Catchment Based Approach

Chalk Stream Restoration Strategy 2021 Implementation Plan 2022

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Foreword by Rt. Hon. Rebecca Pow MP, Minister for Environmental Quality and Resilience.

This summer, I had the pleasure of visiting ONE stretch of the River Lark in Bury St Edmunds which is a remarkable example of what a chalk stream can look like when it has been restored. Its clean water and the banks alongside it are now teeming with wildlife. Yet not all chalk streams are in such good condition. Indeed much of the River Lark itself is in a poor condition.

Chalk Streams are an internationally rare and irreplaceable habitat, as well as an important element of our nation's natural heritage. England is home to the majority of chalk streams across the globe, with 85% of the streams found in England alone. They are a vital water resource and provide a habitat for a diverse group of wildlife from the damselfly to salmon. However, they are under increasing pressure from climate change, development, pollution, and abstraction.

That is why, after almost two years of collaborative work between the government, its regulators, the water and agricultural industries, environmental NGOs, not to mention many river groups, networks and partnerships, passionate individuals and experts, I am delighted to introduce the first CaBA (Catchment Base Approach) Chalk Stream Restoration Strategy **Implementation Plan**. This plan marks the first important steps in our renewed collective effort to restore good ecological health to all of England's chalk streams. CaBA and its collaborators are progressing the recommendations and we will continue to provide updates on the plan's implementation and its impact on the living landscape.

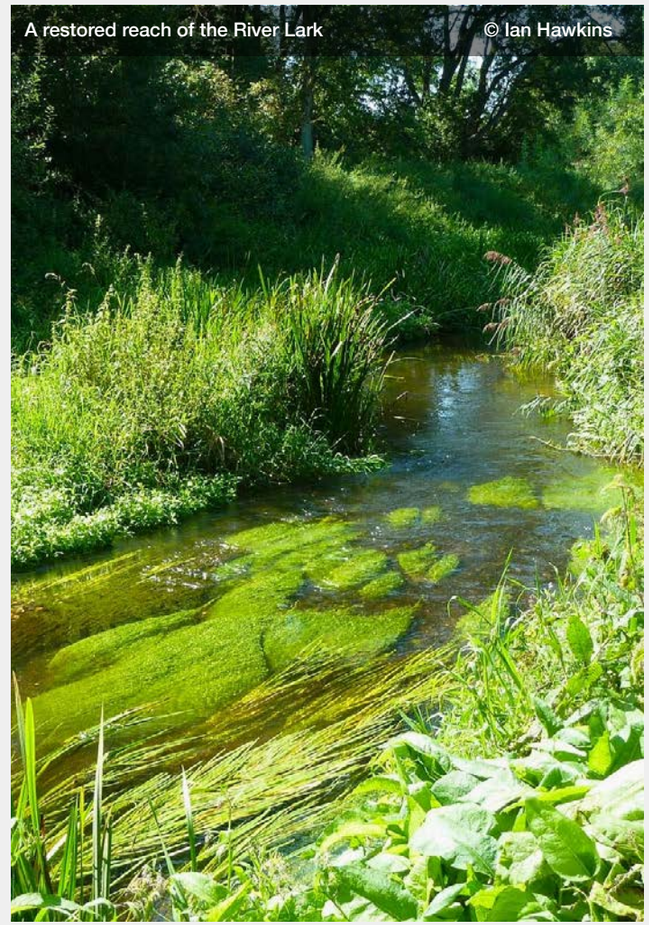
The restoration of chalk streams will also help to achieve the ambitions outlined in the Government's 25 Year Environment Plan which set out the government's commitment to clean and plentiful water and engagement with the natural environment and its wildlife.

In 2019, Defra invited CaBA to investigate where the health of chalk streams could be improved to reach good ecological status. In October 2021, the Chalk Stream Strategy was launched. The Chalk Stream Restoration Strategy identified 34 recommendations to drive forward improvements to enhance and maintain the condition of England's chalk streams. Collaboration is at the heart of combatting the challenges that chalk streams face and ensuring that the government can look at these challenges holistically. These recommendations provide an opportunity for a range of groups, networks, and people to use their expertise to work together and support the restoration of our chalk streams.

I am pleased to be able to introduce this plan and outline the progress that has been made. We are developing our understanding and knowledge of chalk streams through Flagship Restoration Projects. These projects provide an opportunity for us to explore our chalk stream ambitions nationwide. I'm pleased to report that we have made positive progress in other areas that will benefit these iconic habitats too:

- chalk streams are listed as high-priority sites in the government's Storm Overflows Discharge Reduction Plan;
- all chalk catchments are now designated as 'water-stressed', enabling the roll-out of metering;
- the Environment Agency is developing a £2.8 million chalk stream specific programme of works;
- and chalk streams are singled out for prioritised abstraction reduction in the regional planning process for water resources.

I would like to extend my thanks to the CaBA group, our regulators, and the water companies for their continued collaboration to explore and deliver these recommendations. We will continue to work with the Chalk Stream Restoration Group and relevant stakeholders to address the challenges and take the necessary action to restore our precious chalk streams.



A restored reach of the River Lark © Ian Hawkins

The CaBA chalk stream restoration strategy implementation plan

1. Introduction

The CaBA chalk stream restoration strategy was published in October 2021. The strategy was built around the "trinity of ecological health": water quantity, water quality and habitat quality and included 30+ recommendations to Defra, the Environment Agency, Natural England, the water companies, NGOs and stakeholders. In Section 8 all parties made an undertaking to scope and plan the recommendations made and to publish in the autumn of 2022 an implementation plan with commitments and timelines.

It is important to emphasise that our strategy and plan is not a once-and-for-all fix-all. The problems our chalk streams face are too considerable and complex for that. Some of the recommendations have been delivered, some will be set out as time-bound commitments, some will remain unanswered, for now.

But we are making progress: we have, for example, got answers to our request to define all chalk catchments as 'water-stressed' meaning water companies can roll out universal metering; we have got an answer to our request that chalk streams should be treated as 'high-priority sites' in the government's stormwater reduction plan; we have assembled a national network of flagship, full-catchment restoration projects, to be kick-started with water company support, but carried forward by all stakeholders.

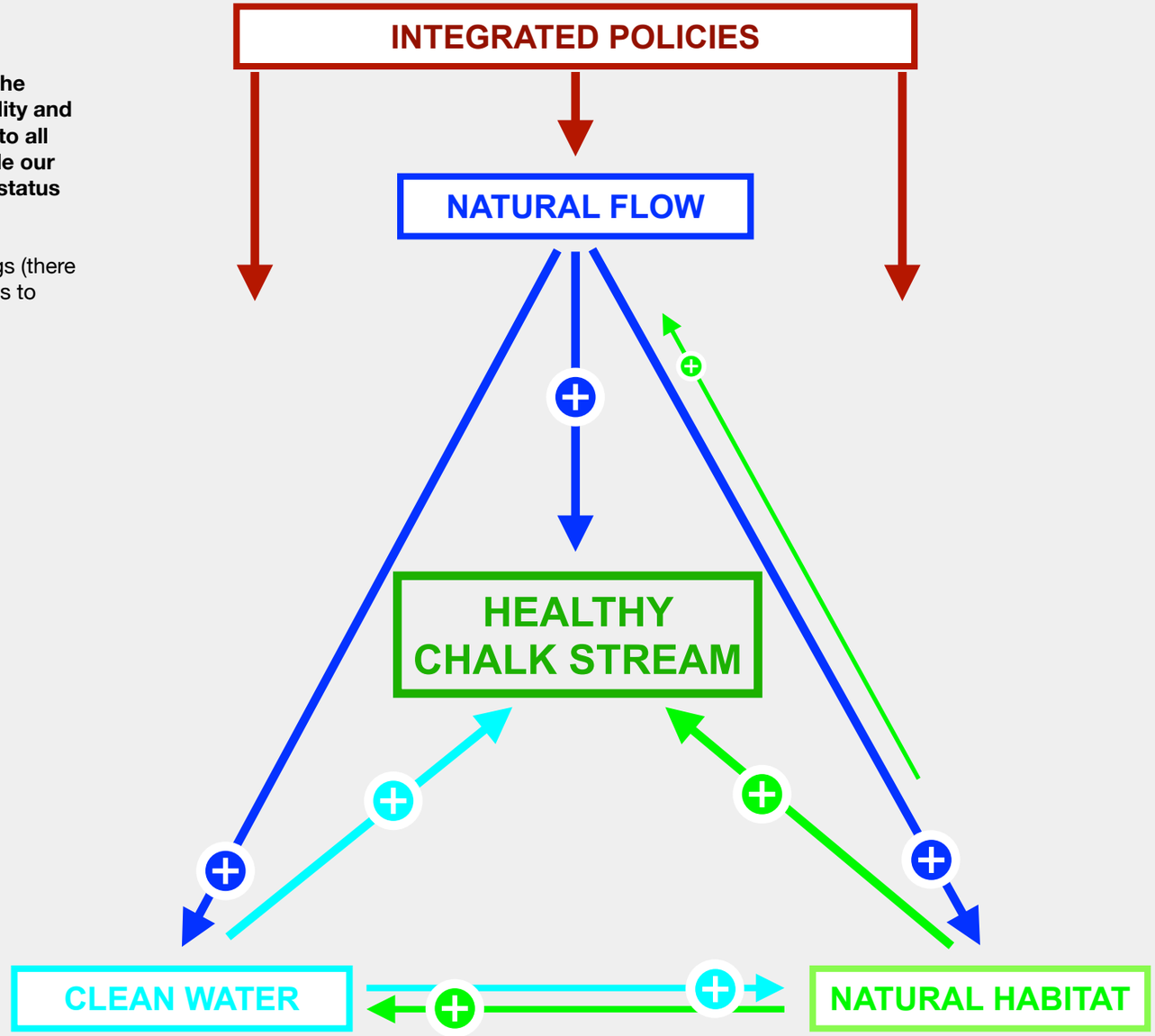
Over time this plan will act as a document of progress. It will be regularly revisited and revised – at least once a year – by the CaBA CSRG and in that way it will help to hold all of the partners to task.

Charles Rangeley-Wilson OBE: chair, CaBA chalk stream restoration group

2. Structure of the implementation plan

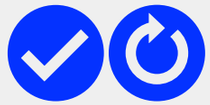
The recommendations made in the 2021 strategy were grouped under the three components of good ecological health: water quantity, water quality and habitat quality. In addition, an important few recommendations related to all three components, under the heading of integrated policies: for example our 'one big wish' to government that chalk streams be accorded a higher status to drive investment.

The implementation plan, therefore, is grouped under the same four headings (there are some overlaps – for example the review of waterbody boundaries applies to water quantity and quality), starting with integrated policies.



A simple diagram illustrating the positive correlations between flow, water quality and physical habitat, to show how positive gains in ecological health are maximised by making improvements to all three components.

How the plan's recommendations and actions / notes are laid out.

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
This is the number of the recommendation as set out in the main CaBA chalk stream restoration strategy document	This is the short title.	This is the full text of the recommendation	These are the lead organisations responsible for the investigation and delivery of the recommendation.	This is the detail of what has been delivered, or of the state of progress any investigation or scheme might be at, or of any relevant findings, with links to reports and other useful information. If the recommendation has been delivered there will a blue tick symbol and the text will be in blue. If the recommendation is assured but it's an ongoing work there will also be a blue work in progress symbol.  If the recommendation is under investigation or is a work in progress whose outcome is not yet assured there will be an amber to green "work-in-progress" symbol and the text will be green. The symbols have a traffic light system: just amber = we have commitment to the investigation but no clear process the above + amber / green = we have commitment and a process but no certain outcome the above + green = we have commitment and process and a likely positive outcome  If the recommendation hasn't got anywhere (yet), there will be a red cross symbol:  **In addition there will sometimes be additional notes / recommendations from the CaBA panel or chair (text in black)** **as well as position statements from The Environment Agency / Defra (text in brown).** **Links are in underlined magenta text**

Integrated policies

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Integrated Policy 1.	Designation for chalk streams	CaBA CSRG recommends that the government create an overarching statutory protection and priority status for chalk streams and their catchments to give them a distinct identity and to drive investment in water-resources infrastructure, water treatment, stronger planning controls and catchment-scale restoration.	Defra	**Defra statement:** Defra is currently looking for opportunities to deliver on this recommendation. The Retained EU Law (Revocation and Reform) Bill provides an opportunity to consider how stronger protections and priority status for chalk streams can fit into reformed environmental legislation. 

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Integrated Policy 2.	Review of cost-benefit analysis	CaBA CSRG recommends a review of cost-benefit analysis: • water companies' customer surveys for PR24 should ensure that they fully cover the environmental impacts of water company assets on chalk streams and make the importance of these iconic habitats clear to respondents, including in depth studies where chalk streams cover a significant component of their area served • Defra / EA should review how the proposals for WINEP reform and revised optioneering and appraisal guidance could be strengthened to ensure that improvements to chalk streams are valued appropriately • innovative approaches to capturing the full range of benefits generated by improvements to chalk streams should be trialled on the chalk-stream flagship projects • consideration should also be given to carrying out a new valuation survey for a chalk stream similar to the earlier study for the Mimram	Water companies Environment Agency Defra	**A review of CBA is integral to Recommendation 1.**

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Integrated Policy 3.	Development rules for chalk streams	CaBA CSRG recommends that the National Planning Policy Framework should be reviewed and include 'development and planning rules for chalk streams' (matching the 'farming rules for chalk streams' outlined in 5.8.3). Guidelines and recommendations for these rules are set out in Section 7.3.1 of the main **CaBA chalk stream restoration strategy 2021**.	Defra	**Defra statement:** The National Planning Framework (NPPF) already makes clear local plans should promote the conservation, restoration and enhancement of priority habitats which include chalk streams. Government will also mandate biodiversity net gain under the Environment Act, measured using the biodiversity metric. The very high distinctiveness score given to chalk streams by the metric means that bespoke compensation will likely be required for impacts or losses on development sites, creating an additional strong incentive for their protection from development. As we review the NPPF we will consider how to further reflect the value of chalk streams in planning. 
Integrated Policy 4.	Commitment to publish and implementation plan	CaBA CSRG will publish within 12 months an implementation plan for the headline actions identified in this strategy.	CaBA CSRG	Changes in government delayed the publication of the plan from October to November. There will be an official public launch of the plan in the spring of 2023 to which all those who have been involved will be invited, including stakeholders who have contributed to the consultation process. The implementation plan will be regularly revised and re-published by the CaBA CSRG panel with the iterations of the plan over time acting as documents of progress. 

Water quantity: restoring & protecting healthy flow

River Beane, Herts

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quantity 1.	Agreed definition of sustainable abstraction	CaBA CSRG agrees to set a target for "sustainable groundwater abstraction" in chalk stream catchments as that which causes a maximum reduction from natural flows of circa 10% at Q95 determined at appropriate assessment points, and in winterbournes a maximum 10% increase in drying duration. These will be the agreed destination targets for chalk streams, but CaBA CSRG recognises that bespoke less or more stringent targets may be necessary to ensure appropriate levels of ecological protection assessed at a local level; and that as flow targets are neared an adaptive response to the delivery of benefits may reasonably drive a change in the flow target.	CaBA CSRG	This was agreed in October 2021. Delivery will now depend on how the lead partners respond to all of the other recommendations under Water Quantity.  **EA statement:** moving toward the destination target will need to be done in a way that is consistent with current regulatory approaches or, if a new regulatory approach is proposed through the other recommendations, we will need to go through a process of consultation and review in defining new regulations. **CaBA CSRG chair notes:** clearly, aspects of the current regulatory approaches and / or their application have nevertheless left some chalk stream flows far from these targets. The following recommendations address some of those issues.
Water Quantity 2.	Review Abstraction Sensitivity Banding	CaBA CSRG recommends a review of the Abstraction Sensitivity Banding. All chalk streams should be banded ASB3, unless there is evidence to support a lower band. ASB3 may not be appropriate on the lower reaches of very big chalk catchments or highly modified systems, for example the lower Colne or Lea, the lower Wey, Gade, Stort etc.	Environment Agency	Following CSRG submission to the EA's chalk stream manager of preliminary notes ref apparent anomalies in the ASB grouping of chalk streams (see https://chalkstreams.org/2022/07/02/abstraction-sensitivity-bands-in-chalk-streams-urgent-review-needed/) the EA has shared data and is in discussion (meeting dates 6.9.22 / 20.10.22) with CSRG leading to a review of the banding. Timeline for potential changes following the review will most likely sync with updated waterbody classifications: next due 2025.  **EA statement:** in addition to reviewing the information on anomalies from CSRG, the EA will use local staff knowledge and the most recent invertebrate data to update the ASB banding where required. The changes need to be in line with the guidance for defining the ASB that has been agreed for use for the flow assessment through the WFD Regulations. Any changes will take effect from the next classification assessment in 2025 at the earliest. There are 132 waterbodies which have ASB3 out of 515 waterbodies which have chalk rivers within their boundary (both high & low certainty, see recommendation 4).

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quantity 3.	Enhanced scenario for chalk streams	CaBA CSRG endorses the national framework's 'enhanced scenario' for chalk streams but based on local evidence. The restoration of flow deficits should be grouped as being either ecologically 'essential', 'beneficial' or 'of limited benefit' and prioritised accordingly. See section 4.6 National framework and section 4.6.5 A%R .	Water Resources South East (WRSE) Water Resources East (WRE) West Country Water Resources (WCWR)	Of the original scenarios in the draft framework planning process 'enhanced' represented the most ambitious level of protection for environmental flows. Selecting the enhanced scenario for chalk streams was an option within all three scenarios (enhanced, adapt or business as usual) and this was recommended by the CaBA CSRG. **WRSE:** within WRSE the scenarios are now termed 'high', 'medium' and 'low' according to the level of output reduction (the previous method produced some anomalies in this respect), with high representing the most ambitious level of environmental protection under all model runs. While the overall environmental destination will very likely fall somewhere between high and medium, the draft regional plan will also include specific criteria for prioritising chalk streams. WRSE and water companies are working on prioritisation strategies and scenarios to help focus abstraction reductions on chalk streams as suggested in the CaBA recommendation (see notes against WQ5). **WRE:** WRE's draft Regional Plan fully endorses the outcomes associated with the 'enhance' environmental destination scenario for 2050 and shows how this could be achieved. The Enhance scenario explicitly recognises the ecological importance of chalk rivers alongside wetlands and headwaters and provides additional protection for these. The proposed first step in WRE's plan is to investigate on behalf of all water-using sectors how best to meet the Enhance scenario's objectives. This will also allow us to prioritise where returns of water to the environment can realise the greatest ecological gains, which could be in chalk catchments. **WCWR:** have generated low, central, and high scenarios which are mapped to Ofwat's scenarios and the National Framework 'enhanced' scenario. The group will be working with its environmental and abstractor partners to ensure acceptable flows are restored in the Hampshire Avon SAC as a priority, before moving on to the other Wessex chalk streams, prioritised on the scale of required flow reduction and the headwaters principle. 

