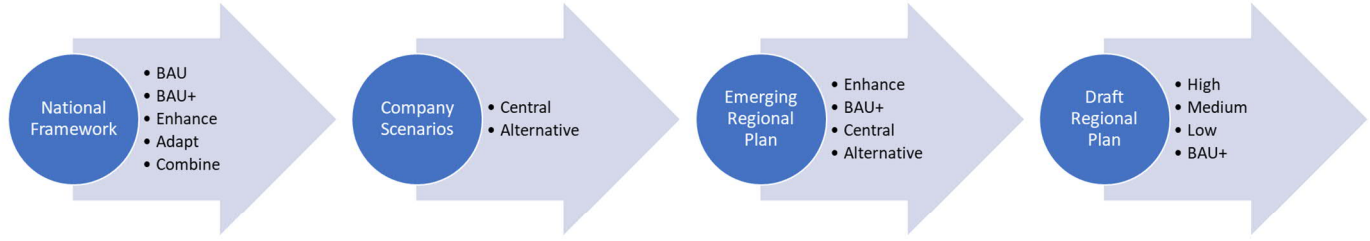
Approach to developing scenarios

2.16 Just as we take account of future population growth, the development of environmental ambition scenarios allows us to take account of the future requirements of the environment; allowing for a more robust regional plan to be constructed. This is a step change in approach from previous plans.

2.17 Our approach has sought to integrate the existing, well established process, with other indicators to provide a better longer-term view of the potential requirements of the environment. We have sought to blend these approaches to generate plausible future scenarios and ensure our environment is well protected in the future.

2.18 The environmental ambition scenarios used in the WRSE investment modelling have evolved during the production of the draft regional plan, as set out in the figure below. Further detail on the scenarios and rationale behind the evolution is in the following sub-sections.

Figure 1: WRSE approach to the development of environmental ambition scenarios



Business as usual (BAU): The same percentage of natural flows for the environment that currently applies continues for the future. Uneconomic waterbodies, where reducing abstraction would imply a significant investment, were initially discarded. However, an additional scenario (**BAU+**) including them has been subsequently incorporated.

Enhance: A greater environmental protection for protected areas and Sites of Special Scientific Interest (SSSI) rivers and wetlands, principal salmon and chalk rivers is achieved by applying the most restrictive Abstraction Sensitivity Band (ASB).

Adapt: Same ASB as BAU but a recovery to a lower standard in some heavily modified waterbodies is assumed.

Combine: Balances a greater environmental protection for protected areas, SSSI rivers and wetlands and principal salmon and chalk rivers with a view that good status (as defined under the Water Framework Directive) cannot be achieved everywhere in a shifting climate. Hence, adopts the Enhance ASB with a lower recovery to the EFI in some heavily modified waterbodies.

Based on their knowledge of the catchments, with regards the potential ecological benefit of sustainability reductions and their affordability assumptions, companies developed two further scenarios to complement the existing five scenarios: **Central** and **Alternative**. These environmental ambition forecasts were developed in liaison with local EA teams.

In addition, companies applied the licence reductions estimated for the EA scenarios to obtain the DO impact for some of their groundwater sources.

Four of the seven defined scenarios were used in the WRSE investment modelling for the emerging regional plan, to represent the range of potential future environmental ambitions: **BAU+**, **Enhance**, **Central** and **Alternative**.

Due to the variation between relative reductions in the scenarios applied by the companies, a mapping exercise was undertaken to map **Enhance**, **Central** and **Alternative** across to consistent **High**, **Medium** and **Low** scenarios for each Water Resource Zone (WRZ).

BAU+ is the minimum environmental ambition scenario required to be considered by companies in their WRMPs, as stated in the Water Resource Planning Guidance (WRPG). This therefore has been used as a reference scenario for the Draft Regional Plan.

The **High** environmental ambition scenario best aligns with the **BAU+** environmental ambition.

All environmental ambition scenarios in the draft regional plan take the proposed licence capping reductions into account.

National Framework Scenarios

2.19 The Environment Agency completed a longer-term environmental water needs assessment as part of the Water Resources National Framework, establishing the potential licence reductions required by 2050 to meet the Environmental Flow Indicators (EFI) so that a good ecological status is achieved or maintained. The EFI is defined by an Abstraction Sensitivity Band (ASB) allocated to each waterbody. Four scenarios were initially analysed:

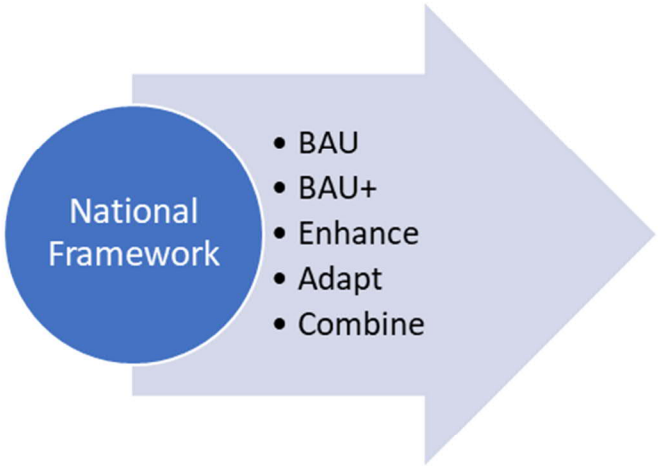
- Business as usual (BAU)
- Enhance
- Adapt
- Combine.

2.20 In all the scenarios, flow balance evolves as a proportion of natural flows as these are changed by the impacts of climate change.

2.21 In addition to the business as usual (BAU) scenario, a BAU+ scenario was developed for the South East, which incorporated waterbodies where it was previously deemed that abstraction reductions were uneconomic, i.e. they would require significant investment.

2.22 The descriptions of all five National Framework scenarios are in Figure 2 below.

Figure 2: National Framework environmental ambition scenarios



Business as usual (BAU): The same percentage of natural flows for the environment that currently applies continues for the future. Uneconomic waterbodies, where reducing abstraction would imply a significant investment, were initially discarded. However, an additional scenario (**BAU+**) including them has been subsequently incorporated.

Enhance: A greater environmental protection for protected areas and Sites of Special Scientific Interest (SSSI) rivers and wetlands, principal salmon and chalk rivers is achieved by applying the most restrictive Abstraction Sensitivity Band (ASB).

Adapt: Same ASB as BAU but a recovery to a lower standard in some heavily modified waterbodies is assumed.

Combine: Balances a greater environmental protection for protected areas, SSSI rivers and wetlands and principal salmon and chalk rivers with a view that good status (as defined under the Water Framework Directive) cannot be achieved everywhere in a shifting climate. Hence, adopts the Enhance ASB with a lower recovery to the EFI in some heavily modified waterbodies.

2.23 To calculate the deficits for each waterbody in 2050 under each of the five scenarios the Environment Agency utilised their bespoke spreadsheet, the Waterbody Abstraction tool. This tool calculated the water balance at the outlet of each waterbody for four flow regimes (Q30 – High flow, Q50 – Medium flow, Q70 – Medium/Low flow and Q95 – Low flow). The process we have undertaken to use this tool is detailed in the WRSE technical note "WRSE Environmental ambition – Sustainability reductions" which is available on the WRSE website in our document library.

2.24 The data extracted from the Waterbody abstraction tool was transferred to a new spreadsheet designed to automatically derive the required sustainability reductions in 2050 in all waterbodies within the WRSE region. The development of the logic underpinning this tool focused upon minimising the abstraction loss and hence the impact on deployable output (DO).

2.25 The range of environmental ambition scenarios has been used in the WRSE investment modelling to forecast how much additional water may be needed to replace unsustainable abstraction beyond 2025 – excluding those already included in the WINEP programmes.

2.26 The WRSE investment model requires deployable output (DO) values for different time horizons and scenarios for each water resource zone (WRZ) and return periods, both for average and peak period (please refer to Method Statement 1318 WRSE Best Value Planning for more details). The Environment Agency methodology used to develop the environmental ambition scenarios can only provide an estimated reduction of average abstraction derived from the calculated licence reduction and the future predicted abstraction.

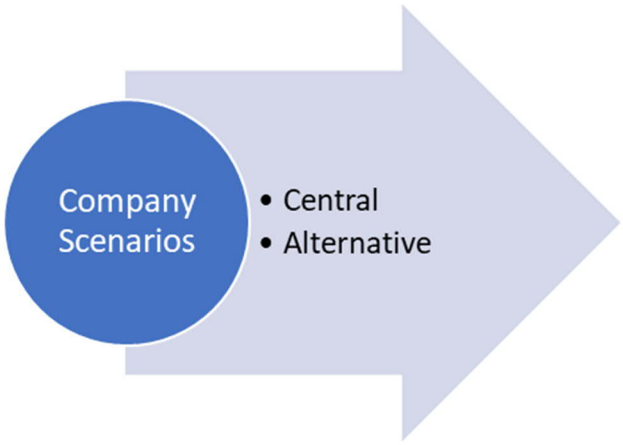
2.27 Estimating the final impact of the modelled sustainability reductions on DO would require system simulation, with licences for each public water supply (PWS) source modified. Likewise, the assessment undertaken following the Environment Agency approach relies on the accuracy of the prediction of future river flows as well as abstraction rates.

