Delivering our smart meter programme.

Delivering our smart meter programme.

Manging water supplies will only get more difficult as our population grows and our climate changes. Installing smart meters is at the heart of our plan to reduce water demand. Smart metering provides a wide range of benefits to our customers, but it can see some customers' bill rise significantly. It is therefore important that we engage with customers and stakeholders at an early stage in our metering programme.

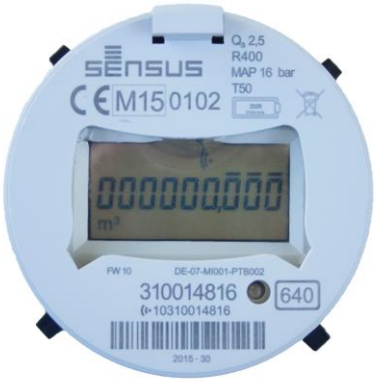
Background.

A combination of the population increasing and climate change means we have a shortfall between the water we can supply and the water our customers use. Fitting free smart meters is one of many ways we are working to address the supply and demand gap in the immediate future as metered customers tend to use an average of 12% less water. Meters also provide greater visibility of where water is used giving households more control over the water they use and their bills.

Our stakeholder engagement.

We work in partnership with political stakeholders, keeping them informed about our programme, and seeking their support while we deliver smart meters in their area. Before starting the programme in any area, we engage with MP's and London Assembly Members, explaining our plans, seeking their advocacy and responding to any queries they may have.

Local elected leaders and council officers provide helpful guidance on how we can best explain our plans to local groups. For example, Enfield Council created a dedicated web page to provide information about our metering programme. We met with the Newham Council leaders to explain and test our engagement strategy and communications plan for the vulnerable members of their community.



Our customer engagement.

We produce a bespoke localised engagement action plan which identifies customers who would require additional assistance and engagement. We may launch an awareness campaign in the area to introduce the programme before sending out detailed customer engagement letters.

Throughout the programme, we continue to engage with housing associations, community groups and voluntary organisations such as Citizens Advice and Age Concern to help widen our communications and share the key messages of the programme between members of the community. Our stakeholder engagement team also meets with religious groups to make sure we understand any concerns about smart meter devices impacting their religious practices.

Our metering team answer questions and concerns building relationships with our customers and stakeholders, and giving them the information they need. Customers are also offered free Smarter Home Visits where our team of advisors help customers assess how they can save water, energy and money.

Thames Water

Being a good neighbour at Streatham Pumping Station.

Case study – March 2017

Being a good neighbour at Streatham Pumping Station.

Our beautiful 19th century Streatham water pumping station is loved by local residents, and it's a real source of pride for their community. But concerns were raised by local residents about the visual impact of new tanks to be installed next to the pumping station.

Background.

As a result of increasing demand for water, we needed to install two new water tanks at Streatham Pumping Station.

Unfortunately, due to their size and the space restrictions of the site, they needed to be placed at the front of the pumping station site, next to the footpath and visible to local residents.

We were aware that residents living close to the Pumping Station were likely to be concerned about the visual impact of the new tanks and their opinions needed to be considered and reflected in our final plans.

- **New water tanks for our beautiful 19th century Streatham Pumping Station**
- **Establishing a working group with residents**
- **Public drop-in sessions to inform residents of our plans**

What did we do?

Before our work started, we held two public drop-in sessions to tell residents about our draft plans and get their feedback. Their main concern was that the tanks would have a negative impact upon views of the pumping station and its surroundings.

We worked with the community to make sure that the tanks were not viewed as an eyesore, and that we did not adversely affect the character of the local area. One-to-one discussions were held and a local working group was formed, with support from local councillors, and a resident elected as the chair.

As a result of these meetings, we hired a landscape architect to work with the group and design a landscaped screen around the tanks. For additional off site screening, we also agreed to fund the planting of trees along neighbouring streets.

Collaboration on our Oxford catchment study.

Collaboration on our Oxford catchment study.

We're working closely with the Environment Agency (EA) and local councils on flood alleviation in Oxford to help reduce the risk of sewer flooding to our customers.

Background.

In Oxford we are undertaking a detailed drainage catchment study looking at traditional and new methods to reduce flooding and improve levels of our drainage service. In developing our catchment study we have worked collaboratively with key stakeholders such as the Environment Agency and local councils.

Oxford's housing and employment levels are expected to grow significantly and we have therefore worked closely with the Oxfordshire local planning authorities to understand where major development will be built and by when. By reflecting this growth in our catchment study, we can then help make sure this significant growth doesn't increase the risk of flooding or pollution in the local area.

- **Reducing the risk of flooding and pollution in Oxford**
- **Collaborative working with the EA and councils on joint flood alleviation solutions**

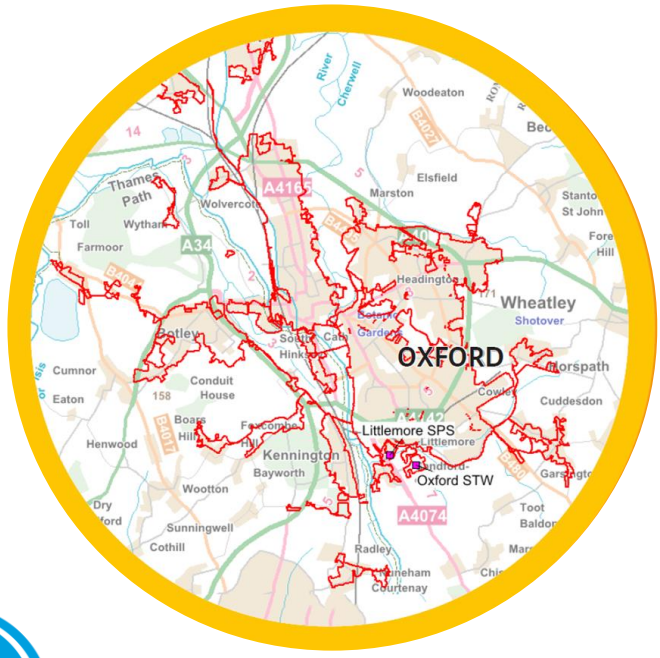
Sharing our resources.

We have also combined our drainage network model with the EA's hydraulic river model of the River Thames through Oxford, and enhanced it by adding data from a number of tributaries. This has provided our drainage partners with an integrated flood prediction model and assists us and our partners in designing robust flood protection schemes.

Communication and collaboration.

We've developed a close collaborative relationship with the EA, Oxford City Council, Oxfordshire County Council and other independent groups including the Oxford Flood Alliance and the South Oxford Flood Action Group.

As we move from the study phase of our work into delivery of drainage solutions, this close collaboration with our drainage partners will continue to develop further.



Walthamstow Angling Academy.

Walthamstow Angling Academy.

Walthamstow Angling Academy was developed as part of our education and engagement programme for local communities in North and East London. Its aim is to use angling as a way to teach young people about the environment and sustainable water usage, with additional focus on wellbeing and social inclusion.

Background.

The Walthamstow Angling Academy is based at our Walthamstow Reservoirs site. Ten reservoirs make up this site, which is nationally and internationally recognised for its wildlife. They also make up the largest fishery in London, as well as being a major operational water supply site for 1.5 million people across North East London.

Mainstream learning.

We work with schools to understand what they need to achieve from angling sessions, and we tailor these to complement their learning curriculum if possible. This year we received more requests for larger groups from mainstream schools than previously.

Over the year, groups of pupils have learned about the water cycle, business studies and engineering, all through the lens of angling. Each of our sessions has a special focus on sustainable water usage and environmental awareness.

Hard to reach communities.

Our approach to learning at our Angling Academy is a valuable engagement tool for groups with responsibility for disengaged young people, as well as those who are less able or with mental health needs.

- **Education and engagement programme in North and East London**
- **748 community members took part in angling events last year**

"We found you and your team very welcoming, knowledgeable, organised and patient. The session itself was amazing and children liked the activities, the fishing and the hands on experience of engineering. I would strongly recommend that other teachers book such sessions with you in future."

Rashida Naseer, Teacher at Al-Muntada Primary School

Family and community days.

Our school holiday and weekend family fishing sessions were also very popular. Over 30 events were held during 2016/17, engaging 748 community members, of which 558 were young people between the ages of 4 and 18.

We also held a number of community open events throughout the year, in partnership with the charity Get Hooked On Fishing, as well as with Waltham Forest Council. These events generated a lot of interest, with families returning to fish at weekends and on weekday evenings.

Gateways to healthier lifestyles.

Although the Academy contributes to the programme at the education centre, it has also become a gateway for participants to develop their fishing skills as a new hobby, or just to enjoy being out in green spaces and observing nature.

Thames Water

Give Someone a Start.

Give Someone a Start.

Our Give Someone a Start (GSAS) programme is a three-week work experience aimed at giving participants who are struggling to find employment an insight to working life at Thames Water.

Background.

This programme started as a pilot scheme in September 2012, and evolved following a Business in the Community Seeing is Believing event we held for our partners to identify how we could collectively make a difference to unemployment in our sector. In November 2014, it was established as an ongoing programme.

GSAS is focussed on actively recruiting participants from various backgrounds including long term unemployed, Not in Education, Employment or Training (NEETs) and those with mental and physical disabilities.

We work in partnership with a number of charities and organisations to find people to be involved, including The Shaw Trust, MENCAP, The Princes Trust and the Job Centre Plus.

A positive experience.

Last year, GSAS participants said they felt more confident about going into the work environment, and many experienced positive changes in behaviour and attitude, as well as increased self-esteem.

- **GSAS aims to make a difference to unemployment in our sector**
- **Three-week work experience for those struggling to find jobs**
- **28 candidates took part last year**
- **100 per cent felt increased confidence and self-esteem**

Developing their skills.

During 2016/17, we had 28 candidates join us across the business. They all did very different jobs, from office administrative positions and project management, to working with our teams on sewage treatment works in Swindon and North East London.

The scheme runs four times a year in our main employment locations: Reading, Swindon, West London and East London. As well as work shadowing with their mentors, the participants take part in various workshop days which include CV writing and interview practice, as well as communication skills, an engineering challenge, and a visit to one of our operational sewage treatment works.

Alex, one of our participants.

Alex joined our Reading cohort in June 2016 after hearing about the scheme through his employment adviser at MENCAP. Although he had achieved a first class degree in Maths, he found it difficult to enter the working environment due to his mild Asperger's condition.