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quantity 4.	Review of waterbody boundaries and assessment points	The Environment Agency should review chalk stream WFD waterbody assessment points and boundaries and make changes to ensure that the EFI methodology adequately protects ephemeral and headwater chalk streams.	Environment Agency	**EA statement:** using the mapping of chalk rivers produced by Natural England (in consultation with CSRG), we have created a list of river waterbodies which include chalk rivers: these have been defined as either high- and low-certainty chalk waterbodies. Where a waterbody contains any length of a high-certainty reach then it will be used in our assessments & reporting of the status of chalk rivers. There are a total of 515 waterbodies which contain a reach of chalk river within their boundary. Out of the 515, 303 are defined as high-certainty. We acknowledge that there are chalk rivers outside of these high-certainty reaches which may have abstraction and flow issues that need to be resolved, but our focus will be on waterbodies with high-certainty reaches. We will review the high/low-certainty waterbody list using local knowledge and feedback into Natural England's mapping project. Proposals for changes to waterbody boundaries will next be considered in early 2024, ahead of updated classification results for River Basin Management Plans. We will work with partners to identify proposals. The decision to progress a proposed change to a waterbody boundary has to be taken on a case-by-case basis, taking into account the benefits and impacts of doing so. Changes will be prioritised where waterbody boundaries are impeding delivery of outcomes – including but not limited to outcomes in the chalk restoration strategy. However, as we manage the environmental impacts within the whole waterbody and not just the outflow point, waterbody boundaries should not prevent any required action within the waterbody. Waterbody flow assessment points are at the downstream boundary of the waterbody and, consequently, there are low-flow issues in the headwaters which aren't picked up through the WFD classification process. We have used our groundwater models to assess the scale of the impacts of abstraction on headwaters. The models can be used to define a naturalised perennial head. We have called this Point X, and assess the impact of abstraction on flows from this point. As the EFI approach uses the flow duration curve, we can only assess flows where streams would naturally be flowing all year round. We have done this scenario modelling using four chalk groundwater models and will produce a summary report by March 2023. The headline message from the modelling work, in catchments where abstraction pressure is significant, is that for abstraction to reduce flows by only 10% from the naturalised perennial head (Point X), groundwater abstraction volumes will have to be reduced by 80% - 90%. The amount of abstraction reduction needed will depend on the abstraction pressure within both the surface water and groundwater catchments and the proximity of abstraction to the headwaters. There is more information on this in Hydrological approaches to assessing sustainable abstraction in chalk streams We are also starting a 'flows fit for the future' programme, which will inform how we plan and manage water abstraction and droughts. The programme will define the technical components of abstraction management for the next 30 years. 

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quantity 5.	Time-bound goals towards sustainable abstraction	Following items 1 - 4 government, regulators and industry should set and publish time-bound goals (short, medium and long-term) towards achieving 'sustainable abstraction' (see Action 1) on all chalk streams, in accordance with regional planning process and the recommended prioritisation articulated in Section 4.6.	Environment Agency Water companies Defra	As part of the regional-, and the 5-yearly water resource management planning processes, water companies must produce a water resource management plan which sets out how they intend to achieve a secure supply of water for customers and a protected and enhanced environment. Each water company must forecast its supply and demand over the statutory minimum period of 25 years. If there is a deficit (caused, for example, by the need to reduce abstraction in order to restore environmentally sustainable flows to chalk streams) the company must set out a range of supply-and demand-side options to address that deficit. The restoration of sustainable flows (see WQ1) to the chalk streams are under abstraction stress (see the CaBA A%R report and Section 4.6.4 of the main chalk stream restoration strategy) will require both demand reduction and the realignment of abstraction pressures to create a more sustainable means of supplying water and protecting the environment. On the following pages we have asked each water company briefly to set out: • its environmental ambition, including with specific regard to chalk streams, • its prioritisation methodology and • investigation or abstraction reduction timelines, where possible.  **EA statement:** the Environment Agency has a key role in working with the regional groups and water companies to develop the plans and will provide our view on the draft plans through the consultation process. We will ensure the WRMPs reflect the environmental destination set out in the regional plans and will respond if we don't feel they are ambitious enough. We will review what the plans mean specifically for abstraction in chalk catchments. More detail of how we have influenced the regional groups and water companies and the other activities we undertake which contribute to achieving sustainable abstraction are set out on the following pages.

Recommendation number:	Recommendation heading	Action / commitment
Water Quantity 5.	Time-bound goals towards sustainable abstraction cont. …	**CaBA CSRG chair statement:** these water company commitments (outlined over the following pages) and the regional planning process are just the start of the planning and delivery of sustainable abstraction in chalk streams. It is encouraging to see chalk streams singled out in WRSE, WRE and WCWR draft plans and / or the explicit endorsement of the enhanced scenario. It is also encouraging to see that chalk streams have been singled out for attention in all the water company statements. However, there is still a notable caution while the national framework and our long-term environmental ambition are debated / costed. In that sense I don't feel we have passed the milestone where the abstraction reductions needed to get to WQ1 on all chalk streams are universally guaranteed. Perhaps understandably, water companies are waiting to see what level of environmental ambition is indicated by the regional planning process and by the Environment Agency. In that respect it is very encouraging to read over the next two pages about the **Environment Agency's commitment to chalk streams and to this strategy.** And on the page after that, to read about Ofwat's role in driving the national framework of water resource infrastructure wherein lies our best opportunity to realign abstraction pressure and restore flow to our pressured chalk streams. **It is also very encouraging indeed that the strategy and schemes like Chalk Streams First now have Ofwat's explicit support.** Some of the water company statements detail actual abstraction reductions due in the next AMP. Others only investigations, while many of the time horizons for change are still a long way off. While it takes time to realign abstraction pressure it is vital that our environmental ambition AND the pace of change fully reflect the unique value of chalk streams. Please note that the draft regional plans are now out for consultation, so now is the time for those who are passionate about chalk streams to have their say in this process.

The Environment Agency's work to help deliver sustainable abstraction in chalk streams

As a core member of the Chalk Stream Restoration Group the Environment Agency is committed to implementing the Chalk Stream Restoration Strategy. Since the publication of the CSRS we have been working to secure resources for this vital work and integrate the special needs of chalk catchments into the operational and regulatory frameworks. It is through these frameworks that, with our customers and partners, we will deliver the restoration, and sustainable future, of chalk catchments and streams.

The Regional Framework

The Regional plans, together with the Water Resource Management Plans, are the key mechanism for delivering significant abstraction reductions from the public water supply sector (water companies). They are informed by the EA National Framework scenarios and much discussion between water companies, EA staff, eNGOs and other interested parties. In the future, the scope of the plans will be widened out to better include abstraction by other sectors.

There has been significant effort with the Regional groups from EA staff to influence the prioritisation approach and, in particular, how the Chalk Stream First principle can be enabled. We worked with the water companies to ensure that proposals such as Chalk Streams First have been considered in their plans. We put forward a modified version of the proposal (downstream relocation of abstractions) which is the solution that is in Affinity Water's preferred plan and would result in acceleration of flow improvements for four chalk streams in the Colne Catchment (Ver, Gade, Bulbourne and Misbourne).

Additional £2.8m chalk-stream specific programmes

The work we do to restore sustainable abstraction, taking a catchment-based approach, benefits all rivers as well as chalk streams, but we have a programme of work that is **specifically focused on chalk catchments.** Through the review of abstraction charges, we have secured £2.8m additional funding, specifically to work on restoring flow in chalk catchments and to develop approaches that can be applied to other sensitive catchments. The money is being split between recruiting additional posts and providing funding for partnership projects. We want to work on both improving the evidence and technical approach to defining the issues in the chalk catchments, but also the engagement and collaborative approach to finding solutions. Using only a regulatory approach from the EA will not deliver all the improvements that are needed or could be achieved. All partners need to work together to achieve the best for chalk rivers.

With this funding, we are:

- targeting more resources towards chalk catchments to enhance monitoring and modelling to give us a better understanding of the hydrology of the catchment and its interaction with ecology;
- increasing our understanding of the specific pressures and needs of partners within chalk catchments and engaging with the catchment partners to develop collaborative approaches to restoring chalk catchments;
- allocating funding across our operational areas that have chalk streams, with the funding weighted towards where there are more flow issues, and also funding for a national team to provide direction and support;
- developing a 'chalk network' bringing together existing work and additional resources to improve consistency across the chalk catchments, sharing expertise, knowledge and lessons learnt and setting out existing and planned work in national and local plans.

These are examples of the partnership projects which are currently being delivered and in support of which we will develop a multi-year programme going forward:

- river restoration projects to mitigate low flows and improve catchment resilience, for example, in the River Chess, Upper Witham, River Beane, Upper Cray and others;

- investigations into the hydro-ecological impacts of abstraction, undertaken across a small network of chalk stream headwaters in East Anglia;
- a post in a local wildlife Trust in Hertfordshire and North London to speed up delivery of multiple habitat improvement projects;
- groundwater modelling to look at modifying abstraction operations to reduce low flows in the Northern Becks in Lincolnshire;
- education and citizen science projects focussed on the Hogsmill in London to improve monitoring, chalk stream awareness and to reduce demand for water.

The impact of the 2022 drought on EA resource allocations

Over the past 6 months, 11 out of 14 English regions have been in a prolonged dry weather or drought situation, including the majority of chalk catchments. Significant resources have been, and will continue to be, focused on reducing the environmental impacts of the drought in chalk catchments. We expect this prioritisation and focus of our resources to continue into 2023.

Restoring Sustainable Abstraction (RSA) programme and new Environmental Permitting Regulations.

Our ongoing work to address unsustainable abstraction has been through the Restoring Sustainable Abstraction programme and continues to deliver WFD objectives of flows supporting Good Ecological Status. To protect catchments from the risk of increasing abstraction and to make water available, should that be sustainable, we are also removing licences which have been unused. Addressing the current impact of abstraction will increase the resilience of catchments but the cost-benefit assessments have often limited the abstraction reductions that can be delivered and therefore the improvement to flows. Alternative supplies for water are expensive and take many years to become operational. This is why the regional and water-company water resource management plans are crucial to shaping the aims but also the partnership work to deliver improvements in shorter timescales.

As abstraction licences are changed to be reviewable permits in the future, currently planned for 2023 (Environment Permitting Regulations), then we will need to set out a catchment appraisal that can be used to identify and support any activity required to deliver abstraction sustainably. The Environment Act 2021 gives us the power from 2028 to be able to change environmentally damaging abstractions without the need to pay compensation. Currently, we can revoke licences which are causing serious damage but the change in legislation now means that the evidence requirements to support the licence changes are less onerous. As set out in the Abstraction Plan, we still want to have a collaborative approach, working proactively with stakeholders to achieve abstraction changes and catchment management behaviour changes on a voluntary basis.

We will continue working with the CaBA Water Resources group, Catchment Partnership, abstractor groups and will engage with the flagship catchments proposed by the water companies.

Chalk streams and climate change research

The Environment Agency's Chief Scientist's Group need to better understand how and where climate change may affect chalk streams. In collaboration with academics at Nottingham Trent University, led by Prof. Rachel Stubbington, we conceptualised Chalk streams of the future: The effects of climate change on biodiversity in England's iconic river ecosystems. This report presents scientific evidence examining the effects of climate change on biodiversity in chalk streams, with the aim of informing evidence-based decision making that enables effective management actions. Complementing this report, we have also produced our first water temperature projections to 2080 for English chalk streams. Under the high emissions scenario the average temperature of the warmest month each decade is projected to rise by about 0.6°C per decade. Streams in the north-east (Lincolnshire and Yorkshire Wolds) may experience the lowest increases whereas those around London (rivers Colne, Lee, Hogsmill, Mole and Wandle) may experience the highest. Adult brown trout will be under threat from high summer temperatures. Salmonid eggs need winter temperatures below 12°C to survive, and this threshold could be exceeded at over 85% of sites by 2080. We are exploring how we can develop more detailed projections of both water temperatures and variability in flow regimes. Our continuing collaboration with academics at Nottingham Trent University will advance our understanding of ecological responses of chalk streams to future climate change in a context of multiple pressures.

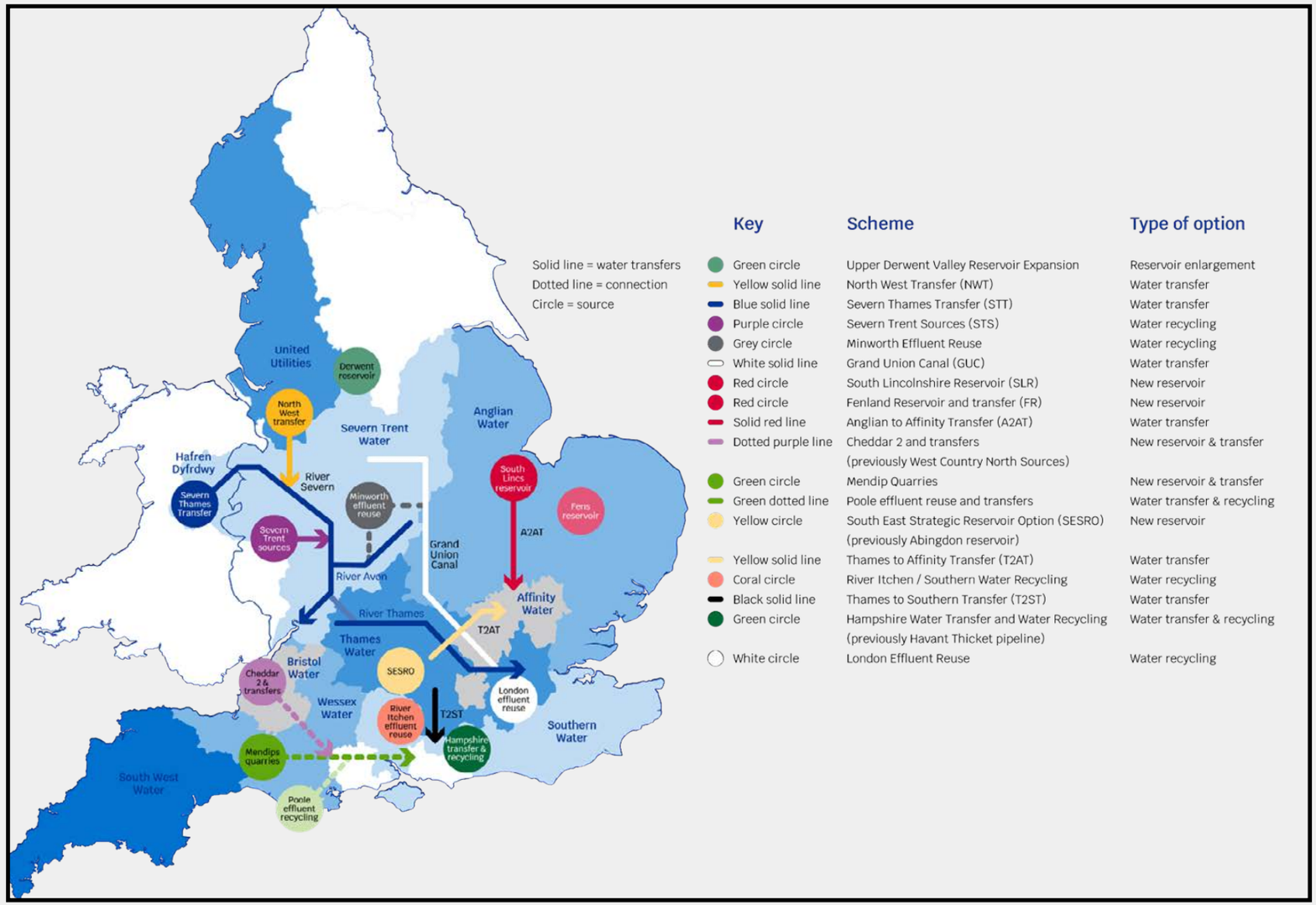
The Environment Agency's work to restore the physical habitat of chalk streams.

We have a long record of maintaining, restoring, and creating habitat on chalk streams. This goes back over decades of working with and funding partnership projects across the country with many groups and organisations. For example, through our habitat creation programme in 2021/22 we improved or restored 13 km of chalk stream and since 2010 we have improved or restored nearly 320 km.

Ofwat's statement.