Company scenarios

2.28 Water companies reviewed the data for the BAU+ and Enhance scenarios in conjunction with WRSE and the Environment Agency, and using their local knowledge and existing operational data, introduced two further scenarios – the Alternative and Central scenarios.

2.29 Developing the Alternative and Central scenarios involved each water company assessing the delivery profiles and individual source sustainability reductions of the initial environmental ambition scenarios and delivery profiles for each of their WRZs. This step is shows in Figure 3 below.

Figure 3: Company environmental ambition scenarios



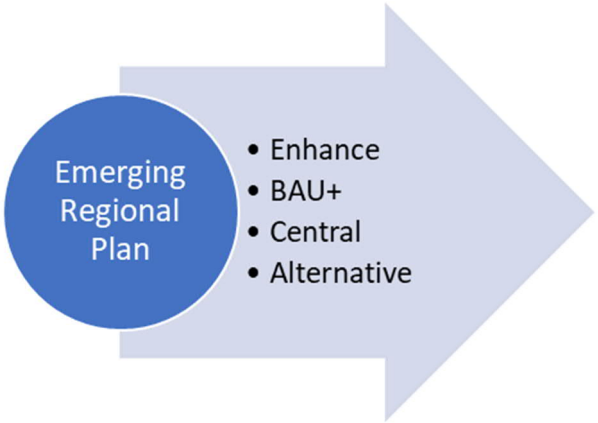
Based on their knowledge of the catchments, with regards the potential ecological benefit of sustainability reductions and their affordability assumptions, companies developed two further scenarios to complement the existing five scenarios: **Central** and **Alternative**. These environmental ambition forecasts were developed in liaison with local EA teams.

In addition, companies applied the licence reductions estimated for the EA scenarios to obtain the DO impact for some of their groundwater sources.

The emerging regional plan

2.30 For the emerging regional plan, a range of environmental ambition scenarios were incorporated into the adaptive planning approach. All seven scenarios were considered, but the Enhance, BAU+, Central and Alternative scenarios were used in the investment modelling for the emerging regional plan to provide the most appropriate range of future environmental ambitions. This step is shown in Figure 4 below.

Figure 4: Emerging regional plan approach



Four of the seven defined scenarios were used in the WRSE investment modelling for the emerging regional plan, to represent the range of potential future environmental ambitions: **BAU+, Enhance**, **Central** and **Alternative.**

2.31 The Environment Agency has reviewed the BAU+ and Enhance environmental ambition scenarios used in the emerging regional plan. Their conclusions showed that if these reductions were implemented then WRSE would meet the EFI challenge across the South East catchments for the BAU+ and Enhance scenarios. This demonstrates that WRSE's interpretation of the Environment Agency's environmental destination targets have been validated at a regional level. More work is required to continue to validate the environmental ambition scenario forecasts against the Environment Agency data and tools.

The draft regional plan

2.32 Although WRSE has considered seven environmental ambition scenarios in total (BAU, BAU+, Enhance, Adapt, Combine, Central and Alternative), only four scenarios were used as part of the investment modelling for the emerging regional plan, as these best represented the range of environmental ambition for the region:

- BAU+
- Enhance
- Central
- Alternative

2.33 At a regional level, the BAU+ and Enhance scenarios provide the most challenging forecasts, with the Alternative scenario generally providing the least challenging forecast, however the proposed DO reductions for these scenarios varied across companies and between WRZs. For example, in some WRZs, the Enhance scenario had the greatest levels of abstraction reduction, whereas in other WRZs the Alternative scenario had the greatest reductions.

2.34 As BAU+ is referenced in the Water Resources Planning Guidance as the minimum level of environmental ambition, this scenario has been used as the reference scenario.

2.35 To provide relative consistency between all the WRZs, the reductions in the Enhance, Central and Alterative scenarios were mapped across to Low, Medium and High, to provide a clearer picture of environmental ambition across the region. This mapping is shown in Table 1 below.

Table 1: Mapping of Enhance, Central and Alternative environmental ambition scenarios across to High, Medium and Low for each of the 37 WRZs

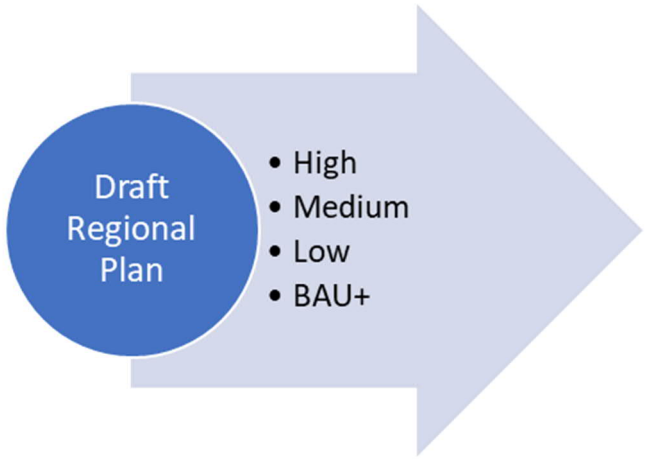
WRZ	High	Medium	Low
AZ1	Enhance	Central	Alternative
AZ2	Enhance	Central	Alternative
AZ3	Enhance	Central	Alternative
AZ4	Enhance	Central	Alternative
AZ5	Enhance	Central	Alternative
AZ6	Enhance	Central	Alternative
AZ7	Enhance	Central	Alternative
GUI	Enhance	Central	Alternative
HAZ	Alternative	Central	Enhance
HEN	Enhance	Central	Alternative
HKZ	Alternative	Central	Enhance
HRZ	Alternative	Central	Enhance
HSE	Alternative	Central	Enhance

WRZ	High	Medium	Low
HSW	Alternative	Central	Enhance
HWZ	Alternative	Central	Enhance
IOW	Alternative	Enhance	Central
KME	Central	Alternative	Enhance
KMW	Alternative	Enhance	Central
KTZ	Alternative	Enhance	Central
KVZ	Alternative	Central	Enhance
LON	Enhance	Alternative	Central
PRT	Enhance	Central	Alternative
RZ1	Enhance	Central	Alternative
RZ2	Central	Enhance	Alternative
RZ3	Enhance	Central	Alternative
RZ4	Central	Enhance	Alternative
RZ5	Enhance	Central	Alternative
RZ6	Enhance	Central	Alternative
RZ7	Enhance	Central	Alternative
RZ8	Enhance	Central	Alternative
SBZ	Enhance	Alternative	Central
SES	Enhance	Central	Alternative
SHZ	Enhance	Central	Alternative
SNZ	Enhance	Alternative	Central
SWA	Enhance	Central	Alternative
SWX	Enhance	Central	Alternative
SWZ	Enhance	Alternative	Central

2.36 The impacts of this mapping have resulted in a much better spread of reductions across the High, Medium and Low scenarios compared to the scenarios used in the emerging regional plan. In addition, the impacts of the proposed licence capping reductions to water company licences has also been included in the High, Medium and Low scenarios used in the investment modelling for the draft regional plan.

2.37 The approach for the draft regional plan is shown in Figure 5 below.

Figure 5: Draft regional plan approach



Due to the variation between relative reductions in the scenarios applied by the companies, a mapping exercise was undertaken to map **Enhance**, **Central** and **Alternative** across to consistent **High**, **Medium** and **Low** scenarios for each Water Resource Zone (WRZ).

BAU+ is the minimum environmental ambition scenario required to be considered by companies in their WRMPs, as stated in the Water Resource Planning Guidance (WRPG). This therefore has been used as a reference scenario for the Draft Regional Plan.

The **High** environmental ambition scenario best aligns with the **BAU+** environmental ambition.

All environmental ambition scenarios in the draft regional plan take the proposed licence capping reductions into account.

2.38 Table 2 below shows the environmental ambition scenario reductions at the company level for the emerging plan BAU+, Enhance, Central and Alternative scenarios and the draft regional plan High Medium and Low scenarios.

