Water Resources Management Plan 2024

Section 5 – Environmental Forecast

Contents

Background and Introduction 3
Drivers for our Environmental Destination Scenarios 6
Environment Agency Guidance 6
No Deterioration – Water Framework Directive 7
Chalk Stream Strategy (part of the Catchment Based Approach (CaBA)) 7
Flagship Catchments 7
Water Industry National Environment Programme 8
Investigation Process 8
Methodology 9
Starting Point: Environment Agency Scenarios of Flow Increase Required 9
High Scenario – Step 1: Transformation of Catchment-Scale Reductions to Source-Scale Reductions 10
High Scenario – Step 2: Calculation of resultant Deployable Output Reductions 10
Medium and Low Scenarios: Prioritisation of Abstraction Sources to Define Sources for Future Licence Reduction Scenarios 11
All Scenarios: Definition of Dates for Delivering Reductions in DO 12
All Scenarios: Accounting for Increases in River Flows Resulting from Affinity Water and Thames Water Licence Reductions 14
Licence Capping Requirement 15
Results: Environmental Destination Scenarios 19
London 27
SWOX 27
SWA 28
Kennet Valley 28
Guildford 29
Henley 29
Further Work 30
Licence Capping 30
Adaptive Planning 31

Figures

Figure 5-1: London DYAA Environmental Destination Scenarios 27
Figure 5-2: SWOX DYAA Environmental Destination Scenarios 27
Figure 5-3: SWA DYAA Environmental Destination Scenarios 28
Figure 5-4: Kennet Valley DYAA Environmental Destination Scenarios 28
Figure 5-5: Guildford DYAA Environmental Destination Scenarios 29
Figure 5-6: Henley DYAA Environmental Destination Scenarios 29

Tables

Table 5-1: Previous Licence Reductions Made for Environmental Improvement 4
Table 5-2: Collated river catchments and abstraction sources in Low and Medium scenarios 12
Table 5-3: Drivers influencing timing of abstraction reductions 13
Table 5-4: Deployable Output Reductions due to “Licence Capping” policy 17
Table 5-5: Licence Reductions Included in our Environmental Destination Scenarios .. 22
Table 5-6: Reasons for Licence Reductions Included in our Environmental Destination Scenarios 26
Table 5-7: Investigations to be Carried Out 30

Background and Introduction

Our supplies come from a mix of surface water (from rivers) and groundwater (underground water-holding rock formations, known as aquifers) sources. In some cases, taking water out of rivers and aquifers can negatively impact the environment. We are committed to protecting the environment and therefore it is important that we plan to reduce abstractions where they cause environmental problems.

The National Framework for Water Resources sets out the strategic direction that regional water resource plans should follow, this includes the long-term ambition of sustainable abstraction by 2050, called environmental destination. This is supported by the Water Resource Planning Guideline which also sets out the environmental requirements that should be included in our plans.

In this section we describe how our environmental destination scenarios have been developed and incorporated into our plan. These include future abstraction licence reductions which have been determined through building 'Environmental Destination' scenarios. The impact that these licence scenarios would have on our supplies in our different Water Resource Zones (WRZs) is then presented, and we discuss how we will conduct investigations to reduce uncertainty going forward.

5.1 The amount of water that we can take from the environment is licensed by the Environment Agency. Our abstraction licences tell us how much water we can take from each of our sources over the course of a year and in any 24-hour period, as well as specifying where we can take this water from. Some licences also set conditions, including additional or variable limits, or different daily limits depending on river flows.

5.2 The limits set by abstraction licences are designed to ensure that the volume of water that can be abstracted does not negatively impact the environment. Since the abstraction licensing regime was introduced in the 1960s knowledge of the link between abstraction and the environment has improved and environmental standards are becoming stricter to protect our precious rivers and chalk streams. Some abstraction licences that were issued allowed abstraction at rates that did not protect the environment. Over the last 30 years we have gone through a process of investigating the impact that many of our sources have on the environment. Where it has been found that our existing abstraction licence limits were resulting in adverse environmental impact or posed a risk of causing environmental deterioration, we have, where possible, reduced our licensed abstraction in accordance with government regulations.

5.3 We are committed to protecting the environment and as shown in Table 5-1, previously shown in Section 2, we have already made significant abstraction reductions of over 130 Ml/d since 1995. This demonstrates our commitment to making abstraction licence reductions and shows that we are not setting an environmental destination from a standing start.

Source	River	Volume of Reduction (Ml/d)	Date
Brasted	Darent	4.56	May 1995
Sundridge	Darent	12.278	Jan 1997
Lullingstone	Darent	4.592	Jan 1997
Eynsford	Darent	18.182	Jan 2005
Horton Kirby	Darent	7.97	Jan 2005
Hampden	Misbourne	3.68	Jun 1998
Wendover	Misbourne	Aggregate with Hampden	Jun 1998
Mill End	Wye	18.184	Jan 2011
New Ground	Bulbourne	7.97	Jan 2011
Compton	Pang	13.638	Feb 2007
Blewbury	Blewbury Pond	9.092	Feb 2007
Speen	Kennet & Lambourn	4	Mar 2015
Axford	Kennet	4	Mar 2017
Ogbourne	Og	8.096	Mar 2017
Childrey Warren	Letcombe Brook	4.546	Mar 2020
Pann Mill	Wye	13.23	Mar 2020
Total		134.0	

Table 5-1: Previous Licence Reductions Made for Environmental Improvement

5.4 Despite the reductions we have made to our abstractions over the last 30 years, there is still more to do to protect our rivers and streams. Across our region, particularly in some vulnerable catchments such as chalk rivers, the quantity of water that is licensed for abstraction is still considered to be higher than is environmentally sustainable. Climate change also poses a growing risk that means some abstractions could become unsustainable as climate change causes river flows to drop. We will continue to make abstraction reductions to protect the environment.

5.5 In previous iterations of the WRMP planning process, the Water Resources Planning Guideline stated that we should only consider abstraction licence reductions which are confirmed within the Water Industry National Environment Programme (WINEP). The WINEP only covers periods of five years at a time, and so previously we have not considered in detail abstraction licence reductions that could be required in the longer term (though in WRMP19 we did include a scenario of limited licence reduction in chalk stream catchments).

5.6 The National Framework for Water Resources published in March 2020 sets the environmental ambition required to address unsustainable abstraction between 2025 and 2050 on a national scale. The Framework sets out that Regional Water Resource Plans are required to develop an agreed environmental destination to achieve sustainable abstraction by 2050. The analysis included in the National Framework notes that the abstraction reductions that are required to achieve this are likely to be significant and drive requirements for new water resource options. In Appendix 4 of the National Framework[1],

[1] Environment Agency, 2020, Water Resources National Framework, Appendix 4: Longer Term Environmental Water Needs, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872344/Appendix_4_Longer_term_environmental_water_needs.pdf

four different scenarios of flow recovery are set out, Business as Usual (BAU), Enhanced, Adapt, and Combined.

5.7 WRSE worked with the Environment Agency and all water companies in the South East region to develop agreed Environmental Destination scenarios. They developed five scenarios, Low, Medium, High, BAU+ and Enhanced. We have integrated the Low, Medium and High, into our supply forecast. These scenarios are known as scenarios of 'Environmental Destination'. For Thames Water the High scenario equates with the Enhanced scenario, and this is common with most of the WRSE water companies.

5.8 All of the scenarios that we have developed incorporate the need to cap some licences at 'Recent Actual' abstraction to prevent the risk of deterioration under the WFD, as set out in Environment Agency supplementary guidance.

5.9 In the rest of this section, we have described:

- The drivers behind our Environmental Destination scenarios
- The methods we have used when deriving scenarios of future licence reduction
- Presentation of our scenarios of future licence reduction

Drivers for our Environmental Destination Scenarios

5.10 Achieving sustainable abstraction is a key driver for our plan as we feel it is the right thing to do to improve, protect and maintain our precious rivers and chalk streams. The scenarios that we have included in our plan mirror those included in the WRSE Regional Plan and follow our regulators' guidelines.

Environment Agency Guidance

5.11 The National Framework for Water Resources[2] introduced the concept of an 'Environmental Destination' and set out the requirement for Regional Groups to investigate and develop long-term Environmental Destinations. One component of this was the development of scenarios[3] using consistent methods across England to determine flow changes that would be necessary to meet Environmental Flow Indicators (EFIs[4]) across all catchments. The different scenarios represent different ways that an EFI could be calculated in the future, and some scenarios involve assigning different 'abstraction sensitivity bands' to some catchments; the abstraction sensitivity band determines what proportion of 'natural' flow should be left for the environment in calculation of an EFI. There are four national scenarios: Business as Usual; Enhanced, Combined and Adapt. The National Framework makes it clear that the information within it needs to be taken forward by the regional groups and should form the starting point for discussion with stakeholders and regulators. It is for the regional groups to carry out more detailed analysis, look at environmental priorities and develop an agreed long term environmental destination and a plan to achieve it.

5.12 Following the publication of the National Framework for Water Resources, the Environment Agency has set out guidance in the Water Resources Planning Guideline[5] (WRPG) and supporting guidance[6]. This guidance is consistent with the National Framework, making it clear that it is for the regional plan to set out the agreed long term destination for environmental improvement and sustainable abstraction. The WRPG also makes it clear that the WRMP should reflect the regional plan unless there is clear justification for not doing so. The WRPG therefore advises how we should incorporate an Environmental Destination into our planning. It needs to be suitably evidenced and reflect the regional plan unless there are good reasons not to do so. This guidance covers the development of an environmental destination to reduce public water supply abstraction licences, with the expectation of reducing impact on water-dependent habitats and improving their health in line with the National Framework for Water Resources. The target is to achieve these abstraction licence reductions by 2050. As a result, there is a need to

[2] Environment Agency, 2020, Meeting our Future Water Needs: A National Framework for Water Resource, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872759/National_Framework_for_water_resources_main_report.pdf
[3] Environment Agency, 2020, Meeting our Future Water Needs: A National Framework for Water Resource – Appendix 4: Longer Term Environmental Water Needs, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872344/Appendix_4_Longer_term_environmental_water_needs.pdf
[4] Environment Agency, 2013, Environmental Flow Indicator: What it is and What it Does, http://www.hwa.uk.com/site/wp-content/uploads/2017/12/SWCD11.5-Environment Agency-Guidance-on-EFI-January-2013.pdf
[5] Environment Agency, Natural Resources Wales and Office for Water Services, April 2023, Water Resources Planning Guideline, https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline
[6] Environment Agency Long-term water resources environmental destination. Guidance for regional groups and water companies October 2020.

include the consequences of future potential abstraction licence reductions in developing the regional Water Resources Management Plan (WRMP) for Water Resources South East (WRSE), which covers the period 2025 to 2075. The consideration of licence reductions that may be required in the long-term is a key change in the Water Resources Planning Guideline between WRMP19 and WRMP24.