Ofwat played a lead role in establishing RAPID (Regulators Alliance for Progressing Infrastructure Development) in partnership with the Environment Agency and Drinking Water Inspectorate and established a development fund of £469m to advance a programme of major new water resource infrastructure. This programme now includes 18 strategic solutions across 12 companies as well as the Canals and Rivers Trust and includes six reservoirs, six water transfers, two source solutions and four reuse schemes with a combined maximum output of c.2,397 million litres/day (equivalent to needs of ~10.5m people). RAPID is encouraging a best value approach in developing these projects to maximise benefits to the environment and customers as well as securing greater resilience. **The programme also has potential to make step changes to the condition of chalk streams. For example, the Grand Union Canal and Thames to Affinity Transfer options underpin the Chalk Streams First initiative and RAPID is encouraging wider consideration of these principles elsewhere.**

More widely, Ofwat has set out expectations of water companies for the coming business planning process for the period 2025-2030. A key element of this is for companies to take a long-term view of future needs including that of the environment to optimise investment decisions and deliver needed improvements in performance. **Ofwat has been closely involved in the development of national Chalk Stream Restoration Strategy and supports the intent to improve these iconic habitats.**



Key	Scheme	Type of option
Green circle	Upper Derwent Valley Reservoir Expansion	Reservoir enlargement
Yellow solid line	North West Transfer (NWT)	Water transfer
Blue solid line	Severn Thames Transfer (STT)	Water transfer
Purple circle	Severn Trent Sources (STS)	Water recycling
Grey circle	Minworth Effluent Reuse	Water recycling
White solid line	Grand Union Canal (GUC)	Water transfer
Red circle	South Lincolnshire Reservoir (SLR)	New reservoir
Red circle	Fenland Reservoir and transfer (FR)	New reservoir
Solid red line	Anglian to Affinity Transfer (A2AT)	Water transfer
Dotted purple line	Cheddar 2 and transfers (previously West Country North Sources)	New reservoir & transfer
Green circle	Mendip Quarries	New reservoir & transfer
Green dotted line	Poole effluent reuse and transfers	Water transfer & recycling
Yellow circle	South East Strategic Reservoir Option (SESRO) (previously Abingdon reservoir)	New reservoir
Yellow solid line	Thames to Affinity Transfer (T2AT)	Water transfer
Coral circle	River Itchen / Southern Water Recycling	Water recycling
Black solid line	Thames to Southern Transfer (T2ST)	Water transfer
Green circle	Hampshire Water Transfer and Water Recycling (previously Havant Thicket pipeline)	Water transfer & recycling
White circle	London Effluent Reuse	Water recycling

Affinity Water	
Environmental ambition & vision & Prioritisation methodology	Affinity Water's strategy and prioritisation process is based on three objectives / guiding principles: Affinity Water is committed to 'progressively ending unsustainable abstraction where identified' based a) on current knowledge and b) the continuing 'investigation of and reduction in unsustainable abstraction across all catchments that have been identified by the EA environmental destination work'. The strategy is 'adaptive', so that abstraction is reduced catchment by catchment, allowing AW 'to learn about observed benefits as the programme progresses and as flow targets are further refined'. And it is intended to balance affordability with monitoring and learning so that AW 'only reduce abstraction where doing so will have a meaningful impact on chalk stream health in a manner which ensures risks such as groundwater emergence and carbon impacts can be managed'.
Schedule of investigations and reductions specific to chalk sources	All the chalk streams in Affinity Water's area are identified within the environmental destination work over AMPs 8, 9, 10 and 11. Sustainability reductions are scheduled as: AMP8: Reductions are planned on the Colne tributaries: • Misbourne • Chess • Gade (Bulbourne and Ver) • Mimram AMP9: Substantive reductions on other Lea tributaries to meet EFI. Review Cam. AMP10: Additional cessations across Colne and Cam (based on monitoring / evidence). AMP11: Additional reductions on the upper Lea, plus Hiz / Ivel 'if augmentation schemes become non-viable due to policy change or additional information.

River Beane, Herts

Anglian Water	
Environmental ambition & vision	At Anglian Water, our Articles of Association require us to deliver long-term value to our customers and the wider community by proactively seeking positive outcomes for the environment and society. This is summarised in a simple statement, which represents our core purpose: 'Our Purpose is to bring environmental and social prosperity to the region we serve through our commitment to Love Every Drop.' We recognise that all of our abstractions must be environmentally sustainable.
Prioritisation methodology	As part of the National Framework, the Environment Agency initially communicated a series of environmental destination scenarios that indicated the extent to which abstraction would need to be reduced in order to return sufficient water to the environment. Across lower and upper scenarios, each with different objectives, the EA estimated that – for all sectors across the entire East of England – abstraction would need to reduce by 269 Ml/d to 567 Ml/d. WRE's Environment Task and Finish group has undertaken further work on scenarios to refine the objectives so that they align to the national regulatory view of environmental destination, as well as checking abstractions and waterbodies at a local scale to ensure the needs of the environment are accounted for as accurately as possible, albeit within the limitations of the methodology adopted for this round of plans.
Schedule of investigations and reductions specific to chalk sources	We profiled the environmental destinations in our dWRMP24 by prioritising key Water Resource Zones (WRZs) with sources where abstraction reductions have the potential to improve the environment in the parts of our region that include the most sensitive environmental features such as chalk streams. This will realise earlier abstraction reductions in our WRZs in Norfolk, Suffolk and Cambridgeshire. This AMP we will be shaping a series of AMP8 investigations designed to improve our understanding and definition of environmental destination, with the following provisional aims: • Determine the scale of sustainability reductions required to achieve the sustainable abstraction as defined by the environmental destination and Water Framework Directive. • Inform the scale of deficits that will need to be considered for long-term water resources planning, as well as the size and type of strategic solutions required to deliver the environmental destination. It is assumed that decisions relating to the costs and benefits of solutions will be incorporated into WRMP29 (2030-2055). Corresponding to the WRZs referred to above, we aim to shape AMP8 investigations, prioritising high-priority sources in our supply area. The results of these are expected to prioritise the catchments and abstractions most at need, as well as further non-abstraction related activities such as river restoration

River Nar, Norfolk

Cambridge Water	
Environmental ambition & vision	Our draft WRMP includes measures to reduce abstractions in order to improve the environment and meet good ecological status, protect designated sites and chalk rivers.
Prioritisation methodology	We have prioritised our programme of restoration measures on waterbodies where we as a company can make the greatest improvements, initially focussing on brown trout habitat, and guided by advice from the EA on where measures would be most effective, and cost-beneficial. We have included the CaBA recommendations and have also already commenced work on waterbodies where we have established stakeholder engagement.
Schedule of investigations and reductions specific to chalk sources	We are developing a new reservoir in partnership with Anglian so that we can remove abstractions that impact chalk streams, and in the meantime we are exploring catchment and restoration measures to improve and enhance chalk streams and make them more resilient to low flows. An extensive programme will commence in AMP8 and deliver hydro-morphological benefits to chalk streams in our area to help improve them in the short term, as we look to return flows to them in the future. We will shortly complete our investigations into 'no deterioration' of water bodies in our area. Until these can be included in our plans we have taken the EAs licence-capping approach to prevent deterioration. The majority of licence caps will be implemented from 2030-35, and these have been included in our draft WRMP plans. Investigations into abstractions to further improve failing waterbodies – for environmental destination scenarios – will be put forward in AMP8, commencing from 2025. The findings from these will be implemented alongside the regional resource options being progressed, and successfully completed from 2036. By this time we expect in excess of 50Ml/d of water will have been returned to the environment for the benefit of chalk streams. We are already working on collaborative projects to improve a number of chalk streams in our area, and have applied to our financial regulator for funding to start earlier on our AMP8 programme for chalk stream improvements.

River Mel, Cambs

Portsmouth Water	
Environmental ambition & vision	Portsmouth Water's (PW) priorities are: to secure sustainable water supplies for our customers, and to 'protect and enhance our environment in a changing world'; to deliver high-quality, net-zero services; to co-create solutions that deliver customer, community and stakeholder preferences; affordable water for all, always. 100% of PW's supplies comes from chalk sources impacting the Itchen, Meon, Ems and Lavant: 62% from boreholes, 27% from springs and 11% from the River Itchen. PW is very aware of the rarity and fragility of this environment. PW has been working closely with the EA nationally and locally to make sure that we make enough provision in our emerging WRMP to account for both WFD no-deterioration and for environmental ambition. To that end PW's WRMP models abstraction reduction scenarios ranging from circa -20Ml/d to -100Ml/d across our supply zone as a whole. Given that the annual average supply volume to customers is 180Ml/d, this scale of reduction represents a very significant impact.
Prioritisation methodology & Schedule of investigations and reductions specific to chalk sources	PW has yet to determine these reductions on a site by site basis. To get to this level of granularity, PW's WINEP submission for PR24 (and PR29) will include a bid to undertake catchment-based assessments for that purpose, starting with: • 2025-2030 the Meon and Ems catchments; • 2030-35 the Lavant, Bedhampton Springs and Chichester block PW's proposed approach to these assessments is to address the question 'how do we get to GES?' and to look for holistic solutions, rather than a single focus on quantity of water. This will hopefully lead to more sustainable solutions that can be owned by local communities as well as water company interventions. In all WRMP scenarios we will be proposing the almost immediate introduction of universal metering for our customers, to reduce demand and therefore abstraction. Should the more significant range of abstraction reductions be necessary then we will need water-recycling or desalination type options to fill the gap in demand for water. Those solutions are significant in both cost and the permitting requirements and are likely to take significant time to deliver.

River Lavant, Hants

SES Water	
Environmental ambition & vision	In our draft WRMP we have included a range of actions which will protect and enhance the chalk catchments that provide 60% of the water supplies to our customers. We have an ambitious demand management programme, with a planned leakage reduction of over 50% despite currently having one of the lowest levels in the industry, and a reduction in household consumption to below the national framework ambition of 110 litres per person per day, by 2050, both driven in part by a smart metering programme in the first 12 years of the plan. We have also included several catchments in our environmental ambition proposals, including all of the chalk river catchments, so we build our knowledge of the impacts of our abstractions on river flows and identify the optimum measures needed for the rivers to reach good ecological status. We plan to complete these investigations in the next 5-year period so that any sustainability reductions can be planned in from 2030. We also plan to carry out work on building the case for more catchment management and nature-based solutions by taking a holistic view of our surface water catchment, the Upper Eden in Kent, with the potential for the outputs of this work to be applied to the chalk catchment areas.
Prioritisation methodology	We have prioritised our programme based on the methodology produced by our region, Water Resources South East, which was developed by the companies in collaboration with the Environment Agency using the CaBA strategy as an input to this. However all of the relevant chalk catchments in our supply area have been put forward for investigation in the next 5 year period so the additional information has not impacted our approach. In the period before the start of the new plan in 2025, we will be refining our programme so that we start work in those catchments where we can make the most improvements on a cost-effective basis, guided by advice from the Environment Agency local teams and also other stakeholders such as the South East Rivers Trust.
Schedule of investigations and reductions specific to chalk sources	The catchments included for investigation in AMP8 include: • Hogsmill • Wandle • Upper Darent • Eden/Medway (groundwater only). We have already carried out some investigations and schemes in these areas, and therefore the scheduled work will build upon the knowledge gained to date

River Hogsmill, Surrey

South East Water	
Environmental ambition & vision	South East Water's ambition is to ensure that water supplies are plentiful, sustainable and reliable in the long-term, including those from chalk stream catchments. South East Water is the first water company to produce a 25 Year Environment Plan. Through this plan they have committed to: • reducing demand for water by promoting water-efficiency • ensuring their drinking water abstractions do not negatively affect the environment (including chalk streams) • ensuring the balance of water resources is resilient to the hazards posed from current and future climate change (particularly drought and flooding) • working with others in groundwater catchments to ensure land-use supports recharge (protection of groundwater quality and quantity is vital for chalk streams, as chalk aquifers typically provide >70% of the baseflow to chalk streams) • protecting infrastructure that delivers water supply, managing current water stocks and resources sustainably, and understanding/ monitoring the impact of changes to catchment land-use on water supply.
Prioritisation methodology	Our prioritisation methodology for abstraction reductions is based the following criteria (tested through the development of our 25-Year Environment Plan, which reached out to over 500k customers/stakeholders): • where SEW is the main abstractor in the catchment • where sound scientific data/knowledge (evidence) is used to inform the decision-making process • where environmental and ecological benefits are most needed, rather than focusing on 'hot topics' • where the impact is in one of SEW's priority catchments • further development of WINEP24 and dWRMP24 will further engage customer preference and willingness to pay in this area.
Schedule of investigations and reductions specific to chalk sources	Confirmed reductions to specific chalk sources in AMP 7 include: • Greywell (chalk source), close to River Whitewater, Hampshire • Itchel (chalk source), close to the River Hart and Itchel Brook, Hampshire. Through the development of our dWRMP24, SEW is proposing an alternative scenario which includes sustainability reductions based on studies into the impact of abstraction on the environment (including chalk streams, rivers, wetlands, SSSIs, groundwater bodies) and the company ambition to sustainably abstract in a strategic way for greater environmental protection (through the conjunctive use of groundwater and surface water sources, resting of sources where aquifers are susceptible to saline intrusion and reducing abstraction in environmentally sensitive areas at certain times of the year ie. when the environment will benefit the most). Water quality deterioration impacts and potential licence-capping changes are included. Through WINEP24 we will be undertaking a number of investigations to improve our understanding and the definition of environmental destination. Catchments included in this work are: Upper Darent / Coastal Chalk Blocks (Seaford and Eastbourne) / Upper Wey & Candover / River Loddon / River Meon / River Blackwater / North Kent Chalk Blocks. Investigations are planned for the Great Stour where we will be working to establish the conjunctive use of groundwater sources alongside a new winter-flow reservoir at Broad Oak in the same catchment. Our WINEP24 work will determine the scale of any further sustainability reductions required to achieve sustainable abstraction, as well as the size of replacement water resources, if needed, ensuring that we continue to operate in a holistic way, providing sustainable abstraction across our supply area along with wider environmental benefits. Decisions relating to the costs and benefits of solutions will be incorporated into WRMP29. We will aim to shape our WINEP24 programme by prioritising highly critical sources in our supply area.

River Meon, Hants

Southern Water	
Environmental ambition & vision	Southern Water's 'long-term destination scenarios propose significant reductions in chalk groundwater abstractions to support nature recovery, meet environmental flow or other agreed WFD targets'.
Prioritisation methodology	Southern Water has based it's prioritisation process on EA guidance, with scores and weighting accorded to various criteria, including: • designated sites or flagship chalk stream catchment • upstream first • certainty of benefit - local, expert and technical knowledge • % below the current EFI targets and with option to use the CaBA A%R methodology where a discharge (for example sewage) masks the impact of abstraction • population in catchment Scores derived from the above will be attributable to each catchment with scores >7 targeted for reductions in the 2030s or early 2040s, scores 5-7 in the 2040s, scores <5 by 2050.
Schedule of investigations and reductions specific to chalk sources	Chalk streams in the Southern Water regions are targeted for abstraction reduction under all scenarios of environmental ambition, with the highest level of ambition yielding the greatest reductions: Low: • Lower Test: 0 to 5 Ml/d • Upper Test: 5 to 10 Ml/d • Upper Itchen: 5 to 10 Ml/d • Isle of Wight: 5 to 10 Ml/d • North-east Kent: 10 to 20 Ml/d Medium: • Lower Test: 0 to 5 Ml/d • Upper Test: 5 to 10 Ml/d • Upper Itchen: 10 to 20 Ml/d • Isle of Wight: 10 to 20 Ml/d • North-east Kent: 20 to 40 Ml/d High: • Lower Test: 0 to 5 Ml/d • Upper Test: 10 to 20 Ml/d • Upper Itchen: 20 to 40 Ml/d • Lower Itchen: 20 to 40 Ml/d • Isle of Wight: 10 to 20 Ml/d • North-east Kent: 20 to 40 Ml/d

River Dever, Hants

Thames Water	
Environmental ambition & vision	Thames Water's stated environmental vision is: 'to stop groundwater abstraction that has an adverse effect on vulnerable chalk river catchments, where this is supported by our customers'. The scope of TWs environmental ambition and destination for AMP8 and AMP9 is being refined through the PR24 WINEP process.
Prioritisation methodology	Based on Environment Agency guidance and the CaBA chalk strategy, Thames Water is developing an adaptive process towards achieving sustainable abstraction in chalk streams via a weighting / scoring assessment process which considers: • timely restoration of sensitive and vulnerable catchments • headwaters first • focus on catchment- scale and / or regional scale reductions • abstraction sensitivity banding • local knowledge • designation status SAC / SSSI / priority habitat • ecological potential • population in catchment
Schedule of investigations and reductions specific to chalk sources	Schedule of investigations and reductions specific to chalk sources – Scores derived from this process have been used to create a ranking of abstraction sources targeted for sustainability reductions under the three scenarios. Chalk streams and sources with high prioritisation scores include: • North Orpington - Cray (closure committed) • Ogbourne - Og (closure delivered) • Childrey - Letcombe Brook (closure delivered) • Hawridge - Chess (closure committed) • Epsom - Hogsmill (reduction Included in PR24 WINEP) • Bradfield – Pang (closure Included in PR24 WINEP) • Netley Mill – Tillingbourne (reduction Included in PR24 WINEP) • Northern New River Wells (GW sources adjacent to the River Lee) (reduction Included in PR24 WINEP) The following are also in our scenario for closure in the draft WRMP24 but need further investigation: Waddon - Wandle / Bexley – Cray / Marlborough - Kennet / Clatford - Kennet / Pann Mill - Wye / Radnage - Wye / Pangbourne - Pang / New Gauge - Lee / Eynsford - Darent / Horton Kirby - Darent / Lullingstone - Darent In addition to those above where investigations is needed, TW also propose to investigate the following in the WINEP: Sundridge - Darent / Westerham - Darent / Darenth - Darent / Green St Green - Darent / Dartford - Darent / Brantwood Road - Wandle / Hampden Bottom - Misbourne

River Chess, Bucks

Wessex Water	
Environmental ambition & vision	Wessex Water is committed – Chalk stream commitment | Wessex Water – to playing its part in ensuring chalk streams are healthy in terms of flow and water-quality, and in partnership work, to improve a river's geomorphology. Substantial licence reductions have been made including 23.5 Ml/d in the Hampshire Avon catchment by March 2018 and more reductions will be required over the coming years to protect chalk streams.
Prioritisation methodology	Wessex Water has generated low, central and high scenarios for Environmental Destination, which approximately map to Ofwat's low scenario (low), BAU+ scenario (central) and the National Framework's enhanced scenario (high). The Hampshire Avon SAC will be the first focus of our subsequent plans to restore acceptable flows, then the other chalk streams will be prioritised based on scale of determined flow reduction (AMP8 work) and the headwaters first principle.
Schedule of investigations and reductions specific to chalk sources	The adaptive pathways within our water resources management plan show how our plan can adapt to deliver the licence reductions required under all pathways by 2050, which will depend on the outcomes of more detailed WINEP investigations between 2025-2030 (AMP8). This work will help to narrow down uncertainties in the volumes of water required in each catchment, and the right investments required to achieve those volume reductions in abstraction.

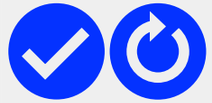
River Piddle, Dorset

Yorkshire Water	
Environmental ambition & vision	Yorkshire hosts England's most northerly chalk streams, and Yorkshire Water is committed to protecting these rare and unique habitats. In addition, we will continue to work with catchment partners to proactivity enhance chalk stream habitats through our biodiversity enhancement programme.
Prioritisation methodology	Yorkshire Water is investigating the sustainability of its abstraction licences in chalk environments through its AMP7 WINEP. These investigations focus on surface water abstraction from West Beck in the upper river Hull, plus groundwater abstraction from in and around the Yorkshire Wolds.
Schedule of investigations and reductions specific to chalk sources	The AMP7 investigations will be completed by 2024 so our adaptive water resources plan makes allowance for the uncertainty in the outcomes of these investigations. Should licence changes be required, these would be delivered through AMP8 (surface water) and AMP9 (groundwater), with all potential reductions realised by 2035. Based on our current understanding we estimate the reductions in abstraction from our chalk sources could range from 0-10Ml/d. We'll have a much greater confidence in this by the end of AMP7 once the chalk system is re-mapped/modelled.