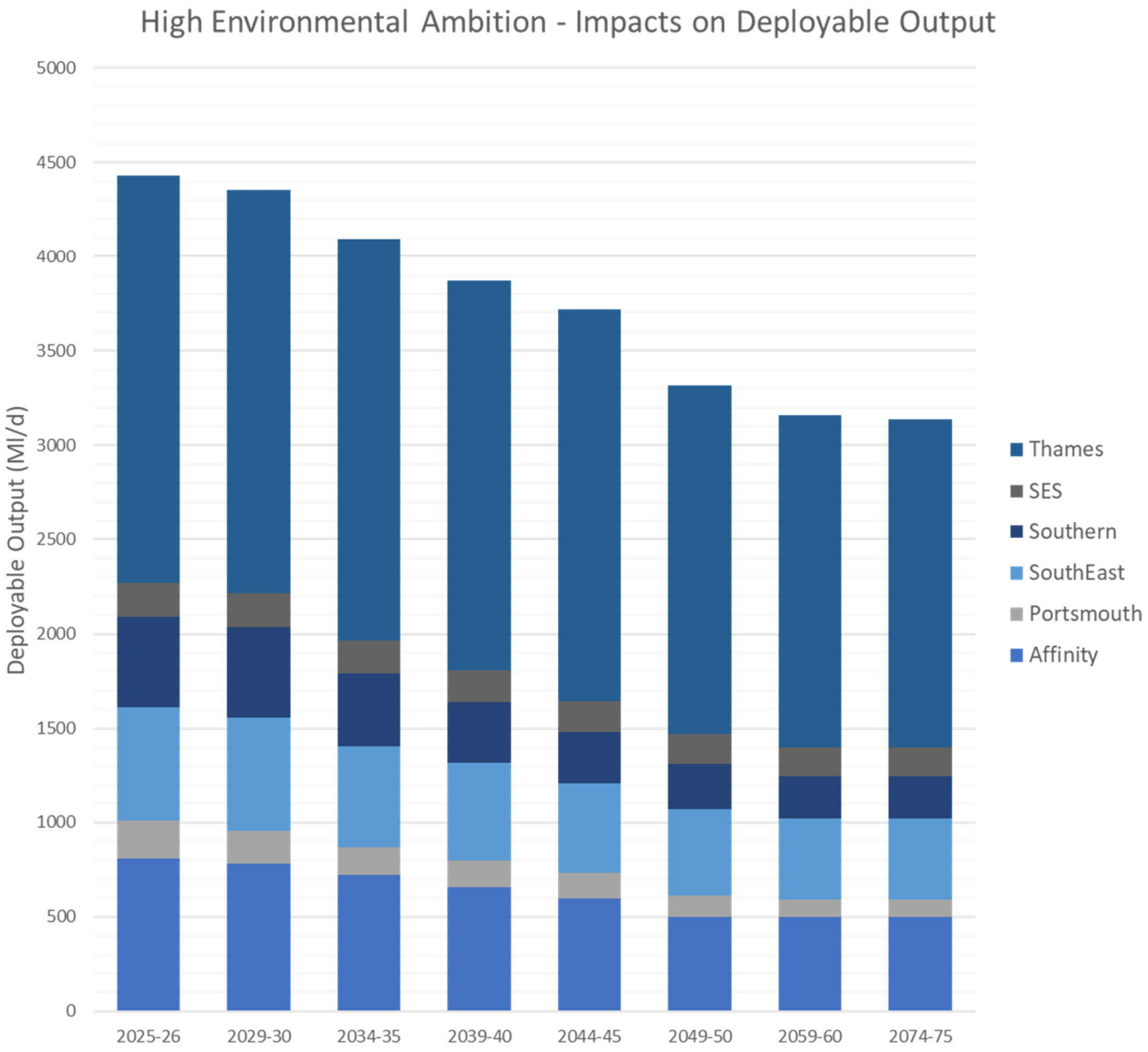
Table 2: Company level variations in environmental ambition scenarios

Company	BAU+	Enhance	Central	Alternative	Low	Medium	High
Affinity	-285	-309	-192	-133	-133	-194	-309
Portsmouth	-42	-48	-21	-6	-26	-51	-107
South East	-156	-162	-92	-44	-83	-130	-178
Southern	-142	-190	-126	-210	-90	-188	-247
SES	-12	-12	-12	-12	-11	-15	-29
Thames	-486	-482	-56	-62	-91	-183	-417
Total	-1122	-1204	-499	-466	-434	-762	-1288

2.39 Table 2 shows that at the regional level the High environmental ambition scenario best meets the reductions in the BAU+ scenario, and therefore represents the scenario which is compliant with the water resources planning guidance and regulatory expectations.

2.40 The graph in Figure 6 shows the impacts on DO in the High environmental ambition scenario for each water company across key time slices in the draft regional plan.

Figure 6: High environmental ambition scenario impacts on DO

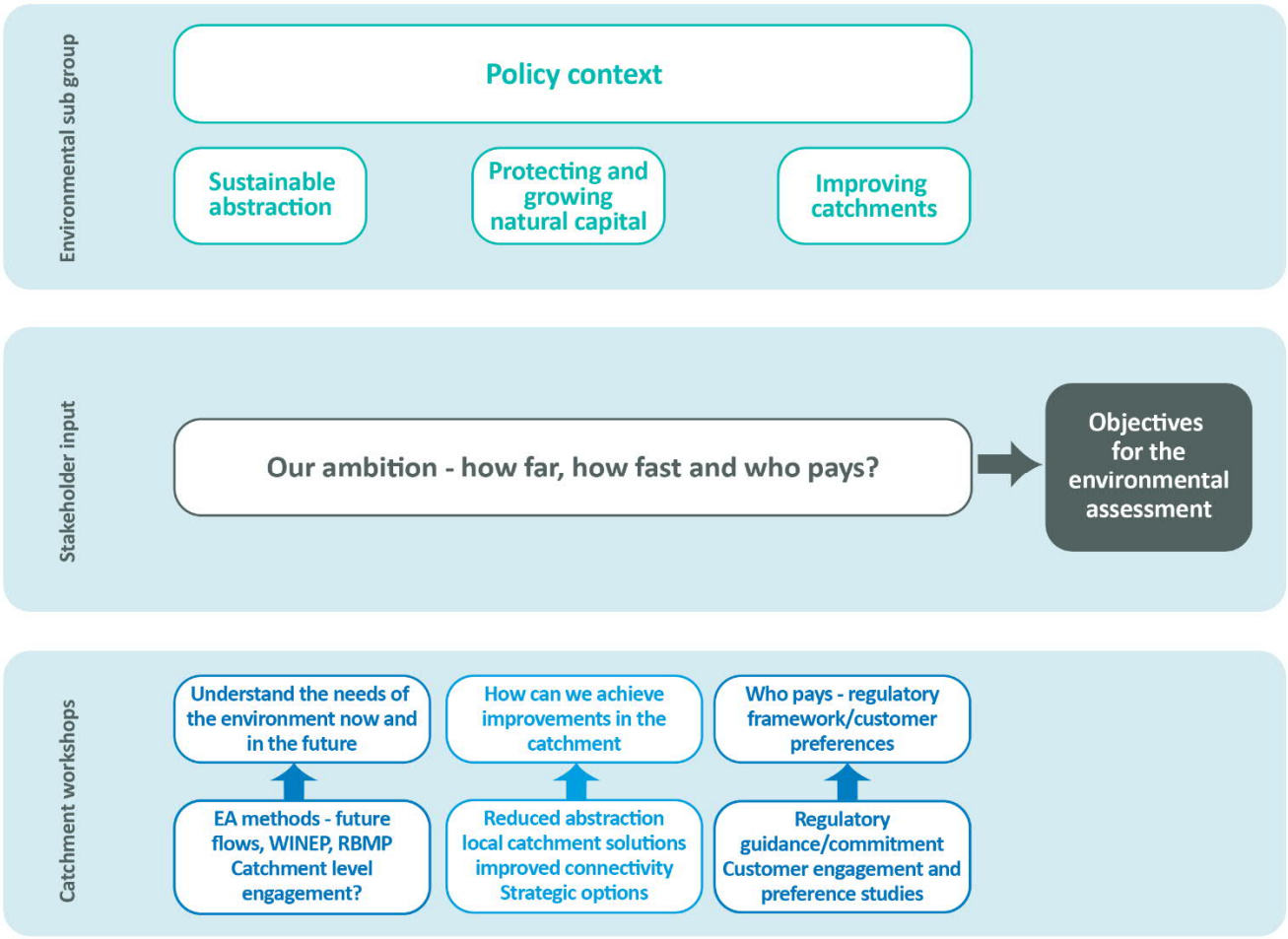


3 Stakeholder engagement

3.1 Whilst we have worked closely with stakeholders and regulators to develop the environmental ambition scenarios used for the draft regional plan, we will continue to work collaboratively with our stakeholders and regulators in future to develop plausible environmental forecasts for the region and continue to develop our overall environmental ambition.

3.2 To help us with the process we have engaged with stakeholders both on a catchment area basis and at an overall regional basis through our environmental sub-group. Figure 7 sets out these groups and the range of questions we are trying to answer through these groups.

Figure 7: Range of questions for Stakeholder groups



3.3 As part of catchment workshops held in 2020 and attended by regulators, Blueprint for Water, farmers and land managers, catchment partnerships and other potential parties who can implement solutions, an important consideration in the discussions were the reasons for environmental failure to ensure these can be represented within the environmental assessment objectives.

Regulatory Engagement

3.4 WRSE has been engaging with the Environment Agency (EA) since the intention to move towards an environmental ambition approach was put forward in the Environment Agency's Water Resources National Framework document, published in March 2020. WRSE has worked alongside the EA to develop the sustainability reduction profiles needed to achieve the reductions in the BAU+ and Enhance scenarios. We have done this through regular engagement with local and national EA colleagues, water company officials, and broader stakeholders.