No Deterioration – Water Framework Directive

5.13 We are required to ensure that no water body is subject to deterioration under the WFD as a result of increases in our abstraction from existing baseline abstraction rates and this applies to increases in abstraction within our existing abstraction licences. As set out in Section 2 we are undertaking a series of investigations into the sources where a risk of deterioration has been identified by the Environment Agency. These investigations are ongoing and the risk of a requirement for licence reduction is being assessed in each case.

5.14 Assessing whether abstractions may pose a risk of environmental deterioration requires interpretation of the WFD in order to establish what is required. The Environment Agency has recently applied a new approach and policy in assessing the risk of deterioration posed by existing abstraction licences. The new approach and policy is set out in the Supplementary Guidance described previously. It sets out that in some cases we should reduce abstraction licences to rates of abstraction that have occurred recently, to prevent us from abstracting more than we have done previously. We often abstract less than the maximum our abstraction licences would allow, but the Environment Agency has assessed that retaining headroom in our licences could, in some instances, mean that there could be a risk of deterioration.

Chalk Stream Strategy (part of the Catchment Based Approach (CaBA))

5.15 The Chalk Stream Strategy has been developed jointly between the Department for Environment, Food and Rural Affairs (Defra), the Environment Agency, water companies and other stakeholders. This is described in Section 2 which sets out the non-statutory strategy outlined in a document which has been agreed to represent a broad aspiration for the recovery of chalk streams and has been considered in the development of our scenarios. We support this strategy and are committed to delivering measures to help realise the goals of the strategy covering quantity, quality and physical habitat. We also recognise the constraints and the pragmatic realisation that it will take some time to get to the destination. The CaBA strategy has helped inform our scenarios principally through endorsing the requirement to address the adverse impact of abstraction on vulnerable chalk streams. We have used the prioritisation criteria which have been discussed and developed with input from the stakeholders involved in the development of the CaBA strategy to inform our scenario development.

Flagship Catchments

5.16 Defra wrote to a number of water companies in June 2021 stressing that restoring England's internationally rare chalk streams is a government priority and urging them to identify flagship catchments to prioritise for recovery of chalk streams. We responded to this Government request nominating the Pang and Chess catchments as flagship catchments which we would work on to restore to good ecological status. These catchments will therefore be of particular focus for addressing the impacts of abstraction

and all other adverse impacts on these rivers. This focus is reflected in our scenarios for abstraction reduction.

Water Industry National Environment Programme

5.17 Rather than a driver for our scenarios, the WINEP is the mechanism by which we anticipate our strategy will be implemented. In the WINEP our environmental improvement programme is set out and agreed through joint work with the Environment Agency. The WINEP is produced for each water company's 5-year Asset Management Planning (AMP) cycle and is used to specify the implementation of schemes to be undertaken during the following AMP to improve the environment, including the abstraction reductions that may be required to address low river flows exacerbated by abstraction. The WINEP is also used to set out the future investigations into the impact of abstractions at our sources that are needed as well as measures to improve the environmental resilience of rivers such as river restoration. For previous AMP cycles the WINEP has been specified by the Environment Agency based on their assessments of the need for abstraction impacts to be addressed, taking into account investigations we have undertaken into the impact of our abstractions.

5.18 Our expectation is that licence reductions will be included in a future WINEP programme.

Investigation Process

5.19 As is described in the following sections, the process that has been used to set out our Environmental Ambition for the "High" scenario works to achieve Environment Agency EFI targets. This is in alignment with the Environment Agency's advice and guidance and with the approach taken by the WRSE Regional Group, which is that use of the National Framework scenarios (which meet the EFI in all catchments, but which use different approaches and assumptions in calculation of the EFI under climate change) is required to demonstrate compliance with current statutory and regulatory requirements in the future.

5.20 The usual process for confirming licence reductions is to undertake detailed investigation and solution development, in order to check licence reduction proposals against policy tests. In some cases, licence reduction proposals identified through EFI compliance can be deferred, or alternative solutions to ensure environmental protection can be found. As such, our consideration is that there is a degree of uncertainty over the extent of licence reductions which may be required in the future, and so we have adopted different scenarios of abstraction reduction within our adaptive plan. While there is a degree of uncertainty, guidance and advice from our regulators has led us to place most weight on the "High" scenario for our long-term planning, as this scenario ensures compliance with current statutory and regulatory requirements. As such, the "High" scenario is adopted in our preferred programme.

Methodology

5.21 The Environmental Destination has been developed in the WRSE Regional plan. The Low, Medium and High scenarios that were developed and agreed in the WRSE Regional Plan form the environmental destination scenarios used in our WRMP. The different scenarios have been included in our adaptive planning, see Sections 6 and 10. Our monitoring and investigation plan is set out in Section 11 and in our WINEP plan. The rest of this chapter focuses on the development of scenarios of licence reduction, and the translation of licence reduction into supply capability reduction.

Starting Point: Environment Agency Scenarios of Flow Increase Required

5.22 The National Framework for Water Resources produced the following scenarios, to address impacts from abstraction on the environment by 2050, meeting Environmental Flow Indicator (EFI) targets; Business As Usual (BAU), Enhanced, Combined and Adapt. The BAU scenario is based on the same regulatory approach for protecting the environment and excluded some water bodies which were uneconomical to resolve. The Enhanced scenario included additional protection for protected areas, SSSI rivers and wetlands and chalk rivers. The Adapt scenario reduced the level of protection for some less sensitive or modified water bodies. The scenarios included allowances for the forecast impacts of climate change.

5.23 Subsequent work developed the BAU+ scenario which included all water bodies, including those that were initially thought to be uneconomical to resolve. The Combined scenario was developed to include aspects of the Enhanced scenario, including higher levels of protection for protected areas, SSSIs and Chalk streams but also incorporated aspects of the Adapt scenario, reducing levels of protection for some less sensitive or modified water bodies.

5.24 The work completed in the National Framework for Water Resources focussed on the volume of water required to be returned to the Environment and not the direct impact that this would have on abstraction licences or water company supplies. Impacts from abstraction licences can be complex, where the relationship between the volume of water abstracted and the resulting impact on the environment is not direct or linear.

5.25 WRSE developed an environmental ambition method defining five alternative scenarios, BAU+, Low, Medium, High and Enhanced. For Thames Water's supply area the Enhanced scenario was the same as the High scenario, which is common across most WRSE companies.

5.26 The scale of the changes resulting from the National Framework scenarios are shown below;

- In the 'BAU+' scenario, 452 Ml/d of abstraction reduction, equating to a loss of 834 Ml/d of licence
- In the 'Enhanced' scenario, 524 Ml/d of abstraction reduction, equating to a loss of 1043 Ml/d of licence

5.27 For Thames Water, the BAU+ and Enhanced scenarios had a relatively similar impact in terms of abstraction reduction and this factor led to Thames Water and WRSE investigating other approaches for the development of Low and Medium Environmental Destination scenarios to be utilised as part of our adaptive planning approach.

5.28 WRSE led the development of the Low and Medium scenarios with water companies and in close consultation with the Environment Agency for inclusion in the Regional Plan. In our supply area they were developed using a bottom-up assessment of licence reductions that we think are likely to be ecologically effective for the most vulnerable rivers. This assessment included utilising previous WINEP investigation findings and expert judgement on source operation and impacts.

5.29 In alignment with the National Framework guidelines and WRPG we have adopted the High scenario in our preferred/reported pathway (4), as this scenario ensures compliance with current statutory and regulatory requirements and applies the precautionary approach in identifying licence reductions which may be required. This aligns with the WRSE regional plan, as advised in the guidelines. We have also adopted the Low and Medium scenarios for adaptive pathway planning.

High Scenario – Step 1: Transformation of Catchment-Scale Reductions to Source-Scale Reductions

5.30 As described in the preceding section, the National Framework for Water Resources set out environmental destination scenarios for all river catchments based on achieving the Environmental Flow Indicator (EFI) at specific assessment points. As the proposed licence reductions were calculated at a catchment scale, no information was available for assessing reductions potentially required at specific licensed abstraction sources. To transform the catchment scale view of licence reductions, Mott MacDonald, on behalf of the WRSE group of companies, developed and implemented a process[7] to apportion the proposed reductions to specific abstraction sources.

High Scenario – Step 2: Calculation of resultant Deployable Output Reductions

5.31 Outputs from Mott MacDonald's work included, for each licence, a value which specifies the future maximum licensed quantity that would be available. If future licensable abstraction identified from Mott MacDonald's work is less than the current source DO, then Annual Average DO is capped at the future licensable volume. The DO impact is then calculated as the original DO minus the capped DO. For some sources this required consideration of multiple licences and sources, where for example, there may be a single licence with abstraction from multiple individual abstraction points. For other sources, aggregated licences were also considered. For some sources, WRZ-level water resources modelling was carried out.

5.32 Where DO reductions are required as part of the AMP7 WINEP programme, it has been ensured that reductions are not double counted.