Gypsey Race, Yorks

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quantity 6.	Evidence of stress or damage	Where existing (or future revised) methodologies indicate that abstraction is causing environmental stress or damage the EA should gather evidence: this will require investment in assessment points and monitoring.	Environment Agency	EA statement: the flow compliance assessment for 2022 shows 159 out of 515 (31%) of the water bodies containing chalk rivers have flows which are below the EFI at Q95. Thirty-six of these are in flow compliance Band 3 (7% of the total number), with the greatest deviation from the EFI. Where the cause of impacted flows is public water supply abstraction, the water companies investigate their abstraction impact and propose solutions to address it. These investigations and improvement actions are delivered through the WINEP. To improve our understanding, we would like to develop a national hydroecology monitoring network, with the initial focus on chalk rivers, to better represent and identify the issues caused by groundwater abstraction. In the longer term, the monitoring could be expanded to focus on ephemeral reaches and reaches supported by augmentation from groundwater. As stated, this will require investment in collecting and analysing monitoring data. Through the local chalk plans, we will identify the particular issues within chalk catchments and what specific barriers need to be overcome to deliver improved flows. 

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quantity 7.	Ofwat to review Abstraction Incentive Mechansism	Ofwat should review the Abstraction Incentive Mechanism to ensure that it is fit for purpose and if or how it can be adapted to increase effectiveness.	Ofwat	This review has taken place between Ofwat and a number of expert consultees. It was concluded that whilst AIM is a very useful scheme for mitigating abstraction pressure from surface water abstractions and rain-fed systems, it isn't well suited to managing the impact of chalk stream groundwater abstraction. Whilst AIM purports to reduce abstraction pressure at times of stress, the timing and trigger points of the generally small reductions make very little actual difference to flows. The EA endorsed this view. In response to Ofwat's discussion document 'PR24 and beyond: performance commitments for future price reviews' the EA told Ofwat that it does not support the proposed ODI relating to AIM because its environmental benefits are unclear. It said that 'Experience with abstraction reduction in sensitive systems such as chalk streams tells us that switching abstractions off completely is likely to be far more effective than making large percentage abstraction reductions; thus, the benefit of small abstraction reductions is questionable'. Ofwat has written to the CaBA CSRG: 'We have concluded that attempting to drive improvements through AIM may not be the most appropriate use of our collective resources and therefore may not be the most effective way of benefitting the environment. While no decision has yet been made on the PCs for PR24, we think that the requirement for companies to have AIM sites could be removed while encouraging companies to use AIM where there is a need to do so. This could be based on a reputational agreement between stakeholders rather than financial incentives, given the lack of clear evidence on benefits and no easy way of gathering this evidence. If AIM was used reputationally, as part of an agreement with stakeholders, it would allow it to be revisited more often than it is possible within the current mechanism; for example, if data demonstrated that levels were set inappropriately, or it needed to keep pace with changes in abstraction licensing.'  **CaBA CSRG notes:** the second part of the recommendation referred to the potential for adapting the AIM concept. AIM was designed to incentivise the relocation or reduction of abstraction pressure at times of low flows, but chalk systems surface flows respond quite slowly to changes in groundwater abstraction. However, variations on the AIM concept are viable, with incentives based on reputation or economics. For example, with stakeholder engagement AIM could be used to incentivise the permanent relocation of abstraction pressure to less impactful parts of the catchment, along the lines currently being explored by the EA and Affinity Water in the Colne catchment (see p.14 and p.29). And of course, surface flows do respond directly to changes in surface water abstraction.

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quantity 8.	Demand management / chalk regions defined as water stressed	All areas dependent on water-resource supply from chalk aquifer groundwater abstraction should be defined as Water-Stressed, enabling compulsory metering. Water companies should set and publish time-bound goals to achieve complete water-meter coverage in these areas. Joined-up action should be taken to influence customer behaviour to reduce demand for water, including education, labelling of goods and building regulations. A related call to drive water-efficiency standards is included in integrated policy recommendations for action section 7.4	Defra Water companies	Since publication of the CaBA chalk strategy Defra has accepted the Environment Agency recommendations to extend the water-stressed designations to cover ALL chalk catchments. Water companies should now consider compulsory metering in these areas, especially in catchments which have been highlighted as being above the CaBA A10%R target (see notes and link to A%R review below) **Defra statement:** The updated Water Stress Assessment produced by the Environment Agency covers all areas of chalk abstraction. Water companies in seriously water stressed areas may implement wider water metering programmes where it is shown within their Water Resources Management Plans (WRMP's) that there is customer support and it is cost effective to do so. Our guiding principles for the 2019 round of companies' WRMP's stated that government expect water companies to increase metering where appropriate. All water companies must evaluate the options they have for increasing metering, and the case for managing demand for water and leakage. In September 2022, the government launched its consultation on mandatory water efficiency labelling, which outline's the government's current position on mandatory water efficiency labelling policy. In September 2022 Defra Minister sent a letter to Local Authority CEOs on water efficiency in new homes yesterday, asking them to consider where appropriate, to require the optional 110 l/p/d efficiency standard for all new build projects.  **CaBA CSRG notes:** it has been pointed out that anomalies remain. The way that Defra/EA currently define areas of water stress – at least for public water supply – is not by catchment, but by Water Resource Zones (WRZs), used for water resource management planning. WRZs can often straddle multiple catchments; including chalk to non-chalk. In Yorkshire there are only two WRZs across the whole region – the Grid zone which includes about 99% of customers, and the East zone which includes Whitby and surrounding villages. As the Grid WRZ is currently not considered to be water stressed, Yorkshire Water cannot implement compulsory metering in any part of the zone, including where there are chalk streams. Thus at present, even if the Hull Headwaters is considered water stressed purely on the basis of it being a chalk stream (regardless of the actual water resources position), Yorkshire Water would not be able to implement compulsory metering. **CaBA CSRG recommends that these anomalies are investigated / resolved quickly, since all parties agree that demand management is a key component of water resource and environmental management.**

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quantity 9.	Flagship flow recovery in the Chilterns	Government, regulators and industry should set a short-term goal to achieve sustainable abstraction in the chalk tributaries of the Colne and Lea catchments, where a technical solution is available within a shorter time-frame because of existing infrastructure plans, as set out in the *Chalk Streams First* proposal. This scheme has the potential to re-naturalise flows in the chalk streams most acutely impacted by groundwater abstraction, representing 20% of the chalk-stream waterbodies where flow does not support good ecological status.	Water Resources South East Ofwat RAPID Water companies	**Affinity Water and Chalk Streams First** Over the past year Affinity Water (AW) has been working with the Chalk Streams First coalition to develop and include the CSF proposal for 'using the flow benefits derived from abstraction reduction'. Thus far there is: a) agreement that flow recovery benefits could be appreciable. b) AW states that flow-recovery 'benefits prior to the first SRO (GUC transfer or Thames Re-use with eastern T2AT in 2032) are small <5Ml/d from the reductions scheduled in AMP8'. This is because without the support of a transfer scheme the CSF concept relies on Thames Water storage when the limiting component is the chalk stream flow recovery in the Q80 - Q100 range. b) a range of views about % of flow recovery in this range, with CSF undertaking some independent analysis. d) Putting all the above aside, whatever the actual % flow recovery, T2AT and Connect 2050 will pick up and make use of the DO gained from surface flows as a result of abstraction reduction. Additional ideas: e) licence relocation is an additional short-term option which AW and CSF agree could be very useful. It is a direct application of the CSF concept, is cost-efficient and gives a 1:1 replacement. Environmental impact must be considered, but flows in the main river will also benefit from upstream reductions. f) a modular (50 to 100 Ml/d) application of the GUC transfer could also provide a relatively timely and cost-efficient replacement of chalk abstraction reductions, making the precise % flow recovery less critical, with any flow recovery a net DO gain.  **CaBA CSRG notes:** the idea is being investigated seriously, which is encouraging. Chalk Streams First remains a golden opportunity to place an iconic ecological restoration project at the heart of the development of a more sustainable way to abstract water and therefore CaBA CSRG would welcome high-level political endorsement / facilitation of this unique opportunity.

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quantity 10.	Independent review of A%R	CaBA CSRG recommends extending to all chalk streams the preliminary independent review of abstraction as a % of catchment recharge (A%R) for chalk streams in order to a) understand the scale of groundwater abstraction in chalk-stream catchments and b) to investigate A%R as a simple and accessible method for independent assessment of abstraction impact and prioritising action.	CaBA CSRG	This review has now been completed on behalf of Defra and the CaBA CSRG and is available HERE: (Thanks are due to John Lawson for the time and care he invested in this review.). 

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quantity 11.	Modelling and knowledge sharing	While A%R is a simple and accessible screening tool, CaBA CSRG also recognises the need for detailed models of run-off, aquifer recharge, groundwater levels and river flows as other components of the suite of tools and data that will support decision-making on chalk-stream restoration interventions. To include stakeholders in the discussion and decision-making, a participatory approach to modelling and data-sharing should be adopted.	Water companies Environment Agency CaBA CSRG Chalk Streams First	Through 2021 and 2022 members of the CaBA CSRG have commissioned a number of independent reports into aspects of abstraction impacts and proposals for abstraction reduction: • Abstraction as a % of recharge was commissioned by Defra • Review of impacts of groundwater abstraction on the chalk streams of the Colne and Lea valleys was commissioned by Chalk Streams First (yet to be published) • In addition the river group RevIvel has commissioned an investigation into abstraction impacts around Baldock and the River Ivel (yet to be published) • The original Chalk Streams First proposal was published tin 2020. These reports have been shared with water companies and the Environment Agency and a number of meetings have taken place: between Chalk Streams First, Affinity Water and Ofwat / Rapid and between Revivel, the Environment Agency, Affinity and Anglian Water Most recently CaBA CSRG convened a workshop (27.10.22), hosted by Affinity Water, involving academics and professional specialists in hydrogeology, geology, water resources and modelling. The workshop was chaired by CaBA CSRG and co-chaired by Professor Adrian Butler (Imperial) and Dr John Bloomfield (BGS). Notes from that workshop will be published as soon as they have been collated. **EA statement:** The Environment Agency has shared, via the CSRG, a report describing the approaches that are used to assess sustainability of chalk catchments: • Hydrological approaches to assessing sustainable abstraction in chalk streams). We will prepare a summary report of our recent groundwater modelling work and have started a data project with the aim of making information on abstraction, rainfall etc. more accessible to better describe the issues in chalk catchments. The EA has produced a Recharge Potential map showing where there may be opportunities for providing water resources benefit from using Nature Based solutions to increase recharge potential. Areas of potential historic pollution are identified by the Consultation Zones layer. Areas identified within Consultation Zones will require additional consultation with local experts and regulators before any work commences. • Water Resources Recharge Potential and Consultation zone mapping (arcgis.com) 

Water quality: tackling pollution

River Chess, Bucks

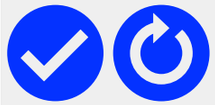
Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quality 1.	Sewage-treatment works that do not strip phosphorus	CaBA CSRG recommends the EA reviews the status the sewage-treatment works on all chalk-stream waterbodies that are at poor, moderate or bad status for phosphorus, and prioritises and timetables remediation via WINEP. Tighter phosphorus limits should be considered for designated priority habitat.	Environment Agency Water companies Ofwat	**EA statement:** the investment required to deliver this recommendation will come through the water company price review process. It is too early to determine what measures have been proposed in the Water Industry National Environment Programme (WINEP) for PR24. However, PR24 WINEP guidance for biodiversity addresses the need to deliver actions to respond to risks and issues for biodiversity related to water company operations, including pressures that are impacting biodiversity. This includes actions that address threats to chalk streams, such as phosphorus from sewage treatment works contributing to less than good ecological status. We will update the CSRS Implementation Plan as this information becomes available. For chalk streams that are designated as Sites of Special Scientific Interest (SSSI) or Special Areas of Conservation (SAC) additional WINEP drivers also apply. And new rules announced by Defra in July 2022, applying to SACs, seek to place a legal duty on water companies in England to upgrade wastewater treatment works in 'nutrient neutrality' areas to the highest achievable technological levels by 2030. A new Nutrient Mitigation Scheme established by Natural England also applies in nutrient neutrality areas. These schemes will help wildlife and allow local planning authorities to grant planning permission for new developments in areas with nutrient pollution issues. 
Water Quality 2.	Integrated constructed wetlands	Notwithstanding changes to CBA (See Action2 under integrated recommendations) CaBA CSRG endorses the use of integrated constructed wetlands (ICW) at small, remote works where conventional treatment is too difficult or expensive and of catchment-scale nutrient-reduction strategies so that the benefits afforded by nature-based solutions (such as ICWs) can be maximised whilst ensuring that ecological targets are met using STW upgrades where necessary.	Environment Agency Water companies	**EA statement:** the Environment Agency has approved and will shortly publish a Regulatory Position Statement (RPS) - operating wetlands for improving effluent quality from wastewater treatment works. This RPS sets out the EA's enforcement position for operating wetlands that improve final effluent from Water and Sewerage Company (WaSC) wastewater treatment works. This RPS applies to Nutrient Treatment Wetlands (NTWs) constructed and operated by third-parties, outside water and sewerage company (WaSC) land. There is a separate process for NTWs constructed by WaSCs on their own land. The purpose and function of NTWs is analogous to Integrated Constructed Wetlands (ICWs). An NTW must provide additional treatment to improve the final effluent discharged from WaSC wastewater treatment works (WwTW). The intention of this RPS is to facilitate construction of these wetlands, so long as the proposed wetlands comply with the conditions of the RPS. Further work is needed to understand where, on chalk streams, ICWs might be the most effective and cost-effective approach to improving water quality in small, remote, yet still consequential STWs. 

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quality 3.	Waterbody boundaries and assessment points	CaBA CSRG recommends the EA reviews the status the sewage-treatment works on all chalk-stream waterbodies that are at poor, moderate or bad status for phosphorus, and prioritises and timetables remediation via WINEP. Tighter phosphorus limits should be considered for designated priority habitat.	Environment Agency	**EA statement:** Using the mapping of chalk rivers produced by Natural England, we have created a list of every single WFD river water-body which includes a reach of chalk stream or chalk river. The waterbodies have been defined as high and low certainty: denoting the level of certainty over their status as containing chalk streams (see CaBA strategy for definitions and types of chalk stream influenced by geology, surface deposits, gradient, base flow etc.). Where a waterbody contains any length of a 'high certainty' reach then it will be used in our assessments and reporting of the status of chalk rivers. There are a total of 515 waterbodies which contain a reach of chalk river. Of these 303 are defined as high certainty. We still acknowledge that there are chalk rivers outside of these 'high certainty' reaches which may have abstraction and flow issues that need resolving but our focus will mainly be on waterbodies with 'high certainty' reaches. We will review the high/low certainty water body list with local knowledge and provide feedback to Natural England's mapping project. Proposals for changes to waterbody boundaries will next be considered in early 2024, ahead of updated classification results for River Basin Management Plans. We will work with partners to identify proposals. The decision to progress a proposed change to a waterbody boundary has to be taken on a case by case basis, taking into account the benefits and impacts of doing so. Changes will be prioritised where waterbody boundaries are impeding delivery of outcomes – including but not limited to outcomes in the chalk restoration strategy. We will be transparent in our decision making. 

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quality 4.	Storm overflows	CaBA CSRG recommends all necessary actions be taken to achieve significant reductions in the frequency and volume of overflows to chalk streams to ensure they are adequately protected from ecological harm and that their iconic status be recognised, including adoption of the findings of the storm overflow taskforce	Defra Environment Agency Water companies	The government published the Environment Act in November 2021 and Storm Overflow Discharge Reduction Plan in August 2022. The Environment Act placed a legally binding duty on water companies to progressively reduce the adverse impacts of discharges from storm overflows. This duty now stands in addition to those in: • the Water Industry Act 1991 'to further the conservation and enhancement of natural beauty and the conservation of flora, fauna' and to 'take into account' the effect of sewage processing 'on the beauty or amenity of any rural or urban area or on any such flora, fauna etc'. • and those in the Urban Wastewater Treatment Directive 1994 to secure 'the limitation of pollution of receiving waters due to storm water overflows' via measures such as 'dilution rates or capacity in relation to dry weather flow, or ... acceptable number of overflows per year' specifically from sewage treatment works over a given size, discharging to SAe catchments. The Storm Overflow Discharge Reduction Plan sets targets for the water industry on investment and delivery: • by 2035, water companies will have improved all overflows discharging into or near every designated bathing water; and improved 75% of overflows discharging to high priority sites (with an interim 2030 target of 38%) • by 2050, no storm overflows will be permitted to operate outside of unusually heavy rainfall or to cause any adverse ecological harm. • by 2050 no storm overflow will be permitted to spill above an average of 10 rainfall events per year (a rainfall event is deemed to last a maximum of 12 hours) As recommended in the 2021 strategy Chalk streams are now designated as 'high priority sites' along with Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SAC), Urban Wastewater Treatment Regulations sensitive areas. By the end of 2023 there will be 100% coverage of event duration monitoring and water companies must make ALL data on the frequency and duration of all storm overflows available to the public by 2025 Under section 82 of the Environment Act 2021, water companies must monitor the water quality impact of their assets that discharge sewage, including storm overflows and continuous discharges from wastewater treatment works. The Act requires the water industry to measure the water quality both up and downstream of these assets. This monitoring framework will give clear evidence to the public on whether improvement schemes are achieving the required outcomes, and where further upgrades may be required. 

Recommendation number:	Recommendation heading	Action / commitment
Water Quality 4.	Storm overflows continued …	**Defra statement:** In August 2022, the Government launched the most ambitious plan to reduce sewage discharges from storm overflows in water company history. Our new strict targets will see the toughest ever crack down on sewage spills and will require water companies to secure the largest infrastructure programme in water company history - £56 billion capital investment over 25 years. Our Plan will protect biodiversity, the ecology of our rivers and seas, and the public health of our water users for generations to come. Our plan sets ground-breaking and ambitious targets for water companies to eliminate all ecological harm and protect public health from storm overflows for the first time ever. Under the plans announced, water companies will have to achieve targets which will mean discharges can only happen if there is unusually heavy rain, and if there is no immediate adverse impact to the local environment. By 2035, water companies will have to improve all storm overflows discharging into or near every designated bathing water; and improve 75% of overflows discharging to high priority nature sites; By 2050, this will apply to all remaining storm overflows covered by our targets, regardless of location. Chalk streams are included in the high priority nature sites.

