

A group of people are wading in a shallow body of water, likely a water catchment area. In the foreground, a man in a blue shirt and waders holds a large black bucket. Other people are visible in the background, some wading and others standing on the grassy bank. The water is calm, and the surrounding area is lush with green trees and vegetation under a cloudy sky.

**Smarter  
Water  
Catchments.**



# Contents

**Cover image:** Thames Water staff volunteers working on a river restoration project on the Kennet near Marlborough, Wiltshire.

Volunteers being trained by the River Chess Association and Chilterns Chalk Streams Project in riverfly monitoring at Latimer Park, Buckinghamshire

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# Foreword

When the water industry was privatised in 1989, boundaries were established along the lines of the river basins that gave many of the companies their names. Our sector has since been defined by these catchments that are such important features of the regions and communities we serve.

The years following privatisation have seen a transformation in standards, with companies radically improving all key aspects of the service they provide customers, and very greatly reducing their impacts on the environment. But the investment that has made this possible has, largely, been through traditional, 'hard' engineering; with solutions rarely addressing problems at source.

Of course, catchment management is not a new way of working. Thames Water has a long tradition of catchment projects and programmes, ranging from pioneering work in the 1990s to protect drinking water sources from pesticides used on rail lines, to our award-winning recent programme to install sustainable drainage in schools, managing flood risk and creating new nature reserves in urban catchments.

Catchment management has come a long way, but has not yet been successfully implemented on a large scale with multiple stakeholders. It can - and must - now play a much greater role. We face many, varied challenges that mean we need to evolve the ways we work. Rapid population growth and changing weather patterns are placing an increasing pressure on our ageing infrastructure, while we strive to meet higher environmental standards.

At the same time, we continue to see strong and increasing support for catchment approaches, from stakeholders including landowners, catchment partners, and in the public policy framework. The Government's 25-year Environment Plan makes clear the greater role catchment approaches will need to play<sup>1</sup>, and Brexit provides an important opportunity to look anew at how land management and the needs of the natural environment can be better aligned<sup>2</sup>. Ofwat recognises the important role catchment management can play in providing long-term resilience<sup>3</sup>.

We know that in some cases catchment management offers better value or greater benefits than more traditional capital investment solutions. But, to date, the successful catchment management projects in England and Wales have each focussed typically on tackling single issues, such as pesticides, phosphorus or nitrates.

We believe that further benefits and better value can be achieved by tackling multiple challenges together, recognising the environment as a system; the value that can be offered by harnessing natural processes, and capitalising on opportunities of greater scope and scale. This is the premise of our Smarter Water Catchments initiative.

Smarter Water Catchments will test the contribution this more holistic approach to catchment management can make, through a variety of very different but equally ambitious projects that address challenges typical of those found across our region.

It will also challenge the conventional association of catchment management with rural, upland areas through a major project in London, the most challenging and complex of all of our urban catchments. This will be particularly important in helping identify long-term solutions to the pressure rapid population growth is putting on the capital's wastewater infrastructure.

Smarter Water Catchments is a step change in our level of ambition and investment in catchment management in our region and will, we hope, shape our approach to the future.



Steve Robertson  
CEO, Thames Water

Steve Robertson,  
left, with John  
Hounslow, river  
keeper on the  
Kennet.

## Chalk streams

The River Kennet is one of around only 200 chalk streams in the world, and 85% of these are found in England. A combination of geology and climate means that our chalk streams have characteristic features that support special wildlife habitats and species, including brown trout and water vole. They are fed from groundwater aquifers, meaning that the water is clear and clean.

Our long-term ambition is, with our customers' support, to cease abstractions from vulnerable chalk streams.



<sup>1</sup> <https://www.gov.uk/government/publications/25-year-environment-plan>  
<sup>2</sup> <https://www.gov.uk/government/consultations/the-future-for-food-farming-and-the-environment>  
<sup>3</sup> <https://www.ofwat.gov.uk/wp-content/uploads/2017/09/Resilience-in-the-Round-report.pdf>



# A history of catchment management

Catchment management is not a new approach at Thames Water. For many years we have found it a more effective way of delivering some of our services than end-of-pipe solutions. The wide-ranging projects we have worked on include:

1 One of the first successful catchment management projects, protecting vulnerable drinking water sources from herbicides used to control weeds on railway lines. We were a founding partner in this project, delivered in collaboration with Network Rail and its predecessors, which became a national agreement administered by the Environment Agency. It is the largest, longest-running catchment management project in the country, protecting 75 vulnerable water sources in our region, and 550 more elsewhere.

2 Using our water quality monitoring data to support the successful call for the Pesticide Safety Directorate to phase out all uses of the herbicide isoproturon, which had polluted surface waters throughout England, and been a particular problem for drinking water treatment in the Upper Cherwell catchment in our region.

3 Playing our part in the Voluntary Initiative, including working alongside farmers, pesticide manufacturers and agronomists to reduce pesticide use without recourse to a pesticide tax.

4 Establishing river water sampling at more than 100 points upstream of our abstractions to identify pesticide 'hot spots'; target interventions and provide baseline measurements to assess their impact. We have since developed this approach through a partnership with Affinity Water and South East Water, sharing monitoring data and co-ordinating our work to tackle sources of pollution with a cross-company impact.

5 Working with environmental stakeholders and researchers to develop best practise methods to reduce groundwater and surface water pollution, including cover crop trials with the Farming and Wildlife Advisory Group (FWAG South East), and slow-release fertiliser trials with Agrii at their research establishment near Swindon.