5.33 The main target of the Environmental Destination is reduction in annual (as opposed to daily, also known as peak) licence quantities but in some cases these reductions would leave sources difficult to manage, having large peak to average licence ratios. For the Dry Year Critical Period (DYCP) planning scenario, therefore, a method has been used to establish peak DO reductions from the average DO remaining. This assumes that the maximum feasible ratio of DYCP to Dry Year Annual Average (DYAA) DO for each source is the maximum of:

- The current ratio of the source peak DO to average DO
- The current ratio of Peak DO to Average DO for the WRZ in which the source is located

[7] Mott MacDonald, 2020, WRSE Environmental Ambition – TW Internal Link: 100412624-011-SSTNB-01B Sustainability reductions for WRSE environmental ambition.pdf

- The ratio of peak to average distribution input (DI), for the WRZ in which the source is located, during the extended 2018 hot, dry period
- 1.1:1; this was set as a default value, i.e., peak DO will as a minimum be allowed to be 10% greater than annual average DO

5.34 The maximum feasible peak DO for each source was identified by multiplying the capped average DO by the maximum ratio found. This was compared with the current peak DO to determine whether a peak (PDO) reduction is implied.

5.35 The Bean Wellfield source has been excluded from our "High" Environmental Destination scenario. As required by the Environment Agency's representation on our dWRMP, we explain why. The Bean source was suggested as a new groundwater development to enable the reductions in abstraction required in the Darent catchment to improve flows and indeed the EA have suggested further abstraction is feasible to exploit water currently lost through the dewatering activities at Blue Water Park. Therefore, having recently developed this new source as a sustainable alternative to abstraction in the Darent catchment as advised by the EA it does not seem sensible to plan to make reductions from this source in the future. We do not consider the Bean source to have adverse impact on the Darent and so we do not feel that abstraction reductions are necessary, and we understand this to be the view of the local EA team.

Medium and Low Scenarios: Prioritisation of Abstraction Sources to Define Sources for Future Licence Reduction Scenarios

5.36 It is important to note that the Medium and Low scenarios have not been taken from the National Framework for Water Resources. As stated in paragraph 5.33 and 5.34, the variation in abstraction reduction between the National Framework BAU and Enhanced scenarios was not significant, therefore, to facilitate the development of an adaptive plan, scenarios with more variability were required.

5.37 Through expert judgement, a "Low" scenario and a "Medium" scenario which builds on the "Low" scenario were developed. This was created in a bottom-up" approach. This work was completed in close consultation with the Environment Agency and the scenarios have been included within the regional plan's adaptive plan development.

5.38 To ensure that environmental benefit was at the forefront of the development of alternative scenarios, the prioritisation of abstraction sources to be included in the Low and Medium was defined on the following basis:

- Prioritisation of chalk streams taking into account the high profile of some chalk streams established through historic stakeholder concern
- Insight gained from sustainability reductions implemented previously at groundwater abstraction sources following investigations
- Insight gained from abstraction impact investigations during pre-AMP7 WINEP investigations, including those where no licence reductions were made
- Abstractions that have been prioritised in AMP7 for WINEP and specific WFD No Deterioration investigations

Information Source	Catchment	Abstraction Sources
Previous sustainability reductions	Darent (C)	Horton Kirby Eynsford Lullingstone Sundridge (LGS)
	Wye (C)	Pann Mill
	Misbourne (C)	Hampden Bottom
Pre-AMP7 WINEP investigations	Darent (C)	Westerham
	Cray (C)	Bexley
	Lee (C)	Lower Lee
	Wandle (C)	Waddon
	Wye (C)	Radnage
	Upper Thames	Farmoor
AMP7 WINEP investigations	Hogsmill (C)	Epsom sources
	Lee (C)	New Gauge Northern New River Wells
	Chiltern Scarp (C)	Chinnor Watlington
	Pang (C)	Pangbourne Bradfield
	Upper Kennet (C)	Marlborough Clatford
	Churn	Latton Ashton Keynes
	Dikler	Upper & Lower Swell
	Tillingbourne	Netley Mill Shalford
AMP8 WINEP Investigation	Coln	Bibury

Table 5-2: Collated river catchments and abstraction sources in Low and Medium scenarios

Note: (C) = Chalk river catchment, (LGS) = Lower Greensand aquifer source

All Scenarios: Definition of Dates for Delivering Reductions in DO

5.39 The definition of dates for delivering reductions in source DO reflects a combination of several drivers, including the following:

- Priority vulnerable catchment – Where catchments are currently perceived to be higher priority for abstraction reductions, based on previous investigations, an earlier delivery in the environmental destination programme is more likely
- Potential investigation outcomes – Where there are ongoing WINEP investigations in AMP7, either for low flow or WFD No Deterioration, an assumption is made that the outcomes are more likely to result in earlier abstraction reductions
- Magnitude of abstraction reduction – Where abstraction reductions are relatively small, e.g. reductions to recent actual abstractions, the reductions may be delivered relatively early. Conversely, where large abstraction reductions are proposed the reductions may be delayed until later into the environmental destination programme
- Outputs from further abstraction impact investigations – Where further investigations are required to increase confidence in decisions taken, later delivery of potential abstraction reductions will result

- Interaction between existing assets and asset solutions – Where the asset solutions required to enable abstraction reductions interact with existing critical water supply assets, and/or assets in the process of being upgraded, this will influence the potential achievement of the required scheme and is likely to delay the delivery of the reduction
- WRZ resilience and solution lead time – WRZ resilience to changes in water supply source changes and the lead time for delivery of the required strategic solution are considered, leading to reductions being later in the programme

5.40 These drivers are set out in Table 5-3 with examples of the sources whose reduction they influence.

Driver	Examples of Sources
Priority vulnerable catchment	Horton Kirby Eynsford Lullingstone
Potential investigation outcomes	Epsom sources Bradfield
Magnitude of abstraction reduction	Netley Mill Bexley Lower Lee New Gauge
Outputs from further abstraction impact investigations	Bexley Sundridge Westerham
Interactions between existing assets and asset solutions	Marlborough Clatford New Gauge
WRZ resilience and need for strategic solution	Latton Marlborough Clatford

Table 5-3: Drivers influencing timing of abstraction reductions

5.41 We have also used other criteria to determine the prioritisation of sources for reductions in the AMP8 period.

5.42 In all cases, it is important to consider the necessary process of investigation, solution design, tests against policy, and construction. This process is necessarily long, and as such we do not think that we could feasibly schedule licence reductions in advance of the schedule demonstrated in Table 5-5.

5.43 All reductions are assumed to be delivered by 2050 at the latest, as per the policy requirements set out in the National Framework for Water Resources.

5.44 Between the dWRMP and rdWRMP24, we reflected on how quickly we could feasibly make licence reductions in the future. Our dWRMP (and the draft WRSE Regional Plan) demonstrated that the 1 in 500-year resilience requirement and overall water resources need in the West of the WRSE area would necessitate the development of significant new resource in the west of the WRSE Region. Given that this new source of water will need to be developed in the west of the Thames catchment in any event, we determined that we could therefore accelerate some licence reductions in our SWOX WRZ and could feasibly make a licence change at our (surface water) Farmoor and (groundwater) Ashton Keynes abstractions by 2040 without this being a trigger for investment which would

otherwise not be needed. We are confident in the ecological benefit of a licence reduction at Farmoor following a previous investigation. Making a licence reduction at Farmoor would result in a DO increase for our London WRZ (i.e., a Farmoor reduction would be DO-neutral for our company-level supply-demand balance).

5.45 The outputs from the steps up to this point are 'High', 'Medium', and 'Low' scenarios of DO reduction associated with individual source licence reductions.

All Scenarios: Accounting for Increases in River Flows Resulting from Affinity Water and Thames Water Licence Reductions

5.46 A further important outcome resulting from the delivery of licence reduction in the environmental destination scenarios is the return of water to the environment. In particular, the benefit of increased river flows that may support increased direct river abstraction downstream needs to be taken into account in calculating water supply system capability. This needs to account for the potential magnitude of increased abstraction as well as the timing of these increases in WRMP supply forecast scenarios.

5.47 The potential benefits for river flows and river abstractions that accrue from abstraction reductions in the environmental destination set out by Affinity Water are especially important for water supply to our customers in the London WRZ. This relates to benefits from reductions at Affinity Water groundwater sources in the River Colne and River Lee catchments and the potential for us to increase abstraction from the rivers Lee and Thames in north and west London, respectively.

5.48 To account for water resource system benefits resulting from reduction in Affinity Water groundwater abstractions, Affinity Water requested a run of the WRSE Pywr model. The outputs from this model run were used to derive benefit that should be added to the London WRZ DO to reflect flow gains associated with licence reductions made by Affinity Water.

5.49 It is important to note that, in this run, it was not assumed that 1 Ml/d of groundwater abstraction reduction upstream would equate to 1 Ml/d of flow gain in London, due to the complex groundwater-surface water relationships that exist, particularly in chalk catchments. Instead, based on a range of evidence collected by Affinity Water, including empirical data where previous groundwater reductions have been made, and reflecting the need to be prudent in determining the security of supply, an assumption was made that, at low flows (Q95), around 0.3 Ml/d of flow gain could be relied upon per 1 Ml/d of abstraction reduction. This same assumption was applied when considering flow gains from Thames Water sources featured in our licence reduction scenarios. This ratio of 0.3 Ml/d flow gain to 1 Ml/d abstraction reduction is based on analysis of regional groundwater modelling and analysis of data observed from previous cessation of abstraction at sources. The ratio of 0.3 was not the only value considered, with flow benefits known to vary dependent on catchment conditions, and so values lower than 0.3 (at flows lower than Q95) and higher than 0.3 (at flows higher than Q95) were applied in the model run.

5.50 Profiles of DO gain for London were derived based on the steps above and incorporated into each of our Environmental Destination scenarios accordingly.