Alex successfully completed the scheme, which gave him greater confidence in how to operate in a structured work environment. The Human Resources team, where he undertook his placement, was so pleased with how he developed and worked over the course that they extended his stay for an additional four-week paid placement. This helped him develop even more skills and confidence for future employment.

Working with communities.

Case study – March 2017

Working with communities.

Through our latest five-year community investment programme worth £6.5m, we're aiming to get communities involved through environmental enhancement and educational outreach between 2014 and 2020.

During 2016/17 we provided funding for 16 exciting projects and a feasibility study with a total value of more than £1.4m, all of which were carried out by our community partners. Below are some examples of the projects we are working on. Ashtead Rye Meadows was completed during 2016/17 and the other projects highlighted are expected to be completed over the next two years.

Ashtead Rye Meadows.

This project, completed during 2016/17, enhanced the habitat at Ashtead Rye Meadows by re-naturalising the stream and creating new ponds and backwaters along a stretch of the Rye Brook.

The Ashtead Rye Meadows Wetlands are 14 acres of meadowland spanning the Rye Brook from Ashtead Woods Road. Working with the Friends of Ashtead Rye Meadows and local volunteers, we helped create a wetland area with a new pond and several scrapes, and a Boardwalk to provide access to those less able. The Friends Group also cleared stretches of the Rye Brook, widening the river and realigning the banks.

Community learning on the River Crane.

We're working with the Friends of the River Crane Environment group on a community learning project. This project will introduce local volunteers to a range of conservation and management skills by means of a variety of activities that will help to improve the River Crane.

The project will take place in open spaces next to the River Crane in Twickenham. The range of activities will include aquatic planting, restoring instream flow deflectors, hedge laying and a variety of traditional techniques such as grassland management using shire horses.

Totally Thames.

We're working with the Thames Festival Trust to help them expand the Key Stage 3 education programmes they run. The Trust is developing a River Thames resource pack which complements the London Curriculum's current portfolio of education resources at Key Stage 3.

Community reedbeds.

Working with Thames 21, this project aims to engage with the local community in six London Boroughs. The project involves the community in identifying locations where they would like to see new reedbeds. After these have been planted, we will provide training for local people to manage and maintain the reedbeds, and make them more sustainable in the future.

Ben Fenton, Thames 21's 'Love the Lea' Programme Manager, said: "We want people to enjoy their local river. By offering the chance to choose the location of reedbeds, we hope to create a sense of ownership and perhaps entice them to join us to install the reedbed and look after it into the future".

- **Over £1.4m committed during 2016/17**
- **16 projects received funding during 2016/17**

Thames Water

Time to Give - Great Greenway clean-up 2017.

Case study – March 2017

Time to Give - Great Greenway Clean-up 2017.

The Greenway is a four and a half mile footpath and cycleway in East London, constructed on the embankment over the Northern Outfall Sewer built by Sir Joseph Bazalgette.

Thames Water employees, residents, community groups, school children and businesses from across the borough came together to take part in the Great Greenway Clean-up 2017 organised by Thames Water and Newham Council, to enhance the area for residents, visitors and the community.

These events along the Greenway were part of a range of community clean-up days organised by the council's Community Neighbourhood Teams. Local councillors took part in the clean-ups in their areas and the Mayor of Newham, Sir Robin Wales, joined the Greenway clean-up in Stratford.

The volunteers removed more than 250 bags of rubbish from Newham's much used Greenway. 450 volunteers collected cans, bottles, food packaging and other rubbish, as well as bicycles, a mattress, car tyres and a hammock.

"I am delighted so many people came out to take part in the Great Greenway Clean-up and the other clean-up days organised by Newham Council… These events also reflect the very ethos of our community neighbourhood work to bring people together to enhance their local areas."

Deputy Mayor, Councillor Ken Clark, Newham

Being a good neighbour.

We want to be a good neighbour in the communities where we operate, and litter picks are a great opportunity. We received lots of support for this clean-up challenge, and we're committed in maintaining the Greenway as an attractive and useful path for everyone in East London.

Army of volunteers.

We'd like to thank all the organisations who supported the great Greenway Clean-up 2017 with our 25 Thames Water employees, including:

- View Tube
- Poplar HARCA
- Dot Dot Dot
- ByWaters
- Eight2O
- Belfour Beatty
- The Conservation Volunteer group
- First Avenue Urban Wilderness Community Garden group

Looking after biodiversity by enhancing our sites.

Case study – March 2017

Looking after biodiversity by enhancing our sites.

We've invested over £250,000 to improve biodiversity and access to wildlife at our sites during 2016/17. This has included putting up new bird hides, fencing and hedgerows, as well as habitat enhancements and better access to a number of our operational and leased properties, which are managed by our partners for conservation and recreation.

Here are a few of the projects carried out during 2016/17:

Grimsbury Reservoir, Banbury.
Our land at Grimsbury Reservoir includes open water, flood meadow, hedgerow, scrub and extensive established woodland. It is managed by the Banbury Ornithological Society and is noted for its bird, bat and otter populations.

Grimsbury Reservoir is open to anglers and sailors, and we've also created a link across our land between the popular Spice Bowl Park and the River Cherwell Canal footpath to improve access for people to enjoy the biodiversity of the site. In the longer term we aim to link these well-used routes to the proposed Banbury Country Park.

As well as this access link, new disabled access and a pedestrian footway have been created, making a beautiful circular walk around the reservoir.

Investing over £250,000 to improve biodiversity and access to wildlife on our sites

Hedgerows project, Chilterns.

We planted over 600m of native mixed species boundary hedgerows at four of our sites in the Chilterns. As these hedgerows get established, they will provide habitat and green corridors for local wildlife in the landscape.

Hedgerows have also been associated with creating micro-climates, reducing wind speed and soil erosion, and absorbing carbon.

Habitat enhancement and new raised bird hide, Bicester.

This small local Wetland Nature Reserve beside Bicester sewage treatment works recorded the highest number of wintering teal ducks in Oxfordshire, with one count in December 2016 numbering 271 individuals.

One reason for this may be because we've worked hard on habitat enhancements to increase the area of shallow open water on this site. A new 12-person raised hide has also been built for visitors to enjoy and record the site's bird life, and we held an opening event supporting World Wetland Day 2017 in February.

Production Pollinator project: beekeeping access on our sites.

Pollinators like bees play a vital role in ecosystems everywhere, but they're often overlooked in calculations of natural capital and services.

Beekeepers are now active on six sites across our catchments. We have created access agreements on land which has been identified as non-operational, and where health and safety issues won't be a concern for members of the Guildford and Weybridge Beekeeping Associations.

We reduced summer mowing to make sure there are enough foraging sources and habitats available for both domestic bees and their wild cousins. Grassland and meadows were left to mature and flower throughout the summer season, resulting in over 100,000m² of un-cut grassland habitat in 2016.

Historical orchid sites.

Various sites have been identified as potential orchid locations, and some landscape management changes were proposed for these sites from winter 2015. As a result, orchid populations were confirmed on six new sites during summer 2016.

Walthamstow Wetlands.

Walthamstow Wetlands.

This is an £8.7 million project to open up Thames Water's Walthamstow Reservoir complex to the public. It will transform the 211 hectare site into one of the largest urban wetland nature reserves in Europe. The site is due to open to the public in autumn 2017.

Ten reservoirs make up this site, which is nationally and internationally recognised for its wildlife. They also provide London with its largest recreational fishery, at the same time as being an operational water supply site. This project will give visitors free access to the site's natural, industrial and social heritage.

First of its kind

This is a first of its kind public, private and charity partnership between Thames Water, Waltham Forest Council and the London Wildlife Trust (LWT). Although this is a Thames Water operational site, LWT is delivering the Walthamstow Wetlands project, and will be responsible for conserving and enhancing the site's wildlife and heritage.

Construction phase

This year saw a major push in construction leading up to the opening. A topping out ceremony (a traditional celebration for new buildings) was held after the roof of the 24-metre swift tower was lowered into place.

The tower replaces an industrial chimney which was demolished in the 1950s, and includes 54 specially installed swift nest boxes to attract urban swifts and bats.

The listed Victorian Engine House, built in 1894, will be renovated into a visitor centre with a café and an education space. There will also be a viewing platform in the Grade II listed Coppermill Tower, providing stunning views over the reservoirs and across London. There will also be a 1.7km new foot and cycle path to improve access, as well as two hectares of reedbeds to enhance habitats.

- **Transforming this 211 hectare site into one of the largest urban wetland nature reserves in Europe**
- **Conserving and enhancing the site's wildlife and heritage**

www.walthamstowwetlands.com

Thames Water

Woodberry Wetlands.

Case study – March 2017

Woodberry Wetlands.

Woodberry Wetlands is an 11 hectare operational reservoir in the middle of Hackney, London. This site is run by the London Wildlife Trust, and it's now a wildlife haven that can be enjoyed by lots of visitors.

This project has opened up access to the site with new pathways and boardwalks. We've restored the Grade II listed building, adding a thriving café and community space, and planted extensive reedbeds. The reservoir now provides many opportunities for community learning and participation.

Praise from Sir David Attenborough.

When he officially launched Woodberry Wetlands on 30 April 2016, Sir David Attenborough said he was "unbelievably lucky" to be turning 90 on the day when this new nature reserve opened in East London.

He added: "It's marvellous in this heavily built up area, that you should have a glimpse of real true countryside, not artificial. I think the pond is artificial in the sense the reservoir is artificial, but nature has taken over so there is a whole community of creatures here, which brings a breath and vision of the countryside and wild nature, and is so refreshing and so important for all of us."

Working together.

The project is a unique collaboration between Thames Water, the London Wildlife Trust, London Borough of Hackney, Berkeley Homes Genesis Housing and Manor House Development Trust.

- **A wide range of wildlife including over 100 species of moths**
- **60,000 visitors in the first year of opening**

www.woodberrywetlands.org.uk

Thames Water

Wildlife records.

Our habitat work was all completed before the official opening, and during the summer we have been rewarded with a wide range of wildlife on site:

- 99 bird species have been recorded
- A pair of black-necked grebes (*Podiceps nigricollis)* has been seen
- Dunlin (*Calidris alpina)* - a first for Woodberry Wetlands have appeared
- Regular visits by the rare Nathusius' pipistrelle bats (*Pipistrellus nathusii*)
- 23 species of butterfly
- Over 100 species of moths

Volunteering.