3.5 WRSE currently engages with the EA using its existing governance and engagement structure.

- Fortnightly WRSE Programme Management Board (PMB) meetings which include water company and EA representatives. These meetings operate at a strategic level, discussing the development of regional plans and WRMPs.
- Decisions and actions from PMB meetings cascade down into the WRSE Environmental Ambition Sub-Group, which consists of both PMB members, and regional EA leads. These meetings focus upon the specifics of developing national and company-specific environmental ambition scenarios and their delivery.
- Decisions and actions from these Environmental Ambition Sub-Group meetings cascade down into meetings between the water companies and their local EA area teams. These meetings discuss technical points involved in the production of scenarios and delivery of environmental ambition at a company level.

Approach to environmental option development

3.6 We held a series of catchment workshops in 2020 to capture additional local knowledge to understand any specific issues and the likely cause of the problems. These workshops covered each management catchment area in turn and has allowed us to better understand what the local issues (and possible solutions) are within each of the catchments that we and the other sectors abstract from in the South East. The catchment workshops were held with catchment partnerships and other local stakeholders.

3.7 The workshops were also helpful to generate potential ideas for solutions and options which came from discussions on the longer-term issues faced by catchments in the South East. These option workshops were key to enable WRSE to generate further regional and local options – please refer to Method Statement 1328 WRSE Options Appraisal for information on the formulation of options within the regional plan.

3.8 The options that were identified in the workshops have been collated into sets or portfolios. As noted in Method Statement 1334 WRSE Multi Sector, some of the issues in catchments might require a multi-sector solution. These portfolios have been put forward through the options appraisal process (see Method Statement 1328 WRSE Options Appraisal which outlines the method for assessing these options in terms

of their benefits). The assessments of multi-sector options will also help to define catchment-wide solution sets for consideration in the investment model, against new supply and demand options.

3.9 Central to our method for deriving the environmental ambition for the region is to understand the needs of the environment now and in the future, and the way in which we can achieve improvements in the WRSE catchments.

3.10 The 2020 catchment workshops were based around the following discussion points:

- The specific issues that are making catchments less resilient and what can be done to improve this.
- Map out issues and identify opportunities and schemes to deliver water resource and water quality benefits that can be put forward to the water companies to improve resilience.
- Working with all catchment stakeholders to identify where these are.
- Setting out the impact to the environment under the future scenarios and discuss what other interventions might be needed in the future.

3.11 Any potential catchment solutions that came out of these workshops have fed into the catchment options workstream (see Method Statement 1328 WRSE Environmental Assessments) to see if they would be feasible and what benefits could be gained through the environmental assessment method and the resilience assessment framework.

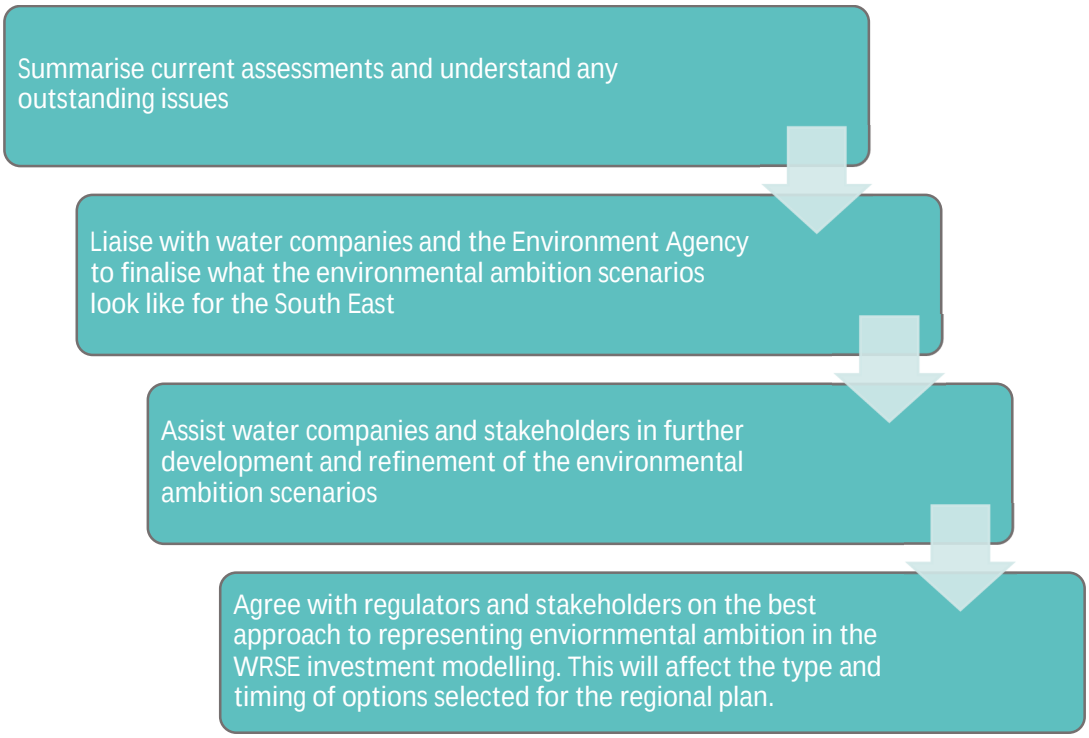
4 Summary and Next Steps

Summary

4.1 This method statement sets out our proposed approach for defining the environment ambition for the region and how it integrates with other workstreams.

4.2 The process follows a simple staged approach of understanding the issues, anticipating the potential needs, setting out the options and setting out solutions which can be considered in the regional plan, as shown in Figure 8.

Figure 8: Developing the environmental ambition for WRSE catchments



4.3 We are continuing to work with the Environment Agency and have produced a range of indicative environmental ambition scenarios which we have used to forecast how much water may be needed to replace unsustainable abstraction in the period from 2025 to 2050 and beyond. These scenarios consider the potential impacts of climate change, licence capping, as well as the outputs of previous investigations and assessments including through the WINEP programme.

4.4 This integrated approach allows a robust, resilient regional plan to be developed which takes both current and future water needs into account to ensure the environment in the South East is resilient for the future.

Next Steps

4.5 WRSE will continue to work with its member water companies and the Environment Agency using the existing governance and engagement structure, as set out in section 3, to further develop the region's environmental ambition scenarios.

4.6 We will also work closely with the Environment Agency to continue to check and test the environmental ambition scenarios and sustainability reduction targets. The Environment Agency's "waterbody abstraction tool" will be used to independently verify sustainability reductions produced by WRSE and water companies at a water source level. At the time of writing, WRSE is working proactively with the EA to corroborate its work to date.

4.7 The environmental ambition scenarios used in the draft regional plan do not currently consider potential impacts of sustainability reductions on non-PWS sources. WRSE will need to consider these impacts further as part of the multi-sector and stakeholder engagement work as the non-PWS abstractions are likely to be impacted by the proposed Environment Agency licence capping policy.

4.8 The current analysis is necessarily simplified and conducted with the sole purpose of providing plausible possible futures with which to determine the preferred regional portfolio of options. More detailed investigations are needed before adopting the modelled reductions to confirm their effect on river flows, verify their ecological benefit, and establish their cost-effectiveness through detailed cost benefit analysis work.

4.9 WRSE is committed to improving the environment in our region, but we need to agree the pace at which abstraction can be reduced and how we prioritise where reductions should be made. This so that activities and costs can be phased across the planning period and customers' supplies are not put at unnecessary risk. This is essential as some of the new schemes required to replace these water sources will take many years to plan and build. Therefore, decisions on whether we develop these schemes or not must be made soon. WRSE is continuing to engage with regulators and water companies to facilitate these decisions.

4.10 WRSE is working with the Environment Agency, Natural England, the Catchment Based Approach (CaBA) chalk stream restoration group and environmental organisations to develop a framework to determine where abstraction reduction should be prioritised in catchments.

4.11 The catchment prioritisation framework has developed criteria to score each catchment, based on the following questions:

- Should WRSE prioritise upper catchments, because headwater ecologies are the most vulnerable and the benefits to flow should improve the whole catchment?
- Should WRSE prioritise catchments where the impacts on flows are the most severe?
- Should WRSE prioritise catchments where there is the highest degree of certainty that abstraction reduction will restore flows and deliver environmental improvement?

- Should WRSE prioritise catchments where people have the most unrestricted access to rivers and streams?
- Should WRSE prioritise catchments where nature will benefit most, even if public access is restricted?
- Should WRSE focus abstraction reductions on a smaller number of catchments but fully address the issues they face?
- Should WRSE focus on a wider range of catchments and partially address their abstraction issues?

4.12 Each catchment within the WRSE region has been scored based on the catchment prioritisation criteria to give an overall indication of which catchments should be prioritised, incorporating the EA prioritisation criteria, Natural England's nature recovery list, and discussions with CaBA regarding chalk stream catchments in the South East.