Catchment approaches only succeed through collaboration with farmers and other stakeholders, and engagement has been central to our approach. We have:

- Played a prominent role in key stakeholder groups, including the Voluntary Initiative, Metaldehyde Steering Group, Amenity Forum, Hard Surfaces Group and Pesticides Forum
- Attended conferences and technical events for farmers alongside pesticide manufacturers and other water companies, meeting up to 1,000 farmers in the course of one event
- Worked with organisations trusted by farmers as sources of advice on catchment management and other issues, including FWAG branches in the east, south east and south west; Catchment Sensitive Farming, where we fund a staff member; and Innovation for Agriculture
- Funded MOT and calibration tests for slug pellet applicators to ensure targeted applications at the right levels, and covering the costs of exams in pesticide application needed to convert some farmers' 'grandfather' rights.

Train programmed to spray herbicides and avoid vulnerable water sources.

Credit: JSD Rail

# Catchment management today

We manage a wide range of catchment projects across our region, reaching (as of May 2018) around 300 farmers. We plan to extend this to more farmers in the coming years.

In autumn 2017 we ran projects across 20 catchments, half involving substituting products that are polluting drinking water sources with alternatives, and the remainder based on the Payment for Ecosystem Services (PES) approach. This makes payments to managers of land or other natural resources in exchange for ensuring the environment provides services such as the provision of clean water. We are now working in 25 catchments in readiness for autumn 2018.

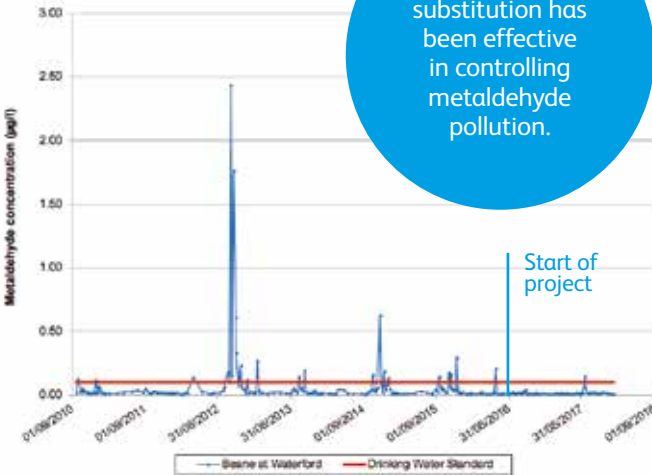
Key current projects with farmers include our work to protect drinking water sources from the impacts of pesticides and nutrient leaching.

## Pesticides

Metaldehyde is the active ingredient in most slug pellets. It is effective in controlling slug populations, but is not effectively removed by existing drinking water treatment processes. Working with farmers to reduce the amount of metaldehyde reaching rivers used as drinking water sources is the single biggest element of our catchment management work.

In some cases, farmers switch to ferric phosphate pellets, which research has found to be as effective at protecting crops as metaldehyde, but do not affect water quality. In other areas, farmers change aspects of the way they work to limit pesticide run-off from their farms.

Metaldehyde concentrations in the River Beane before and after product substitution trials.



Product substitution has been effective in controlling metaldehyde pollution.

## Payment for Ecosystem Services

### River Tillingbourne and River Wey

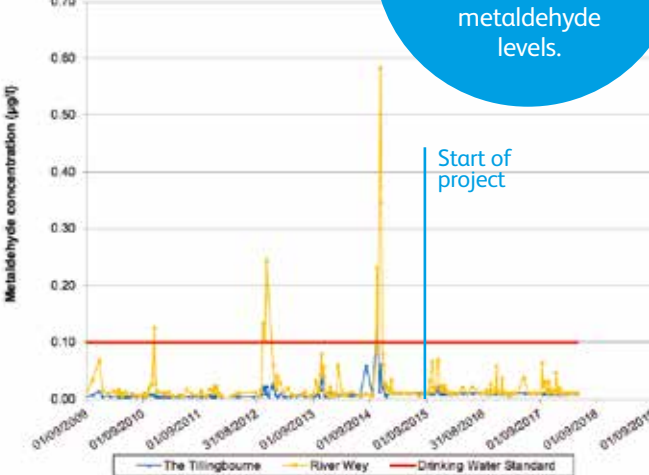
The River Tillingbourne and River Wey near Guildford, Surrey, are sources of drinking water that can see metaldehyde levels rise above the Drinking Water Standard (DWS) between September and December. In autumn 2015 we started work there to test the impact of PES, making payments to three farmers to reflect their contributions to keeping metaldehyde concentrations below the DWS.

PES focusses on outcomes, giving farmers the opportunity to select land management practices most appropriate for them. They include adopting cultural control methods to create a less favourable environment for slugs, and using integrated pest management.

To determine the success of the trial, metaldehyde concentrations were monitored at the downstream end of the catchment. The trial reduced levels in the River Tillingbourne below the DWS from the outset. Farmers have received payments for ensuring the quality of the water throughout the high-risk season, and are keen to continue to work with us in the future.

The trial provided valuable learning on the PES approach, and we are now building on the success of the project by scaling up this approach across larger catchments with more farmers, such as the River Ray catchment in Oxfordshire. In 2018 we are running 19 PES projects across the Thames basin and Lee Valley.

Metaldehyde concentrations in the River Tillingbourne and River Wey before and after PES project.



Water quality tests show that the PES project has successfully reduced metaldehyde levels.

# Catchment management today

## Swales

Swales are shallow ditches or scrapes created to slow run-off from fields. They offer the potential to reduce pesticide, nitrate and phosphate concentrations by holding run-off in contact with soil for longer, increasing the opportunity for microbes naturally to degrade them.

We are running three small-scale projects to assess the impact swales can have, and to consider the practicalities of scaling up their use. These include two at farms in the Beane and Cranleigh Waters catchments near Stevenage and Guildford respectively, and one at the Royal Agricultural University trial farm near Cirencester.

The farm-based trials are at an early stage, but initial results from Cirencester have shown some reductions in concentrations of pesticides (including metaldehyde) and nutrients. We will continue to assess the potential benefits swales can offer, alongside work to review the impact of taking otherwise productive land out of use to create them, and the scale at which they would be needed to have an impact at a whole-farm level.