The London Wildlife Trust runs a number of volunteering opportunities on site. People from the local community can become site wardens who meet and greet members of the public.

Volunteers carried out a number of ecological surveys on site. The first dragonfly and damselfly survey took place over the summer as part of the London Wildlife Trust's 'Water for Wildlife Project'. Working with the London Bat Group, volunteers have had a chance to survey bat populations around the reservoir.

Conservation work plays a big part in the volunteering calendar, with lots of opportunities for volunteers to manage the reed beds and carry out other practical tasks.

The cob round house building was constructed by volunteers, and now provides a sheltered place for them to rest after working hard in all weathers.

Education.

The site offers a great range of formal and informal learning experiences. Children from schools across London enjoy pond-dipping sessions which let them discover the mini-beasts and other creatures living in the wetlands, as well as learning about where their water comes from.

A series of heritage walks also takes place on this site, focussing on the Coal House and the Ivey Sluice House on the New River.

Pictures by Penny Dixie

The Ridgeway path improvements.

The Ridgeway path improvements.

The Ridgeway path runs for three and a half miles in South London from Plumstead Station to Crossness Pumping Station. It is built on top of our Southern Outfall Sewer, engineered by Sir Joseph Bazalgette.

- **Improving access to the Ridgeway**
- **Increasing safety and creating a new link to Southmere Park**
- **Helping biodiversity thrive on one of London's green corridors**

Background.

The Ridgeway path is one of our three key green corridors in London (Ridgeway, Greenway and the New River). It is built on an embankment which covers the Southern Outfall Sewer, designed and built by Sir Joseph Bazalgette in the Victorian era.

What we're doing.

We are working with partners to provide pedestrians, cyclists and runners with a safer and more convenient route as well as helping biodiversity to thrive. These improvements are due to be completed during 2017.

Working together.

The project is funded by Thames Water and the London Borough of Bexley and Peabody. Project partners also include the Royal Borough of Greenwich and the North West Kent Countryside Partnership (NWKCP).

Ridgeway improvements.

The new shared use footpath will have new lighting discs installed on the surface to mark the edge of the path. A new access ramp will also be constructed to create a new link to Southmere Park. All the existing gates will be upgraded, with new signage installed.

"I'm pleased to see work getting started on the Ridgeway to create a much safer and more usable connection between north and south Thamesmead. This project is a great example of what we can achieve for the community with the support of our partners."

Cllr Linda Bailey, Bexley's Cabinet Member for Regeneration and Growth

Thames Water

Our WaterAid Campaign.

Case study – March 2017

Our WaterAid Campaign.

We continue to support our principal charity, WaterAid, which was set up by UK water companies over 35 years ago. Our WaterAid steering committee, made up of employees from across the company, sets the strategy and fundraising targets each year and meets regularly to review progress and recognise achievements.

It's unacceptable that ten million people in Malawi, the world's poorest country, do not have a safe and clean place to go to the toilet. Thames Water is supporting WaterAid to raise issues around water, sanitation and hygiene at the highest level in Malawi, to make change happen for everyone across the country. We'll also be using our people's expertise to help Team Malawi solve technical issues on the ground.

In Malawi 2016/17, we've reached:

- **945 people with water**
- **2525 with sanitation**
- **1770 with hygiene messaging**

Our fundraising activities.

We have calendar of events for fundraising which includes:

- The 'Big Fat Cheesy Quiz' - which raised £27,000 with the help of our contractors.
- Our 20th annual raft race - around 30 teams battled it out on the River Thames in Reading, raising £25,636.
- Our WaterAid employee lottery, managed by employee volunteers, along with payroll giving, raised £57,008.
- We also had three employees participate in WaterAid's Trek Malawi, raising almost £11,000.
- Annual netball and 5-a-side football tournaments raised £13,159.
- Ten employees took part in the London Marathon alongside our regular Humphrey the Camel, raising £16,653.

Thames Malawi

Transforming lives in the warm heart of Africa.

A proud year of fundraising.

In the first of our four-year £2 million 'Thames Loves Malawi' fundraising campaign we have raised £350,147 with a further £93,000 of income pledged.

Our graduates once again participated in WaterAid's 'Water Innovators' initiative, raising £5,641 by organising three new fundraising activities.

Raising money to transform lives.

Over the next three years we will continue to work with WaterAid to transform people's lives in Malawi. We hope to do this by raising over £1.5 million to improve sanitation, provide safe water and educate people in two key towns.

Thames Water

Looking for invisible flaws in our water mains.

Case study – March 2017

Looking for invisible flaws in our water mains.

Trunk mains are the backbone of our water network, carrying drinking water the long distances from our treatment works. Although bursts on these pipes are relatively rare, when they do happen they can cause major and unacceptable impacts such as flood damage, widespread interruption to water supplies and even risk to life.

We know that trunk main bursts are a concern to our customers and the public, especially after some high profile events in late 2016. We're constantly trying to learn more about what causes these events and where they have the worst effects, so we can work out the best ways to invest in these important pipes.

- **£4.5m three-year project to trial new ways of testing trunk mains**
- **Working with experts at the University of Surrey to better understand how corrosion affects trunk mains**

Ageing wonder material.

Much of our 3,500km trunk main network is made from cast iron dating back up to 200 years, with diameters as great as 1.5m. Although cast iron was a wonder material of its day, it was put in the ground with little protection from corrosion. Many of these pipes have decades of service left, but we know that in some places they've become badly corroded. During the current five-year period we are already investing £240m in improving our trunk mains, and this project will further enhance our understanding for the future.

University of Surrey research.

Thames Water's water innovation team have spent years working with the University of Surrey to understand how corrosion affects the strength of cast iron pipes. We've also learned that the corrosion is very variable and difficult to detect. The research that we fund and supervise has been published in scientific journals.

Thames Water

Three-year programme.

Over the next three years we're investing £4.5 million in a major programme of research and technology trials for trunk mains. Our ongoing practice of inspecting the outside of these pipes whenever we dig them up to work on them gives us useful information about the network as a whole. We're going to build upon this experience and our previous research, to enable inspections of hundreds of metres of pipe at a time. To achieve this without digging up entire roads, we need a method that will work from inside the pipe.

In-pipe scanning technology.

The oil industry have been inspecting pipes from the inside for years using sophisticated scanners, but we can't just copy them. We need technology that will work on thick cast iron, which is much more difficult for scanners to penetrate than the steel used in oil pipelines. We also need to avoid damaging our pipes or affecting the quality of the water that flows through them. To achieve this we'll need to work with technology companies to test and improve their in-pipe scanners.

Unique testing facilities.

As part of the programme we'll be building a replica trunk main at our water innovation centre in South West London. This will enable us to provide a low risk testing ground for in-pipe scanners, whilst still providing many of the challenges of the real network. The trunk main test facility will also be used to evaluate and develop other technologies. We completed the rig design this year and it will be built soon.

Scanning real trunk mains.

Only the most promising in-pipe scanners will get the opportunity to be inserted into our real trunk mains. Our aim is that by the year 2020 we'll have identified a technology that we can use more routinely. It'll be expensive work, so we'll only be able to carry out these new inspections sparingly.

Making sense of it all.

Hand in hand with the technology trials, we'll be working with experts from universities and industry on analytical tools to convert pipe scan data into intelligent decisions.

Our future vision.

Ultimately we hope that by scanning the highest risk trunk mains, we'll be able to work out which sections really need to be replaced and which sections are safe to carry on using. Being able to target our investment better will help us avoid replacing pipes needlessly, which will benefit everyone.

Thames Water

Smart Water Networks.

Case study – March 2017

Smart water networks.

Thames Water is one of 20 organisations taking part in a European Union funded smart water network project called SW4EU to help us understand how smart technologies can help us improve the water supply service we provide to our customers. We've also provided one of four demonstration sites for this project.

Smart water technologies.

Reducing leakage is very important for us and all our customers. It's important to find more effective ways to engage and educate our customers about water efficiency, which will help us to provide a more resilient supply of water. Smart water technologies capture, analyse and report data, allowing us to spot the early signs of leaks 24/7.

- **We have one of four SW4EU demonstration sites across Europe**
- **Using smart water technologies to help provide a secure supply of water for our customers**

Our demonstration project.

Our demonstration project is located in Reading, where we've installed a number of innovative pressure sensors and flow meters in 870km of distribution mains and 172km of trunk mains serving 89,000 properties. Many of these pipes are over 60 years old, and vary in size and materials.

This smart water network, combined with our existing network meters and energy meters, is now generating a huge amount of data, and we're using novel techniques and algorithms to quickly detect and locate leaks and bursts which might not otherwise have been identified using standard methods. We're focussing on five key areas:

- Network-leakage algorithms
- Customer-side leakage algorithm
- Energy visualisation tool
- Trunk main monitoring
- Pressure transient analysis

Network leakage algorithm.
We've worked with experts at the University of Sheffield to apply the same techniques used to monitor abnormalities in brain activity to monitor the sensors on our network. We use this information to develop algorithms which will allow us to create alarms to identify leaks on distribution mains.

Customer-side leakage algorithm.
We've also developed an algorithm to create alarms for customer-side leakage and wastage. We can use this data to assess the severity of the leak, and estimate the volume of water being lost, in cases where this leakage would previously have been undetectable.

Energy visualisation tool.
Water supply and distribution is normally measured in terms of flows and pressures. Using an energy visualisation tool (EVT) we are able to display energy alongside flow and pressure used in water networks in a new and innovative way. The EVT helps with visualising the energy consumed in the network in a quick and intuitive way, so we can quickly detect issues and identify opportunities to take action.

After manpower, energy is the second highest operational cost for our business. That's why it's important to do everything we can to better understand where energy is being used and where it can be reduced. We're now exploring new ways of using the EVT to reduce leakage and energy consumption.

Trunk main monitoring.
With trunk mains, there's a significant risk that a small leak could lead to a sudden big burst. Because of the large size of trunk mains, and the amount of water they transport, any burst could have significant impacts on our customers.

Acoustic trunk main technology called 'TrunkMinders' (sensors fitted to our larger trunk main pipes) are monitoring in real-time flow, pressure, vibration and sound data more than 100 times a second over a kilometre of vital trunk main. These sensors have been able to identify leaks which we were then able to repair. Extending the use of this monitoring across all our vital trunk mains is part of our strategy to mitigate the impacts of potential bursts.