4.13 These scores will be reviewed with stakeholders and regulators through a series of workshops planned for late 2022/early 2023. The environmental ambition scenarios for these agreed priority catchments will then be reviewed to understand if the environmental ambition profiles can be accelerated. In addition, any further environmental investigations within the priority catchments will be identified, and taken through into company WINEP programmes, or into catchment options in company business plans for PR24.

4.14 These proposed next steps will continue to be delivered by WRSE in collaboration with water companies, stakeholders and regulators, working to deliver the draft regional plan, draft Water Resource Management Plans and beyond.

Method Statement Updates

4.15 An initial version of this document was consulted on between 1st August 2020 to 30th October 2020 and comments received during this time were incorporated into this method statement.

4.16 Following the publication of WRSE's emerging regional plan and the subsequent consultation, further changes to our approach have been made. This method statement has been updated to reflect those changes which have been adopted for the draft regional plan, which is due to be published for consultation in November 2022.

4.17 If any other relevant guidance notes or policies are issued, then we will review the relevant method statement(s) and see if they need to be updated.

4.18 When we have finalised our Method Statement, we will ensure that we explain any changes we have made and publish an updated Method Statement on our website.

4.19 We will update our website with relevant information from time to time to ensure that as new information comes forward stakeholders are kept informed.

Appendix 1: Water Resource National Framework Approach

Water Resources National Framework approach

The Environment Agency's Water Resources National Framework sets out the expectation that regional plans should seek to pro-actively enhance the environment and increase ambition in this area. The EA has also produced some additional guidance on future environmental ambition.

This document sets out the proposed approach by the regulator in determining how much water would be required in the environment. This assessment is based on a number of requirements and assumptions which include:

- meeting the water requirements of sites specially protected for nature conservation
- restoring sustainable levels of abstraction to freshwater and wetland habitats of principal importance listed under Section 41 of the Natural Environment and Rural Communities Act (2006), particularly chalk rivers and other sites identified as priority habitats for restoration
- restoring river flows to support the recovery of salmonid fish populations
- embedding the principle that new developments should result in net environmental gain including 10% biodiversity net gain - the aim is for every plan to have a net positive impact on the local and national environment.

As there are a number of policy decisions that could influence the level of environmental protection required for the future, the guiding principles document categorises these potential futures into four scenarios discussed in chapters 0, Error! Reference source not found., Error! Reference source not found., Error! Reference source not found. and Error! Reference source not found.. The scenarios used in the environmental assessments are based on current estimates of environmental flow indicators (EFIs) and future EFI assessments. Based on these estimates an assessment of how much water has to be left in the environment can be derived for each of the four scenarios. This therefore provides the plan with a potential range of impacts on the supply forecast.

Business as Usual

- Policy/regulatory approach remains the same
- We continue to protect the same % of Qn for the environment
- Flow and GW balance tests evolve as a proportion of natural flow irrespective of climate change impacts
- Environment adapts to Climate

EFI evolves as a proportion of natural flow irrespective of climate change impacts

- Recover to Complaint
- No deterioration

Groundwater tests evolve around seasonal changes and response to abstraction pressure

- Recover to Good, or on pathway to Good
- No Deterioration

Maintain the ambition for the environment

- We maintain the same environmental protection as now despite climate change
- Flow and GW balance tests set at current volumes to protect environmental flows from climate change impacts
- Abstractions adapt to Climate change

- Fix EFI at current volumes
- Fix GW allowance based on current volumes
- No Deterioration
- Recover to Complaint

Enhance the environment

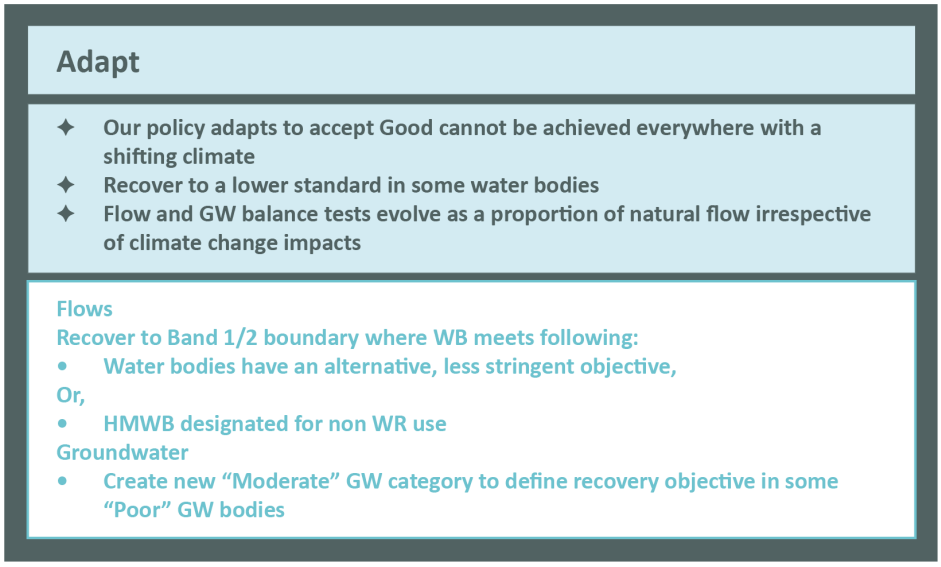
- Greater environmental protection for Protected Area and SSSI rivers and wetlands, principal salmon & chalk rivers
- Apply most sensitive flow constraint as appropriate
- Flow and GW balance tests evolve as a proportion of natural flow irrespective of climate change impacts

For Protected Area/SSSIs:

- rCSMG or equivalent
- Recover to Good in GW units linked to these rivers or wetlands

For principal salmon and chalk rivers:

- ASB3
- Recover to Good in GW bodies underlying chalk rivers



In summary, the overall assumptions made in the EA guidance are that it:

- Does not include local intelligence or specialised regional/ catchment scale modelling to identify ecological needs.
- Uses a single approach to model possible climate change impacts on flow rather than a wide range of scenarios to represent uncertainty.
- Assumes abstraction reduction is the only possible solution - other changes, such as altering the way reservoir storage is used to address flow issues, are not considered.
- Assumes the WRGIS database is a snapshot in time - February 2019 version – this may not represent catchments in as much detail as locally specific models and may differ from other models in assumed distribution of abstraction impacts (it includes estimates of some unlicensed activities).
- Assumes waterbodies that were at Good Ecological Status in 2016 will remain at good.
- Assumes that the planned implementation of schemes in WINEP and AMP will enable waterbodies to achieve good by 2027.
- Assumes non-economic waterbodies have been excluded from the baseline.
- Estimates some licence reductions where exact quantities are not available.
- Assumes groundwater abstraction reductions to achieve natural flows will deliver the most environmental improvements and will improve groundwater status.
- Is more complex to model changes to surface water licences so only considered these if:
    - The licence does not have a flow constraint,
    - It is not from a reservoir or lake or level dependant catchment,

- It does not have an upstream supported flow.

- Is based on recovery to the EFI (other than in the Adapt scenario).
- Is important! Focus is long term planning.
- Makes broad assumptions on a national scale for the purposes of the national framework.
- Should not supersede local investigations that have used more detailed modelling.

The guiding principles document was issued by the Environment Agency. However, Natural England also has a proposed approach to achieving a sustainable environment in designated areas and this is set out in the Common Standards Monitoring Guidance document(s).

Common Standards Monitoring Guidance (CSMG)

CSMG sets out a series of water quality and water quantity targets for designated sites. The water quality objectives were adopted by Natural England and the Environment Agency. However, the flow targets have not yet been fully adopted.

The underlying principle of the flow targets set out in the guidance note is that only a certain percentage of the natural flow in the catchment should be abstracted. How much is permissible depends on whether the abstraction is taking place in the tidal reach, lower reaches or in the headwaters of rivers.

Typically, only 5% of the natural resources would be allowed to be abstracted in the headwaters of a catchment and 10% of the natural flows in the lower reaches of a river.

This approach sets out a very different approach on flow targets and what is sustainable in designated rivers. Therefore, it is important to use this approach for abstractions in these areas.

An alternative approach would be to use the Water Framework Directive assessment approach.

Water Framework Directive (WFD)

The WFD is a European Directive that imposes legal requirements to protect and improve the water environment (including our rivers, coasts, estuaries, lakes, ground waters and canals).

In undertaking a WFD assessment any activity should support the objectives of the local River Basin Management Plan (RBMP) or meet strict sustainability criteria. It is important that any activity does not cause a deterioration to the status of a water body.

The River Basin Management Plans set out the current status of water bodies and the actions required to meet the objectives. Typically the assessments are based on the state of the environment over the last 6 to 18 years (1 to 3 WFD six year cycles).