5.51 Combining all steps above, profiles of net DO change across the planning period were defined for each WRZ for each of the Low, Medium, and High environmental destination scenarios. The net DO change in each year of the planning period is a balance of the following:

- DO reduction at individual abstraction sources
  - Thames Water sources
- DO increase from return of water to river flows, with benefits where river flow increases are upstream of Thames Water abstraction points from
  - Thames Water source DO reductions
  - Affinity Water source DO reductions
- Changes programmed to reflect the timing of abstraction reductions made by
  - Thames Water
  - Affinity Water

Licence Capping Requirement

5.52 Subsequent to the development of our main, long-term abstraction reduction scenarios, the Environment Agency issued guidance relating to the requirement for licence capping to avoid the potential for deterioration under the WFD. The document 'Water resources planning guideline supplementary guidance – actions required to prevent deterioration' was provided by the Environment Agency on 4 April 2022. The Environment Agency has also provided two Information Letters – 'Addressing deterioration risk from existing abstractions' - one on 15 November 2021 and a further letter on 4 April 2022.

5.53 We have assessed the pre-WRMP licence information, licence capping guidance and letters, alongside abstraction records for April 2010 – March 2016 and other source/Water Body information and have developed a view of which licences may need to be capped during AMP8.

5.54 The process of identifying DO impacts associated with the licence capping policy involves several steps:

- Sources where licence capping may be required were determined through information provided by the Environment Agency, and subsequent conversation with Environment Agency specialists (not all sources are subject to this policy, with Environment Agency technical specialists' screening playing a role in determining which sources would be subject to the policy).
- For each source where licence capping was identified as potentially being required, average abstraction over the period April 2010 – March 2016 was calculated. This "Recent Actual Average" abstraction was compared with each source's Deployable Output to identify sources where licence capping would result in DO reduction.
- In some cases, we put forward arguments to the Environment Agency regarding why we considered either that a risk of deterioration did not exist with our existing licence, or occasions where following the policy would result in operational risk or disproportionate expense.

5.55 As highlighted in the last bullet point in the preceding list, we are working with the Environment Agency to mitigate the impact of moving our time-limited licences to recent actual average, where not doing so would lead to a risk of deterioration. Where we can't implement them without an interruption to our customers' water supply, we submit cases of Overriding Public Interest (OPI) which will demonstrate that the licence caps need to be delayed until we have additional sustainable sources of water to replace our DO losses and appropriate network infrastructure to ensure resilient supply systems.

5.56 Following this process, we arrived at DO reductions required by 2030.

5.57 In our scenarios of longer-term DO reduction, additional licence reductions may be required at sources where "licence capping" reductions are made in the short term by 2030. As an example, Netley Mill is highlighted as being subject to the licence capping policy (DO impact 1.03 Ml/d) and features in the "Medium" and "High" Environmental Destination scenarios (total cessation, DO impact 4.54 Ml/d, 2040). As such, in the "Low" scenario, a DO reduction of 1.03 Ml/d would be applied throughout the planning period from 2030 onwards; in the "Medium" and "High" scenarios, respectively, a DO reduction of 1.03 Ml/d would be applied from 2030 to 2039, and a further DO reduction of 3.51 (total 4.54 Ml/d) would be applied from 2040 onwards.

Northern New River Wells and New Gauge

5.58 The Environment Agency identified several of the Northern New River Wells (NNRW) sources (groundwater sources which discharge into the New River, which we then transfer to our reservoirs in the Lee Valley) and the New Gauge surface water abstraction as being subject to the licence capping policy, primarily due to a risk of deterioration of the River Lee.

5.59 The NNRW sources identified contribute a total of 74.7 Ml/d of Deployable Output to London. Capping each source's abstraction licence at the volume abstracted over the period April 2010 – March 2016 would have resulted in a DO reduction of 47.7 Ml/d, a considerable volume which would trigger major investment (of the order of hundreds of millions of pounds). The reason for the large difference between "Recent Actual Abstraction" and "Deployable Output" is that many of the NNRW sources were used infrequently during the period 2010-2016 due to issues that have arisen from historical pollution (from a nearby chemical works).

5.60 Making licence reductions at our New Gauge source is assumed to not result in Deployable Output loss for London WRZ, as our River Lee abstractions are such that abstraction can be deferred at New Gauge and taken at other abstraction points further downstream. Making licence reductions at our New Gauge source would, however, be more likely to result in direct environmental gain for the River Lee than making licence reductions at our NNRW sources.

5.61 We are currently unsure of the maximum feasible abstraction reduction that we could make at our New Gauge abstraction, prior to making interventions at our WTWs in the Lee Valley due to bromate and nitrate risks in the area.

5.62 In order to prevent risk of deterioration to the River Lee while attempting to avoid unnecessary investment, we have provisionally agreed an approach with the Environment Agency whereby we will:

- Cap the identified NNRW sources' annual licences at a level equal to the maximum annual abstraction over the period 2010-2020
- Cap the New Gauge source's annual licence at a level equal to the average annual abstraction over the period 2010-2016.Implement a Section 20 agreement, whereby:
    - During normal conditions, we would limit aggregate abstraction across the identified NNRW sources and New Gauge to the average aggregate abstraction across the period April 2010 – March 2016.

- During severe drought conditions this limit would be lifted, in order that the 1 in 200-year DO of the system can be achieved. In this case we would be able to abstract the annual licensed volume for each source.

5.63 This approach mitigates the risk of deterioration during non-drought conditions, and we will undertake river restoration activities to mitigate risks that exist for drought conditions.

5.64 We have estimated that the Deployable Output impact of the proposed Section 20 agreement would be 25 Ml/d, though the exact Deployable Output impact would be dependent on the triggers used and the balance between reductions made at New Gauge and the NNRWs.

5.65 Discussions regarding the specific triggers and licensing implementation of this proposal are ongoing and may be impacted by the AMP7 WINEP action related to right-sizing the licences for the abstractions into the Lee Valley Reservoirs. The Section 20 agreement would need to be implemented before a "1 in 200-year" event is confirmed, but would only be implemented in "severe drought" conditions. In order to mitigate outstanding risk, hydromorphological improvements have been included in our AMP8 WINEP programme for the Lee Navigation (Hertford to Fieldes Weir) and River Ash (from confluence with Bury Green Brook to Lee) waterbodies.

5.66 Our aim is to include a further licence reduction which would leave 40 Ml/d licence remaining at New Gauge in the AMP9 WINEP, on a "DO neutral" basis (i.e., abstracting deferred water at our Enfield intakes).

Licence Capping Requirement – Results

5.67 In order to highlight DO reductions triggered by the licence capping requirement, the DO impacts of reductions required by the licence capping policy are detailed in Table 5-4.

Source	Water Resource Zone	Current Annual Licence (Ml/d)	Current DYAA DO (Ml/d)	Capped Licence (Ml/d)	DYAA DO Impact (Ml/d)
Netley Mill	Guildford	4.55	4.54	3.51	1.03
Chinnor	SWOX	2.27	2.13	0.86	1.27
Bradfield**	Kennet Valley	2.27	1.64	0	1.64
NNRW* and New Gauge	London	76.43	74.71	See above – S20	25

Table 5-4: Deployable Output Reductions due to "Licence Capping" policy

** Sources are Amwell End, Amwell Hill, Amwell Marsh, Broadmead, Hoddesdon (Essex Road), Middlefield Road, and Rye Common*

*** The Bradfield source would be subject to a licence cap, but as the Pang is a "Flagship Catchment", we have proposed cessation of abstraction at Bradfield.*

Licence Capping Policy – Sources without DO Impact

5.68 While the licence capping policy impacts the Deployable Output of some sources, for others licence capping does not impact the Deployable Output. Alongside the sources referenced above, the following sources are impacted by the licence capping policy, but have not had DO impacts assigned to them in our WRMP24:

- Upper and Lower Swell – no DO impact as the capped licence would be below current DO value
- Pann Mill – no DO impact as licence recently reduced, below the Recent Actual value
- Shalford – no DO impact as licence capping only would be for the protection of the Tillingbourne. Shalford has 2 abstraction points, 1 on the Tillingbourne and 1 on the Wey. The whole licence for the source can be abstracted at either abstraction point, and so capping the licence for the Tillingbourne abstraction would not impact the DO.
- Ashton Keynes – abstraction found to have low risk of causing deterioration and so not anticipated to be subject to capping
- Latton – possible that licence may be capped, and that the capped licence would result in a DO impact. However, it is considered likely that a large solution would be required to enable any licence reduction below the current 15 Ml/d licence, and that this is infeasible by 2030 (noting an OA is in progress). As such, licence reduction included for 2040. Action not included in AMP8 WINEP.

Results: Environmental Destination Scenarios

5.69 High, Medium, and Low scenarios of DO reduction resulting from potential future abstraction licence reductions were developed for the WRSE Regional Plan, using the methods described above (Table 5-5). In summary, the scenarios can be described as:

- High – This is a view of licence reductions that are necessary to meet requirements of the 'Enhanced' environmental destination scenario. This was agreed between WRSE and the Environment Agency as a scenario which would comply with the guidelines.
- Medium – This is a scenario based on insight from previous abstraction impact investigations plus abstractions prioritised for AMP7 investigation.
- Low – This is a scenario which is similar to the Medium scenario, but which includes only those sustainability reductions that we consider to form a 'plausible low' scenario.

5.70 The principal difference between these three scenarios is the total magnitude of licence reductions proposed across the Thames Water supply area. It should be noted that although the Environment Agency set a target date of 2050 for reaching the environmental destination, no phased programme of reductions has been defined by the Environment Agency. Therefore, we have set out a timetable of reductions that is broadly the same across each of the High, Medium and Low scenarios but of different total magnitudes.

5.71 The sources, magnitudes, and timing of DYAA DO reduction at each source for each scenario are detailed in the table below.