Transient analysis.
Water pipes are subject to high pressures to make sure water reaches customers' taps at a reasonable flow rate. Changes on the network such as pumping, valve operation, bursts, and pressure regulation all disrupt the flow of water, creating pressure waves that spread through the network. Extreme changes in pressure can put excessive strain on the network, damaging pipes and fittings, and sometimes leading to failure.

Pressure waves which are created by different events, but with similar profiles, can be grouped together. This has allowed us to create a 'dictionary' of transient pressure waves (high pressure water waves which are short lived). When we observe them in our network, we can use these signals to trigger proactive action, helping to avoid damage to the network and allowing us to run it better.

Applying the knowledge.
Thanks to this project we can now identify:

- Where trunk mains are beginning to deteriorate
- The locations of any bursts and leaks

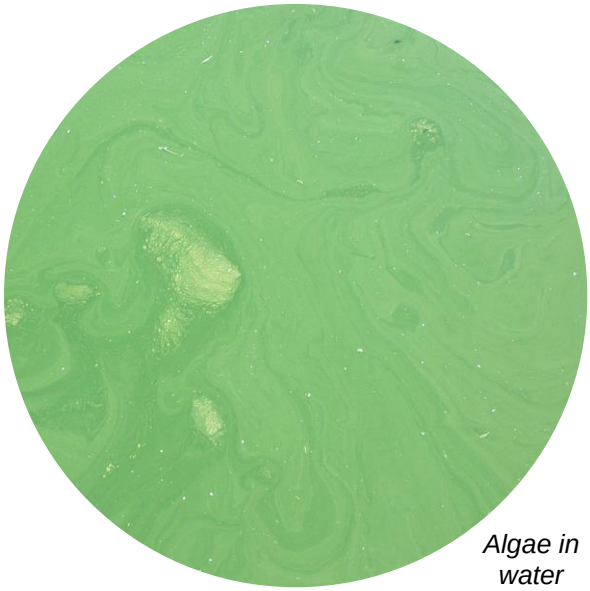
All this means that we can visualise what's happening in our network much more accurately. This way, we can manage all our resources more efficiently, and avoid burst pipes, service interruptions and other inconvenience for our customers.

Thames Water

Algal blooms and climate change.

Algal blooms and climate change.

Algal blooms are a natural phenomenon, but when they occur they can block processes in our water treatment plants. This is already a regular occurrence and it's set to get more common with future climate change. We're exploring an innovative way to remove algae and reduce the impact on our treatment processes by adapting a filter that's already widely used in cleaning treated wastewater effluent.



Algae in water

- **Novel use of established filter technology**
- **Future-proofing our treatment works against climate change**

Background.

Algae are microscopic plants which live in water. Because plant nutrients are plentiful in the Thames Water area, we experience extreme algal population growth, called blooms, in our reservoirs several times a year between spring and autumn. Each bloom results in a large number of algal cells needing to be removed from the water to make it fit to drink. This increase in algae can block our filters more quickly, which requires more wash water, and sometimes limits production capacity.

To provide water to our customers, we operate a network of over 20 large storage reservoirs which are fed from the River Thames and River Lea. These reservoirs supply nine water treatment works, where we use a sequence of treatment steps to remove particles and other impurities from the water to make it fit to drink.

Every day, under normal weather conditions, we pump river water into our storage reservoirs and take some out for treatment. This allows us to have enough water stored to supply our customers for approximately three months if the river flows get too low. Storing the water also helps to start purifying it naturally.

Challenge

Our current approach to controlling algae involves mixing water in our deepest reservoirs. This moves algae to deep water, out of the sunlight, which reduces its growth. We then try to select water from the most treatable reservoirs.

However, climate change may result in warmer temperatures, as well as longer, dryer and sunnier periods, and more intense storms. If this occurs, we anticipate that reservoir water will become more difficult to treat. Our filters could be overloaded by algal blooms and too many microscopic particles – and our current algae control strategy of mixing water will not work if there's not enough water to keep the reservoirs full to allow mixing.

A promising solution.

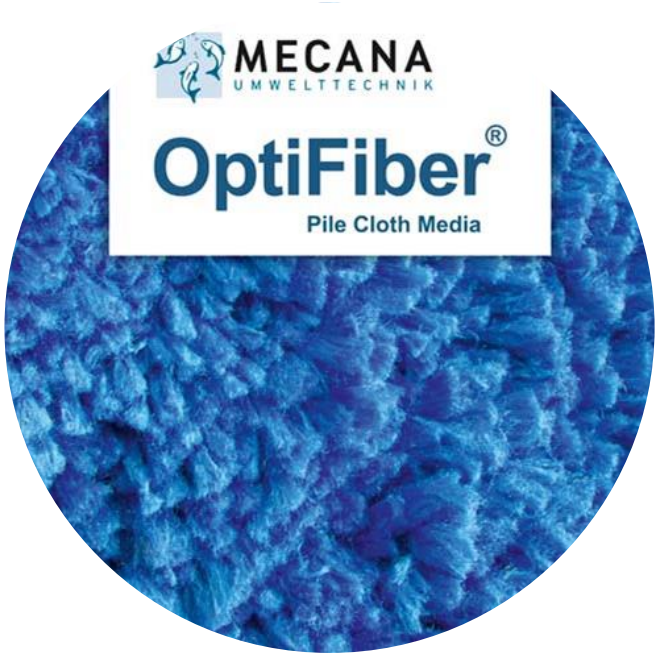
We're currently investigating whether adding an extra stage of filtration ahead of our normal water treatment processes could protect our existing equipment and make sure it remains capable of doing the job.

Although this method of filtration is widely used to treat wastewater, using it to treat raw water is an innovative new application. The filter is made of cloth which is on a frame that allows water to pass through. To keep the cloth clean, the filter is regularly backwashed to remove debris including algae.

We're currently operating a pilot scale version of this technology at two of our operational treatment works, treating 500m^3 a day of reservoir water.

Our tests so far have shown that these filters can produce treatable water even from the worst algal challenges encountered during the study period.

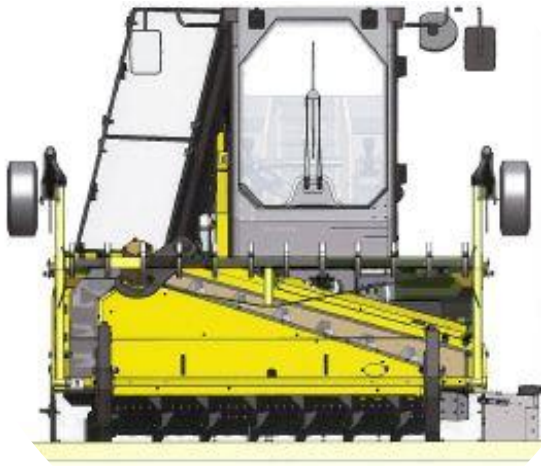
These results are very encouraging, and we think these filters could offer necessary protection to our water treatment works against some of the anticipated future challenge of climate change. In turn, this will enable us to keep on providing clean, safe drinking water for our customers.



Making maintenance of slow sand filters safer.

Making maintenance of slow sand filters safer.

Slow sand filters are at the heart of London's largest treatment works, supplying 70 per cent of our water each day. These sustainable biological filters clean the water using low amounts of energy. However, they can be hazardous places to work when our people are carrying out maintenance. Our teams are required to work in close proximity to heavy machinery and perform manual handling tasks, increasing the risk of health and safety incidents.



Daily filter skims.

We operate 102 slow sand filters in London to treat drinking water biologically. After a few weeks of filtering the water, the surface of the sand becomes blocked. Almost every day, one of these filters requires a team to remove around 250 tonnes of sand to be cleaned and recycled. Currently, most of the sand is removed by a purpose built skimming machine, but these can't get close enough to the filter walls. As a result, our technicians have to use shovels to manually skim the edges and dig over five tonnes by hand. This is a manual operation that takes around an hour, and can expose workers to greater health and safety risks.

- **Safer slow sand filter skimming**
- **We have to clean at least one of our 102 slow sand filters each day**
- **Every time we clean a filter, 250 tonnes of sand are washed and reused, with five tonnes dug by hand**

New skimmer design.

We've worked with the skimmer manufacturer to design a new cleaning attachment which allows the machine to skim right up to the edges of the filter walls. Similar to a snow plough, our new edging blade is fixed to the side of the existing skimmer, which runs along the filter wall pushing sand into the path of the skimming head. This avoids potentially hazardous manual labour and saves time too.

A promising future.

We undertook successful field trials with the prototype in our slow sand filters at Ashford Common, and these tests saw a 90 per cent reduction in manual handling tasks, as well as saving time for the whole skimming process. We'll be rolling out this innovation to all of London's slow sand filter sites in 2017, to make sure our people stay safe, and improve the efficiency of our maintenance work.

Thames Water

Fats, oils and grease (FOG): from nuisance to energy.

Fats, oils and grease (FOG): from nuisance to energy.

Fats, oils and grease (FOG) cause major problems for our business. When they reach our sewers, they can combine with wet wipes and other unflushables to form fatbergs, which lead to blockages and sometimes flooding and pollution. FOG also increases operational costs at our sewage treatment works. But if we capture FOG before it reaches our sewers, we can use it to generate energy, and turn a problem into a valuable resource.

What is the problem?

With 15 million customers and a larger-than-average number of restaurants, hotels and pubs in our area, significant amounts of FOG are being poured down our drains. Once it's in our sewers, FOG can form hard deposits and block part, or all, of the pipes.

We estimate that at least 25,000 blockages are caused by FOG every year, which makes operating our sewers much more expensive.

FOG builds up over time so that it can partly or totally obstruct our sewer pipes, lead to flooding of properties.

The facts:

Our evaluation assessed that:

- 1 out of 3 blockages each year is caused by FOG
- Potentially, around 300 tonnes of FOG are going down our pipes every day
- Only 10 per cent of commercial kitchens in our area have effective grease management

Removing FOG at source.

FOG can be removed at the source of the problem with grease removal units (GRUs). These units can and should be installed in commercial kitchens to reduce the amount of FOG entering our sewers. But previous surveys have suggested that fewer than 10 per cent of commercial kitchens in our area have an appropriate grease management plan in place.

From waste to energy.

Two types of grease can be collected from food service establishments: used cooking oil (UCO) and grease trap waste (GTW).