Recommendation number:	Recommendation heading	Action / commitment
Water Quality 4.	Storm overflows continued …	**Further recommendations from CaBA CSRG** **Prioritising according to ecological impact, size of stream, and with upstream / headwater weighting.** While some have been disappointed at the proposed pace of change, The Storm Overflow Reduction Plan does set out out legally binding and time-bound targets in a way that will hopefully prove to be more measurable and enforceable than the prior legislation. It is also very encouraging to see that chalk streams have been classified as high priority sites. To achieve the greatest and most cost-effective ecological improvements it will now be important to begin a transparent process of quantifying the relative ecological impacts of stormwater overflows at each site where they occur on chalk streams and defining / prioritising the improvements to '75% of overflows by 2035' according to the ecological severity of these impacts. This will help avoid the obvious pitfall of prioritising the improvement of sites based solely on the number of spills or ease / cost of improvement, which could potentially deliver limited ecological improvements in the high priority sites, and/or limited ecological improvements relative to the expenditure. Assuming the 75% figure refers to the overall number of spills with each spill defined by a 12-hour time-limit, the quantification process should take account of the length and ecological condition / potential of the stream d'stream of the discharge point, as well as the size of the stream and average flow, with a weighting given to upstream spills and volume of spills relative to the average flow. This is because a single 12-hour spill into a small headwater stream (the Upper Shreen or Chess for example) may well cause more ecological damage than the same spill or even a larger one, or a greater number, into the lower reaches of a large river (the lower Colne, for example). Note: prioritising according to human health and bathing water impacts may give a different weighting. It will be important to have an agreed methodology for resolving differences where they vie with each other.

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quality 5.	Groundwater ingress at small works	CaBA CSRG recommends an investigation of the practicability of using ICWs as a cost-effective measure to mitigate the impacts of storm overflows caused by groundwater ingress into the sewer network. With a view to the limitations of ICWs ref size of works and spatial area of available land, this is likely to relate to smaller works in rural settings.	Water companies Environment Agency	Section 2.5 of the Storm Overflows Discharge Reduction Plan under the heading "Driving better solutions" gives a specific endorsement of green infrastructure approaches to addressing storm overflows, where appropriate. Sub-heading 6 reads: '**We expect water companies to prioritise a natural capital approach, considering carbon reduction and biodiversity net gain, as well as catchment-level and nature-based solutions in their planning … / … Green infrastructure and other nature-based solutions are an effective option to reduce the harm caused by storm overflows** and can provide multiple co-benefits for the environment and society. For example, separating surface water so that it doesn't mix with sewage and is diverted to water gardens or wetlands improves water quality, creates new habitats for species and acts as a carbon sink … / … **The Environment Agency and Ofwat will actively encourage companies to consider green infrastructure in their proposals to achieve the targets set out in this plan**, and wider government priorities set out in the Government's Strategic Policy Statement to Ofwat … / … We are aware that green infrastructure enhancements often have longer delivery timelines than traditional concrete solutions and may therefore be seen as riskier investments by water companies. For that reason, the Environment Agency and Ofwat will work to ensure assessment processes promote and incentivise the use of nature-based solution in favour of more carbon intensive alternatives … / To promote sustainable solutions, green infrastructure projects started before 2027 and delivered as quickly as possible will count towards completion of the targets, subject to review. This will be the case even when the full environmental impact of these projects has not yet been realised by the target end date.' Further recommendations from the CaBA CSRG CaBA CSRG welcomes the strong endorsement of green infrastructure options for reducing harm from stormwater discharges. Context is important: CaBA continues to recommend an investigation of the potential of ICWs and of the site-appropriate considerations as expressed in the CaBA strategy: • size of works relative to spatial area of available land • size of receiving watercourse • relative remoteness of works and limitation of conventional P-stripping options • predominant type of stormwater discharge (green infrastructure may be best suited to the groundwater ingress type of overflow as cited in the Hanging Langford case study p.75. of the CaBA chalk stream restoration strategy.) 

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quality 6.	Septic tank hot-spots	CaBA CSRG recommends a review of SAGIS and / or a programme of research to identify septic tank 'hot-spots' in chalk stream catchments and based on evidence of harm a pilot trial of monitoring and policing poor septic tank performance.	Environment Agency Defra	**EA statement:** records of locations of septic tanks are scarce and limited in their coverage, so the EA has used nationally available data to help identify where potential sources of additional phosphorus are most likely to be coming from. Using detailed spatial data of domestic properties, cross referenced to digitised sewer networks and a number of simple assumptions, the EA is now able to estimate the annual load that is mostly likely due to septic tanks, and other small, non-consented 'point sources'. By integrating this new data alongside more established estimates of agricultural and sewage-treatment sources of phosphorus, the EA is able to place this 'additional diffuse point source' into the context of overall catchment water quality. If resources allow, the next steps will be to look at this data for chalk catchments to identify potential septic tank hotspots and determine whether targeting septic tanks is a feasible and effective way of reducing phosphorus in chalk streams. 
Water Quality 7.	Septic tank point of sale	CaBA CSRG recommends a law that requires homeowners at point of sale to register and bring septic tanks up to standard.	Defra	**EA statement:** the Agency is working with DEFRA on proposals for a package of regulatory changes for small sewage discharges (SSDs). Our proposals include the introduction of a registration system for low and medium risk discharges and the retention of permitting for discharges in high risk or sensitive locations. These proposals require legislative change (EPR Regs) and changes to the charging scheme. The proposals need to secure political support and the development and implementation of change will require DEFRA and Agency resources. **Defra statement:** Defra is currently reviewing options for reducing pollution from small sewage discharges. The proposed register is one of the options we are looking at. 

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quality 8.	Farming rules for chalk streams	CaBA CSRG recommends that the compulsory rules for farming in chalk stream catchments set out in section 5.9.3 be adopted into the new Sustainable Farming Incentive (SFI).	Defra	**Defra statement:** Defra issued statutory guidance to the Environment Agency in March 2022 with regards to applying the Farming Rules for Water. The guidance outlines the criteria the Agency should consider when deeming if enforcement action is appropriate or not. It regards the broad application of the regulations and does not refer directly to any protected sites or habitat features (aside from farm soil types). Defra continues to keep our agricultural pollution prevention regulations under review to ensure they are fit for purpose in achieving our priorities.  **Landscape Recovery** will facilitate large-scale projects through bespoke, long-term agreements. These projects will be selected in rounds, which will involve a competitive application process. On Friday 2 September, Defra confirmed the 22 projects selected for the first round of Landscape Recovery. All of the successful initiatives have demonstrated that they have pioneering ideas that will improve the rural landscape and reverse the decline in nature. These projects will be awarded a share of around £12 million in development grants to help them finalise their delivery plans over the next two years. We aim to support them to complete their development phase as soon as possible and start implementation on the ground. We are very pleased that seven of these projects are located in **chalk catchments**, as it represents an opportunity to support the restoration of these priority habitats at scale. Defra is currently developing the content for the future land management schemes including identifying what actions can be incentivised to deliver environmental outcomes. As part of this Defra is actively exploring actions which will protect chalk stream environments and their catchments. 
Water Quality 9.	Farming incentives for chalk streams	CaBA CSRG recommends that new ELM incentive schemes beyond SFI be structured so as to enable changes to habitat restoration at the catchment scale, taking critical land areas out of production, prioritising the restoration of headwater, spring-line fens and flushes, riparian zones and large tracts of floodplain.		

Recommendation number:	Recommendation heading	Action / commitment
Water Quality 8 & 9.	Farming rules for chalk streams cont …	The CaBA CSRG has been invited to join the Future Farming and Countryside Planning (FFCP) stakeholder working group developing the offers within Sustainable Farm Incentive and Local / Landscape Nature Recovery (SFI and LNR). CSRG has independently organised farmer and land-manager meetings in Norfolk, the Chilterns and Wessex to discuss and develop the CaBA strategy's recommendations for 'farming rules in chalk landscapes'. Notes from these meetings and a revised set of recommendations – summarised below – will be submitted by CaBA CSRG to Defra. **CSRG** encourages catchment partnerships, rivers trusts and the flagship project steering groups to consider working with land-managers to trial the package of ideas summarised in the table, especially at the basic level of farm run-off risk mapping and sediment pathway attenuation, delivered with the help of chalk-catchment farm advisors. NOTES: • in spite of the inclusion of CaBA CSRG in the FFCP stakeholder advisory group, there is no guarantee that these ideas will be adopted by Defra. CaBA CSRG will continue to engage with the farming community to develop these ideas and provide useful feedback to the regulators. • discussions have often returned to the need for chalk stream farming advisors to work with farmers on everything from the run-off risk mapping to the development of restoration ideas / opportunities. This could be piloted via the CaBA flagship restoration projects, and funded by water companies via the rivers trust network? • it was recognised that for proposals to have greatest impact they must be widely taken up across catchments. Collaboration was a common theme, and farm clusters were identified as a potential mechanism to drive collaboration and engagement. A suggestion was put forward that payments for carrying out the proposed actions could attract a premium if they were obtained via a cluster group or similar (or standalone) initiative.

Recommendation.	Details	Covered under ?
For ALL farms (within and without SFI ie. minimum standards) in chalk catchments:		
Basic farm-based run-off audit and risk map	**Identified and unanimously endorsed as the basis for all of the following recommendations:** a run-off risk map / audit focusing on topography, soil types and sediment transport pathways from field through gates and along tracks and ditches to stream	
Buffers at identified high-risk points and areas	Buffer strips – location and width based on the scale of risk assessed in the audit – designed to minimise escape of sediment on to transport pathways (tracks, roads and ditches) that lead to a chalk stream. Min 5m width at high risk points.	
For Sustainable Farming Incentive (SFI):		
Higher-level run-off audit and risk map	Run-off audit to include correlation of risk to land-use, every X years	
Buffers for high-risk farming	Potentially higher impact farming such as outdoor pigs, carrots, parsnips, beet, maize, asparagus and potatoes: a buffer around the perimeter of the field, wider (up to 20m) at high-risk egress points and field edges, with the areas of greater width potentially offset by a commensurate reduction along the lower-risk boundaries.	CS: SW1, SW4, SW5, SW8, SW11; LNR
Buffers for lower-risk farming	Buffers of 5m along any field edge which connects directly, or indirectly (via ditches) to a stream course. Buffers must preclude fertilisers, manures, pesticides, livestock.	CS: SW1, SW4; LNR
Cover crops & topography	Maize should be grown with an accompanying cover-crop, especially on sloped land.	
	SFI tiers for % cover crop (50% and 75%) should prioritise higher-risk farming: ie. recommend cover crops over ALL infield high-risk areas and / or based on levels of risk as well as % of coverage.	CS: SW5, SW6 and others
	For outdoor pig units, a grass ley should be established before pigs are turned onto the land. Pig units should not be sited on steeply sloped fields or where the topography might increase the risk of direct or indirect run-off to a chalk stream.	
Gateways and crop-pads	Noting that later versions of SFI will include capital grants – strongly recommend capital support for the relocation of gateways and crop-pads from high-risk to low-risk locations, as identified in the audit.	CS: RP2, RP15.
Cultivation patterns and slope	Cultivation patterns should minimise run-off from the infield high-risk areas as identified in the audit: for example, where the shorter tractor run is perpendicular to slope and it is therefore easier and cheaper to cultivate in-line with slope, a minimum width of the downhill edge should be left, or cultivated across the slope.	

Recommendation.	Details	Covered under ?
SFI cont…		
Muck and slurry spreading	Noting that slurry is often spread in wet weather, in spite of guidelines (because when slurry tanks are full they must be emptied), recommend minimum slurry storage **over-capacity** per head of livestock, supported by capital grants.	
	Muck and slurry should not be spread on highest-risk land as identified in the audit, including within 10m of any field margin connected to a sediment transport pathway, as well as any riparian margin.	
Local and Landscape Nature Recovery (LNR):		
Infield:	• cover crops 75 - 100%	CS: SW5, SW6 and others
	• zero or minimal till 75 - 100%	Potential advance arable soils standards ’23
	• infield grass buffer strips running perpendicular to slope	
	• green swales runnings through field dips	CS: SW3, RP11; LNR
	• restoration of hedges, especially those running perpendicular to slope	CS: BN5, BN6, BN7, BN11; LNR
	• restoration of woodland	
	• restoration of ponds	CS: RP7; LNR
Riparian and in-river:	• restoration of lateral connectivity between the chalk stream and floodplain designed to allow riparian & floodplain inundation above Q10 flows (for example): this should be achieved by restoring natural river bed to floodplain ratios (ie by infilling dredged stream beds) and NOT by impounding the stream	
	• restoration or recreation of lost or relic meanders patterns	
	• restoration of spring-line calcareous fens and flushes including infilling or blocking historic drainage and ditching networks	
	• restoration of wet woodland and riparian meadow by stepping back farming – except extensive grazing by suitable livestock – from the edge of stream	

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Water Quality 10.	Highways	Roads are the primary pathway of sediment to chalk streams from their catchments and therefore roadside drainage grips should not feed directly into chalk streams or unplugged drains which feed into chalk streams. Highways Agency standard practice for construction / maintenance of roadside grips that discharge run-off to chalk streams must either: discharge to plugged ditches or to settlement areas.	Highways Agency Local highways authorities	
Water Quality 11.	Aquaculture	EA to work with relevant trade associations to provide updated technical guidance notes for cress and fish farming and also to review permitting approach.	Environment Agency	**EA statement:** The Environment Agency is keen to explore the aquaculture trade association's (fish farms and watercress) readiness for working together to produce updated guidance for the sector, as their engagement will be key to a successful outcome. The Environment Agency is currently recruiting for additional resource in the team that will lead this work area and will consider its priorities with the intention to engage with the sector in 2023. This will be an opportunity to gauge what can be achieved, if updates are feasible, and how best to produce these. A review of the permitting approach will be informed by any updated guidance. 

Physical habitat: restoring process

River Nar, Norfolk

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Physical Habitat 1.	Principles of chalk stream restoration	CaBA CSRG endorses the key foundations and principles of chalk stream restoration set out in Section 6.6 and 6.6.1 agreeing that the chalk stream restoration, should be a restoration of that which **catalyses process**: the **natural gradient** of the river, an **intact river bed**, a **dynamic interconnection between the river and the floodplain**, and through all the above the restoration of the **ecological processes** and the habitat requirements of the ecosystem engineers (fish, insects, mammals and plants) that shape a truly heterogenous and dynamic habitat.	CaBA CSRG	**Members of the CaBA CSRG, including the Rivers Trusts, Wildlife Trusts, Wild Trout Trust, Wild Fish Conservation and River Restoration Centre, have endorsed a statement of 'principles for chalk stream restoration' (see following page) intended to help guide physical restoration investigations, proposals, projects and monitoring.**  With thanks to Professor David Sear (University of Southampton) and Martin Janes (The River Restoration Centre) for their assistance and expertise.

CaBA chalk stream restoration group: principles of chalk stream restoration.

Formation & lost processes:

Chalk streams and their floodplains were shaped by processes active during past glacial periods which have long since ceased to operate in the landscape.

Pressures & modifications:

The common chalk-stream modifications – mills and other impoundments, channelisation, dredging & drainage management etc. – have radically altered the natural physical condition of chalk streams (e.g., by altering slope or reducing flow) and thus disabled their eco-hydrological processes (e.g., plant community structure, salmonid spawning, floodplain groundwater table, river and floodplain connectivity).

Self-repair:

Once damaged or modified, most chalk streams lack the stream power and gravel production for self-repair. As a result, chalk streams are highly dependent (especially compared to higher-energy streams) on the ecological processes that can help self-repair and restore good ecological health – this is where it is critical to understand that restoring chalk stream processes often differs from other stream/river types.

Ecosystem engineers:

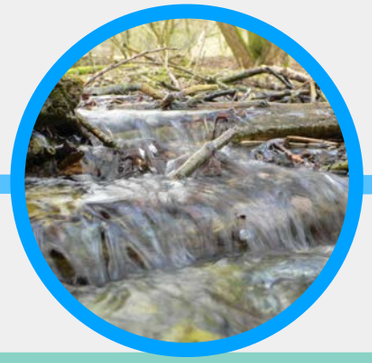
Chalk streams greatly depend on the work of the stream's ecological engineers: these are, for example, plants like ranunculus which interact with flow to create a mosaic of scour and trapped sediment, or fallen trees which create habitat complexity, or healthy populations of organisms that alter the bed and bank sediments through their actions (e.g. salmonid spawning, crayfish movement, or invertebrate net spinning). These plant and animal 'ecosystem engineers' are a vital part of chalk stream and floodplain functionality.

Sustainable restoration:

Sustainable and effective restoration of chalk streams (both physically and ecologically) therefore demands approaches which look beyond the stream itself, to restore natural processes, and target the habitat requirements of the ecosystem engineers (fish, insects, mammals and plants) that shape a truly heterogenous and dynamic habitat: see the following page.

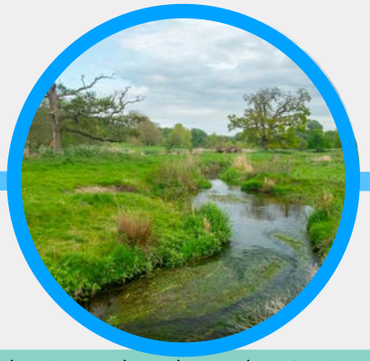
Sustainable chalk stream restoration will also deliver ecosystem services that mitigate climate change, deliver natural flood storage and result in biodiversity gain, ideally on a landscape /catchment scale.