## Biofilters

Pesticide-spraying vehicles can present the risk of low volumes of highly concentrated discharges of pesticides becoming part of farmyard run-off. We paid for the installation on a farm in the River Cherwell catchment of a trial biofilter that uses natural organic materials such as straw and soil to filter dirty water washed off sprayers or drips and spills from pesticide handling areas.

The biofilter was very successful in reducing the concentrations of several pesticides, and we are now looking to include it as an option made available to more farmers under the PES approach.

## Nutrient leaching

The second key strand to our work with farmers focusses on protecting drinking water sources from high levels of nitrate.

We have worked with six farmers in the Thames Valley to evaluate the benefits of cover crops on nitrate levels in the soil. Cover crops are non-cash crops grown to protect the soil from erosion, improve soil health and minimise losses of nutrients through leaching and runoff - benefitting both water companies and farmers.

Results from the trials showed that nitrate losses were significantly reduced, with mean concentrations between five and ten times lower with the presence of a cover crop compared to a bare soil control plot.

Having completed the trials, we are currently finding out more about farming practices in areas vulnerable to nitrate leaching, learning about local land use and making farmers aware of ways they can reduce nitrate losses from their fields, keeping nutrients where the crops can use them.

For more information about our work on metaldehyde, please contact us at:

 [catchment.management@thameswater.co.uk](mailto:catchment.management@thameswater.co.uk)

# Urban catchment projects

Catchment management is most often associated with rural, particularly confined, upland catchments. Its successful use in urban catchments is more complex and less common, but is becoming increasingly relevant and necessary, partly because of the pressure rapid growth is placing on sewer networks, and the increasing cost per property of sewer flooding, which has risen as the more cost beneficial schemes are completed.

## Partnership projects

As work to manage flood risk moves upstream, working in partnership with other organisations becomes more important – particularly the Environment Agency (EA), who are responsible for rivers, and lead local flood authorities, who have overall responsibility for surface water. We have worked through the Thames Regional Flood and Coastal Committee to identify partnership opportunities for projects that address river, surface water and sewer flooding issues.

This has delivered projects including the Herne Hill and Dulwich Flood Alleviation Scheme, where we worked with the EA and London Borough of Southwark to solve surface water and sewer flooding. The multi award-winning solution, which is based around sustainable drainage (SuDS), includes flood relief measures in three parks. As well as reducing flood risk, it has created a new wetland habitat and wildflower meadow; improved the existing play area, and provided children from six primary schools the opportunity to learn more about the project.

## Sewerage catchment studies

More extreme weather patterns, combined with the paving over of gardens and loss of green areas, are increasing the risk of surface water and sewer flooding. We are working on five catchment studies looking at both traditional and new methods to reduce flooding. They involve surveying and monitoring the catchments, and working with customers and stakeholders to develop a more comprehensive understanding of the flooding, and potential solutions.

Our studies are taking place in:

- Brent, London
- Aldershot, Hampshire
- Swindon, Wiltshire
- Ravensbourne Valley in Hornchurch and Romford, London
- Oxford, Oxfordshire

The studies are not yet complete, but we have already identified the opportunity to reduce the risk of floods at one location in Harrow by installing SuDS further upstream, working in partnership with the London Boroughs of Harrow and Brent; the EA and Thames21. We are looking for other upstream, partnership solutions in the other catchments as our studies progress.

## Real-time monitoring and proactive catchment control

The single biggest change in managing our sewerage catchments is the use of technology that allows us to monitor what is happening, and intervene in time to prevent potential problems occurring - rather than responding once they have happened.

Our Intelligent Hub – or ‘iHub’ – draws together real-time data from a range of sources to help us make better decisions about how to proactively manage sewerage catchments.

This includes advanced weather radar that track storms across our catchments; data on levels in our sewers, and information about the energy use of our pumps. Together, this information makes us far better able to prioritise key issues, identifying potential flooding and pollution incidents. The insights iHub provides have helped prevent several flooding and pollution incidents.



Herne Hill after flooding in 2013



The £4.3m Herne Hill flood alleviation project, which protects 200 homes from flooding, has improved a children's play area, including making use of flood alleviation features.



# Investing in our communities

Thames Water has a long history of funding or part-funding community projects in addition to those we deliver ourselves, including many catchment management schemes. We significantly increased this funding through a commitment in 2014 to invest £8.5m in community projects, as part of a package of customer redress following the accidental misreporting of regulatory data on sewer flooding.

We will continue to support applications for funding for catchment schemes after the fund has been fully invested.

In addition to workstreams covering vulnerability, education, heritage and our flagship project to create Europe's largest urban wetlands at Walthamstow reservoirs in east London, the programme includes:

- Projects to encourage communities to become involved with and value their local rivers
- Sustainable drainage projects delivered in partnership with the Wildfowl and Wetlands Trust and Environment Agency
- Funding for partners to run 'citizen science' projects to monitor rivers in our region
- Partnership funding for projects run by charities and NGOs, such as Wildlife Trusts and Thames21

These projects involve work in catchments to manage flood risk, improve water quality, and increase biodiversity – but also provide wider benefits for local communities through better access, improved amenities, schools programmes, volunteering opportunities and health and wellbeing benefits.

## Firs Farm Wetlands - with Enfield Council

Firs Farm Playing Fields was an open space in Edmonton, north London, with sports pitches used by some of the local community, but no interesting natural features, and little for local people not playing team sports.

We provided £220,000 to create a major new wetland habitat with improved access and increased biodiversity. Diverting flows from an old culverted watercourse through the wetland helps improve water quality, and slows storm flows to reduce the risk of flooding downstream.

Local people were closely involved in deciding the most appropriate solutions, and are positive about the changes the project has made. Visitors to Firs Farm now include children and parents, some of whom had previously had to walk around half an hour to reach a park.