Because they're relatively 'pure', UCOs are used as a feedstock for biodiesel production. GTW, also known as brown grease, is a mixture of residual fats, wastewater and food waste. This can be separated and refined to extract the oily fraction for biodiesel production. Due to its carbon-rich composition, brown grease can be degraded by microorganisms in anaerobic digesters to produce biogas.

We're currently conducting research on how to unlock the potential of brown grease in anaerobic digesters. We're also developing a commercial waste collection and refining facility at our Long Reach sewage treatment works. The refined waste from Long Reach will then be further processed at other sites.

Digesting FOGs is a great opportunity to increase energy generation and help our business become more sustainable.

Thames Water

Anammox bacteria for next generation ammonia removal.

Case study – March 2017

Anammox bacteria for next generation ammonia removal.

We're testing a recently-discovered bacteria called Anammox, which has the potential to revolutionise nutrient removal in the wastewater treatment process.

Background.

Ammonia can be hazardous to the environment as a result of its toxic impacts on fish and other species, and sewage treatment works are a major source of ammonia in rivers. Our treatment works must remove ammonia to prevent any impact to local watercourses and comply with the strict environmental consents set by the Environment Agency.

We currently use a two-step process called biological nitrification to remove ammonia in our sewage treatment works. This involves two different types of bacteria: one which converts ammonia to nitrite, and another which turns nitrite to nitrate.

Oxygen is needed for each step, and providing this is another step which uses a large proportion of the energy required by our sewage works. The end product, nitrate, also needs to be removed, and converted to nitrogen gas which sometimes involves the addition of chemicals.

Anaerobic ammonium oxidation (Anammox) bacteria were discovered in marine sediments, and they're much more efficient than conventional processes at removing ammonia.

- **Anammox significantly reduces the amounts of energy and chemicals needed to remove ammonia**
- **Anammox will help to reduce our carbon footprint and make the business more sustainable**

Anammox granules in use at pilot scale

How it works.

Anammox bacteria have the unique ability to convert ammonium directly to nitrogen gas. This shortcut to ammonia removal halves the amount of oxygen and therefore the energy needed during the treatment process.

What are we doing with it?

These are several different techniques for using Anammox, and we're currently trialling them in pilot plants at one of our sewage treatment works. Once the most suitable technique is identified, we'll seek to roll it out at full scale.

More sustainable solution.

Anammox-based processes have a lower energy demand for aeration, a smaller footprint in comparison to traditional processes, and they don't require extra chemicals. All these factors make the process more sustainable.

Thermal Hydrolysis Process.

Case study – March 2017

Thermal Hydrolysis Process (THP).

At Thames Water we provide an essential service that's at the heart of daily life, health and enjoyment, to 15 million customers across London and the Thames Valley - and we aim to do this in the most sustainable way. Striking a balance, doing the right thing for people, for the performance of our business and for the natural environment is what being more sustainable means to us. Increasing our THP capacity is helping us become a more sustainable business.

Background.

Sewage sludge is a source of renewable fuel or biogas which we use to generate renewable energy. This helps reduce our energy costs and greenhouse gas emissions.

Last year we renewably generated 19.7 per cent of our overall electricity from sludge and biogas, but there's more we can do. One key aim is to extract more biogas from sewage sludge by enhancing the performance of anaerobic digestion by using the Thermal Hydrolysis Process (THP).

How it works.

THP is similar to a pressure cooker where the sludge is heated for 30 minutes at 165^{o}C under high pressure (6 bar). This breaks down the organic matter of the sludge into smaller and more accessible (digestible) compounds for the microbes in the anaerobic digesters to utilise. The microbes use these compounds more efficiently, which results in more biogas production.

A traditional anaerobic digestion facility generates about 0.75MWh for every tonne of dry sewage sludge treated (MWh/tDS). THP allows us to increase generation by 33 per cent to 1 MWh/tDS. The biogas produced can then be used as a renewable fuel for combined heat and power (CHP) engines.

In addition to the renewable energy benefits of pre-treating sewage sludge with THP, it also reduces the amount of treated sludge which needs to be recycled to land.

THP 2.0.

We can get even more out of this process with just a few changes. Intermediate THP (ITHP) is a very simple arrangement – two digesters with THP in the middle. We are looking to implement this configuration in AMP7.

The first digester quickly uses all the available organic material that does not require a THP. Once all the readily available organics are digested, the sludge is passed through a smaller THP which is approximately two thirds the size of a conventional THP plant. This cooks the sludge and breaks down the long-chained organic material left in the sludge, which can easily be used by the microbes in the second digester.

Overall, the gas yield increases by around 17 per cent compared to a conventional THP set up. The final digested sludge also has approximately 15 per cent lower organic content and it is easier to dewater, reducing transportation costs when we're recycling it onto land.

Advanced energy recovery.

Sludge can be further treated after anaerobic digestion with Advanced Energy Recovery (AER) by means of pyrolysis.

The cost of drying sludge to the degree needed for pyrolysis has always required a significant input of energy, so it hasn't been economically viable. However, since the breakthrough of starting to use the Bucher press (adapted from the cider industry) for dewatering, using pyrolysis has now become possible.

The digested sludge cake is pyrolysed by heating it up to 800^{o}C under controlled conditions without oxygen. During pyrolysis, two products are obtained:

- Fuel gas (similar to biogas) which has a high energy content and can be used to generate even more renewable electricity.
- Char, a by-product with high concentrations of carbon, phosphorous and even precious metals which could be recovered.

We're currently building a large-scale demonstration site at Crossness sewage treatment works. If it's successful, Beckton and Crossness will have full scale AER processes installed in AMP 7 during our next investment cycle 2020-25.

Increasing THP capacity.

In AMP 7, we may be able to roll out THP improvements to six additional sites, enhancing our renewable energy generation and bringing other benefits like reducing sludge transportation costs. We're also comparing possible uses of ITHP as against the traditional deployment of THP.

All this work is helping us become a more sustainable and energy-resilient business by saving resources, increasing the amount of renewable energy we generate, and reducing our energy costs.

Engaging our customers.

Engaging our customers.

It's important for us to understand the needs and wants of our customers, so that we can embed these in the decisions we make as a business. We engage with our customers and gather rich insights about them in a number of different ways.

Listening and observing.

We believe it's vital to listen to our customers, engage with them and build on the information we've gathered to improve our service. Social media is a growing channel for our customers to communicate with us. We're now very active on this channel, helping with issues and identifying opportunities to engage and share key information with our customers.

By watching how our customers navigate our communication channels, we can determine how easy they find it to engage with us. We use these insights to make improvements to what we do: for example, by becoming more proactive and identifying any issues before they impact our level of customer service.

Reaching out.

Customer feedback is essential to the success of any business. Our customers can engage with us more easily, and provide feedback on their views and experiences, across numerous channels. Some of these channels include:

- Short dial codes shown on our streetworks
- Research workshops
- Public meetings
- Text messages when we've asked for feedback about our agents and technicians

We also monitor key customer indicators, such as our internal satisfaction scores, to identify whether the changes we make - our refreshed brand, for example - are having a real impact on our customers.

Understanding our customers' needs and wants helps us to deliver a great service

Understanding what others do.

As well as understanding what's best for our customers, it's important to know what our customers value from other companies too. We'll consider all this and try to use the latest best practice to improve how we deliver our own services.

Looking to the future.

We're identifying key drivers and trends in customer service so that we're able to plan for the future, and make sure we can meet a range of constantly evolving expectations. We'll build all these future requirements into our change programmes, and provide our customers with the services they need, whenever and wherever they want them.

Thames Water

Our social media customer service.

Our social media customer service.

Over the past year, we've made significant investments in social media as a channel to communicate with our customers. In December 2016, we expanded our social media customer service from Monday to Friday 8am to 8pm to a contact channel that's available 24/7, 365 days a year.

Facebook, Twitter and Brandwatch.

We receive a wide range of contacts via Facebook and Twitter, where we communicate both publicly and privately in accordance with data protection requirements and our customers' preference.

The types of contacts vary daily, and cover a range of topics including revenue, operations, media enquiries, positive feedback, complaints, through to the more unusual requests and queries.

We've also recently invested in an industry-leading social media monitoring tool, Brandwatch, to provide us with deeper insight than ever into our potential audience on social media channels.

- **94,001 messages received via social media**
- **226 per cent increase in contact volumes, compared with 2015/16**

(1 April 2016 – 31 March 2017)

Telling our story.

With a growing social media audience of over 34,000 followers across Twitter and Facebook, we now have a fantastic opportunity to tell the wider stories around our business.

We're using these channels to acknowledge our partnerships with schools through our education programme, as well as local causes which we support on our Time To Give Days, and local events we'll be attending where anyone can come and speak to us.

We also use social media to promote services like our Extra Care offering and our online account facilities - as well as providing advice and support about other aspects of our business.

Expanding our team.

Our business is a 24/7 operation, so our social media presence needs to reflect this. We receive contacts throughout the night for various reasons - usually in relation to operational work such as overnight emergency repairs, leak detection or supply issues.

To handle these contacts more effectively, we've expanded our team to cover the longer hours required by social media.

Thames Water

Brandwatch.

This is an industry-leading social media monitoring tool which helps us listen to our audience and understand them better in the context of their social media environment.

We've used the tool to monitor campaigns and reactions to our communications, including industry announcements and operational events.

We'll be increasing our usage of Brandwatch in the future, along with the addition of a new social media management tool.

Social media advertising.

We use our social media channels to educate our customers on our three key programmes:

- 'Bin It - Don't Block It'
- Water efficiency
- Metering

We started a successful trial with Facebook advertising last year. The digital element of the 2016/17 'Bin It - Don't Block It' programme generated 300 million digital impressions via Facebook Advertising and Google Display Ads. We'll be looking to continue the success of our social media advertising this year.

Social media is an effective way to reach a large audience. But we'll always make sure we use it alongside other forms of communication like letters and drop-in sessions, for those who prefer to use other services or don't have access to social media.

An unusual story.

In June 2016, a customer contacted us because he'd found a waxed jacket in a vintage store with 'Thames Water' emblazoned across the back. Keen to find out more, the customer sent us a Facebook message to see if we could help establish the history of his find.

As word spread around the business via Yammer, our internal social media network, it was only a matter of hours before an answer was found - the jacket was issued in the early 1980s as a waterproof coat, suitable for winter, otherwise called 'vintage' Personal Protective Equipment (PPE).

Service Incentive Mechanism (SIM) explained.

Service Incentive Mechanism (SIM) explained.