Principles of chalk-stream restoration

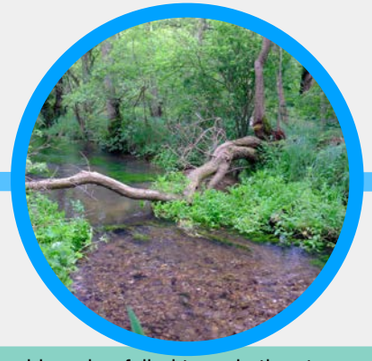


at the catchment scale, restore natural flow regimes, reduce fine sediment & nutrient runoff from the land, and the impacts from sewage works

restore the gravel stream-bed, using material similar to that found in local intact river beds (avoid using graded and outsized material)

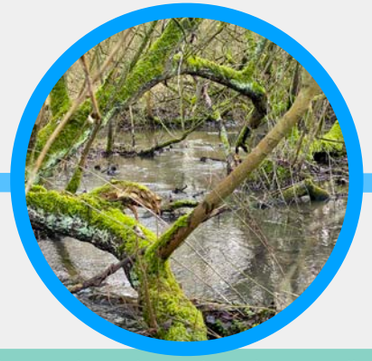


restore the stream slope, bypassing structures like mills, mill channels and estate lakes or by removing weirs and other impoundments

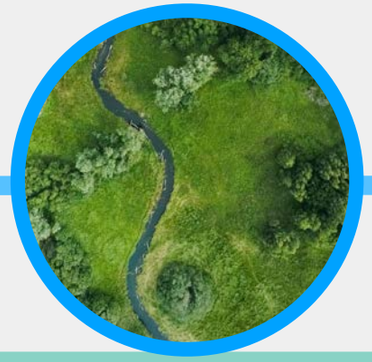


use fallen, hinged or felled trees in the stream channel to increase habitat variety / complexity and to drive river processes and gravel supply

restore a dynamic interaction between the stream and its floodplain, with a natural bed-to-width ratio and a naturally varied bank profile



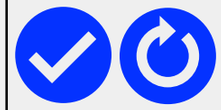
restore former channels, pools and surrounding wetlands: re-saturate the floodplain where possible and attenuate headwater drainage systems



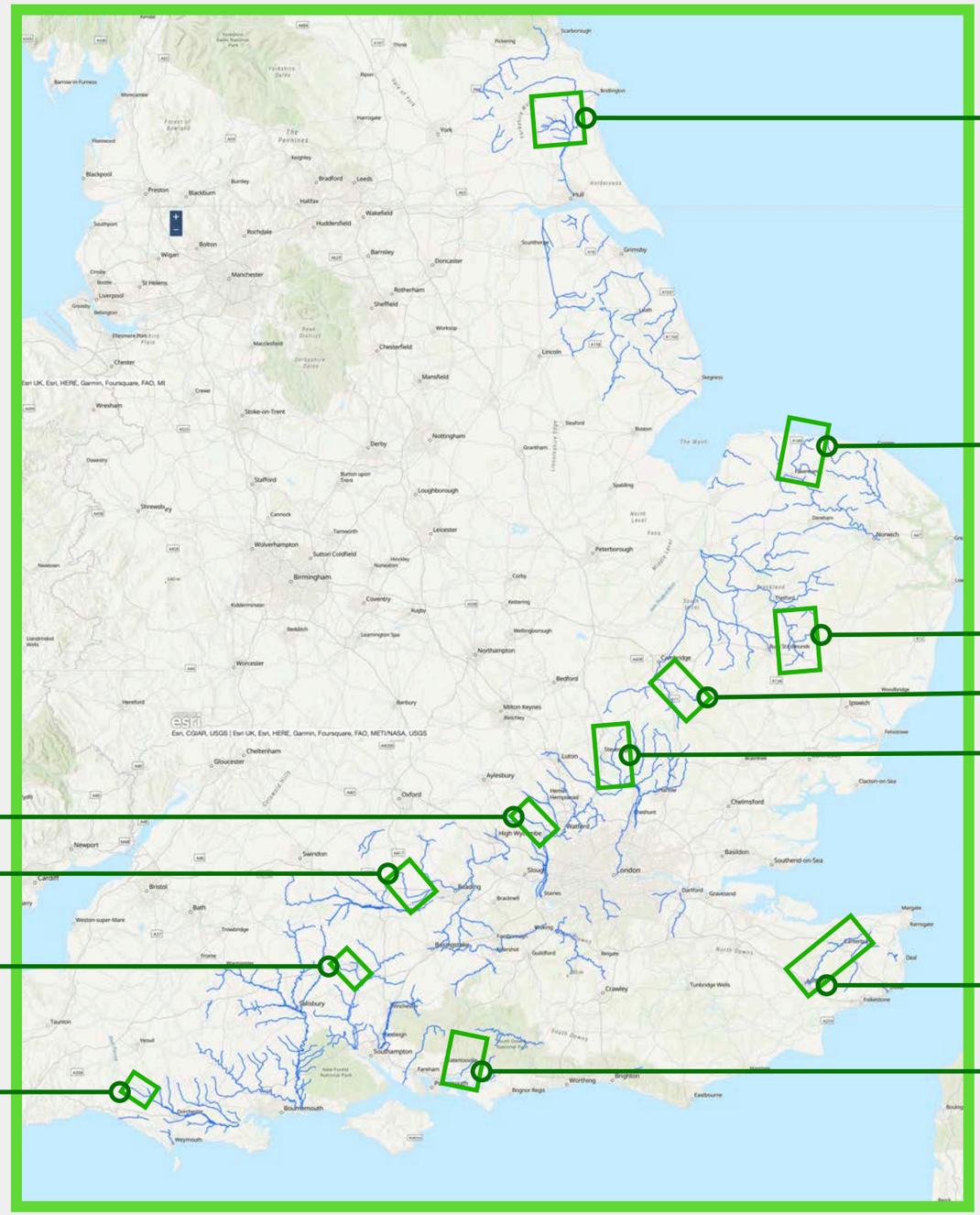
restore the natural channel planform, meander pattern and multiple channels:

all these measures will restore the habitat requirements of the ecosystem engineers (fish, insects, mammals and plants) which shape …

… the varied and dynamic habitat of a healthy and resilient chalk stream

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Physical Habitat 2.	Flagship restoration projects	CaBA CSRG will work with water companies and other partners to deliver a national network of flagship catchment restoration projects as set out in Section 7. The aim is to realise on these flagships streams all the dimensions of ambition the CaBA strategy has articulated, to show what is possible and to act as exemplars to assist in the restoration of other chalk catchments.	Water companies CaBA CSRG The Rivers Trust	Lead partners have been working all year on the development of scoping reports for the national network of flagship full-catchment restoration projects. These projects will become localised pilots for the full brief of the chalk stream restoration strategy. They are intended to: • develop and demonstrating the art of the possible • inspire others • show what river restoration can achieve • make the case for the application of the strategy on all chalk streams The water companies have been tasked with facilitating the evolution of these projects, with funding the catchment restoration strategies (as well as relevant works via the WINEP) and with developing partnerships and steering groups to aid delivery over the coming years. The first phase, ready for this implementation plan, was a scoping report for each project. These have been summarised on the following pages, with embedded links to the full reports. 

Locations of the CaBA CSRG flagship restoration projects



Flagship restoration projects: scoping reports.

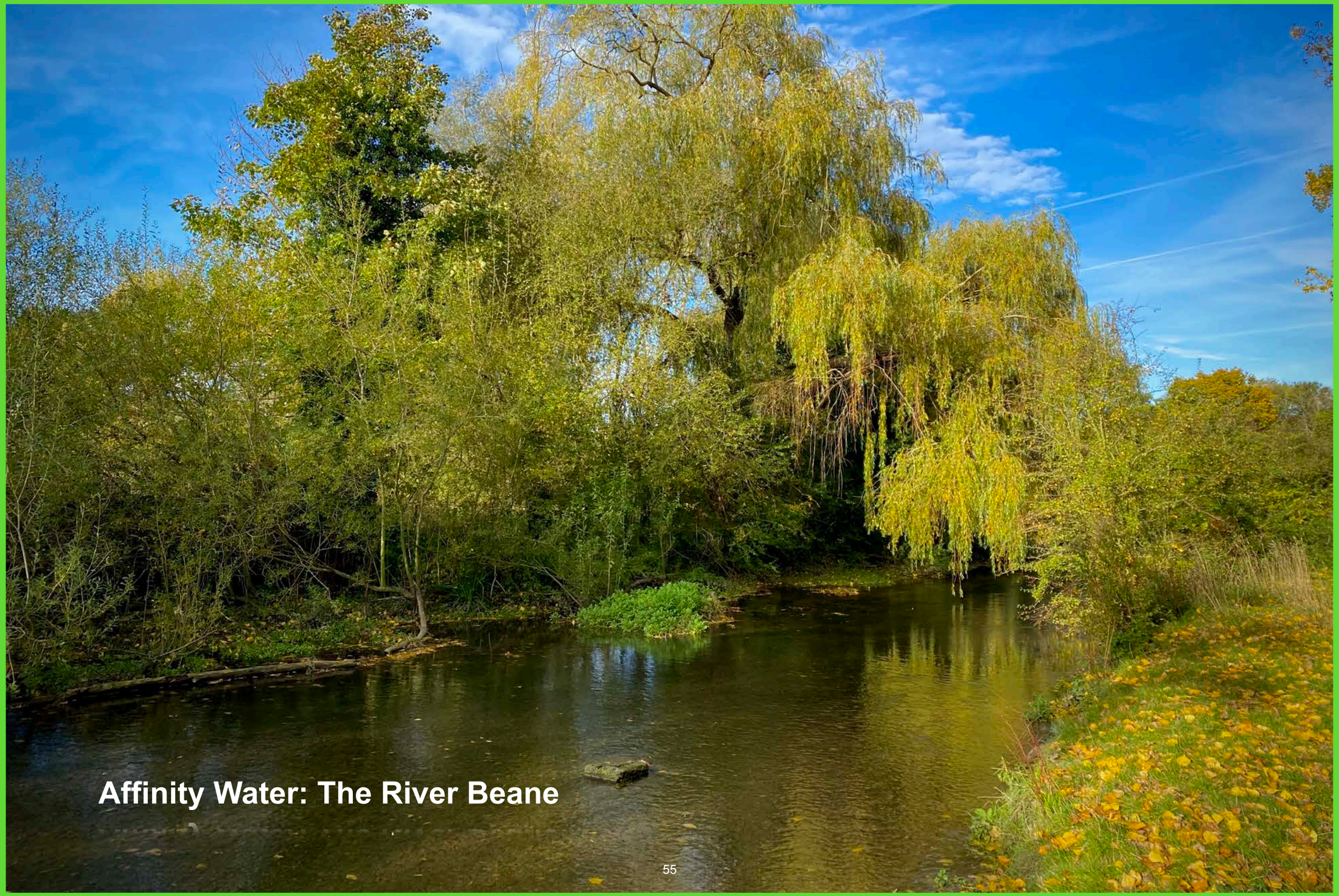
As a first phase of the development of the flagship projects, each water company has been asked to produce a **scoping report** intended to provide an intermediary stage to the production of the full catchment strategy for each flagship project by October 2023.

The scoping report will be used as a basis for discussion with the wider CaBA CSRG as well as publicising the plans of the water companies, government and partners, for restoration of the flagship chalk streams, and the landscapes which support them. CaBA CSRG has recommended that the scoping reports covers the following areas:

- **overview of the catchment** with summaries on any background data both historic and ongoing, covering water quality, flow geomorphology and ecology
- **catchment problems** and stresses that are already identified, such as high sediment load, high phosphorus levels etc.
- details of any **water company assets** within the catchment including which of these will be associated with the water industry national environment programme (WINEP) for AMP8 (2025 to 2030) and which have already been subject to improvement measures through WINEP for AMP6 or 7
- details of any other **statutory drivers** or programmes that could help with the catchment restoration
- a high level **summary of water company projects** already identified or in the pipeline
- summary of other **stakeholder projects** already identified or in the pipeline
- a **timeline** for the next 10 years for the catchment and how these projects build towards the overall catchment vision / strategy
- how the water companies are already working or intend to work with **other catchment stakeholders to ensure local ownership**

It is expected that the scope will fall in line with time scales for the production of the WINEP and early drafts of the PR24 business plan. It is important to note that the scope is to provide an indication of what will be covered in the strategy and is not expected to go into great detail at this stage.

The following pages give a higher level summary of each flagship project with a link to the water company's full scoping report at the foot of each page.


Affinity Water: The River Beane

AFFINITY WATER : RIVER BEANE CaBA CSRG FLAGSHIP RESTORATION PROJECT OVERVIEW	
Overview of the catchment	The River Beane, Herts: 11-miles long: catchment 67 sq. mile; base-flow index 0.76. Predominantly rural, with a number of villages, plus urban areas of Stevenage and Hertford. A tributary of the Lea / Thames.
Catchment problems	Failing to meet good ecological status (GES): fish 'poor' / hydrological regime in lower Beane does not support good ecological status (GES) / macrophytes moderate (2019 cycle). Agricultural, urban and road runoff causing turbidity, sedimentation and pollution. Non-native species: giant hogweed / Himalayan balsam etc. The river and floodplain have been heavily modified over the centuries with many historic channel modifications still exerting an influence on the ecological status.
Water company assets - WINEP	Seven public water supply (PWS) groundwater abstractions with the total annual average licensed abstractions reduced from 49.98 Ml/d to 28.25 Ml/d post AMP6 sustainability reduction at Whitehall.
Other drivers or programmes	Three SSSIs within the catchment. The whole catchment is a nitrate vulnerable zone (NVZ) as well as a drinking water safeguard zone (surface-water). Several source protection zones (SPZs) in the catchment.
Water company projects	River restoration and habitat enhancement projects at Frogmore Hall and Woodhall Phase 1 and 2 (completed). Walkern Road, Woodhall Phase 3 (proposed). Farmer engagement including Groundswell. Cover crop funding scheme. Dane End tributary natural flood management project.
Stakeholder projects	River Beane Restoration Association INNS Out scheme funded by AMP7 biodiversity programme. River Beane farmer cluster. HMWT water-vole reintroduction.
10-year catchment vision	To improve water quality, hydrological regime, river morphology to achieve good ecological status as per WFD and enhance chalk stream habitats for people and wildlife. To restore water quality, and the physical habitat of the channel, banks and floodplain to support iconic chalk stream species and ecology. To increase the attractiveness of the stream and public access to the river, so that people can appreciate their local chalk stream. To monitor the ongoing status of the river.
Timeline	2022-25 AMP7 Establish partnership working group. Review existing catchment plan and develop the flagship strategy via steering group, key lead partner, key stakeholders. Review historic monitoring data, identify gaps, develop enhanced citizen science programme. Continuation of schemes cited above (cover crops INNS Out etc). Working with South East Rivers Trust to produce catchment and nature-based solutions (C&NBS) opportunity map. 2025 - 2035 AMP8 & 9 subject to funding approval (PR24 WINEP/business plan): options for community fund to support stakeholder projects. Use C&NBS work to target works in the catchment. Full geomorphology survey plus reach-by-reach condition assessment and costed restoration proposals. Develop Dane End NFM work in the rest of the catchment. Investigate potential for ELMS or LNR wild-life corridor along entire river. More details in the full scoping report.
Catchment stakeholders	The River Lea catchment partnership. The River Beane partnership, hosted by the Herts and Middlesex Wildlife Trust, includes: The Environment Agency (EA); River Beane Restoration Association (RBRA); Affinity Water; Countryside Management Service (CMS); local parish councils, Stevenage Borough Council and landowners in the catchment. To launch the flagship project and develop ideas, Affinity Water held a workshop on 19th August 2022 to which all catchment stakeholders were invited. This is building on work already underway for The River Beane Catchment Management Plan which began in 2012
Scoping report link	**RIVER BEANE SCOPING REPORT** **AFFINITY WATER CATCHMENT MANAGEMENT WEBPAGE**

Affinity Water & Thames Water: The River Chess

	AFFINITY WATER & THAMES WATER : RIVER CHESS CaBA CSRG FLAGSHIP RESTORATION PROJECT OVERVIEW
Overview of the catchment	The River Chess, Bucks; 11-miles long; catchment 40 sq. miles; base-flow index 0.95. Tributary of River Colne. Flows through the Chilterns AONB. Mostly rural with some urban areas and major roads. A tributary of the Colne / Thames.
Catchment problems	Failing to meet good ecological status (GES), reflected in the poor health of its fish and macrophyte communities. Primary causes are: nutrient enrichment – a combination of point-source pollution, (including unplanned discharges from Chesham STW when large volumes of groundwater enter the system) and diffuse pollution, including rural and urban run-off throughout the catchment, but delivering surges in polluted run-off during periods of short sharp and more intensive rainfall; and low flows as a result of public water-supply abstraction.
Water company assets - WINEP	Work is already underway to address some of the challenges of restoring flows, through groups such as Water Resources South East (WRSE). Affinity Water closed two pumping stations that abstract water in the upper Chess in the summer of 2020, and final closure of the Thames Water abstraction at Hawridge will be delivered in the next business plan period (2025-2030). Some infrastructure upgrades to the sewer network and STW (Chesham STW) are already underway: the Chess catchment has been a focus of a project to demonstrate what is necessary to virtually eliminate groundwater infiltration from the sewerage system.
Other drivers or programmes	AONB. Two SSSIs in catchment adjacent to stream. Drinking Water Safeguard Zone. The 10-mile Chess Valley Walk runs between Rickmansworth and Chesham and is easy to access via the London tube network.
Water company projects	Smarter Water Catchments trial catchment (AMP7). A number of outstanding actions under AMP7 across main themes: improving water quality, managing flow, control of INNS, improving wildlife corridors, involving people and working together.
Stakeholder projects	Working with the Chesham Water Group. Working with Impress the Chess group to support their plans. 10-year set of Riverfly data, and water quality information being collected by the collaborative ChessWatch project. Wilder Chess initiative, farmers and landowners.
10-year catchment vision	The Chess catchment is a jewel in the heart of the Chilterns. We want to create a place where people are working together to protect and improve the water environment for everyone. We want the River Chess to possess the clean, plentiful, flow characteristics of a healthy chalk stream. We want to ensure that the river is sensitively managed, meeting the needs of all those who rely on its resource whilst enabling it to reach its full biological potential, supporting rich and diverse populations of fish, birds and other wildlife. We also want the wider catchment to be a working landscape that is managed for the benefit of both people and wildlife. We want to minimise the impact of pollution, flooding and non-native invasive species and conserve a connected mosaic of wildlife-rich habitats. We want to create a natural and attractive amenity for people to enjoy and improve social wellbeing for present and future generations.
Timeline	2022-25 AMP7 - Baseline created State of the Chess report, stakeholders engaged in addressing water quality impacts through improved land management, phase 1 of nature-based solutions prioritised and implemented. Improved public awareness of water consumption, reduced water usage in the catchment, options determined for priority sections/reaches, implement sustainable drainage solutions. Options for INNS control identified and implementation begun. Options and feasibility for wildlife corridors identified and implementation begun. Access, recreation, education and awareness of the River Chess assessed, education and 'blue health' approaches developed, volunteering programmes developed, public value of water and the river catchment enhanced. Strategy for partnership developed. Partnerships sustainability and resilience models created. 2025-31 AMP8 & 9 - Detailed, comprehensive, and coherent plan for AMP 8 & 9 timeline.
Catchment stakeholders	Steering Group: Affinity Water, Buckinghamshire Council, Chilterns Conservation Board, Chiltern Society, Environment Agency, Hertfordshire & Middlesex Wildlife Trust, Thames Water, The River Chess Association.
Scoping report links	STATE OF THE RIVER CHESS REPORT RIVER CHESS CATCHMENT PLAN