The site attracts volunteers from diverse backgrounds, ranging from young offenders, to adults with learning difficulties, to corporate groups. The site is available for use in therapeutic treatments for children, and there has been positive feedback about the health benefits of the mindfulness space.

## Durnsford Mill - with Action for the River Kennet (ARK)

This 1km stretch of the Kennet was designated as being of 'unfavourable' status as a Site of Special Scientific Interest, and was failing to meet Water Framework Directive requirements for 'good ecological status'.

Heavily dredged in the 1970s, and seriously affected by a pollution incident caused by a third party in 2013, this part of the river needed extensive improvements to restore its natural chalkstream characteristics.

We provided £110,000 to support work to introduce 2,500 tonnes of gravel, narrowing the river channel to recreate a natural chalkstream profile, with a shallower bed and healthy weed growth. Habitat enhancements along the riverside path have included seeding with a wildflower-rich grass mix.

ARK also worked in partnership with Savernake Flyfishers and the local river keeper to run a series of community events and initiatives enabling more people to enjoy the river, including mental health charity Together UK, plus schools, cub and scout groups and the general public.

## Ashtead Rye Meadows - with Friends of Ashtead Rye Meadows

Ashtead Rye Meadows is home to the Rye Brook, making it wet for most of the year and limiting access for visitors, as well as creating the potential for flooding downstream in north Leatherhead

Working with the Friends of Ashtead Rye Meadows and local volunteers, we supported work to re-naturalise the stream; create a wetland area with a new pond and several scrapes, and install a boardwalk to provide access.

The new ponds attract invertebrate and insect life, and the walkway opens up the area to local people in all weather conditions, while the ponds and scrapes hold back flood water. Part of the wetlands has been dedicated as a Centenary Field to commemorate Ashtead residents who died in the First World War.

These three examples are drawn from the many community investment projects, large and small, that have benefited catchments across our region. Projects completed or in progress as part of the £8.5m programme include all those shown in the table on the following page.



Pond-dipping at the wetland created at Firs Farm, Edmonton.



Thames Water staff volunteers working on a river restoration project on the Kennet near Marlborough, Wiltshire.



# Investing in our communities

Project	Partner	Thames Water funding	Overview
Salmons Brook - Enfield, London	Thames21	£238,500	Creation of SuDS and reed beds to improve water quality, with community engagement and a schools programme.
Stanmore Marsh and Queensbury Recreation Ground - Harrow, London	Thames21	£210,000	River restoration and habitat improvements, with a programme to develop river-friendly schools.
Community Reed Beds – north and east London	Thames21	£80,000	Project to engage communities along the River Lea to find locations for new reed beds, improving water quality and supporting greater biodiversity.
Roundmoor Ditch – Eton Wick, Berkshire	Thames21	£100,000	Habitat restoration and community engagement programme to improve the river and reduce the need for storm sewage discharges.
Reconnecting the Rom and the Ingrebourne – London and Essex borders	Thames21	£175,000	River restoration and catchment improvement work to address issues including pollution, urban expansion and neglect.
Water for Wildlife - London	London Wildlife Trust	£240,000	Programme co-funded with the Esme Fairburn foundation to survey and monitor dragonflies as indicator species for water habitats.
Lost Effra – Brixton & Dulwich, London	London Wildlife Trust	£90,000	Creation of SuDS and rain gardens to manage rainwater, through residents' planting days and other opportunities.
Wild about Water – Camley Street Natural Park, Camden, London	London Wildlife Trust	£100,000	Transformation of the Park into a centre to learn about wildlife, including the rewilding of a stretch of the Regent's Canal.
SuDS for Slough	Wildfowl and Wetlands Trust	£150,000	Reduction of flood risk, improvements to water quality and environmental enhancement through a network of new and restored SuDS wetlands.
Prince of Wales Wetlands – Enfield, London	Wildfowl and Wetlands Trust	£90,000	Innovative urban community wetlands and SuDS project, with habitat enhancements to support wildlife.
Woodstock Water Meadows – Oxfordshire	Wychwood Project	£49,400	Community involvement in river restoration work to improve water quality, reduce flood risk and enhance biodiversity.
Fleet Pond Nature Reserve - Hampshire	Fleet Ponds Society	£48,000	Restoration of natural features to increase the Pond's resilience to pollution and degradation.
Rivers and Wetland Community Days – region wide	Environment Agency and Wild Trout Trust	£175,000	Small river restoration projects to engage local communities through volunteering, addressing issues including water usage and pollution.
Sandford Mill – Reading	Twyford and District Fishing Club	£38,400	Improvements to a stretch of the River Loddon to create fish breeding areas and provide interpretation boards.
Springs and Sources of the River Lea – Luton	Groundwork	£72,000	Creation of SuDS in public green spaces, accompanied by a programme of community engagement.
Thames Water for Wildlife – region-wide	Freshwater Habitats Trust	£80,000	Programme helping communities to access and enjoy freshwaters through wildlife surveys and monitoring.
WILD Churn Project – Cirencester	Farming and Wildlife Advisory Group South West	£150,000	Restoration of blue-green spaces, involving residents in improving the natural environment and reducing flood risk.
Headstone Manor Park - Harrow, London	Green Corridor	£22,250	Management of woodland areas, including river clean-ups and bankside vegetation management, with school engagement sessions.
Community Learning Project – Twickenham, London	Friends of the River Crane Environment	£15,555	Community learning project to introduce local people to a range of skills to help improve the river corridor.
Nature reserve restoration – Kingston upon Thames, London	Environment Trust	£168,000	Project to restore the Raeburn Open space, and involve the local community in improving aquatic and bankside ecology of Surbiton Stream.
Mapping our Watery Places – River Thames catchment	River Thame Conservation Trust	£128,400	Project to raise awareness and encourage changes in water use, making the catchment more naturally resilient.