5.72 The Water Resources Planning Guideline states that: "For each sustainability reduction you should provide: a description of the change being made, including the licence and deployable output changes, the timing of the reduction, the location, the reason for the reduction". Table 5-5 shows the licence and DO reductions in different scenarios for individual sources and associated timing, along with the licence number. Table 5-6 shows the reasons for inclusion of different licence reductions. At this stage we are not able to provide detail on the expected outcome the changes will achieve for the environment except where we have undertaken detailed investigations previously or are in the process of doing so in this AMP period.

					Low Scenario			Medium Scenario			High Scenario		
Source	WRZ	Licence Number	Current Annual Average Licence (Ml/d)	Current DO	DO Reduction	Licence Remaining	Year	DO Reduction	Licence Remaining	Year	DO Reduction	Licence Remaining	Year
Environment Agency Area - Kent & South London													
Horton Kirby and Eynsford	London	9/40/01/0121/GR & 9/40/01/0125/GR	6.78, 2.09 (agg.6.78)	6.8	3.4	3.4	2035	3.4	3.4	2035	6.8	0	2035
Lullingstone	London	9/40/01/0122/GR	4.48	4.49	4.49	0	2035	4.49	0	2035	4.49	0	2035
Waddon	London	28/39/41/0012	7.58	7.56	7.56	0	2040	7.56	0	2040	7.56	0	2040
Bexley	London	9/40/01/0130/GR	31.69	31.7	9	22.7	2050	15	16.7	2050	31.7	0	2040
Epsom Sources	London	28/39/33/8	19.32 (agg)	15.2	10.2	5	2035	10.2	5	2035	10.2	5	2035
Sundridge	London	9/40/01/0123/GR	1.36	1.36				1.355	0	2050	1.36	0	2050
Westerham	London	9/40/01/0119/GR	0.97	0.87				0.88	0	2050	0.88	0	2050
Darenth	London	9/40/01/0133/GR	20.8	20.7							20.7	0	2050
Wilmington	London	9/40/01/0118/GR	19.04	18.6							19	0	2050
Dartford	London	9/40/01/0132/GR	3.63	3.63							3.63	0	2050
Orpington	London	9/40/1/127/GR	11.05	10.1							8.55	1.55	2050
Crayford	London	9/40/01/0129/GR	13.6	13.5							13.6	0	2050
Wansunt	London	9/40/01/0126/GR	13.6	13.6							13.6	0	2050
Green St Green	London	9/40/01/0120/GR	4.53	4.47							4.46	0	2050
Environment Agency Area - Thames Valley													
Marlborough	SWOX	22/39/22/55 & 28/39/22/0420	1.86, 2.48 (agg 2.48)	2.48	2.5	0	2040	2.5	0	2040	2.5	0	2040
Clatford	SWOX	28/39/22/73 & 28/39/22/0419	0.89, 1.24 (agg 1.24)	1.24	1.24	0	2040	1.24	0	2040	1.24	0	2040
Pann Mill	SWA	28/39/25/0042	9.5	9.50	7.5	2	2050	7.5	2	2050	7.5	2	2050
Radnage	SWA	28/39/25/0051	2.21	1.58	1.58	0	2040	1.58	0	2040	1.58	0	2040
Bradfield	Kennet Valley	28/39/21/0009	2.27	1.64	1.64	0	2030	1.64	0	2030	1.64	0	2030
Pangbourne**	Kennet Valley	28/39/21/0007 & TH/039/0021/003	38.64 (agg)	29.1	5	tbc**	2035	5	tbc**	2035	5	tbc**	2035
Bibury	SWOX	28/39/06/0062	12.27 (PWS	6.82	3	3.82	2040	3	3.82	2040	3	3.82	2040

					Low Scenario			Medium Scenario			High Scenario		
			6.82, aug. 5.46)										
Latton	SWOX	28/39/02/0010	16.95	15	5	10	2040	5	10	2040	9.74	5.26	2040
Netley Mill	Guildford	28/39/30/0088	4.55	4.54	1.03	3.51	2030	4.5	0	2040	4.5	0	2040
Ashton Keynes	SWOX	28/39/01/0009	8.69	8.69				1.71	6.98	2050	1.71	6.98	2040
Upper & Lower Swell	SWOX	28/39/10/0031 & 28/39/10/0038	4.49, 1.39 (agg 4.49)	2.92				1.82	1.1	2050	1.82	1.1	2050
Chinnor	SWOX	28/39/19/0186	2.27	2.13				1.61	0.52	2040	1.61	0.52	2040
Watlington	SWOX	28/39/19/0042	1.31	1.12				0.26	0.86	2040	0.26	0.86	2040
Seven Springs	SWOX	28/39/10/0030	3.26	2.75							1	1.75	2050
Syreford	SWOX	28/39/06/014 & 28/39/06/0072	0.91, 1.13 (agg 1.13)	1.13							0.52	0.61	2050
Ashdown Park	SWOX	28/39/22/81 & 28/39/22/0441	2.27, 2.73 (agg 2.73)	2.72							0.95	1.78	2050
Woods Farm	SWOX	28/39/20/0011	4.99	2.59							1.59	1.00	2040
Bishops Green	Kennet Valley	28/39/22/0033	15.89	10.4							0.8	9.6	2040
East Woodhay	Kennet Valley	TH/039/0022/011	9.97	6.70							3.87	2.87	2040
Ufton Nervet	Kennet Valley	28/39/22/0415	13.64	13.4							11.58	1.82	2050
Playhatch	Kennet Valley	28/39/23/0134	7.25	7.23							6.5	0.73	2040
Sheeplands	Henley	28/39/24/0020	18.13	11.2							8.37	2.83	2050
Datchet	SWA	28/39/27/0003	18.13	15.3							13.08	2.22	2050
Bourne End	SWA	28/39/23/0007	22.73	21.6							5.65	15.95	2050
Medmenham	SWA	28/39/23/0110	52.3	52.3							16.3	36	2050
Albury	Guildford	28/39/30/0289	6.82	6.82							3.58	3.24	2040
Mousehill & Rodborough	Guildford	28/39/30/0089	6.82	5.30							1.48	3.82	2040
Shalford	Guildford	28/39/30/319 & 28/39/30/66	30, 30	27.8							20.32	8.28	2050
Farmoor	SWOX	28/39/16/0078	151.1	N/A*				15	135.7	2050	35	105.4	2040
Environment Agency Area - Herts and North London													
Lower Lee	London	29/38/08/0194	2636.72 (total)	N/A***	25		2060	50		2060	65		2050
Northern New River Wells	London	See below	See below	96.07	25	S20****	2040	25	S20****	2040	See Below	See below	See below

					Low Scenario			Medium Scenario			High Scenario		
NNRW – Amwell End	London	29/38/07/0034	5.44	3.67	See above	See above	See above	See above	See above	See above	1.58	2.18	2050
NNRW – Amwell Hill	London	29/38/07/0035	13.60	13.6	See above	See above	See above	See above	See above	See above	9.51	4.09	2050
NNRW – Amwell Marsh	London	29/38/07/0036	20.40	20.4	See above	See above	See above	See above	See above	See above	3.01	17.39	2050
NNRW – Broadmead	London	29/38/07/0037	6.80	6.80	See above	See above	See above	See above	See above	See above	4.07	2.73	2050
NNRW – Broxbourne	London	29/38/08/170	12.69	12.7	See above	See above	See above	See above	See above	See above	7.61	5.09	2050
NNRW – Hoddesdon	London	29/38/08/0173	12.24	12.2	See above	See above	See above	See above	See above	See above	6.68	6.68	2050
NNRW – Middlefield Road	London	29/38/07/0042	3	2.99	See above	See above	See above	See above	See above	See above	1.64	1.35	2050
NNRW – Rye Common	London	29/38/07/0043	16.36	15.0	See above	See above	See above	See above	See above	See above	6.0	9.0	2050
Hampden Bottom	SWA	28/39/28/0238	7	2				2	0	2040	2	0	2040
New Gauge	London	29/38/07/0039	101.9	N/A***				60	40	2050	80	20	2050
Total, including DO return from upstream abstraction reduction					98			190			422		

Table 5-5: Licence Reductions Included in our Environmental Destination Scenarios

Note: DO impacts were calculated against AR21 DO figures. Figures presented in this Table are AR22 DO figures and so small misalignments may exist. Updates were made to our scenarios to account for AR22 DO updates where the DO impact was >1 Ml/d, or more than 10% of the DO (whichever is the lesser).

** The Farmoor abstraction's DO is modelled as part of the SWOX conjunctive use system. DO impacts are estimated.*

***The Pangbourne source is subject to a flow constraint and its DO calculation is complex. A 5 Ml/d DO reduction has been assumed on the basis of an assumed 5 Ml/d reduction to licence quantities under all conditions.*

**** DO calculated as part of London conjunctive use system*

***** Section 20*

Source	WRZ	River	Reason for reduction – low scenario	Reason for reduction – medium scenario	Reason for reduction – high scenario
Environment Agency Area – Kent & South London					
Horton Kirby and Eynsford	London	Middle Darent	Benefit to sensitive Middle Darent (chalk catchment)	Benefit to sensitive Middle Darent (chalk catchment)	Benefit to sensitive Middle Darent (chalk catchment); Compliance with EFI
Lullingstone	London	Middle Darent	Benefit to sensitive Middle Darent (chalk catchment); Compliance with EFI	Benefit to sensitive Middle Darent (chalk catchment); Compliance with EFI	Benefit to sensitive Middle Darent (chalk catchment); Compliance with EFI
Waddon	London	Wandle	Benefit to Wandle (chalk catchment); Compliance with EFI	Benefit to Wandle (chalk catchment); Compliance with EFI	Benefit to Wandle (chalk catchment); Compliance with EFI
Bexley	London	Cray	Benefit to River Cray (chalk catchment)	Benefit to River Cray (chalk catchment)	Benefit to River Cray (chalk catchment); Compliance with EFI
Epsom Sources	London	Hogsmill	Benefit to river flow in headwaters of Hogsmill	Benefit to river flow in headwaters of Hogsmill	Benefit to river flow in headwaters of Hogsmill
Sundridge	London	Upper Darent		Benefit to the river Darent; Compliance with EFI	Benefit to the river Darent; Compliance with EFI
Westerham	London	Upper Darent		Benefit to the river Darent; Compliance with EFI	Benefit to the river Darent; Compliance with EFI
Darenth	London	Lower Darent			Benefit to the river Darent, Compliance with EFI
Wilmington	London	Lower Darent			Benefit to the river Darent Compliance with EFI
Dartford	London	Lower Darent			Benefit to the river Darent Compliance with EFI
Orpington	London	Middle Darent			Benefit to the river Darent Compliance with EFI
Crayford	London	Cray			Benefit to the river Cray Compliance with EFI
Wansunt	London	Cray			Benefit to the river Cray Compliance with EFI
Green St Green	London	Lower Darent			Benefit to the river Cray Compliance with EFI