The Service Incentive Mechanism (SIM) is used by Ofwat to measure the level of service provided to household customers. Performance against the SIM is measured as a score out of 100, so that it can be compared against other companies across the water industry.

How it's scored.

The SIM score is made up of two elements:

- The first element allocates penalty points for each unnecessary telephone contact and written complaint made by household customers. Unlike a few years ago, the SIM is now a household measure only. This makes up 25 per cent of the overall SIM score.
- The second element captures household customer satisfaction by independently surveying a sample of people who have contacted us during survey weeks. Customers are asked to rate the overall service they received as a score between 1 (very dissatisfied) and 5 (very satisfied). This makes up 75 per cent of the overall SIM score.

- **SIM measures our household customer service**
- **We've achieved our best ever performance score of 77.26 out of 100**

SIM performance in 2016/17.

Our SIM performance has continued to improve and we've had another good year, with our best ever performance of 77.26 points compared to 76.74 in 2015/16.

We've set ourselves challenging targets against future SIMs, which reflects our commitment to making sure our customers get the quality of service and value for money they're entitled to expect.

Outcome delivery incentives.

Water companies are financially rewarded or penalised according to their relative performance in the SIM's industry league table over a four-year period.

Companies that score well against the SIM, and do better than the industry average, are likely to see a reward for their performance, while those which fall below the industry average will be penalised.

Thames Water

A resilient water supply – adaptation pathways.

A resilient water supply - adaptation pathways

We need to plan for the long-term because much of the infrastructure we build to supply water may last for centuries and it needs to be able to cope with likely changes over that time span. Climate change and population growth are key challenges that need to be addressed in our planning and will become more uncertain in the future.

Background.

While the risk of future floods has captured political attention due to terrible events in recent winters, the risk of future droughts has been largely overlooked. However, droughts can have potentially significant consequences for the economy, society and the environment. We estimate a severe drought could cost the London economy up to £330 million a day – and could potentially last for months. We need to improve the resilience of our water supply system to manage such challenges.

Water security.

We aim to deliver a sustainable, affordable and resilient water supply for our customers to the year 2100 and our next Water Resource Management Plan (WRMP19) will set out how we plan to achieve this.

- **In London, a severe drought could cost as much as £330 million a day**
- **We need to plan for a range of scenarios because the future is uncertain**

We forecast that the growing population, exacerbated by climate change and the need to leave more water in the environment, will create a gap between the supply and demand for water of over 800 million litres per day by 2100. If we don't take action to close this supply-demand gap, the risk of droughts will increase.

Our WRMP19 focuses on reducing the demand and increasing the supply of water. We have identified a number of large water resource options to contribute to closing the predicted supply-demand gap, including:

- Transferring raw water from wetter parts of the UK
- Building a new storage reservoir to capture and store excess flows in the Thames
- Desalinating water from the Thames Estuary
- Reusing treated effluent from our sewage treatment works

Identifying best options.

No single option will be sufficient to close the gap on its own so we believe a portfolio of measures will be required. Therefore, the question is what sequence of which options delivers the optimum performance and resilience against an uncertain future?

Adaptive pathways approach.

To answer this question, we are using an 'adaptive pathways' planning approach. This approach was used by the Environment Agency to manage sea level rise and flood risk in the Thames Estuary.

To test a wide range of possible futures, we developed combinations of three forecasts (high, medium and low) of the four major challenges (climate change, population growth, reductions in water abstractions and changes in the amount of water needed by other water companies).

This generated 81 different future scenarios. We then grouped together similar scenarios to create a more manageable number of 26 scenarios (see figure below).

Combinations of the water resource options were then tested against the 26 scenarios to create an optimum portfolio of the water resource options that performs best against the future scenarios.

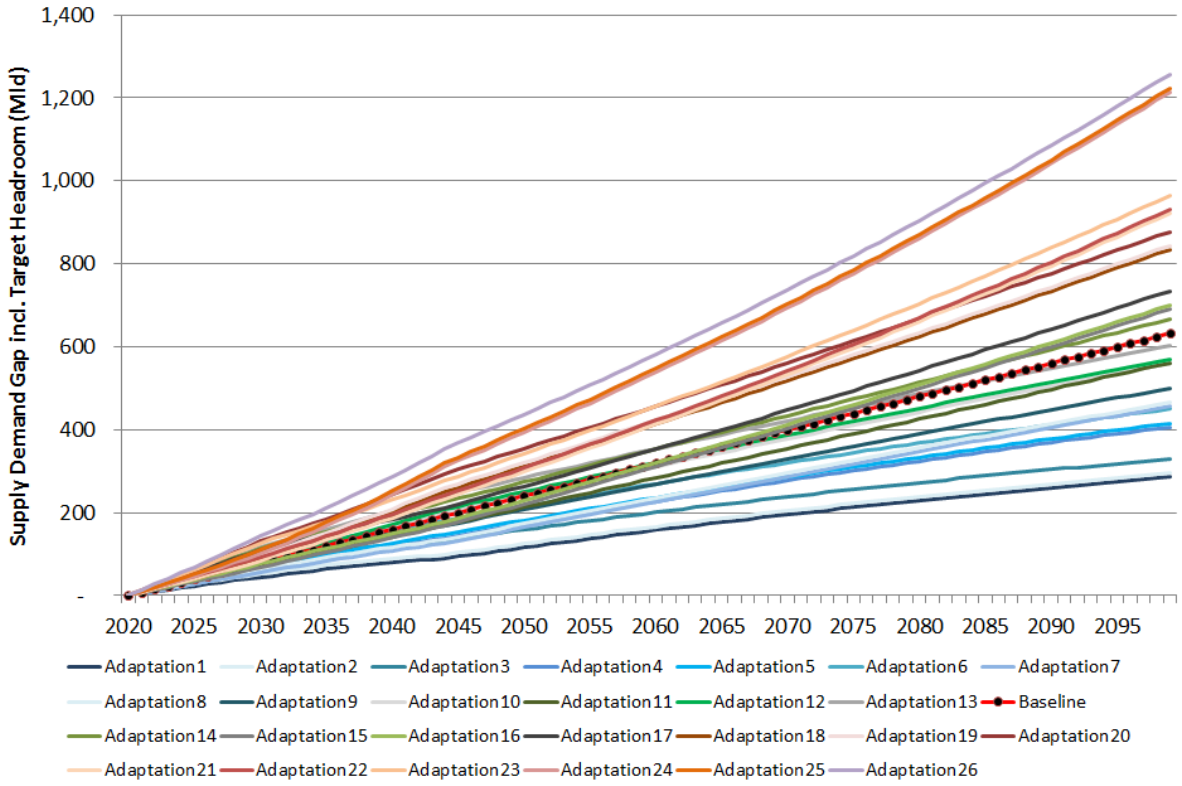
The adaptation pathways approach can also highlight where potential future decision points may lie and where a switch from the current preferred pathway onto an alternative pathway may be required.

As the WRMP and its associated investment plan are reviewed every five years, we can regularly assess whether the forecasted scenario is being realised and whether the preferred portfolio of options is still the best in meeting current and future demands.

Our next WRMP.

We will publish our draft WRMP19 in January 2018 for a three month public consultation. We want to hear your thoughts on whether it meets these challenges in the best possible way. Click here to find out more about our WRMP.

Simplified representation of 26 future scenarios



Axford and Ogbourne pipeline: licence reduction.

Axford and Ogbourne pipeline: licence reduction.

In consultation with the Environment Agency (EA), we've committed to help protect flows in both the River Og and River Kennet, a Site of Special Scientific Interest. In March 2017 we completed the Axford and Ogbourne pipeline, which has allowed us to stop abstracting water from the Og and reduce our abstraction from the Kennet. The new 18km pipeline brings water to 30,000 homes in south Swindon from the Farmoor Reservoir in Oxfordshire.

Our environmental and technical teams worked hard to make sure appropriate measures were put in place to manage environmental risks and ensure sustainable water supplies to the south Swindon area. This meant working closely with landowners including the Honda car plant, Network Rail and the Woodland Trust, as well as local stakeholders and regulators such as Swindon Borough Council and the EA.

Background.

The new pipeline crosses a railway, two rivers, a number of roads and goes under the M4, carrying water from the Blunsdon and Farmoor reservoirs, north of Swindon, to the Whitefield reservoir complex south of Swindon.

- **Helping to protect flows in the Rivers Kennet and Og**
- **Significant archaeological discoveries**

Saving rare chalk streams.

This alternative supply has been installed to help protect flows in the Rivers Kennet and Og. The Kennet is one of around only 200 chalk streams in the world, and it's a Site of Special Scientific Interest (SSSI). It also provides a home for wildlife such as water voles and brown trout.

As well as the pipeline, the scheme includes three new water pumping stations, one of which is a completely new building designed to blend into the agricultural landscape.

Protecting archaeological discoveries.

Another highlight has been the major programme of archaeological work which was undertaken along the full course of the pipeline scheme to record buried remains before construction began. The scale and significance of these archaeological remains are of national importance.

One of the most important finds was an extended area of the Roman town of Durocornovium near Swindon, including a cemetery, which will now be protected as part of the wider scheduled monument site.

Thames Water

Roman pits and ditches were found adjacent to the A346. Traces of prehistoric settlement were also evident, with enclosures, a round house and a ring ditch burial mound. Medieval ridge and furrow agriculture and a well-used trackway leading to Badbury were recorded.

Five Roman coins were also found. The earliest (and most worn and corroded) is a rare silver denarius struck for the emperor Vitellius in AD 69, either in Gaul or in Spain. The remaining four coins are all issues of the emperor Trajan (2nd century AD).

Safeguarding our environment.

The main aim of the project was to help protect flows in the Rivers Og and Kennet. We also took extra care while were constructing the pipeline:

- We cleared vegetation under the supervision of expert ecologists, and have now reinstated it to the landowner's satisfaction
- We adjusted the route to avoid disturbing great crested newts and important habitats for other species
- We used directional drilling to avoid direct impact on rivers and the sensitive plants and animals they support.

The successful delivery of this project has enabled us to help protect the flows of the Rivers Og and Kennet.

Efficiently supplying water to customers.

The pipeline carries water from the Farmoor and Blunsdon reservoirs to the Whitefield reservoir complex south of Swindon. Three new booster stations were needed to pump the water almost 18km. We have used gravity as far as possible to move the water, limiting the amount of pumping needed.