# Smarter Water Catchments

Successful catchment management projects in England and Wales have each focussed typically on tackling single issues, such as pesticides, phosphorus or nitrate. We believe that further benefits and better value can be achieved by tackling multiple challenges together, recognising the environment as a system, the value that can be offered by harnessing natural processes, and capitalising on opportunities of greater scope and scale.

This is the premise of our Smarter Water Catchments initiative, which will test the contribution this more holistic approach can make, through a variety of very different but equally ambitious projects.

The Smarter Water Catchments programme for 2020 – 2025 includes six partnership projects with key stakeholders that will join up existing and new activities, addressing a range of issues and providing multiple benefits. It will build detailed evidence of the costs and benefits of this new approach, helping us and others assess the potential to adopt catchment management on a larger scale more widely in our region.

Each one of the six projects focuses on challenges that we see replicated across our region, so will provide evidence and learning that we plan to apply to other locations. In each case, we have identified a key catchment partner to work with.

The six projects are:

Catchment	Focus	Partner
River Evenlode, Oxfordshire	Range of water quality issues in a rural catchment	Evenlode Catchment Partnership, Natural England, Atkins
River Crane, west London	Water quality and flooding in an urban catchment	Crane Valley Partnership
River Chess, Buckinghamshire	Low flows and water quality	River Chess Association, Chilterns Chalk Streams Project
One or more catchments in – Thames Water and South East Rivers Trust region	Environmental resilience to support abstraction	South East Rivers Trust
River Kennet, Wiltshire & Berkshire	Impact of community engagement on water use	Action for the River Kennet
Region-wide	Dual-purpose flood and water storage assets	Environment Agency

We will measure the success of the projects by:

- Assessing the extent to which a wider catchment – based approach can help deliver services in a cost-effective way
- Looking at the impact of working with key stakeholders – catchment partnerships in particular – in achieving the outcomes of the projects
- Identifying the cost/benefit of catchment interventions compared to more conventional ‘hard engineering’ solutions
- Evaluating the extent to which the projects are able to bring together opportunities within and outside our business to provide multiple benefits

The underlying aim of the Smarter Water Catchments approach is to understand the impact working with stakeholders to understand and address broad catchment needs can have in building better functioning river catchments that, in turn, are better equipped to support water company and ecosystem services.

Work on the Smarter Water Catchments project in the Evenlode catchment is underway, with plans for the other five projects under the same umbrella being developed in discussion with the key partners we will work with, and delivery planned for 2020 – 2025.



Learning about rivers with a River Chess Association volunteer at Chartridge School fete.



# River Evenlode

## Project focus

To assess the impact of catchment management in a rural area where water quality issues are key

## Key partners



### Evenlode Catchment Partnership

[www.wildoxfordshire.org.uk/biodiversity/river-catchments/evenlode-catchment/](http://www.wildoxfordshire.org.uk/biodiversity/river-catchments/evenlode-catchment/)



**ATKINS**

Member of the SNC-Lavalin Group

## About the Evenlode

The Evenlode is a headwater of the River Thames, flowing from Moreton-in-Marsh in Gloucestershire to Eynsham on the River Thames in Oxfordshire over a distance of more than 75km. It drains an area of nearly 30,000 hectares, and is managed as a number of river 'waterbodies'.

Like many lowland catchments, one of the dominant influences on water quality is phosphorus, including the discharges from our 14 sewage treatment works in the area. Phosphorus is a common constituent of agricultural fertilisers, manure, and organic wastes in sewage and industrial effluent. It is essential for plant life, but too much of it can reduce levels of dissolved oxygen, which is needed for a healthy aquatic environment.

Reducing the high levels of phosphorus in lowland rivers to meet the standards needed to reach 'good' ecological status under the Water Framework Directive can be very expensive. Phosphorus standards are set to become even lower, increasing the need for us to test whether we can provide value for money for our customers through a catchment approach.

Our Smarter Catchments Project in the Evenlode is already underway with a phosphorus reduction trial. We are working with

farmers and other local stakeholders to encourage water sensitive farming and reduce phosphorus loss from farms and fields into local watercourses.

There are four elements to the project:

### 1. Catchment fund

The Catchment Fund provides grants for new infrastructure and changes in farm management practices to reduce phosphorus loss from fields and farmyards to watercourses.

The Fund makes annual payments at a rate high enough to support specific changes in operational practices on farms. These can be made for up to three years, subject to annual farm checks, and include a broad range of measures, from arable reversion to grassland, to installing and maintaining buffer strips to intercept nutrients.

It also provides grants for one-off, capital investment improvements to farm infrastructure, including 30 measures ranging from concrete yard and drainage renewal through to additional gates to keep stock away from watercourses.

The Fund also includes an 'Innovation' measure, designed to encourage applications from farmers who have ideas in addition to the measures we have listed and costed, and that would provide alternative approaches.

### 2. Advice service

Our advice service helps farmers take advantage of existing agri-environment schemes, as well as support in completing applications for our Catchment Fund. Delivered through a sub-contracted Catchment Sensitive Farming Officer, it includes free farm visits to help design farm activities that reduce phosphorus loss and deliver additional benefits.

### 3. No Till and Cover Crops

We are running a trial to explore the effectiveness of No Till and Cover Crops in reducing the loss of soil and phosphorus to watercourses, and in improving soil health. Just as importantly, we need to understand their impact on the profitability and efficiency of farms.

This approach involves maintaining stubble in fields after the harvest, and planting new crops directly into it. It can represent a big change in approach, but can also yield major benefits for farmers, and we are encouraging its use by providing access to or funding for alternative equipment and seed.

Trees being  
planted to slow  
farmland run-off

Credit: Atkins

Farmers decide what they would like to try, how, when and where. Our role is to support the trial financially so that risks to participants over the five years of the trial are minimised.

We have organised a series of farm visits and talks by people with experience of No Till and Cover Crop farming, open to all farmers in the Evenlode, to explore the challenges and benefits of this farming system, and to help design trials. The trial itself commences in August/September 2018.