Anglian Water: The River Lark

	ANGLIAN WATER : RIVERS LARK (and lately added River Stiffkey) CaBA CSRG FLAGSHIP RESTORATION PROJECT OVERVIEW
Overview of the catchment	River Lark, Suffolk; 15 miles from source to Cavenham Heath; catchment 106 sq. miles; base-flow index 0.77. Mostly rural. Flows through Bury St Edmunds. Higher gradient reaches upstream of the town, becomes Fenland river d'stream before reaching Mildenhall. Tributary of the Ouse.
Catchment problems	The entire Lark catchment consists of 12 WFD waterbodies of which eight relate to the chalk reaches. Three on the main Lark to Mildenhall, plus the Hawstead, Kennet, Cavenham and Tuddenham tributaries. The Kennet is also a chalk stream and joins the Lark via a Fenland river d'stream of Freckenham. Of these only the Cavenham is rated as having good ecological status. The rest are either moderate, poor or bad. Reasons for not achieving good include: point source pollution from sewage works, diffuse pollution from agriculture, physical modifications (the river is heavily canalised and impounded), urbanisation, low flows caused by ground and surface water abstraction, INNS.
Water company assets - WINEP	WINEP - AMP7 restoration work to take place by 2024 on sections of the Linnett, Cavenham Stream and Kennet. Cap of aquifer abstraction and capital investment in solutions to reduce abstraction impacting the River Lark. Fornham WRC agreed to be used as a case-study as part of WINEP review, focusing on chalk streams as sensitive environments. Innovation to be applied to the regulatory programme to resolve intractable solutions for phosphate and develop policy to incentivise performance improvements.
Other drivers or programmes	Brecks Fen Edge Landscape Partnership Project: heritage lottery fund project delivering cultural, social and environmental improvements in the Lark valley. Brecks Farm Wildlife Network (BFWN): farmer-run group to improve biodiversity and habitat connectivity across the Breckland Farmland SSSI and have successful ELMS Landscape Recovery Pilot starting in 2023. Lark Abstractors Group: with assistance from Water For Tomorrow, have been developing water management strategies and piloting flexible licensing for agricultural abstraction.
Water company projects	Anglian Water have made the River Lark one of their 12 "flagship chalkstreams" which will involve reinstating lost habitats, features and processes that allow the rivers to function naturally, support thriving wildlife (including invertebrates, fish and water vole and otter), and be resilient to the challenges of climate change.
Stakeholder projects	River Lark Catchment Partnership (RLCP) - Lark Partnership Action plan. Following outline Catchment appraisal and Pollution Review documents (2021) and support from Jo Churchill MP and partners, RCLP developed an action plan to deliver water quality improvements. In channel restoration on Lark continues with projects delivered through RLCP with Bury Water Meadows Group, Bury Trout Club, Lark Angling Preservation Society, Fornham All Saints parish council and others. RLCP active in citizen science water testing group restoring gaps in lost EA sampling data and identify unknown sources of pollution.
10-year catchment vision	Building on recent successes on the rivers Stiffkey and Bure, we aim to produce a road-map to catchment-scale restoration for each of these rivers, addressing each of the major reasons for failure.
Timeline	The initial two-year phase will assess problems and opportunities in the both catchments, one sub-catchment at a time. The Norfolk Rivers Trust will work with the existing catchment partners to identify priority actions and to identify possible funding streams. At the end of the initial two-year period we will have produced catchment plans for each of the rivers that will lead to whole-catchment restoration over the following ten to fifteen years. Final catchment plans will be prepared by spring 2024.
Catchment stakeholders	River Lark Catchment Partnership, including: Lark Angling and Preservation Soc., Fullers Mill Gardens, The Bricks and Fen Edge Rivers Landscape Partnership, Bury Water Meadows Group, Environment Agency, Cam and Ely Ouse Partnership.
Scoping report link	**RIVER LARK SCOPING REPORT**


Cambridge Water: The River Granta

CAMBRIDGE WATER : RIVER GRANTA CaBA CSRG FLAGSHIP RESTORATION PROJECT OVERVIEW	
Overview of the catchment	The River Granta, Cambs: 18-miles long; catchment 44 sq. miles; base-flow index 0.55. A flashy chalk stream subject both to flooding and drying in some reaches. Predominantly rural with villages and roads. A tributary of the Cam / Ouse.
Catchment problems	Fish barriers and lack of connectivity, caused by gauging stations, weirs and mills. INNS. Low flows with some dry reaches due to porous chalk and abstraction. Phosphate from water company and non-water company STW discharges, and run-off compounded by reduced river flow. Channel morphology and connection with floodplain.
Water company assets - WINEP	There are five Cambridge Water PWS abstractions in the catchment that influence local groundwater levels and flows. An EA river support scheme operates most years discharging upstream of Linton. Three of these PWS have Hands Off Flow (HOFs) conditions which are applied in most years. Multiple STWs, including storm overflow problems.
Other drivers or programmes	SSSIs in catchment, some adjacent to stream. Drinking Water Safeguard Zones (Groundwater). Safeguard Zone (Groundwater) identified for Nitrate. Nitrate Vulnerable Zone. The Granta Project provides an important foundation for the flagship project to progress.
Water company projects	A number of studies on flow impact from existing PWS abstractions have been made in previous NEP projects. As a result, licence conditions are in place, to complement the existing EA river support scheme (Lodes-Granta), which are intended to protect the EFI. Storm overflow reduction plan (no detail yet).
Stakeholder projects	The Granta Project. Wild Trout Trust - Good for the Granta.
10-year catchment vision	To achieve multiple ecological benefits at the catchment scale by identifying and implementing nature-based solutions against three key objectives; i) minimise flood risk, ii) maximise water quantity in the aquifer, iii) improve water quality. In the short term this will enhance river ecology, habitats and improve the health of the chalk stream, whilst longer term abstraction reduction and restoration objectives and projects are developed and implemented.
Timeline	2022-25 AMP7 - Catchment Modelling, Catchment Plan, Delivering Nature Based Solutions, Farm Land Management. Deliver measures through existing NBS projects with local stakeholders and prepare and scope PR24 WINEP. Funding for WINEP Restoration measures implementation to support flows and habitats. WRMP24 preferred plan implemented. Intervention options appraisal and prioritisation complete. 2025 to 2030 – WRMP24 transfer options in place. Existing abstractions reduced/switched off. Investigations and surveys already completed for WINEP (AMP8) river restoration proposals and options to enhance habitats. These options and funding are documented in a separate report. These reports are high level options appraisal, leading to feasibility assessment and outline design stages. 2030 and beyond - WINEP restoration measures complete. PR29 proposals. Strategic regional resource options in supply. Environmental destination abstraction reductions implemented.
Catchment stakeholders	An established stakeholder group has been in place since 2020 with aims and objectives to deliver improvements in the Granta. Abington Nature Watch, Linton Friends of the River Granta and staff at Babraham Research Campus. Wild Trout Trust, Wildlife Trust, Cambridge City Council.
Scoping report link	**RIVER GRANTA SCOPING REPORT**

Portsmouth Water: The River Ems

PORTSMOUTH WATER : RIVER EMS CaBA CSRG FLAGSHIP RESTORATION PROJECT OVERVIEW	
Overview of the catchment	River Ems: 6-miles long: catchment area 23 sq. miles; base-flow index 0.93. Emerging from the chalk aquifer of the South Downs, the catchment is predominantly rural, flowing south through a number of villages including Westbourne and the larger coastal town of Emsworth where the river meets the sea, within Chichester Harbour.
Catchment problems	Reasons for not achieving good (RNAG) ecological status include flow (groundwater abstraction) and physical modifications (flood protection/ impoundments). Suspected intermittent discharges are recorded as a reason for deterioration (RFD). A detailed survey of the river Ems is currently being undertaken by the Arun and Rother Rivers Trust (ARRT) which includes assessing the presence of non-native species (Nov' 2022).
Water company assets - WINEP	Two public water supply (PWS) groundwater pumping stations located along the river Ems, with a total average annual abstraction of 21 Ml/d. (Portsmouth Water figures averaged for the period 2016-2020). One of the abstractions is used solely for river augmentation.
Other drivers or programmes	The Ems links the South Downs National Park and Area of Outstanding National Beauty (AONB) with Chichester Harbour AONB and Site of Scientific Interest (SSSI), Chichester and Langstone Special Protection Area (SPA), Chichester and Langstone Harbour Ramsar and Solent Maritime Special Area of Conservation (SAC). Brook Meadow Local Nature Reserve (LNR) in Emsworth, with Slipper Mill pond, designated as a Site of Nature Conservation Importance (SNCI). Two Nitrate Vulnerable Zones (NVZ), to protect groundwater resources and limit further eutrophication of Chichester Harbour. Chichester Harbour Urban Wastewater Treatment Directive and Shellfish Water Directive within the Emsworth Channel of Chichester Harbour. The Ems catchment is located within a Source Protection Zones (SPZ) and there are two Drinking Water Safeguard Zones for groundwater (nitrate, cryptosporidium and turbidity) that cover part of the river Ems area.
Water company projects	Portsmouth Water supports the 'Downs & Harbours Clean Water Partnership' funding farmers operating in zones deemed to be of 'high risk' to groundwater resources, with a focus on regulated nitrates and pesticide levels. There is also a biodiversity grant scheme and a South Downs Farmer Group. Portsmouth Water / INTERREG payment-for-ecosystem-services programme with a focus on soil health and cover crops.
Stakeholder projects	South Downs Farmer Group funded by Portsmouth Water. A National Environment Project (NEP) 2015 with extra funding from the Arun, Rother & Western Streams Catchment Partnership Fund and the Environment Agency. This included the restoration of 300m and 150m reaches of the mid-to-lower Ems, removal/modification of several in-river structures that limited fish passage and flow-regime, and fencing-off of many kilometres of the river from grazing animals. The project was delivered by ARRT in partnership with the Wild Trout Trust (WTT). There are also a number active local groups including Friends of the Ems (FotE).
10-year catchment vision	To restore good ecological status, including sustainable flows as per the WFD targets. To remove and/or modify the remaining, in-river artificial structures that severely restrict fish passage and limit dynamics of flow / the ecological functioning of the river. To improve water quality and the physical habitat of the channel, banks and wider floodplain to support iconic chalk stream species and ecology. To 'wet-up' land surrounding the river to better support surface flow. To increase the attractiveness of the Ems and public access, so that people can appreciate their local chalk stream. To increase legal protection for the river. To monitor the on-going status of the river and increase citizen-science involvement and wider community engagement.
Timeline	2022-25 AMP7 TBC: review the catchment appraisal being prepared by ARRT and support the development of the flagship strategy via steering group, key lead partner, key stakeholders as well as technical input from hydrogeologists, hydrologists and aquatic ecologists. Review historic monitoring data, identify gaps, develop enhanced citizen science programme. Extend farmer-group engagement in the Ems catchment (cover crops, removal of INNS etc). Continue work with ARRT to produce Ems catchment and nature-based solutions opportunity maps. 2025-30 AMP8 & 9: initiate and complete PR24 WINEP environmental investigation and options appraisal work. Establish community fund to support stakeholder projects and to keep the catchment appraisal and Ems Restoration Plan updated and active, relevant and accountable. Investigate potential for ELMs or LNR wild corridor along entire Ems river. Establish River Ems partnership working group to help drive delivery.
Catchment stakeholders	Arun, Rother & Western Streams Catchment Partnership, hosted by the ARRT, includes Portsmouth Water, Environment Agency, Wildlife Trusts, Southern Water (wastewater treatment provider within the Ems catchment), RSPB, Local Flood authorities. Friends of the Ems campaign group; Westbourne Parish Council / Havant Borough Council / Chichester District Council.
Scoping report link	**TBC.**


South East Water: The Great Stour

SOUTH EAST WATER : GREAT STOUR CaBA CSRG FLAGSHIP RESTORATION PROJECT OVERVIEW	
Overview of the catchment	The River Stour, Kent: 57-miles long (chalk stream reach approx.14 miles); catchment 133 sq. miles incl. greensand headwaters; base-flow index 0.7. Two main tributaries, the Great Stour and the East Stour. Rises from greensand aquifer, but takes on a chalk character between Ashford and Canterbury. Catchment mainly rural with some small urban areas and the larger town of Ashford.
Catchment problems	Household and business water use and increasing demand; pesticides and nutrients, land use, housing growth and highways run-off; septic tanks, sewers and other discharges. Physical modifications. Climate change. Multiple sewage treatment works including storm overflows (Southern Water Services assets).
Water company assets - WINEP	South East Water (drinking water only) - 100 per cent reliant on groundwater sources to provide drinking water in the Stour catchment. 10 groundwater abstractions. Affinity Water and Southern Water Services also have groundwater abstractions in the River Stour catchment (Little Stour). Southern Water is the waste water provider for this area and has potential plans to recommission a Stourmouth water supply source referenced in its current Water Resource Management Plans (WRMP). Water Resources South East (WRSE) is an alliance between water companies working collaboratively to manage water resources and secure supplies across the region.
Other drivers or programmes	Sites of Special Scientific Interest (SSSI) SSSIs at Hothfield Common and Stodmarsh; Special Areas of Conservation and ancient woodlands. Nitrate Vulnerable Zone.
Water company projects	EU-funded PROWATER Interreg 2 Seas project, working with Kent County Council and South East Rivers Trust, we have delivered a soil improvement scheme which will build resilience to drought through better water and nutrient retention. This work was supported by the Kentish Stour Catchment Partnership (KSCP) and Affinity Water.
Stakeholder projects	KSCP Our Stour, river based community initiatives across the Stour catchment. Projects have included river habitat and restoration works, identification and control of invasive non-native species, fish pass improvements, education, community projects and working with riparian landowners to reduce sediment and nutrient losses. Kent Wildlife Trust's (KWT) RiverSearch Citizen Science RiverSearch project. KCC and KWT H20 Interreg pilot project using nature-based solutions and natural capital valuation in water-management decision-making.
10-year catchment vision	Working with our partners we have identified six key opportunities/outcomes to address the challenges: 1) resilience to drought and flood management; 2) river and habitat restoration; 3) sustainably managing water resources for public value and recreation; 4) creating natural carbon sinks; 5) raising awareness through education; 6) working with others.
Timeline	2022 to 2024 - baseline data and river health surveys taking place in the Lower Stour catchment. 2023 - Start to co-create a plan for the future, promoting schemes that deliver biodiversity gains, water quality improvements and better water connectivity. Include plans in WINEP24 submission and Business Plan. Studies into managing and operating groundwater sources and understanding benefits of conjunctive use with Broad Oak Reservoir. Further develop natural capital assessment at Broad Oak and identify interventions needed to address biodiversity and ecology impact and how it can support chalk abstraction reductions. Full catchment strategy for River Stour published. 2025 onwards - Results due from Little Stour and Wingham catchment project to understand water usage and needs, develop water-efficiency and address low flows. Roll-out of future plans.
Catchment stakeholders	Gathered evidence and insights from stakeholder engagement, including working closely with the catchment partnership group. The Kentish Stour Catchment Partnership (KSCP). KSCP, landowners, water companies, KWT, local councils, parish councils, IDB, Environment Agency, Natural England and local communities local community groups.
Scoping report link	RIVER STOUR SCOPING REPORT

Southern Water: The River Anton

SOUTHERN WATER : RIVER ANTON CaBA CSRG FLAGSHIP RESTORATION PROJECT OVERVIEW	
Overview of the catchment	The River Anton, Hampshire: 8-miles long; catchment 71 sq. miles; baseflow index 0.96. Flows through the town of Andover in Hampshire, and is a tributary of the River Test. Mixed urban / sub-urban and rural catchment.
Catchment problems	The Upper Anton WFD classification 'does not support good', attributed to groundwater abstraction from the Andover WSW. Artificially widened, flowing within hard banks and offering little habitat diversity along the reaches passing through Andover town centre. Previous Environment Agency studies have also shown that the quality of the ecology of the Upper Anton is in many reaches hindered by the degree of channel modification, access to the river (by dogs and ducks) and in particular the effect of the impounding structures (designated HMWB).
Water company assets - WINEP	Southern Water abstraction, from chalk, for public water supply from a water supply works (WSW) located in Andover. Most of the water abstracted at the Andover WSW is returned to the River Test upstream of its confluence with the River Anton via the Fullerton Sewage Treatment Works (STW) discharge.
Other drivers or programmes	Test catchment SSSI. Drinking Water Safeguard Zone. Nitrate Vulnerable Zone.
Water company projects	Much work ongoing including water company investigations and river restoration through AMP6 and 7. It was agreed through the RSA investigation options appraisal that there would be sustainability reductions of the Southern Water Andover WSW abstraction licence in 2020, and further reductions in 2027. In addition, Southern Water would implement river enhancements in the Upper Anton as part of the Water Industry National Environment Programme (WINEP) scheme in AMP7 (2020 to 2025). Urban development in the valley of the Upper Anton, particularly through Andover town centre is largely now dependent on depressed groundwater levels and suffers from a degree of groundwater flooding during significant recharge periods. The long-term rebound in groundwater levels resulting from future reduced abstraction at Andover WSW could potentially cause groundwater flooding in wet winters.
Stakeholder projects	Rooksbury Lakes and the reaches immediately downstream have benefited from significant enhancement in recent years, led by the Environment Agency and Test Valley Borough Council, and supported by local environmental groups such as The Anton River Conservation Society (TARCA). Test Valley Borough Council Andover River Anton Enhancement Scheme, with planned river enhancements for reaches of the Upper Anton. Lower Anton fishery is also planning river enhancements in the Lower Anton, with input from Wessex Rivers Trust, the Piscatorial Society and TICP.
10-year catchment vision	10 year catchment vision – Southern Water is already implementing river enhancement schemes in AMP7 in the Upper Anton and is in partnership with Wessex Rivers Trust and Test Valley Borough Council to extend that work to subsequent reaches for improvement measures by 2025. SW will implement further schemes in AMP8 and AMP9 in collaboration with key catchment partners. The detailed catchment action plan will outline a pipeline of projects, likely for a 10-12 year planning horizon, which deliver aligned river enhancement outcomes; identify opportunities for blended financing across organisations; data collection/sharing; and setting out key tasks such as an action plan for any monitoring, biodiversity, citizen science, educational and community engagement opportunities.
Timeline	2022-2023: work with Catchment Partnership and key catchment partners to identify issues and potential opportunities for further improvement of the River Anton; develop detailed catchment plan, identifying potential schemes and 3rd party funding opportunities 2022-2025: complete the 1.6km of planned enhancement in the Upper Anton; partnered with TICP for their enhancement plan of the River Anton through Andover town centre 2022-2027: working with Wessex Rivers Trust to implement enhancement in the Lower Anton 2025-2030: implement AMP8 enhancement scheme plan 2030-2035: implement AMP9 enhancement scheme plan
Catchment stakeholders	Anton River Conservation Society (TARCA). Test Valley Borough Council. Wessex Rivers Trust. Test and Itchen Catchment Partnership (TICP). Piscatorial Society.
Scoping report link	**RIVER ANTON SCOPING REPORT**