Reducing construction time.

We needed to build a new booster station at The Marsh. We chose a steel frame with a modular construction system to reduce the amount of time spent on construction. This also allowed us to finish the structure with wood cladding.

Sensitive design.

The Marsh pumping station was designed to resemble a barn, and its cladding has the appearance of wood to blend into the environment. We also planted a screen of trees and hedgerows to improve biodiversity.

Providing resilience.

The Axford and Ogbourne pipeline will be in place for many years, so we've allowed space for future growth and additional resilience in the networks which are served by the scheme.

At The Marsh booster station we incorporated flood resilience interventions to reduce surface water runoff. These include a retention pond and permeable paving called Hexapath.

Walton eel screens.

Case study – March 2017

Walton eel screens.

We've installed a series of travelling band screens to stop eels being sucked into the reservoir at our Walton advanced water treatment works. This will protect the eels and help with the recovery of this endangered species.

Background.

We worked closely with our suppliers, Bridges and Steelways, to create protective eel screens for our advanced water treatment works at Walton. These moving band screens are designed to stop eels getting into the reservoir and allow them to continue their migration up and down the river. The screens' small mesh prevents the eels from passing through, while an auto-wash feature enables the screens to self-clean without hampering the flow of water into the treatment works. The design is modular, so that all eleven screens and frames could be easily installed from a floating pontoon.

Working offsite.

The modules were constructed at Bridges' factory in Midsomer Norton, providing the benefits of a controlled working environment, free from the risk of delays and potential hazards on site.

The steelwork was designed to fasten onto a frame fitted by the piling contractor. This connection was made above the water level, so that once the pilings had been built, almost all the following works could be done from the bank or from the pontoon.

Our construction team visited the factory to see a demonstration of the installation process. This meant that as soon as the components reached the site, they knew how to install them correctly.

Benefits of the scheme.

The new screens have reduced embodied carbon, operational carbon and energy demand to just 22 per cent of what was originally proposed in our business plan. The screens are also cutting operational carbon by an average of 9.6 tCO_2e per year, and are saving 39 MWh per year of electricity compared to our business plan. In addition to these savings, the screens were installed at £200,000 below the original budgeted costs.

Our approach to delivering this scheme meant we didn't need to close the footpath next to the river, and we minimised disruption by limiting our time on site.

What's next?

There are another nine sites where we need to install eel screens at the intakes. Now we've successfully proven the effectiveness of this modular approach at Walton, we can repeat the process at our other sites.

- **Protecting endangered eel populations**
- **Saving 9.6 tCO_2e/year and 39 MWh/year of electricity**
- **Minimising disruption and keeping footpaths open**

Thames Water

How smart meters are helping us tackle leakage.

How smart meters are helping us tackle leakage.

Smart meters have an important part to play in detecting leaks, and they've already saved millions of litres of water in London boroughs. Last year we installed over 103,000 smart meters in our area.

All water meters being installed today have smart capabilities. This means they're able to connect to a radio communication network, so each meter can send important data to us every day, and help us unlock the full potential of smart technology.

How we find leaks.

To estimate leakage from our pipes, we measure the flow into small areas, usually around 2000 properties, called district meter areas. Then we estimate customers' water usage, usually overnight when people are using the least amount of water. The difference between the amount of water supplied and the amount of water used can help us identify potential leaks in our network. We can also detect leaks from customers' plumbing by analysing their water usage. 28 per cent of total leakage from the 31,000 kilometre network is customer-side leakage (from privately-owned pipes) which is why we offer to fix these for free.

By using smart meters, we can be far more accurate when we're assessing and identifying leaks, and confidently send leakage detection teams to these areas.

Challenges we face.

Estimating water use can be difficult, especially for commercial properties – for example, hospitals can use very large volumes of water, even at night. Additionally, lots of properties in our water supply area still aren't metered, so we don't know how much water these properties are using.

Other detection methods.

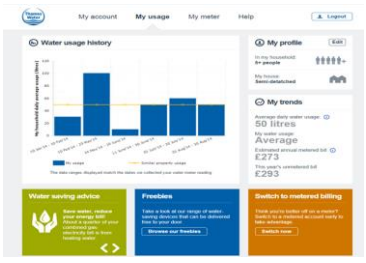
We use a number of other methods to detect leaks too. These range from the very oldest of technologies - the listening stick - to the most modern, including electronic devices on valves or hydrants, and even satellite and drone analysis. We also use in-pipe noise logging, which means inserting a microphone unit into a live main to detect the noise generated by a leak.

In the future, smart meters will allow us to improve the accuracy of our leakage models, and help ensure that we're investing our money in the right areas. Fixing leaks will also make it easier for our customers to manage their water use and bills.

- **We installed 103,000 smart meters last year**
- **28 per cent of total leakage is customer-side leakage**

Measure the flow of water into district meter areas.

Identify leakage by comparing the amount of water supplied with customers' usage.



Customers can view their water usage online and identify household leaks.

Thames Water

Metering – securing future water supplies.

Metering - securing future water supplies.

- **Metered customers use 12 per cent less water**
- **Using smart meters to address the shortfall between supply and demand**

Our region has been classified as seriously water stressed, with the demand for water higher than the amount available.

We have a shortfall between the amount of water we can supply and the amount our customers use. Fitting free smart water meters is one of the most effective ways to address the supply and demand gap in the immediate future, because metered customers tend to use an average of 12 per cent less water.

We provide around 2.6 billion litres of clean water every day direct to our customers' homes across London and the Thames Valley. Data from meters helps improve our understanding of where water goes once it leaves our water treatment works – directly to our customers, or lost through leaking pipes. This lets us find and fix leaks faster. It helps our customers understand and control their household water use, and ultimately their bills.

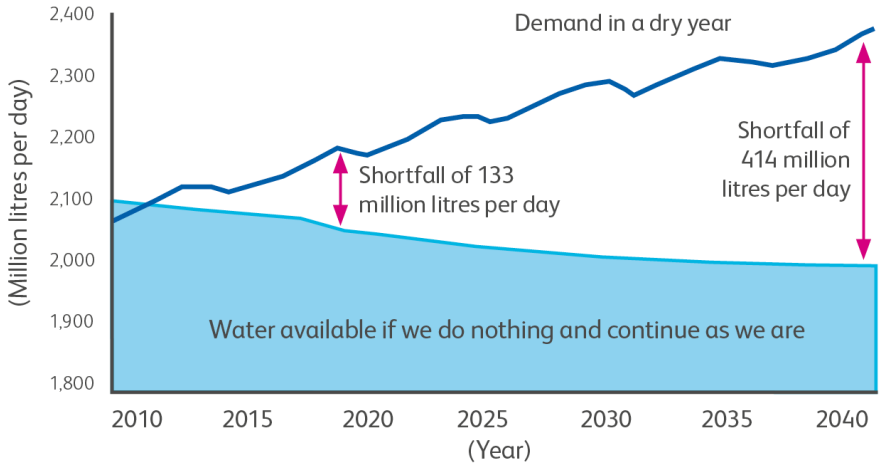
How are we doing?

In the first full year of running our progressive metering programme, we have learned a huge amount about where and how water is being used. Last year, we:

- Installed nearly 124,000 new water meters
- Replaced over 42,000 existing meters
- Saved over 10 megalitres of water a day

Helping our customers save.

As well as fitting meters, we aim to talk to all of our customers about saving water and money. We're offering a free Smart Home Visit (SHV) to all customers who have had a meter fitted where we visit your home, review how you're using water and provide you with bespoke water saving tips and free water efficient devices. In 2016/17 we delivered over 60,000 SHVs in London and the Thames Valley, helping customers save money on their water and energy bills.



Forecast gap between supply and demand in London

Source: Water Resources Management Plan, 2014

Thames Water toilet refit - making our own toilets more efficient.

Case study – March 2017

Thames Water toilet refit - making our own toilets more efficient.

Although the bathroom fittings in our Clearwater Court office in Reading were already quite water efficient, we thought we could do more to save water by installing new toilets, taps and urinal sensors. The results were staggering…

Background.

In June 2015, we ran a water efficiency trial at Clearwater Court, to see how water efficient we could become by making changes in the area that commonly uses the most water in any business.

During this trial, we refurbished the facilities in one each of our men's and women's toilets. The changes included:

- Replacing existing dual flush toilets with 1.5 litre flush toilets
- Replacing existing push button taps with sensor taps
- Replacing existing urinal sensors with more efficient sensors
- Installing water meters on all hot and cold pipes to capture 'before' and 'after' usage

- **Reduced water use in trial bathrooms by 83 per cent**
- **Total water use in head office reduced by 50 per cent**
- **Total water use in call centre reduced by 66 per cent**
- **Projected savings of 4.9m litres of water a year**

A flushing success.

Our dual flush toilets were typically using between four and six litres of water per flush, in comparison to between seven and nine for an older style loo, which already presented a good water saving.

For the trial, we installed new toilets which flush with a combination of air and water.

These models use just 1.5 litres per flush, letting us reduce our water use in our toilets alone by an astounding 80.7 per cent!

Tapping the flow.

We replaced our existing push button taps with new sensor taps in both of our trial bathrooms. The new sensors were set at a flow rate of 3.5 litres per minute, with a run time of 8 seconds when triggered.

Although our previous taps would automatically shut off, we saw large water savings with the sensor replacements too, reducing the tap water we were using by 59 per cent.

Hands-free success.

Previously, our urinals delivered a flush of 4.5 litres per user, activated on use. By removing the cisterns and fitting direct-flushing valves, we reduced this water use down to 0.5 litres per flush.

Thanks to this change in flush rates, we're seeing a huge saving of 90.7 per cent compared to the original fittings.

Sharing our success.

The trial was a huge success, producing an 83 per cent reduction in water use. That's 1,636 litres per week, or more than 606,000 litres per year based on average use.

Our initial estimations suggest that we'll see a saving of 4.9 million litres of water a year from our refurbishment at Clearwater Court alone.

After these excellent results, we extended our refurbishment last year to cover all of our remaining facilities at Clearwater Court, as well as those at another of our sites.

Since we rolled out all these new toilets, urinals and tap sensors, our savings have continued. We've experienced huge reductions in the amount of water we're using around both buildings, cutting total water use by around 50 per cent.

Smarter Home Visits.

Case study – March 2017

Smarter Home Visits.

Our Smarter Home Visits (SHV) initiative is the largest and most extensive water efficiency programme ever seen in the history of the UK water sector.