The WFD sets out an assessment criteria which look at:

- physical habitat – the distribution and diversity of habitat including the physical processes that sustain and create new habitat. Physical habitat is essential for fish, macrophytes and invertebrates to live and thrive
- water quality – particularly physico-chemical aspects of water quality - such as levels of dissolved oxygen, phosphorus and ammonia
- fish and eels
- macrophytes - water plants visible to the naked eye, growing in the river
- invertebrates - insects, worms, molluscs, crustacea etc living on the riverbed
- diatoms - microscopic diatoms (algae) found on rocks and plants
- Invasive non-native species (INNS)

All these approaches will require an understanding of the range of flows (flood and drought) we face today and the likely range we will face in the future. We intend to use the historic flow sequences and the new regional future flow sequences in our assessments using these approaches. We also intend to use the output from our hydrological investigations to estimate the impact of groundwater abstractions on river flows. These studies coupled with potential land use changes across the region and an understanding of the potential impacts of climate change will be used to help assess the future water availability from both surface water bodies and groundwater bodies within the region. It is likely that this work will continue to be refined but it should provide enough understanding to define the range of water availability in the catchments and consequently the range of environmental ambition which we will have to plan for.

ANNEX B ENVIRONMENTAL AMBITION TECHNICAL NOTE VERSION D

Environmental Ambition Technical Note

Version D

February 2022

Title:	Environmental Ambition Technical Note
Last updated	February 2022
Version	D
History of Changes made to this version	This document outlines the approach undertaken by Mott MacDonald to calculate the environmental ambition scenarios for the emerging regional plan (published in January 2022).
Author	David Ocio / Nathan Burt (Mott MacDonald)
Reviewed by	Affinity Water Portsmouth Water SES Water South East Water Sothern Water Thames Water
Approved by	Sarah Green
WRSE Director	Meyrick Gough

MOTT MACDONALD

Water Resources South East

Environmental ambition

Project:	WRSE Environmental ambition		
Our reference:	100411624-011-SSTNB-01		
Prepared by:	David Ocio/Nathan Burt	**Date:**	22/02/22
Approved by:	David Ocio	**Checked by:**	Peter Ede/Sarah Green
Subject:	Sustainability reductions		

1 Introduction

Water Resources South East (WRSE) is undertaking a multi-sector, regional resilience plan to secure water supplies for the South East until 2100 while ensuring environmental resilience. Planning approaches have historically considered the environmental requirements as defined through the Water Industry National Environment Programme, but these only consider the following 5 to 15 years. In order to have a longer forecast for the environment, WRSE has committed to developing an 'over-arching environmental ambition' for the region that includes a holistic approach to environmental management.

The Environment Agency (EA) has recently completed a longer-term environmental water needs assessment as part of the Water Resources National Framework, establishing the potential licence reductions required by 2050 to meet the Environmental Flow Indicators (EFI) so that a good ecological status is achieved or maintained. The EFI is defined by an Abstraction Sensitivity Band (ASB) allocated to each waterbody. Four scenarios have been analysed:

- Business as usual (BAU): the same percentage of natural flows for the environment that currently applies continues for the future. Uneconomic waterbodies, where reducing abstraction would imply a significant investment, were initially discarded. However, an additional scenario (BAU+) including them has been subsequently incorporated.
- Enhance: a greater environmental protection for protected areas and Sites of Special Scientific Interest (SSSI) rivers and wetlands, principal salmon and chalk rivers is achieved by applying the most restrictive ASB.
- Adapt: same ASB as BAU but a recovery to a lower standard in some heavily modified waterbodies is assumed.
- Combine: balances a greater environmental protection for protected areas, SSSI rivers and wetlands and principal salmon and chalk rivers with a view that good status (as defined under the Water Framework Directive) cannot be achieved everywhere in a shifting climate. Hence, adopts the Enhance ASB with a lower recovery to the EFI in some heavily modified waterbodies.

In all cases, flow balance evolves as a proportion of natural flows as these are changed by the impacts of climate change.

Future predicted level of abstraction in 2050 for the different sectors as estimated by the EA is shown in Table 1.1. Power generation is the largest abstractor in the region. However, when consumptiveness is considered, public water supply would account for 92% of the total consumption.

Table 1.1: Distribution of licences and abstraction in Ml/d per sector in 2050

Sector	Licence	Abstraction	Consumption total	Consumption % of total
Power generation	29,190	10,680	13	0.4
Public water supply	8,028	5,108	3,287	91.8
Industry	4,499	2,747	79	2.2
Agriculture	1,893	1,489	68	1.9
Amenity/environmental	518	158	84	2.4
Other	67	49	48	1.4
Total	**44,194**	**20,231**	**3,580**	**100.0%**

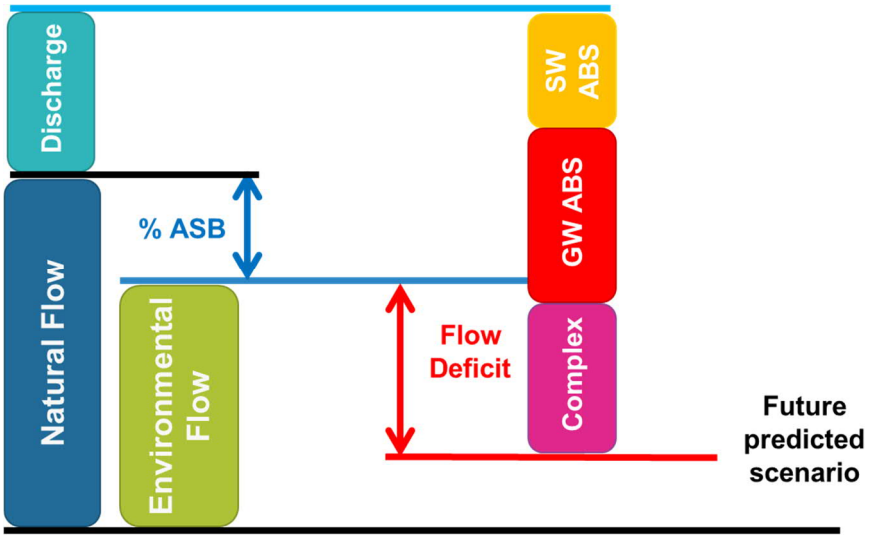
WRSE wishes to analyse the impact of the EA scenarios on the supply-demand balance of its water resources zones by establishing the potential changes in deployable output. This technical note presents the results of the analysis undertaken to feed into WRSE investment modelling.

2 Approach

In the Water Resources National Framework, the EA utilised a bespoke spreadsheet tool (Waterbody Abstraction Tool) to estimate the deficits in 2050 for each waterbody per scenario. The tool calculates the water balance at the outlet of each waterbody for four quantiles (Q30, Q50, Q70 and Q95) by (see Figure 2.1):

- Starting with the predicted natural flow in 2050 based on ensemble AFIXK of the Future Flows Hydrology project extrapolated to the outflow point of the integrated waterbodies in the WRGIS.
- Adding the future predicted discharge to each waterbody modifying the recent actual value with a growth factor based on water company demand projections.
- Subtracting the future predicted surface water abstractions based on the recent actual value with growth factors according to the sector.
- Subtracting the future predicted impact of groundwater abstractions based on the recent actual value with growth factors according to the sector, and the spatial and temporal impact factors included in WRGIS which have been calculated using regional groundwater models.
- Incorporating complex impacts associated with reservoirs, transfers or augmentation schemes.
- Comparing the resulting future predicted flow in the river with the EFI, the latter calculated by applying the maximum allowed abstraction as indicated in Table 2.1 with Abstraction Sensitivity Bands varying per scenario (see Figure 2.2 and Figure 2.3 showing how abstraction would be more restricted in the upper parts of the catchments)

Figure 2.1: Process to derive flow deficit for a certain quantile

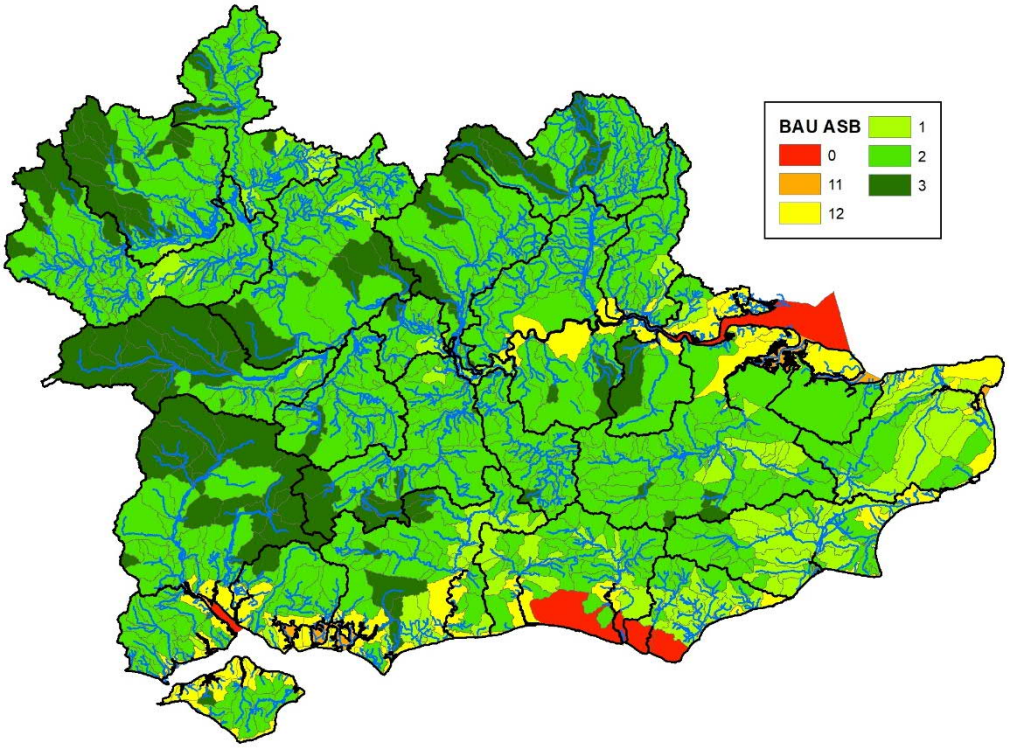


Source: Mott MacDonald

Table 2.1: Maximum allowable abstraction as a function of Abstraction Sensitivity Band