### 4. Partnership working

We will be working with the ECP and other local organisations to support projects that provide additional benefits within the catchment. This includes the Natural Flood Management scheme being delivered with funding from the Environment Agency.

This scheme, running from 2017 to 2022, uses a range of interventions ranging from riparian tree planting to woody dams to naturally slow the flow of water within the catchment. Some have now been installed, and the next phase of the project will involve monitoring their effectiveness.

### Next steps

The Evenlode Smarter Water Catchments project is still at an early stage, with results being gathered and analysed. But

initial feedback from the partner organisations is positive, with enthusiasm for the prospect of scaling up our current work.

Once we have assessed the effectiveness of the different interventions we will look to expand the project in collaboration with the ECP. This will continue the partnership work already underway, which involves monitoring and sharing data across the organisations, as well as further investment into additional equipment and modelling.

Above all, the project will help by measuring how effective this approach is in reducing levels of diffuse phosphorus pollution; quantifying the cost per kilogramme of phosphorus removed from the environment, and fully understanding the relative cost effectiveness of financially supporting landowners compared to end of pipe control with additional treatment at sewage works. But we also believe the project can deliver multiple benefits, including increased biodiversity and opportunities for recreation.

Credit: Atkins

No Till involves maintaining stubble post harvest and planting new crops directly into it. The photograph on the left shows the no till drill sowing a crop within the stubble cover. The image on the right shows a winter wheat crop emerging through the stubble

Credit: Atkins



# River Crane

## Project focus

To assess the impact of catchment management in a densely-populated urban catchment affected by a wide range of issues.

## Key partner



 [www.cranevalley.org.uk/](http://www.cranevalley.org.uk/)

About the Crane: “The Crane Valley is a major geographical feature in the west of London, providing a continuous belt of semi-natural habitat from Harrow to Richmond-upon-Thames. The catchment is approximately 127 square kilometres”. (Crane Valley Partnership)

Much catchment management work in the sector has focussed on confined, upland areas, often dominated by one particular issue. The densely-populated urban catchments in the low-lying region we serve present a different challenge, with a wide range of issues to address.

This project focusses on how an integrated upstream approach could address the issues found in the River Crane catchment in west London, and ultimately reduce or defer the need for hard, end-of pipe solutions.

London’s rapid growth is quickly eroding the headroom that was created by a major programme of improvements completed in 2015 at the capital’s largest sewage works. The challenge is greatest at the Mogden site in Twickenham, west London.

With population growth of more than 15% expected in the sewage works catchment area over the next 20 years and very little space to accommodate changes within the boundary of the site, finding a solution within the catchment is key.

Wrongly connected household drains are a key source of problems in the Crane and wider Mogden sewage works catchments. These ‘misconnections’ send household waste into surface water drains, causing pollution in local rivers. In other cases they channel rainwater from domestic properties into sewers, using up valuable treatment capacity at our works.

This huge influx of rainwater is the dominant issue we need to address. A more conventional approach to upgrading Mogden sewage works is estimated to cost £256 million, with relatively high operating costs through significant energy requirements. Importantly, it would not solve the underlying problems at source. We are aiming through this project to reduce the extent to which new infrastructure is needed at the works.

This project will aim instead to work through the local catchment partnership to identify and deliver a programme of activities, many in collaboration with customers and NGOs, including:

- Detailed catchment modelling
- Improvements to the public sewer network, which could include restoring surface water outfalls; recommissioning redundant outfalls and creating new sections of foul sewer
- Property-level improvements, potentially including tackling misconnected drains; installing water butts and planters
- Increased use of SuDS to manage surface water, including at schools
- Education and engagement, targeting the 60 schools in the catchment
- Extending the successful citizen science programme already underway.

Volunteers led by Rob Gray from FORCE search for evidence of pollution in the River Crane, west London. This Outfall Safari project puts citizen science and community engagement at the heart of catchment management.

Credit: ZSL

## Citizen Crane

Citizen Crane is a citizen science project to investigate the causes of pollution in the River Crane, and to identify and put in place measures to improve the condition of the river. The project is now in its fourth year, supported by Thames Water throughout this period, and provides a continuous dataset of water quality data for the catchment.

The project steering group includes members of the Crane Valley Partnership, including Green Corridor (host of the Partnership); Thames Water; the Environment Agency; Zoological Society of London; Friends of River Crane Environment and frog environmental Ltd.

One of the most important elements of the project has been Outfall Safari. Citizen Crane volunteers surveyed all the outfalls along 34 km of the main river corridor in the catchment; locating, photographing and assessing a total of 227 outfalls, using a methodology previously developed by Thames Water. Details of all polluting outfalls were passed to Thames Water’s Environmental Protection Team to follow up and take action.

Since the creation of the Outfall Safari methodology, 112 volunteers have been trained and the approach used on more than 140 km of river corridors across Greater London. More than 1100 outfalls have been assessed and their details passed on to the Environment Agency, Thames Water and the relevant catchment partnerships to take action by tackling the pollution that volunteers find - often from wrongly connected household drains.

Outfall Safari has improved public awareness of the risk of wrongly connecting drains, which has historically had little public visibility. This should support a reduction in the appearance of new misconnections, and more effective work to resolve them where they are found.

Following the success of the project Thames Water is now supporting similar schemes on the River Cray in Bromley and Bexley, and the River Beam in Barking and Dagenham and Havering.

Credit: ZSL



Credit: ZSL

Trained volunteers gathering data from a surface water outfall

Polluted surface water outfall





# River Chess

## Project focus

To explore the impact of catchment management in a rural catchment where flow and water quality are critical.