Thames Water: The River Pang

THAMES WATER : RIVER PANG CaBA CSRG FLAGSHIP RESTORATION PROJECT OVERVIEW	
Overview of the catchment	The River Pang, Berkshire: 14-miles long; catchment 65 sq. miles; baseflow index 0.87. A tributary of the River Thames. Mostly rural with some villages, and the town of Pangbourne at the confluence. It is joined by the River Bourne around 5km upstream of the Pang's confluence with the River Thames. The Fulham Brook is included in the scope of the project.
Catchment problems	WFD classification (2019) Moderate Ecological Status. Within the catchment there are nine sewage treatment works, two discharging directly to the Pang, and one discharging to Sulham Brook catchment. Three discharge to ground and three to streams that are tributaries. The two larger STW are both known to make prolonged storm discharges during periods of high groundwater and wet weather. There are also road drainage points that discharge into the river, and a number of private package (sewage) plants. Surface water runoff and flooding, groundwater infiltration and flooding, siltation, barriers to fish passage, INNS, overgrazing, and diffuse pollution sources. Physical modifications to the channel, including historic straightening and dredging.
Water company assets - WINEP	Groundwater abstractions at Pangbourne and Bradfield for public water supply. Nine sewage treatment works within the Pang Catchment.
Other drivers or programmes	North Wessex Downs Area of Outstanding Natural Beauty (AONB), which contains chalk upland, river valleys, ancient woodland, and historic sites. Site of Special Scientific Interest (SSSI), including Sulham and Tidmarsh Woods and Meadows - damp copses, seasonally flooded water meadows and rich invertebrate community. Drinking Water Safeguard Zone, Nitrate Vulnerable Zone. EA operated West Berkshire Groundwater Scheme (WBGWS) is a groundwater pumping scheme commissioned in the 1970's as a drought augmentation.
Water company projects	Delivery of river restoration projects on Sulham brook (planned for delivery by 2025), and the requirement to implement a fish-passage by-pass of the sluice at Pangbourne WTW by 2025. There are ongoing investigations within the Pang catchment to meet the WFD driver and to undertake a 'No Deterioration' assessment. The abstraction at Bradfield is due to end in 2030 with a 5Ml/d reduction at Pangbourne agreed by 2050, in line with the regional environmental destination work-stream. There is a flow constraint on the Pangbourne abstraction licence to protect the local Sulham and Tidmarsh SSSI during low flows. In areas where there is a risk of groundwater infiltration of the sewers, following persistent heavy rain, Groundwater Infiltration System Management Plans have been developed. In the Pang catchment these have been developed for Ashampstead, Briff Lane, Bucklebury, Compton, East Ilsley and Hampstead Norreys.
Stakeholder projects	'No deterioration investigation' into the Berkshire Downs chalk water body is due to report findings in 2023. Action for the River Kennet Rivers Trust (ARK) is working in the catchment, running training / engagement projects with the local community. PVFF is working to engage landowners to implement natural flood management projects. Many of the landowners in the catchment are making habitat improvements as part of their ongoing land management practices. BBOWT have a site at Moor Copse, where restoration works have previously been undertaken on the Pang. Thames Water, ARK, PVFF, West Berkshire Council, BBOWT, Natural England and the Environment Agency have been part of a collaborative Natural Flood Management (NFM) research project, Landwise led by the University of Reading (along with a wide range of partner organisations). There are also several river restoration schemes in development.
10-year catchment vision	To optimise natural processes and enhance the River Pang and catchment making the river system more resilient to flood, drought and events linked to climate change and achieving 'Good Ecological Status' under the WFD. The Strategy will identify actions to be taken to manage and create habitats to support wildlife and communities and enable the river to be accessed and valued by catchment communities.
Timeline	2020 to 2025 - Setting the WINEP framework and determination, development and implementation of a monitoring plan to generate a baseline within the catchment, collaboratively identifying environmental risks and issues: proposing solutions; assessing proposals; price review, water company business plans. Note: the vision is currently in draft and being finalised with the Steering Group
Catchment stakeholders	Flagship steering group formed of: Environment Agency, Thames Water, Action for the River Kennet (ARK), Thames 21, farm clusters (Lower Pang and Kennet, Upper Pang, and the Ridgeway Farm clusters), landowner representatives (Englefield Estate, Sulham Estate, Yattendon Estate), Pang Valley Flood Forum (PVFF), Berks, Bucks and Oxfordshire Wildlife Trust (BBOWT), West Berkshire Council.
Scoping report link	**RIVER PANG SCOPING REPORT**

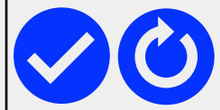
Wessex Water: The River Frome headwaters

WESSEX WATER : RIVER FROME HEADWATERS CaBA CSRG FLAGSHIP RESTORATION PROJECT OVERVIEW	
Overview of the catchment	The River Frome headwaters comprising Rivers Hooke, Wraxall and upper Frome: total length approx 20 miles; catchment 30 sq. miles; base-flow index 0.89. Largely rural catchment, with a number of small villages.
Catchment problems	Three of four WFD waterbodies failing to achieve good ecological status. Two waterbodies with moderate status for phosphate – both agriculture and sewage discharge implicated. Runoff from agricultural land represents the main form of diffuse pollution in the headwaters of the Frome, with both arable and livestock sources for P and N. Channel modification, such as diversions, impoundments, straightening and embankments, poaching. Some abstractions potentially require a reduction due to meet EFI at low flows. STW + storm overflows and combined sewer overflow. INNS. Flash-flood risk at the top of the Frome.
Water company assets - WINEP	Two main sewage treatment works discharge to the Frome and the Hooke. Three sources of abstraction within the project area, at Hooke Springs, Cattistock and Maiden Newton. Abstraction at Hooke affects flow in the River Hooke and abstraction at Cattistock and Maiden Newton affect flow in the Frome. The Wraxall Brook is therefore not impacted by abstraction except for private water sources, which appear to be present at Rampisham and Lower Wraxall. All three sources are located in Nitrate Vulnerable Zones (NVZs). Areas deemed to be at high risk from agricultural nitrate pollution. Three frequently overflowing storm overflows in catchment, subject to improvement options appraisal and planning.
Other drivers or programmes	SSSIs, SACs and NNR in catchment. NVZ.
Water company projects	Some supply sources will be the subject of investigations into abstraction sustainability reductions under the WINEP for the 2024 price review. Driven by Natural England suggestions for safeguarding the River Frome SSSI and the ecological health of its headwaters. Additionally, the Hooke Springs abstraction has been highlighted in the EA's Environmental Destination work as potentially requiring a reduction due to non-compliance with the EFI at low flows.
Stakeholder projects	Dorset Wild Rivers Project, and specifically the development by DWT of a catchment management plan for the River Hooke, which includes an inventory of over 40 proposed restoration projects. Dorset Beaver Trial, Dorset Water Guardians, Poole Harbour Nutrient Management Scheme, Himalayan balsam management. Individual fishery owners / managers have been carrying out habitat enhancement / protection works for 30+ years.
10-year catchment vision	To restore the headwaters of the Dorset Frome to good ecological health and increase their resilience to future environmental change. This means going beyond specific ecological and hydromorphological targets under the WFD, to create a more natural, climate-resilient catchment. Ensuring the interests of all stakeholders are represented. Recognising the geological, hydrological and ecological distinctiveness of the catchment and realistic reference conditions.
Timeline	The strategy will be developed over the coming year and shared for consultation in autumn 2023. Wessex Water commenced water quality and macroinvertebrate monitoring in spring 2022 and electric fishing in summer 2022. Potential restoration measures identified and some underway through DWT work. Ongoing and additional water company measures through AMP7, and AMP8.
Catchment stakeholders	Dorset Wildlife Trust; Frome Headwaters Flagship Project; Poole Harbour Catchment Partnership; farms and riparian landowners on the Frome, Wraxall Brook and Hooke; Frome and Piddle Fisheries Association
Scoping report link	**RIVER FROME HEADWATERS SCOPING REPORT**


Yorkshire Water: The Hull Headwaters

YORKSHIRE WATER : THE HULL HEADWATERS CaBA CSRG FLAGSHIP RESTORATION PROJECT OVERVIEW	
Overview of the catchment	River Hull headwaters: entire chalk stream network including SSSI and non-SSSI reaches. West Beck and Foston Beck 20 miles, + smaller tributaries; catchment 145 sq. miles (upstream of Hempholme); base-flow index 0.75. Mostly rural but flows through the market town of Driffield.
Catchment problems	All but one of the Water Framework Directive waterbodies in the Upper Hull are failing to achieve Good Ecological Status: failures are due to a range of pressures including channel modifications for purposes including land drainage, flood defence, water supply, navigation and aquaculture. Seven of eleven WFD waterbodies in upper Hull catchment support GES for flow, but Lowthorpe/Kelk/Foston Becks, Wellsprings Drain/Eastburn Beck/Driffield Trout Stream, West Beck Upper (all of which are at least partially within the SSSI) – are classified as not supporting good status (*uncertain*).
Water company assets - WINEP	Surface water abstraction at Hempholme Weir supplies East Riding supplies over 50% of Hull's requirements. Groundwater abstraction from Wolds well-fields: 8 groundwater sites on the scarp slope north of Driffield. 15 larger YW wastewater plants discharge in upper Hull catchment, in addition to domestic septic tanks.
Other drivers or programmes	Much of the catchment is a SSSI, with the river sections unfavourable / improving. NVZ. DWSZ. Numerous water company and non-water company waste water discharges including persistent storm overflows.
Water company projects	AMP7 WINEP investigations to assess the sustainability of the West Beck intake and abstraction from the Wolds well-fields are ongoing. Ref water quality YW is currently developing a programme of implementation / investigation projects through the AMP8 WINEP. YW's storm overflow AMP8 programme is yet to be determined, however with chalk streams classed as high priority sites it is likely that all water industry overflows in the upper Hull which do (or could) adversely impact on chalk habitats will be removed or reduced through 2025 - 2035. The Water Industry National Environment Programme (WINEP) is likely to be the main source of water-industry funding of the flagships in the initial phase of delivery. The WINEP comprises numerous drivers spanning water resources, wastewater, raw water management and biodiversity.
Stakeholder projects	The Hull & East Riding Catchment Partnership was established in 2014. It is jointly hosted by the YWT and the East Yorkshire Rivers Trust (which itself was formed in 2006). In 2019 a conference and subsequent workshop brought in many stakeholders and interested individuals, community groups and landowners; from this, the overarching name of an aspirational landscape-scale programme centred around the Yorkshire Wolds, its chalk and the region's water began. This programme is known as Chalkshire and is led by Yorkshire Wildlife Trust in its capacity as host of the Catchment Partnership. A Chalkshire summary report was produced in 2021, highlighting the work undertaken to date.
10-year catchment vision	The plan for Chalkshire is to build on the interest and support garnered to date with the aim of bringing together work streams from different sectors (e.g. wetland biodiversity and landscape history or agriculture and lifelong learning). Through cross-sector working it is hoped to identify common, overlapping priorities where increased partnership and understanding of each other's drivers can be recognised and maximised. By building a network of inter-related programmes with complimentary activities and focus, the catchment as a whole should benefit across many different targets and in different sectors of work.
Timeline	It is anticipated that the flagship projects will be split into two phases i) development and ii) delivery. The development phase is likely to run through 2023, with delivery over the subsequent 10 years.
Catchment stakeholders	The Hull & East Riding Catchment Partnership; Yorkshire Wildlife Trust; East Yorkshire Rivers Trust; Albanwise Farming Limited; Beverley and North Holderness Internal Drainage Board; East and North Yorkshire Waterways Partnership; East Riding of Yorkshire Council; Environment Agency; Historic England; Hull City Council; Natural England; Ouse and Humber Drainage Board; South Holderness Internal Drainage Board; The University of Hull; The Woodland Trust.
Scoping report link	**RIVER HULL HEADWATERS SCOPING REPORT**

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Physical Habitat 3.	Urban chalk streams	CaBA CSRG endorses the use of urban and public chalk stream spaces as sites for Biodiversity Net Gain and for inclusion in Nature Recovery Networks and Local Nature Recovery Strategies.	Multiple CaBA CSRG partners	Because urban and suburban chalk streams provide the best opportunity for large numbers of people to engage with natural spaces, we hope over time to see a greater emphasis on the restoration of chalk streams in the urban environment, with local authorities making use of the opportunities provided through NRN, LNRS and Biodiversity net gain. For example: www.cambridge.gov.uk/chalk-streams 
Physical Habitat 4.	Monitoring and appraisal	CaBA CSRG endorses the development of a simple, replicable and standardised monitoring initiative, covering the key components of habitat, biology, quality and flow in perennial and winterbourne reaches. Delivery through engaging citizen scientists and conservation volunteers would help to build links between various stakeholder communities and lead to better appraisal of the evolution of environmental projects and their long-term impacts.	CaBA	In September '21 the CaBA national support group group announced that £7.1M funding had been secured from the Ofwat breakthrough water challenge to develop a catchment monitoring cooperative framework for the gathering and sharing of catchment data and evidence. The government's progress report on the 25 Year Environment Plan sets out an intention to develop a cost-effective, citizen-science programme to inform progress against the outcome indicators. CaBA aims to lay the foundations for a national catchment monitoring cooperative to bring together local communities, NGOs, businesses and public bodies to develop a coordinated and cost-effective environmental monitoring programme. The CaBA national support group and the catchment data user group, chaired by The Rivers Trust, have developed a proposal for how citizen science monitoring data can be gathered, interpreted and shared to fill gaps in knowledge. Various charity and volunteer organisations are already gathering data in a cost-effective way, often at a greater level of detail than the regulatory bodies: data that is being used to identify local issues and priorities for environmental improvements. However, there are many different methodologies, which means the data cannot easily by combined and compared. The CaBA initiative aims to overcome this, to encourage local communities to gather, study and share data via: • standardised methodologies and joined up data platforms • training and technical support programmes • commitment from scientists and regulators to make use of the data • sustainable funding to support national coordination and to embed local community monitoring for the long-term Specific to chalk streams the Anglian Water catchment monitoring initiative includes the River Lark (Anglian Water's nominated flagship restoration catchment) and the River Wensum. 

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Physical Habitat 5.	Sharing best practice	In addition to and complementing this flagship initiative, CaBA CSRG is working towards the establishment of: • a CaBA chalk stream online data and information hub. This will be hosted by the Rivers Trust. It will include data and knowledge to help empower and facilitate grass-roots catchment advocacy and river restoration • a manual of best-practice restoration principles and guidelines and a forum for sharing best practice and experience • an annual CaBA chalk stream restoration conference and programme of site visits, again to promote an open and exciting exchange of information, experience and best practice among those who are passionate about rivers in general and chalk streams in particular	CaBA CSRG	**A CaBA chalk stream data hub** has been set up via The Rivers Trust and CaBA partnership supported by Environment Agency funding and the Interreg North Sea Region TopSoil project. Already there are background notes on the origin and ecology and the typology of chalk streams, as well as ARC GIS interactive maps covering: • water resource availability by WFD chalk catchment • water quality and a source apportionment dashboard of key nutrient pollutants, for example phosphorus, by WFD chalk catchment • physical habitat including designated catchments, priority sites and groundwater safeguarding zones Over time this hub will build and become a resource and library of information and data on chalk streams. Visit the hub to learn about: • their origin and ecology • water quantity issues in chalk streams • the water quality of chalk streams • and more…. https://catchmentbasedapproach.org/learn/chalk-streams-hub/ **Annual Conference** The first of what will become an annual **CaBA chalk stream conference** will be held in the spring of 2023 at the official launch and update of the Implementation Plan. We hope to host the Minister, as well as the new Environment Agency chair Alan Lovell and of course Tony Juniper, chair of Natural England and stalwart supporter of chalk streams. There will be an opportunity for Q&A engagement with the chalk stream stakeholders, and presentations on the three components of the strategy.  **Manual of best practice restoration techniques** CaBA CSRG chair is in discussion with a number of academics and with the Environment Agency about the compilation of a manual. Funding has yet to be secured. 

Recommendation number:	Recommendation heading	Recommendation	Leading organisation(s)	Action / commitment
Physical Habitat 6.	Research into reference conditions	There is a need for further research into the reference conditions and characteristics of the different groups of chalk streams to inform our knowledge and understanding of the practice and aims of river restoration.	CaBA CSRG Universities?	CaBA CSRG has been in discussion with **Professor David Sear, Southampton University** with the aim of developing this much needed research area as a PhD studentship, which would be very generously co-funded by **Anglian Water.** The studentship would aim to derive evidence-based models of chalk stream types as a guide to aid future restoration project design, best practice and environmental vision. Research would be based around three forms of evidence gathering: palaeo-environmental data derived from sediment archives stored in floodplain and abandoned channel fills; morphological analysis of abandoned unmodified palaeo-channels; analysis of relatively unmodified reaches of chalk streams. Thus the PhD would also form the basis of the data gathering in PH7 below and the formation of a database of reference reaches.  **CaBA CRSG notes: this is a very exciting opportunity to make an invaluable contribution to knowledge, and to advance and inform chalk stream restoration design and conceptualisations of the potential range of habitats and services future communities can expect from restored channel:floodplain restoration projects. Special thanks are due to Anglian Water for agreeing to help realise the potential of this project.**
Physical Habitat 7.	Database of reference reaches	Although they are rare, relatively natural reaches of chalk streams do exist, as do reaches where naturalness is being recovered through river processes or restoration. These reference reaches should be recorded, mapped and surveyed to add to our knowledge base.	CaBA CSRG Universities?	
Physical Habitat 8.	Chalk-stream map and index.	An important first step in the protection of a natural resource such as a chalk stream is to accurately map the resource. Natural England is working on a complete and agreed map of all English chalk streams. This will be published by Natural England but it will also be included on the CaBA Chalk Stream online hub.	CaBA CSRG Natural England	The CaBA strategy published in October last year included an index of chalk streams by catchment and WFD waterbody. At the time the CaBA CSRG group was working with Natural England to develop and finalise the official chalk stream map. This has now been published and can be viewed at: https://priorityhabitats.org/display-data/display-rivers-stream-types/