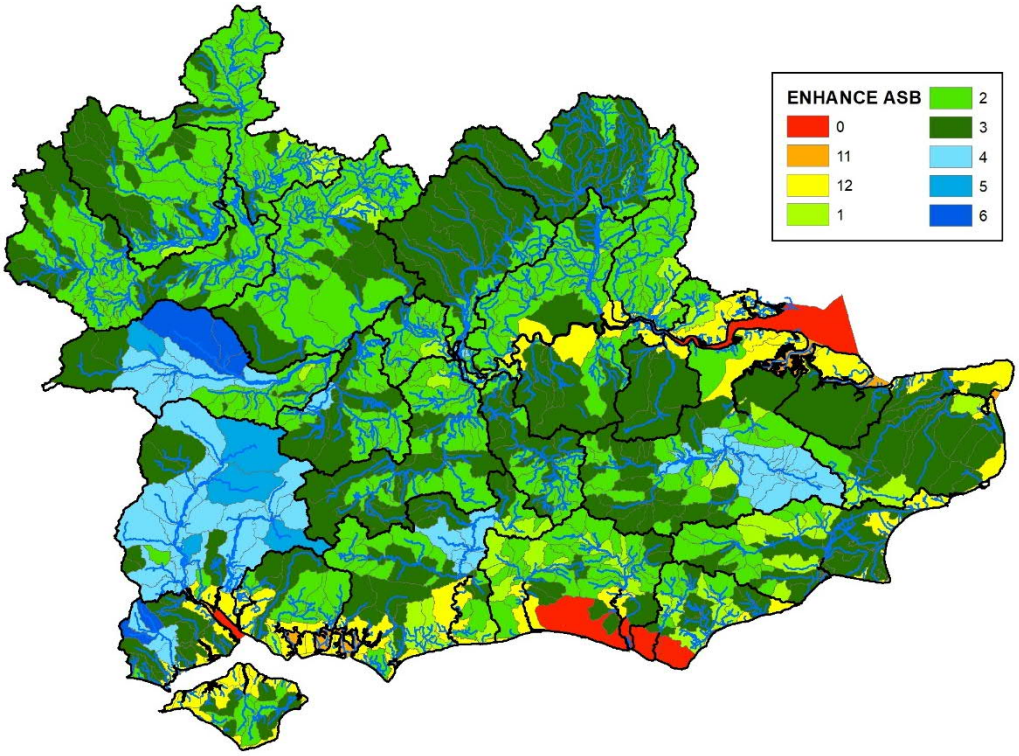
Flow quantile	Abstraction Sensitivity Band									
	0	11	12	13	1	2	3	4	5	6
Q30	100%	45%	40%	35%	30%	26%	24%	10%	15%	10%
Q50	100%	41%	36%	31%	26%	24%	20%	20%	15%	10%
Q70	100%	39%	34%	29%	24%	20%	15%	15%	10%	10%
Q95	100%	35%	30%	25%	20%	15%	10%	10%	5%	5%

Figure 2.2: Abstraction Sensitivity Bands for BAU scenario



Source: EA

Figure 2.3: Abstraction Sensitivity Bands for ENHANCE scenario



Source: EA

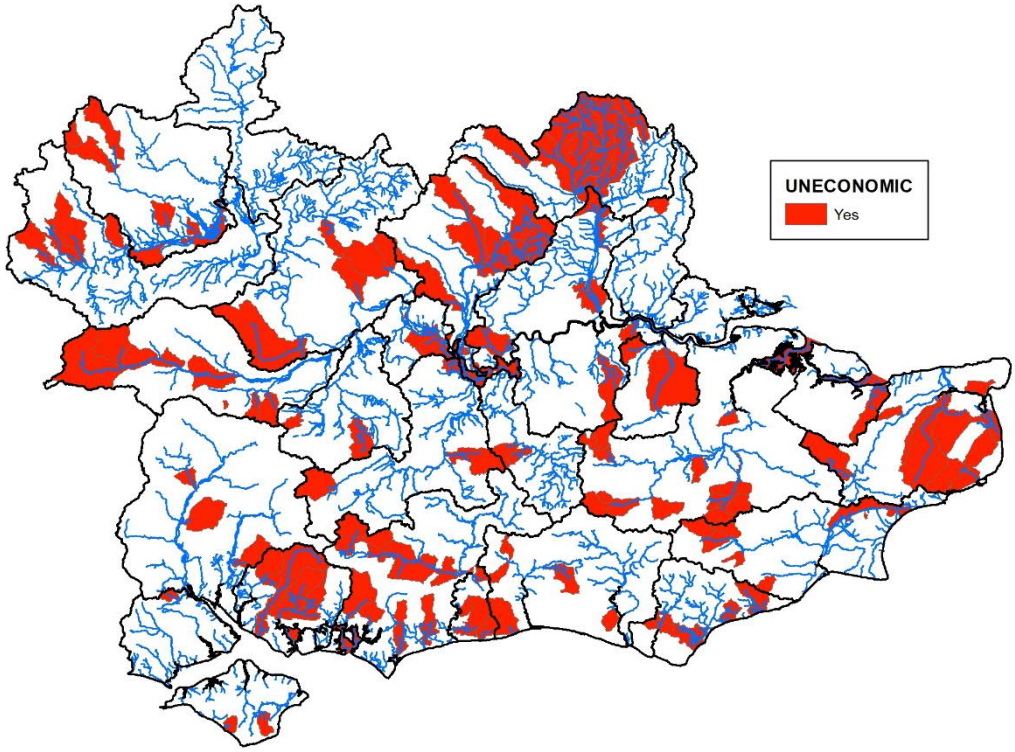
Data from the Waterbody Abstraction Tool has been transferred to a new spreadsheet tool designed to automatically derive the required sustainability reductions to remove the deficit at Q95 in 2050 in all waterbodies within the WRSE region. The logic for establishing the reductions needed has aimed to minimise the abstraction loss and hence the impact on deployable output (DO). It is as follows:

- Reductions are applied from top to bottom of each catchment so that upstream benefits (i.e. increases in river flows due to licence reductions) are considered downstream before applying the required reductions.
- Licences are reduced first to their future predicted abstraction rates as this would imply no loss of DO.
- Surface water licences are then reduced further, if existing, as they would impact DO less than reductions in groundwater licences given that availability of water for abstraction in rivers during a drought is not as guaranteed as in the case of aquifers. This reduction of abstraction from rivers during droughts is already accounted for in planning assumptions.
- Groundwater licences are subsequently reduced below future predicted abstraction rates starting from the ones that impact the deficit the most, because of either the spatial or temporal allocation of their impact.
- Licences with high consumptiveness are reduced next (licences with consumptiveness lower than 10% not adjusted).
- Licences located in the waterbody of analysis have priority in the reduction over others located upstream so as to minimise impact on DO. Thus, if for example two abstractions are causing a deficit in a certain waterbody X, one located in that waterbody X and another upstream in a different waterbody Y, and the upstream abstraction is not provoking a deficit in the waterbody Y it is located in, the reduction will be first applied to the abstraction in the waterbody X. Reducing the abstraction in waterbody Y would solve the problem in waterbody X as well but it would imply a surplus in waterbody Y.
- In equal conditions, smaller licences are reduced/removed first as they would be less economical to maintain.
- Sustainability reductions are applied at 5% steps and uniformly across the flow duration curve.