Source	WRZ	River	Reason for reduction – low scenario	Reason for reduction – medium scenario	Reason for reduction – high scenario
Environment Agency Area – Thames Valley					
Marlborough	SWOX	Upper Kennet	Benefit to the high-profile Upper Kennet; Compliance with EFI	Benefit to the high-profile Upper Kennet; Compliance with EFI	Benefit to the high-profile Upper Kennet; Compliance with EFI.
Clatford	SWOX	Upper Kennet	Benefit to the high-profile Upper Kennet; Compliance with EFI	Benefit to the high-profile Upper Kennet; Compliance with EFI	Benefit to the high-profile Upper Kennet; Compliance with EFI.
Pann Mill	SWA	Wye	Benefit to the river Wye – a sensitive Chilterns Chalk stream where investigations have been undertaken in the past; Compliance with EFI	Benefit to the river Wye – a sensitive Chilterns Chalk stream where investigations have been undertaken in the past; Compliance with EFI	Benefit to the river Wye – a sensitive Chilterns Chalk stream where investigations have been undertaken in the past; Compliance with EFI.
Radnage	SWA	Upper Wye	Benefit to the river Wye – a sensitive Chilterns Chalk stream; Compliance with EFI	Benefit to the river Wye – a sensitive Chilterns Chalk stream; Compliance with EFI	Benefit to the river Wye – a sensitive Chilterns Chalk stream; Compliance with EFI.
Bradfield	Kennet Valley	Pang	Benefit to the river Pang, a sensitive chalk stream which is also a Flagship Catchment; Compliance with EFI	Benefit to the river Pang, a sensitive chalk stream which is also a Flagship Catchment; Compliance with EFI	Benefit to the river Pang, a sensitive chalk stream which is also a Flagship Catchment; Compliance with EFI.
Pangbourne	Kennet Valley	Sulham Brook	High-profile chalk catchment; Flagship catchment	High-profile chalk catchment; Flagship catchment	High-profile chalk catchment; Flagship catchment
Bibury	SWOX	Coln	Benefit to the Coln; Compliance with EFI	Benefit to the Coln; Compliance with EFI	Benefit to the Coln; Compliance with EFI
Latton	SWOX	Ampney Brook/ Upper Thames	To address impacts on sensitive Cotswolds streams	To address impacts on sensitive Cotswolds streams	To address impacts on sensitive Cotswolds streams; Compliance with EFI.
Netley Mill	Guildford	Tillingbourne	Benefit to the Tillingbourne. AMP7 investigation that is ongoing and the requirement for no deterioration.	Benefit to the Tillingbourne. AMP7 investigation that is ongoing and the requirement for no deterioration; Compliance with EFI	Benefit to the Tillingbourne Compliance with EFI.
Ashton Keynes	SWOX	Upper Thames		Benefit to sensitive Cotswolds streams; Compliance with EFI	Benefit to sensitive Cotswolds streams; Compliance with EFI

Source	WRZ	River	Reason for reduction – low scenario	Reason for reduction – medium scenario	Reason for reduction – high scenario
Upper & Lower Swell	SWOX	Dikler		Potential impact on sensitive Cotswolds streams; Compliance with EFI	Potential impact on sensitive Cotswolds streams; Compliance with EFI
Chinnor	SWOX	Chilterns Scarp Streams		Benefit to sensitive Chiltern scarp spring fed rivers; Compliance with EFI	Benefit to sensitive Chiltern scarp spring fed rivers; Compliance with EFI
Watlington	SWOX	Chilterns Scarp Streams		Benefit to sensitive Chiltern scarp spring fed rivers; Compliance with EFI	Benefit to sensitive Chiltern scarp spring fed rivers; Compliance with EFI
Seven Springs	SWOX	Windrush			Benefit to the river Windrush; Compliance with EFI
Syreford	SWOX	Coln			Benefit to the river Coln; Compliance with EFI
Ashdown Park	SWOX	Lambourn			Benefit to the high profile river Lambourn; Compliance with EFI
Woods Farm	SWOX	Middle Thames			Benefit to the river Thames; Compliance with EFI
Bishops Green	Kennet Valley	Middle Kennet			Benefit to the river Kennet; Compliance with EFI
East Woodhay	Kennet Valley	Middle Kennet			Benefit to the river Kennet; Compliance with EFI
Ufton Nervet	Kennet Valley	Lower Kennet			Benefit to the river Kennet; Compliance with EFI
Playhatch	Kennet Valley	Thames			Benefit to the river Thames; Compliance with EFI
Fognam Down	Kennet Valley	Lambourn			Benefit to the high profile river Lambourn; Compliance with EFI
Sheeplands	Henley	Loddon			Benefit to the river Loddon; Compliance with EFI
Datchet	SWA	Thames			Benefit to the river Thames; Compliance with EFI

Source	WRZ	River	Reason for reduction – low scenario	Reason for reduction – medium scenario	Reason for reduction – high scenario
Bourne End	SWA	Thames and Abbots Brook			Benefit to the river Thames and Abbots Brook; Compliance with EFI
Medmenham	SWA	Hamble Brook			Benefit to the Hamble Brook; Compliance with EFI
Albury	Guildford	Tillingbourne & Law Brook			Benefit to the Tillingbourne and Law Brook; Compliance with EFI
Mousehill & Rodborough	Guildford	Wey			Benefit to the Wey; Compliance with EFI
Shalford	Guildford	Wey and Tillingbourne			Benefit to the Wey; Compliance with EFI
Farmoor	SWOX	Middle Thames		Benefit to Oxford watercourses.	Benefit to Oxford watercourses. Compliance with EFI
Environment Agency Area – Herts and North London					
Lower Lee	London	Lower Lee	To mitigate impact on the Lower Lee	To mitigate impact on the Lower Lee	To mitigate impact on the Lower Lee; Compliance with EFI
Northern New River Wells	London	Lee	Compliance with Licence Capping Policy; to mitigate impact on the river Lee	Compliance with Licence Capping Policy; to mitigate impact on the river Lee	To mitigate impact on the river Lee; Compliance with EFI
Hampden Bottom	SWA	Misbourne		To mitigate potential impact on the river Misbourne; Compliance with EFI	To mitigate potential impact on the river Misbourne; Compliance with EFI
New Gauge	London	Lee		To mitigate impact on the river Lee	To mitigate impact on the river Lee; Compliance with EFI

Table 5-6: Reasons for Licence Reductions Included in our Environmental Destination Scenarios

5.73 The impact of each scenario on WRZ DO for each of our WRZs for the Annual Average condition is shown in the figures below.