## Key partners



 [www.riverchessassociation.co.uk](http://www.riverchessassociation.co.uk)

 [www.chilternsaonb.org/about-chilterns/chalk-streams/chalk-streams-project.html](http://www.chilternsaonb.org/about-chilterns/chalk-streams/chalk-streams-project.html)

About the Chess: the River Chess is a chalk stream flowing from Chesham in Buckinghamshire to Rickmansworth, where it becomes a tributary of the Colne. It supports wildlife including water voles, brown trout and stream water crowfoot, and is enjoyed by walkers, fishermen, photographers and wildlife enthusiasts.

While the key challenge is the impact of water abstraction on river flows, there is a wider range of issues affecting the catchment. This project aims to provide multiple benefits by combining various strands of existing and new activities.

## Flow

The section of the River Chess upstream of Chesham sewage has in recent years run dry, sometimes for long periods. This is thought to be due to a combination of licensed abstractions for customers served both by Affinity Water and Thames Water, and low rainfall.

## Aquatic plants

One factor limiting the quality of the River Chess is levels of phyto-benthos, plants which play an important role in the health of freshwater environments. This is likely to be a result of the loss of suitable habitat for them to thrive in, linked to low flows; high levels of sediment and enrichment as a result of run-off from land adjacent to the river. This makes the river less able to support healthy fish populations.

## Water quality

Levels of phosphorus and nitrogen are further limiting the water quality of the River Chess. This is thought to be due to urban run off and, to a lesser extent, agricultural practices on arable land. Treated effluent discharged from Chesham sewage works is meeting current permit standards, but there are some concerns that these standards are not sufficient to support good chalk stream ecology.

## Groundwater flooding

In addition to the challenge of lower river flows in the summer months, winter rainfall in a chalk bedrock catchment like the Chess can lead to high groundwater levels, causing infiltration into the sewer network. This has contributed to storm discharges from Chesham sewage works. Although this is not the main focus of the project, we will consider how the approaches we take could positively influence this issue.

## Next steps

We are taking the project forward in partnership with the River Chess Association and the Chiltern Chalk Streams Project, both well-established and very active in the catchment on projects ranging from riverfly monitoring to work with schools and river restoration projects. They have already developed a project plan of potential interventions. With our partners we are now compiling data about the catchment and, once a catchment model has been completed we will analyse which activities will be most effective and jointly agree objectives, governance and the activities we will deliver from 2020.

Work to repair a river bank at Sarratt on the River Chess

Credit: River Chess Association

# River Kennet

## Project focus

To test how an improved understanding of and closer connection with their local river affects the way a community uses water.

## Key partner



## Action for the River Kennet

 [www.riverkennet.org/](http://www.riverkennet.org/)

About the Kennet: 72km in length, the River Kennet rises west of Marlborough in Wiltshire, and joins the River Thames at Reading. One of England's iconic chalk streams, it is both an important source of water for our customers locally and in Swindon, and a Site of Special Scientific Interest along much of its length.

Supported by organisations including ARK, we completed a 17 km, £30m pipeline in 2017 to end groundwater abstractions from Ogbourne, and reduce them at Axford. This is boosting flows in the Kennet by up to 10 million litres a day during periods of low river flows, addressing long-standing concerns about the impact of abstractions.

The Smarter Water Catchments project for the River Kennet marks the next step in work to protect and improve the river. We will work with ARK to raise awareness of the connection between water use and the condition of the river, and to develop the community's relationship with the river. The aim is both to reduce demand for water, and influence the way people use the sewers.

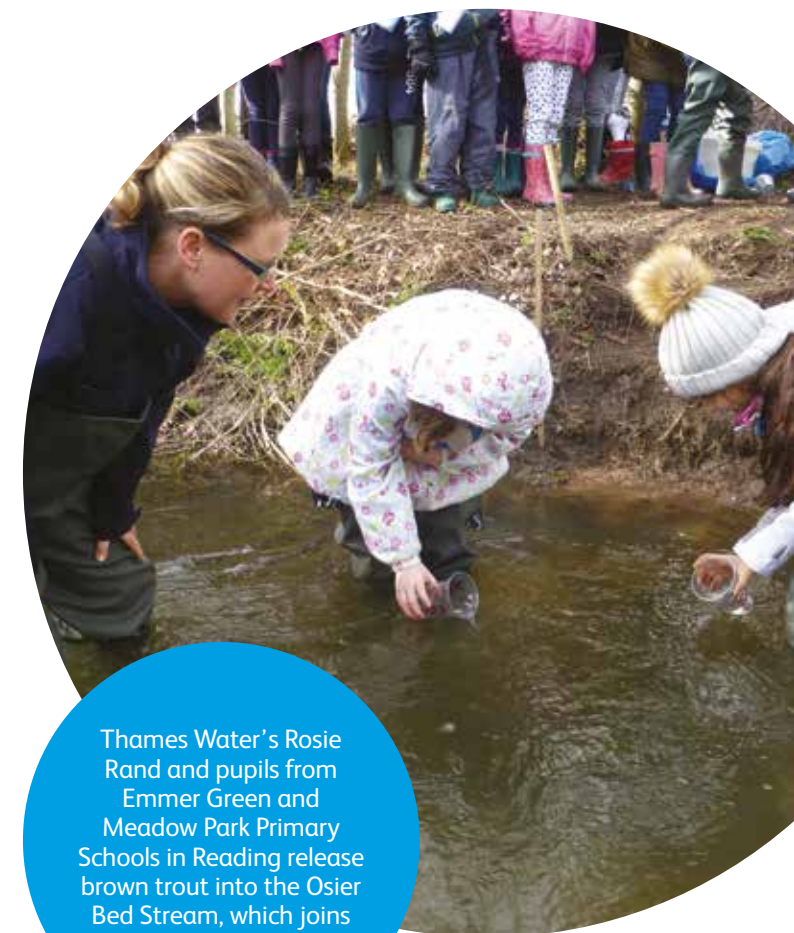
Thames Water is already working with communities along the Kennet on projects including Smarter Home and Business Visits that audit water use, provide tailored advice and fit water efficient devices for free, and the river restoration work at Durnsford Mill on page 11. The Trout in Schools scheme, a ten year programme we part-fund, has helped thousands of children learn about the river.