It is noted that:

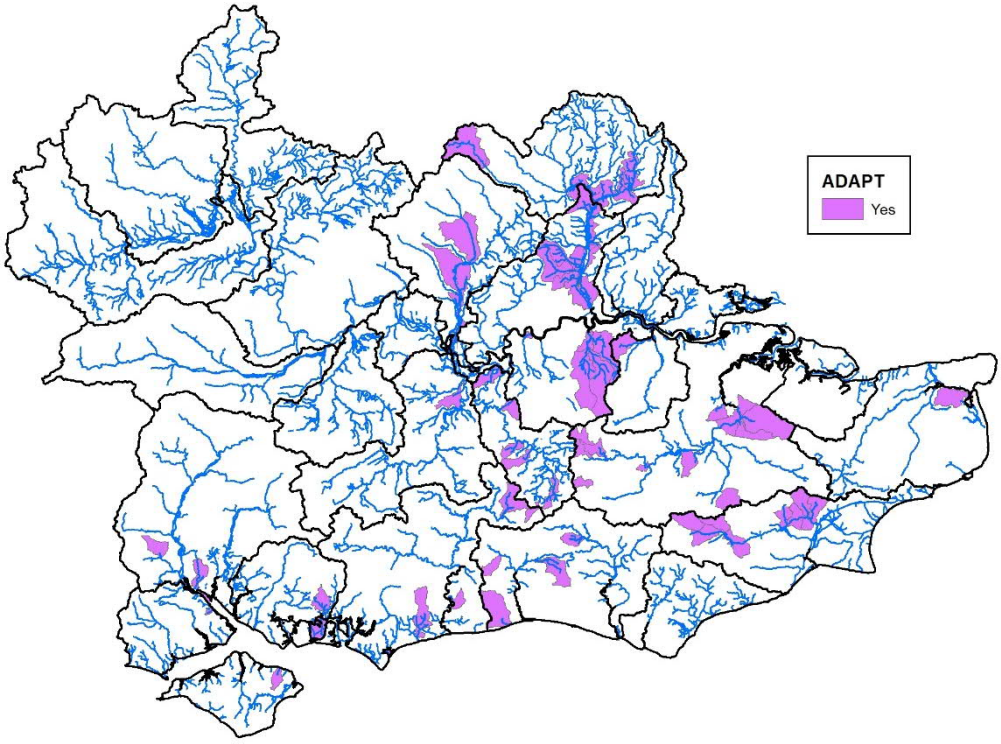
- In order to avoid PWS sustainability reductions impacting other sectors, the part of the Q95 deficit attributed to PWS abstractions was estimated and then used to derive PWS licence reductions.
- In the BAU scenario 189 waterbodies considered uneconomical were excluded from the analysis (see Figure 2.4)
- In the Adapt and Combine scenarios a 25% deficit over the EFI was allowed in 90 heavily modified waterbodies (see Figure 2.5)

Figure 2.4: Uneconomic waterbodies



Source: EA

Figure 2.5: Adapt waterbodies



Source: EA

3 Results

Table 3.1 presents the modelled reductions required in PWS licences to fulfil the objectives of the different EA scenarios. The largest reduction in abstraction corresponds to Thames Water followed by Affinity. Moving from the BAU scenario to the Enhance scenario would increase the reduction of abstraction required by 60% although there are differences between water companies, with Thames Water for instance only experiencing an increase of 14%.

Table 3.1: Required licence reductions in Ml/d by sector and scenario

Water company	Current licences	BAU	ADAPT	BAU+	COMBINE	ENHANCE
Affinity Water	988	-275	-421	-426	-504	-511
Portsmouth Water	302	-84	-133	-134	-142	-143
South East Water	825	-232	-376	-377	-416	-415
Southern Water	1179	-320	-640	-645	-694	-696
SES Water	402	-12	-99	-101	-99	-99
Thames Water	4190	-824	-878	-939	-960	-1019
Other	93	-17	-41	-42	-46	-47
Total	**7979**	**-1765**	**-2587**	**-2664**	**-2860**	**-2930**

4 Scenarios for investment model

The WRSE investment model requires DO values for different time horizons and scenarios for each water resource zone (WRZ) and return period, both for average and peak period. The EA methodology can only provide an estimated reduction of average abstraction derived from the calculated licence reduction and the future predicted abstraction. The impact on DO is likely to differ as:

- Surface water sources have Hands Off Flow conditions which would reduce the availability of water for abstraction during droughts beyond average low flow conditions,
- Storage can limit the effect of a reduced summer abstraction, or
- Groundwater sources can be operated at different rates seasonally within the annual licence.

Estimating the final impact of the modelled sustainability reductions on DO would require system simulation, with licences for each PWS source modified as established here. Likewise, the assessment undertaken following the EA approach relies on the accuracy of the prediction of future river flows as well as abstraction rates. To note, the assumptions adopted by the EA with regards to the impact of climate change and demand growth could be inconsistent with those adopted by WRSE, with an unknown impact on the results. Further work to review the methodology will be undertaken in collaboration with the EA and WRSE companies.

Based on their knowledge of the catchments, with regards the potential ecological benefit of sustainability reductions and their affordability assumptions, companies have developed two further scenarios to complement the existing five scenarios: Central and Alternative. These environmental ambition forecasts have been developed in liaison with local EA teams. In addition, companies have applied the licence reductions estimated for the EA scenarios to obtain the DO impact of some of their groundwater sources.

Four of the seven defined scenarios have been used in the WRSE investment modelling to date, to represent the range of potential future environmental ambitions: BAU+, Enhance, Central and Alternative. The adopted DO reductions for each of these four scenarios are shown in Table 4.1.

In order to develop the Central and Alternative scenarios, five of the six WRSE companies provided estimated DO losses in their WRZs. In the case of Affinity AZ3 and AZ5, the reductions incorporate some

estimates from Water Resources East (WRE), who have been undertaking a similar environmental ambition assessment. Central and Alternative scenarios for one company, Portsmouth Water, have been developed slightly differently, and represent a 50% reduction of the Adapt and BAU scenarios respectively.

Table 4.1: Adopted DO reductions per water resource zone in Ml/d

WRZ	BAU+	ENHANCE	CENTRAL	ALTERNATIVE
GUI	-11.0	-10.9	-4.5	-4.5
HAZ	-5.1	-5.1	-11.4	-11.4
HEN	-3.3	-3.3	0.0	0.0
HKZ	0.0	0.0	-2.9	-7.3
HRZ	0.0	0.0	0.0	-4.4
HSE	-22.3	-35.8	-60.0	-60.0
HSW	0.0	0.0	0.0	0.0
HWZ	0.0	0.0	-11.5	-21.4
IOW	-9.3	-11.1	-10.0	-15.3
KVZ	-9.1	-9.1	-7.3	-7.3
KME	-19.0	-19.4	-20.6	-19.4
KMW	-6.4	-8.9	0.0	-8.9
KTZ	-23.1	-29.6	-8.1	-29.6
LON	-433.5	-429.4	-22.7	-28.7
PRT	-42.1	-48.3	-21.0	-6.1
RZ1	-18.8	-19.3	-10.7	0.0
RZ2	-1.5	-1.9	-4.1	0.0
RZ3	-22.4	-22.5	-9.1	-3.6
RZ4	-16.7	-17.8	-24.9	-18.9
RZ5	-1.8	-2.6	-0.7	0.0
RZ6	-18.9	-19.7	-4.9	-2.4
RZ7	-6.0	-6.0	0.0	0.0
RZ8	-69.5	-72.2	-37.4	-18.7
SBZ	-25.3	-34.5	0.0	-15.7
SES	-12.3	-12.3	-11.5	-11.5
SHZ	0.0	0.0	0.0	0.0
SNZ	-23.1	-29.5	0.0	-2.4
SWZ	-7.9	-16.4	-1.5	-13.9
SWA	-12.0	-12.0	-9.7	-9.7
SWX	-16.8	-16.8	-11.7	-11.7
AZ1	-30.4	-33.4	-21.4	-21.4
AZ2	-89.5	-102.5	-69.5	-10.3
AZ3	-99.4	-102.4	-71.4	-71.4
AZ4	0.0	0.0	0.0	0.0
AZ5	-38.3	-39.3	-25.2	-25.2
AZ6	0.0	0.0	0.0	0.0
AZ7	-26.9	-31.5	-4.9	-4.9
Total	**-1121.4**	**--1203.3**	**-498.5**	**-465.8**

Note: Values for Southern Water WRZs correspond to 1:500yr

To further explore the investment scenarios so as to define robust adaptive pathways, the DO reductions for environmental ambition have been applied:

- To four time horizons – profiled assuming the reductions are realised in 2030, 2040, 2050 and 2060. Due to assumptions made around the wider environmental ambition decision making process, only the 2050 time horizon has been considered at this stage.
- To the average DO alone, or to the average and peak DO simultaneously, assuming in the latter that the ratio between the two is maintained.

Finally, it is important to highlight that the current analysis is necessarily simplified and conducted with the sole purpose of providing plausible possible scenarios with which to determine the preferred regional portfolio of options. More detailed investigations are needed before adopting the modelled reductions to confirm their effect on river flows, verify their ecological benefit, and establish their cost-effectiveness.

The iterative process for developing company environmental ambition forecasts is still evolving as WRSE work towards the draft regional plan. WRSE will continue to work with water companies and the EA to develop the most appropriate environmental ambition scenarios for the South East.

More information can be found in the WRSE Environmental ambition method statement