London

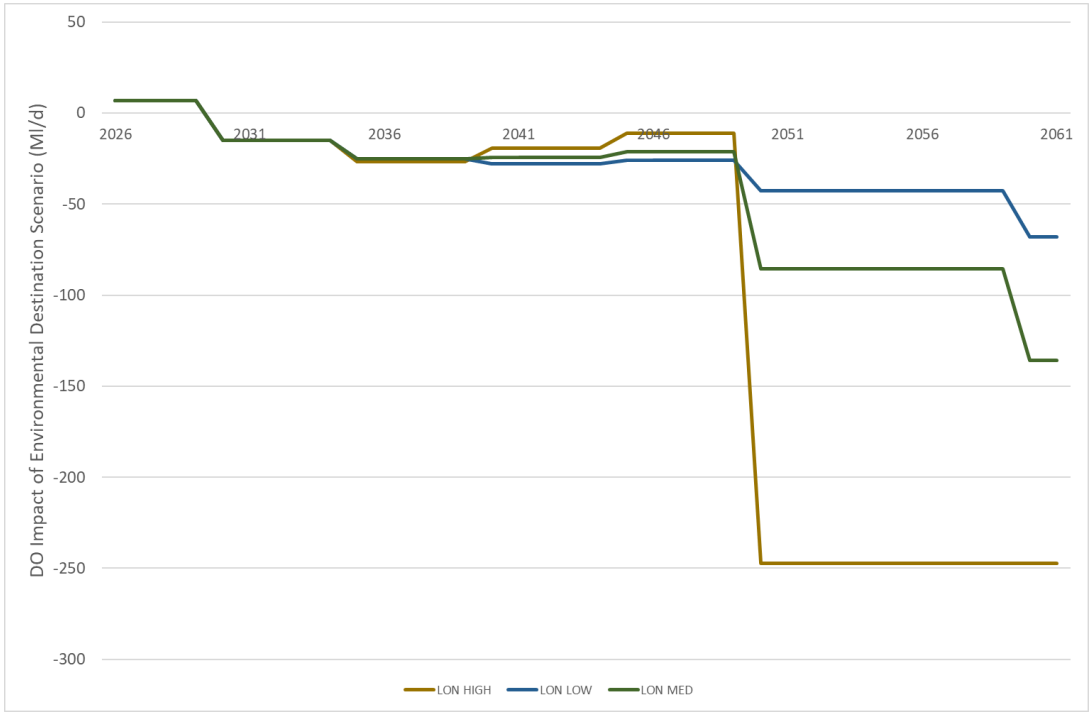

Figure 5-1: London DYAA Environmental Destination Scenarios

SWOX

Figure 5-2: SWOX DYAA Environmental Destination Scenarios

SWA

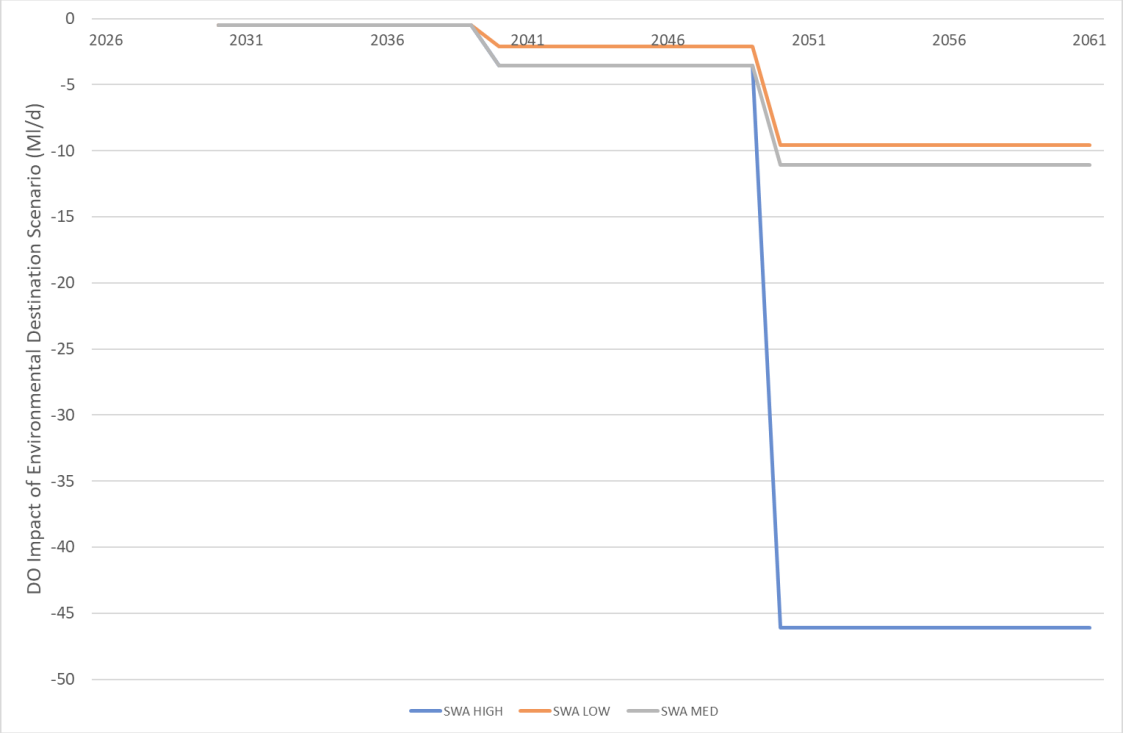

Figure 5-3: SWA DYAA Environmental Destination Scenarios

Kennet Valley

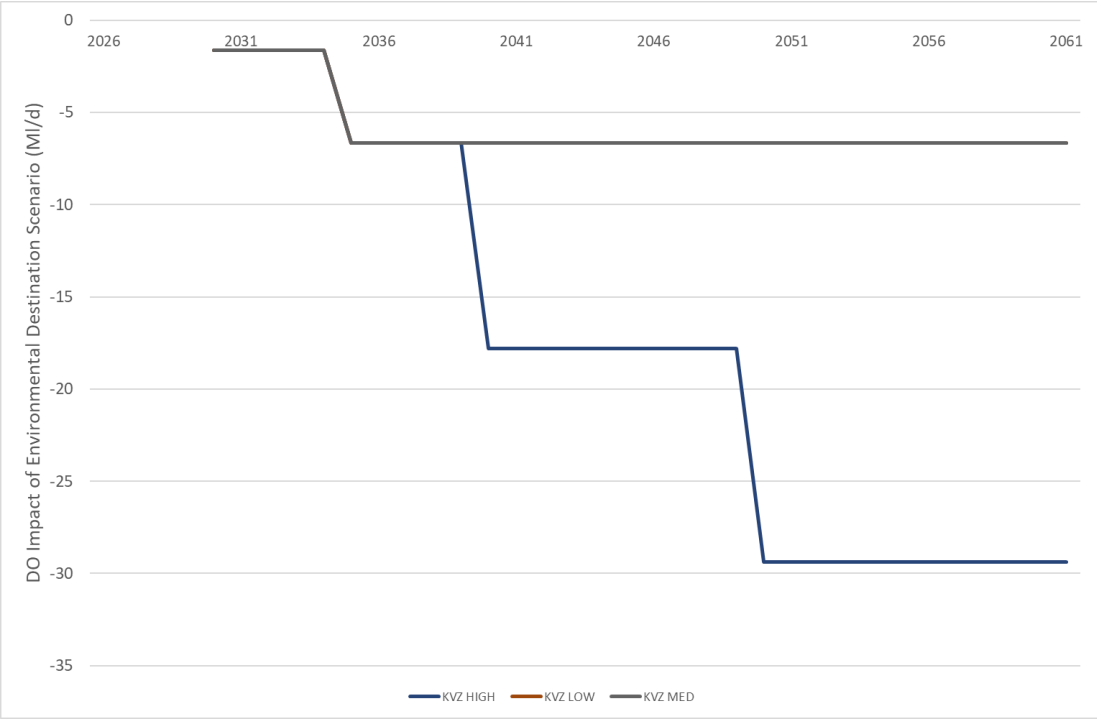

Figure 5-4: Kennet Valley DYAA Environmental Destination Scenarios

Guildford

Figure 5-5: Guildford DYAA Environmental Destination Scenarios

Henley

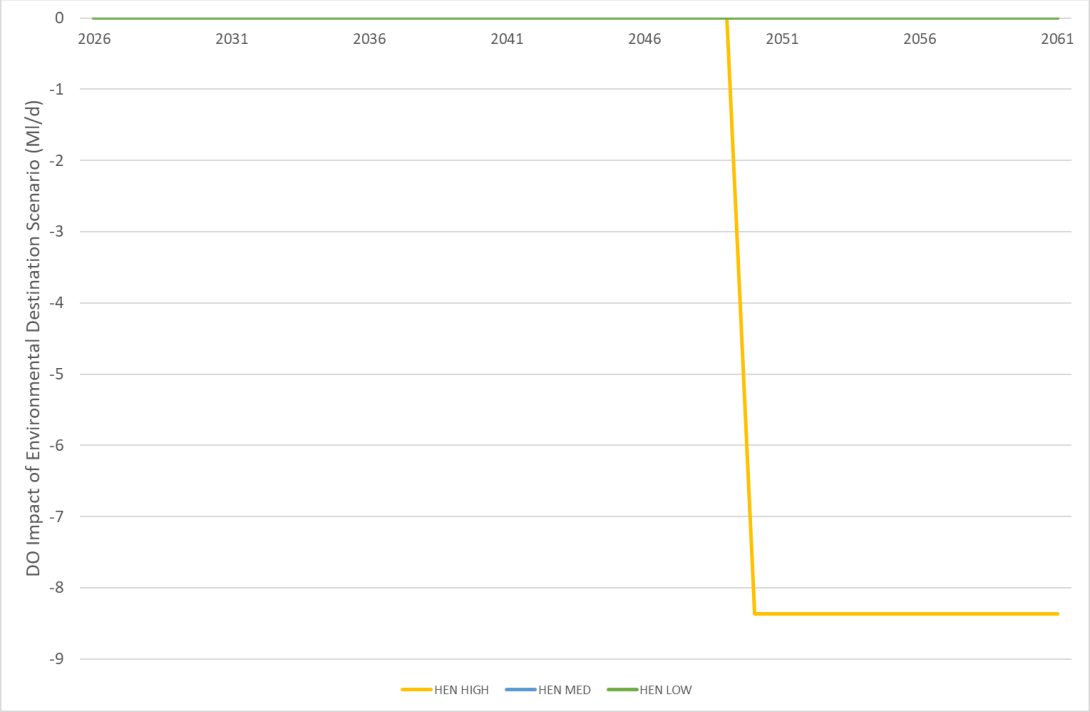

Figure 5-6: Henley DYAA Environmental Destination Scenarios

Further Work

5.74 Our environmental ambition is clear. In alignment with the guidelines set out by our regulators, the level of environmental destination has been determined at the WRSE regional level in consultation with the Environment Agency. In line with the National Framework for Water Resources and the WRPG, we aim to achieve a sustainable level of abstraction by 2050.

5.75 Within this aim there is still a significant programme of work to confirm that the right combination of sources have been included within each catchment to meet the deficit reduction agreed with our regulators. This programme of work will focus detailed investigations and apply the conceptual understanding to a catchment level, to ensure that the deficit reduction agreed is achieved using the right sources for the maximum benefit to the Environment.

5.76 The key action that we must take is investigating the impact of our abstractions on the environment to establish where licence reductions would result in environmental benefit. This will be undertaken across AMP8 and AMP9 in order that by 2035 we have a robust understanding of source licence reductions that will be needed to meet the environmental destination. Our AMP8 WINEP programme will set out the need to undertake a number of detailed investigations, as shown in Table 5-7.

High Priority	Medium Priority	Low Priority	
AMP8	AMP8/9	AMP9	
Eynsford	Sundridge	Orpington	Wansunt
Horton Kirby	Hampden Bottom	Darenth	Dartford
Lullingstone	Westerham	Wilmington	Mousehill & Rodborough
Lower Lee	Farmoor	Fognam Down	Fobney
Waddon (& Brantwood Road)		Ashdown Park	Datchet
Pann Mill		Green St Green	Medmenham
Bexley		Seven Springs	Sheeplands
Radnage		Syreford	Woods Farm
Broxbourne		Shalford	Playhatch
Pangbourne		Crayford	
Bibury			
Latton			

Table 5-7: Investigations to be Carried Out

Another important piece of further work to undertake is assessing the measures needed to maintain WRZ integrity given the potential licence changes included in the 'High' scenario. This will involve an assessment of the major distribution network enhancements that will be required to ensure WRZ integrity is maintained, alongside those needed to keep customers in supply and to maintain an adequate level of drought resilience.