The Smarter Water Catchments project will bring together existing activities and new approaches. It will start with research with customers to establish a baseline understanding of their views of the river, and attitudes towards water, followed by a co-ordinated programme of activities that is planned to include:

- Smarter Home and Business Visits, providing advice and practical support to reduce demand

- The installation of water butts, rain gardens, domestic and commercial rainwater harvesting
- A full programme of educational visits with local schools
- Opportunities to improve health and wellbeing through the positive impact of 'Blue Spaces'
- Visits to food service establishments to provide advice on waste disposal, including used cooking oil, to reduce the risk of sewer blockages that can cause flooding and pollution

We aim to foster a deeper understanding of the value of the River Kennet, and create opportunities for measurable changes in behaviour that have wider benefits. These will include the volumes of water used locally, and the number of blockages we need to clear from local sewers.



Thames Water's Rosie Rand and pupils from Emmer Green and Meadow Park Primary Schools in Reading release brown trout into the Osier Bed Stream, which joins the River Kennet

Credit: ARK



# Environmental resilience

## Project focus

To test the impact of increasing environmental resilience on a catchment's ability to support public water supplies and receive treated wastewater.

## Key partner



[www.southeastriverstrust.org](http://www.southeastriverstrust.org)

About the catchment: this Smarter Water Catchments project will focus on a river in the area served by Thames Water and South East Rivers Trust.

We have been working with the Trust for 10 years and provide financial support for the 'water catchments for communities' project, which connects people with their rivers through a variety of volunteering opportunities. We support SERT on work including river clean-ups; river restoration; monitoring and controlling invasive species; and river monitoring to detect changes in quality.



Credit: SERT

The River Wandle at Hackbridge, south west London, before and after river restoration work led by the Wandle Trust, part of the South East Rivers Trust.

This pilot will explore whether we can help the environment be more resilient to our activities, starting off with river catchments which are not meeting Water Framework Directive standards for 'good ecological status'. For those rivers where our activities are influencing this, SERT are helping us identify where improvements in the river may help reduce our impact, which might be linked to abstraction, or discharges from our sewage works.

Over-abstraction of watercourses can cause unnaturally low flows, and discharges from the sewage network can introduce high nutrient loads, harming river systems and the fish, invertebrates and plants that live there. River restoration techniques aim to bring back or strengthen the natural processes that support biodiversity, flood management, landscape development and recreation.

This Smarter Water Catchments project will examine whether a new approach to increase the environmental resilience of river ecosystems can be achieved by proactively improving river habitat to mitigate the impact of abstractions and effluent discharges.

Where our activities are demonstrated to be harming the environment, potential solutions are often subject to a cost benefit test. If the benefits of ceasing or modifying the activity, by using an alternative abstraction or improving the quality of a discharge, for example, do not exceed the costs of doing so, an alternative approach has to be found.

This Smarter Water Catchments project will investigate and evaluate the extent to which it is possible to help the river environment cope with our activities without harm, by modifying the river's flow and features so they are closer to a more natural state and enhancing the river's ability to cleanse itself.

Key elements of the project include:

- Working with SERT to identify opportunities for river restoration projects
- Working with stakeholders to jointly agree objectives, ways of working and governance – and to agree activities from 2020
- Enhancing our understanding of the most effective interventions to increase the resilience of the river environment
- Delivering projects and developing an understanding of the potential to use river restoration more widely across our region and elsewhere.

# Water resources and flood management

## Project focus

To test the scope for water storage reservoirs to provide flood storage, and flood alleviation schemes to offer capacity to store water for public supply.

We are working with the Environment Agency to develop this Smarter Water Catchments project.

Recent years in the UK have seen more frequent extreme weather events, with a prolonged period of drought in 2010-12 followed by severe flooding in the winters of 2013-14 and 2015-16. This has created greater interest in managing these peaks and troughs in water availability and, in particular, the potential for reservoirs to provide flood storage, and flood alleviation schemes to store water for public supply.

The key challenge in managing assets to serve both these purposes is the mismatch between need and opportunity. Normal practice is to replenish water storage as soon as the opportunity arises in the autumn and winter. This manages the risk that lower than usual rainfall in subsequent months could lead to pressure on water supplies – but leaves very limited capacity to store flood water at the time of year when it is most likely to occur.

Conversely, the most likely time that flood waters could provide an additional source for public supply is during the wetter months – but this is when the public demand for extra water, and capacity in water storage reservoirs to receive any more, are at their lowest.

This project will test whether these challenges can be overcome by quantifying them and exploring potential solutions. We will look specifically at whether any water resource benefits can be secured from the major flood alleviation schemes being delivered at Oxford and on the Lower Thames. We will also assess whether the operation of our existing water storage reservoirs could be adapted to provide flood storage, with an investigation based on Farmoor reservoir, near Oxford.

## Next steps

The pressures of rapid population growth and climate change, and the need to continue to improve the quality of the environment we rely on, are all greater than ever before – and growing. Conventional solutions to these new challenges are unlikely to provide all the answers we need - and may not provide the best value for money for our customers.

Catchment management projects in the sector have already delivered excellent results. Our challenge now is to test the potential to take catchment management to another level, delivering wider benefits, on a greater scale. We are excited about the potential Smarter Water Catchments offers to do this, and would welcome the chance to talk to you about our plans.

## Get in touch

If you would like to find out more about any aspect of our Smarter Water Catchments work – including discussing opportunities to get involved - please contact Helena Soteriou:

[helena.soteriou@thameswater.co.uk](mailto:helena.soteriou@thameswater.co.uk)

We will investigate the potential use of Farmoor Reservoir, near Oxford, to provide additional flood storage.



# Catchment management projects