Licence Capping

In late 2023 the Environment Agency issued new guidance regarding the licence capping policy. As a result of this new guidance further licences may need to be capped, or Regulation 19 exemptions applied for. We have work underway to fully understand and quantify the impacts of further licence capping that this guidance may result in, and will complete this assessment as soon as possible. We will report any additional sources for which licence caps are forecast to be needed, and associated Deployable Output impacts, in our WRMP Annual Reviews.

Adaptive Planning

5.77 In our baseline supply-demand balance, we have included all licence reductions required to meet Environmental Destination by 2050, the "backstop" date for delivery of licence reductions in the National Framework for Water Resources and the WRMP guidelines. The delivery of the licence reductions has been phased between 2030 and 2050. The programme was phased as set out in this chapter to enable us to identify a coherent overall solution when considering new water resources and new infrastructure, rather than applying a fractured approach where reductions are accelerated in certain locations. The process of investigation, design and solution implementation is important and will take time when considering the scale of infrastructure (both new water resources and new network infrastructure) which is necessary. However, when sites have been included in the programme for reduction in 2050, the intention was not that we would delay licence reductions where they are identified as beneficial and feasible (both in terms of water resource and network infrastructure) but that they would not be implemented until a comprehensive strategic solution could be implemented.

5.78 As such, as is described in Section 11 of our WRMP, we have considered an adaptive plan scenario in which licence reductions are confirmed and demand reduction (50% leakage reduction and 110 l/h/d PCC) is successful. In this adaptive plan scenario, we would see surplus available from the development of Strategic Resource Options and so we would look to accelerate licence reductions from 2050 to the 2040s where possible. Here we describe those licence reductions which could perhaps be accelerated, and give reasons as to why acceleration is unlikely to be feasible at other sources, noting that the implementation/acceleration of licence reductions would be dependent on both investigation outcomes and solution identification.

5.79 In the preferred plan, surplus is generated in the SWOX WRZ in the 2040s, which could be utilised in the London, SWOX or SWA WRZs (via direct pipelines in the case of SWOX and transfer from the River Thames in SWA and London). As such, we have considered only licence reductions in those WRZs in which surplus from the preferred plan could enable licence reductions.

5.80 We have separated the licence reductions which are currently planned for 2050 into sub-WRZ categories and have described the feasibility of accelerating reductions in each category.

<u>London – Darent and Cray catchments</u>

5.81 The 2050 licence reductions in this category are:

- Sundridge
- Westerham
- Darenth
- Wilmington
- Dartford
- Orpington
- Crayford
- Wansunt
- Green St Green

5.82 These licence reductions total 65 Ml/d of Deployable Output reduction, and all of the sources are groundwater sources in South East London. As is described in WRMP24 Appendix A (Water Resource Zone Integrity), while London is a single WRZ, the supply system in South East London is different to the rest of the WRZ. In South East London there are a number of groundwater sources, ranging in size from c.1 Ml/d to c. 30 Ml/d. Water from these sources is treated relatively near each source, at relatively small water treatment works (again c.1 Ml/d to c.30 Ml/d), before it is transmitted to customers via a complex system of trunk mains and service reservoirs. In addition to water provided from these groundwater sources, there is also a large transfer into South East London from the west London reservoirs via the London Ring Main, at Honor Oak.

5.83 Westerham and Sundridge are very small sources (totalling < 2 Ml/d) in the upper reaches of the River Darent. Strategic solutions would not be required in order to enable these licence reductions.

5.84 The total current Deployable Output of the groundwater sources in South East London is approximately 230 Ml/d. As such, a Deployable Output reduction of 65 Ml/d would be very significant, recognising that this would be in addition to other licence reductions which are included before 2050 in the High scenario. While the Honor Oak transfer into South East London is significant, the existing transfer could not simply be increased to enable all of these licence reductions. Major strategic network solutions would be required across this part of the WRZ to ensure that customer supplies would be maintained if these licences were to be reduced. The most efficient network solution would be different according to the licence reductions which are identified as being part of the final solution.

5.85 In view of this need for a strategic solution, our consideration is that we should (by 2035, following investigations) confirm the licence reductions which are required and then (by 2040) design strategic network solutions to enable those licence reductions. Given that the construction of infrastructure would then take a significant amount of time, we do not think it would be possible to accelerate most of these licence reductions ahead of the "backstop" date of 2050.

5.86 Conclusion: acceleration unlikely to be feasible at most sources, unless it is concluded that minimal reductions are required. Acceleration would be feasible at Sundridge and Westerham as these are small sources in the upper reaches of the Darent catchment where strategic solutions would not be necessary.

London – New Gauge and NNRWs

5.87 The 2050 licence reductions in this category are:

- New Gauge (transition from "DO neutral" reduction into "DO negative" reduction, i.e., not taking deferred abstraction at Lower Lee abstraction points).
- Northern New River Wells (Amwell End, Amwell Hill, Amwell Marsh, Broadmead, Broxbourne, Hoddesdon, Middlefield Road, Rye Common).

5.88 These licence reductions would be made at sources where water is currently treated at our Hornsey WTW and Coppermills WTW, in North East London.

5.89 While these licence reductions would result in a significant loss of Deployable Output (c.120 Ml/d in aggregate), the configuration at Coppermills (which treats around 400 Ml/d, with water being provided from our Lee Valley reservoirs) means that a network

infrastructure solution would not be required in addition to new water resources. Therefore, these licence reductions could be accelerated if surplus water resource is available and investigations confirm that they are necessary.

5.90 Conclusion: acceleration feasible if surplus water resource is available

London – Lower Lee

5.91 This licence reduction would involve reducing the abstraction licence at our Lower Lee abstractions, which abstract water into our Lee Valley reservoirs. Similarly to the New Gauge and NNRW abstractions, water from these abstractions is treated at Coppermills WTW.

5.92 This licence reduction is considered a lower priority than the New Gauge and NNRW licence reductions, as the New Gauge and NNRW source reductions would be for the benefit of the same river (the River Lee) but further upstream (and so would benefit a longer stretch of river). Furthermore, very significant modifications would need to be made to the morphology of the Lower Lee in order for there to be ecological benefit from a licence reduction at our Lower Lee sources, which we consider is unlikely to be delivered ahead of 2050.

5.93 Delivering additional licence reduction beyond the NNRW and New Gauge reductions may well require major new infrastructure in addition to new resource (either raw water network, e.g., Thames-Lee tunnel improvements/duplication, or treated water network, e.g., ring main changes). The most efficient network solution would be dependent on the total volume of licence reduction which is required.

5.94 In view of the above, our consideration is that we should investigate the River Lee to confirm the total volume of licence reduction which is required at our sources in aggregate (by 2035), make licence reductions at NNRW and New Gauge subject to surplus being available, and then design and implement infrastructure which is required to enable any additional licence reduction which is identified. Given that the infrastructure required to implement the final reductions may be significant and given that significant river morphology modifications would be needed in order for ecological benefit to be derived, we do not think that acceleration ahead of 2050 would be feasible.

5.95 Conclusion: acceleration unlikely to be feasible

SWOX – Cotswolds

5.96 The 2050 licence reductions in this category include:

- Upper and Lower Swell
- Seven Springs
- Syreford
- Ashdown Park

5.97 These licence reductions would all be made at groundwater sources in remote parts of the SWOX WRZ. These are all small sources which currently provide water to local areas.

5.98 We included these licence reductions at the backstop date of 2050 because they are lower-confidence (in terms of ecological benefit) and are located in parts of the SWOX WRZ which are very remote (and as such long pipelines would be needed to ensure customers remain in supply).

5.99 However, if surplus is available in the SWOX WRZ and investigations indicate that licence reductions are required, it may be feasible to accelerate these licence reductions ahead of 2050 depending on the required network solution.

5.100 Conclusion: acceleration feasible

SWA Sources

5.101 The 2050 licence reductions in this category include:

- Bourne End
- Medmenham
- Datchet
- Pann Mill

5.102 These are licence reductions at large groundwater abstraction sources, most of which are near the Thames. Aside from Pann Mill, they are also lower confidence in terms of likely ecological benefit. The licence reductions total 43 Ml/d and would involve a total Deployable Output reduction of nearly 25% of the total current SWA WRZ DO.

5.103 Significant network modifications and new treatment facilities, alongside new resources, would be required to enable these licence reductions, and the most efficient network solution would be different according to the specific licence reductions which are confirmed as being required.

5.104 As such, our consideration is that we should (by 2035, following investigations) identify the licence reductions which are required and then (by 2040) design network solutions to enable those licence reductions. Given that the construction of infrastructure would then take a significant amount of time, we do not think it would be possible to accelerate most of these licence reductions ahead of the “backstop” date of 2050.

5.105 Conclusion: acceleration unlikely to be feasible

Changes made between dWRMP24 and WRMP24:

- We have updated this section to make it clear how we have developed our environmental ambition and included Environmental Destination
- The Deployable Output (DO) impacts of our licence reduction scenarios have been re-calculated to take into account baseline source DO updates made between dWRMP24 and WRMP24.
- Our profiles of licence reduction have been altered to ensure compliance with government policy, and following representations raised by the Environment Agency.
- A more comprehensive explanation of our approach to applying the "licence capping" policy is given.
- A greater level of explanation is given regarding the derivation of the "Low" and "Medium" scenarios.
- A greater level of explanation is given regarding the scheduling of licence reductions that may be required in the future.

Changes made between rdWRMP24 and fWRMP24

- We have clarified the licence capping reductions we will make that do not have an impact on deployable output.
- We have clarified other aspects of the licence capping reductions to be made in AMP8.
- We have considered whether acceleration of licence reductions may be feasible in different locations as an adaptive planning scenario.


Thames
Water