The background.

Our SHV scheme involves retrofitting water saving devices, and providing individually tailored water saving advice, to households across London and the Thames Valley.

The scheme is run by our partner Groundwork - which helps to get local unemployed people back into work by training them to carry out the visits and retrofit our range of water saving devices.

In 2016/17 we delivered over 60,000 SHVs in London and the Thames Valley, and installed over 200,000 water and energy saving devices through our activities. Most of our SHVs were conducted in households where a smart water meter had recently been installed.

We're aiming to increase our SHV delivery to 70,000 in 17/18. During these visits we also fix leaking toilets, and offer selected customers free Benefit Entitlement Check and debt advice. An average of £2,760 per year has been identified for each family eligible for financial assistance.

Award winning.

Our efforts to improve the quality of all the services we offer were rewarded in 2016 with four national awards.

Our Smarter Home Visits programme won the Water Industry Achievement Award for Water Resource Management Initiative of the Year; the UK Water Efficiency Award for Built Environment and the UK Customer Experience Award for Utilities and Team - Customer at the Heart categories.

Our Smarter Home Visits were also shortlisted in the Sustainability Leaders Awards and the Utility Week Awards.

- **Fitting 200,000 free water saving devices last year**
- **Fixing leaky loos for free**
- **Winning four national awards**

Water saving in action.

We've seen more and more of our customers take up our SHVs because they're keen to learn how they can reduce their water use, and save money on their water and energy bills.

During each SHV, our Smarter Home Advisers demonstrate how each customer they could be saving money using our specialist water and energy saving app. This app has been developed in conjunction with the Energy Saving Trust (EST), incorporating both water and energy savings for the customer.

By taking the customer through each water usage area with the app, and asking a number of simple questions about how they use water and energy, our advisers can show a 'live view' of where savings could be made, and produce a bespoke water savings plan for every customer.

To maximise these water savings, we've also offered customers a wide range of water saving devices and fixes including:

- Showerheads and shower saves
- Shower timers
- EcoBETAs (toilet dual flush retrofit device)
- Toilet cistern displacement devices
- Tap aerators
- Kitchen swivel taps
- One off free leaky loo fixes

Smarter Business Visits.

Smarter Business Visits.

We've run a Smarter Business Visit (SBV) trial in London during 2016/17 to make businesses more water efficient. This trial delivered a total of 268 SBVs across Bexley, Dartford and Enfield.

Background.

Although we've now exited the non-household retail market, we still have our wholesale non-household water efficiency target to reduce demand and increase security of supply.

Alongside our Smarter Home Visit (SHV) programme, our SBVs involve a qualified plumber visiting business premises and reviewing the kitchen and bathroom facilities.

They recommend best solutions for the business and fit suitable water saving devices. The visit and the installations are free, and help to save water for both the business and the environment.

In addition to these installations, our SBV team also find and fix visible internal leaks, most commonly leaky loos or leaky urinals.

"A great big 'Thank You' for going the extra mile. For doing the extra work on the pipework that was leaking, putting control valves on our urinal flushes and showing us how to save money on water!"

Edmonton Baptist Church

Installing free water saving devices.

The free water saving devices we offer to install include:

- Cistern displacement devices
- Tap inserts
- ecoBETAs
- Shower heads
- Urinal controls

During the 268 visits that took place in 2016/17, we managed to save each business 3615 litres of water per day on average.

- **Visiting 268 business customers**
- **Saving each business an average of 3615 litres of water a day**

Thames Water

Oxford water efficiency campaign.

Oxford water efficiency campaign.

We identified Oxford as an area for a long term behaviour change campaign, to raise awareness of water shortage and the need to save water. Oxford falls within our Swindon and Oxfordshire area, which needs a higher level of water management to make sure we can provide enough water to meet future demand.

Through a localised marketing campaign, we explained to customers how increased water use and population growth are affecting the amount of water available in the area. The campaign demonstrated that we can prepare for the future and 'Be Water Smart' by working together.

By raising customer awareness of the water shortfall issue, and helping them understand what they can do about it, we hoped to lay the foundations for reducing water use in this area, and a more positive perception of our work to protect future water supply.

What we did.

With the headline 'More people in Oxford, less water to go around', our campaign ran across two six-week periods in autumn and spring, and included:

- Radio adverts (Heart FM and Jack FM)
- Posters
- Local press articles (Oxford Mail and Oxford Times)
- Digital (Google display and Facebook)
- Direct mailing (leaflets to targeted postcodes)

Positive campaign results.

To measure awareness, we conducted research with targeted customers before and after the campaign. Of the 500 customers we interviewed:

- 88.5% said they need to be more careful with the water they use, to make sure there will be enough water to go around.
- 97% felt they trust Thames Water to tell them about water efficiency.

These results demonstrate high understanding of the key messages, and a good increase of awareness of water efficiency in the Oxford area.

Our campaign will continue in 2017/2018. We'll aim to build on the awareness we've raised - increasing public understanding of the need to save water, and what everyone can do to help.

- **Raising awareness of Oxford's water demand and shortage**
- **'More people in Oxford, less water to go around'**
- **88.5% of interviewees said they need to be more careful with the water they use**

Thames Water

Leaky loos and household wastage.

Leaky loos and household wastage.

Leaky loos are one of the most common causes of unexpectedly high water use in households and businesses, but they aren't always easy to spot, and often go unnoticed. We estimate that up to five per cent of toilets leak, with leakage rates varying between 200 to 2,500 litres per day.

Fixing leaky loos.

Following a successful trial in 4,000 households, fixing leaky loos and other internal wastage is part of our core business, with every Smarter Home Visit customer eligible for one free repair.

Now that fixing leaky loos and tackling internal wastage has become core business for us, we've increased our capacity to provide these fixes and have been rewarded with significant savings.

With an average leaky loo doubling a metered household's annual water bill, our efforts to raise customers' awareness and fix these leaks, will deliver savings that directly benefit metered customers' bills.

- **Leaky loos can double a metered household annual water bill**
- **Over 6,000 repairs carried out**
- **1.7m litres of water saved per day**

Smarter Home savings.

During 2016/17 we completed over 6,000 leaky loo and wastage fixes as part of our Smarter Home Visit programme. This produced savings of 1.7 million litres of water per day.

When the cost of a fix is accounted for, it represents extremely good value for money. But the benefits for customers who have received a Smarter Home Visit and retrofit don't end here, and everyone has something to gain from wider awareness of water saving issues:

- Average saving per fix of over 300 litres per day
- Saving money for customers
- Reducing in-home wastage

Incentive scheme pilot.

Incentive scheme pilot.

In partnership with Green Redeem, we've developed and launched an incentive scheme pilot based on the concept of rewarding customers for cutting the amount of water they use.

Background.

As part of our AMP6 business plan, we made a commitment to test whether innovative tariffs or incentives could be a way of helping to reduce household water demand. This would be the first ever programme to combine the use of smart meter data with non-financial rewards to help household customers save water and money on their metered bills.

How it works.

Our pilot incentive scheme has been made available for 3000 households in Reading, using smart meter technology to provide regular data on how much water they consume.

We've established a baseline water consumption value for each household taking part in the pilot, by calculating their average water use over the previous three months from meter readings.

Then, if the household's water use during one week falls below their baseline, they're awarded points through their online account page or app.

- **Rewarding customers for saving water through an innovative pilot incentive scheme**

Rewarding water efficiency.

Customers can spend their points on a selection of rewards offered by Green Redeem, such as local business offers, shopping vouchers, free coffees and more. Points can also be exchanged for entry into a monthly prize draw, or monetary awards that are donated to charity.

The platform for the incentive scheme also allows 'bonus points' to be awarded for taking quizzes about water efficiency, and pledging to undertake sustainable actions. All this helps to increase awareness and education amongst participating customers.

Our pilot results.

260 households are currently taking part in our incentive pilot scheme. We'll keep on adding more households, monitoring customer engagement with the app and reward offers, and any resulting reduction in water consumption. If this pilot scheme is successful, our intention is to expand the scheme to many more smart metered households.

Our partnership with Action for the River Kennet.

Our partnership with Action for the River Kennet.

Since 2011, we've been delivering a successful schools programme in partnership with Action for the River Kennet (ARK) raising awareness of the value of water for both wildlife and people.

Our partnership programme has expanded to include projects and education packages suitable for primary and secondary schools, and community groups such as cubs and scouts.

What is ARK?

ARK is a registered environmental charity, part of the Rivers Trust, working to protect the River Kennet and its surrounding environment.

With support from Thames Water, ARK offers a range of different programmes to schools in a number of areas within the River Kennet catchment, including talks, trips and classroom projects.

- **Successful partnership with ARK, an environmental charity**
- **Raising awareness of the value of water for wildlife and people**
- **32 school visits, engaging with 1,600 children**

During 2016/17, ARK carried out 32 school talks and programmes, engaging directly with more than 1,600 children and young people via the following community projects:

- 'Water matters' talks
- Trout in school
- Eels in the classroom
- Invertebrates in the classroom
- A river in my classroom
- River fieldtrips

'Water Matters' talks.

Our talks are offered to schools in the River Kennet area to help link water efficiency to the local environment. By also incorporating our 'Bin it – don't block it' campaign, we're able to show children and young people the impact that their actions can have on local rivers.

Thames Water

Eels in the classroom.

Eels are amazing creatures, but their population has crashed in recent years. In this project, students grow eels from tiny glass eels to elvers, releasing them into the river once they are ready. The project runs for about a month, starting at Easter.

Together with ARK's trout project, this programme helps students learn about life cycles, food webs, habitats, adaptions, river ecology, and the importance of water in the environment.

Invertebrates in the classroom.

ARK also runs a session on invertebrates in schools. This project has been a fantastic way for children and young people to learn about chalk stream habitats, life cycles of insects, river ecosystems and the importance of water to us all.

A river in my classroom.

ARK has a physical model of a river (called EmRiver) which can be taken into classrooms to explain how rivers work. It simulates river processes like flood plain and meander formation with great accuracy, and it's very widely used by rivers trusts, educational professionals and scientists.

There's also the Em2 model which demonstrates basic principles of river behaviour, subtle channel morphology and sediment transport processes.

Both models are fun and interactive, and work well with all age groups.

River field trips.

These trips enable school groups to visit their local river to learn about the wildlife that lives in it, how it's formed, and the ways that river health can be affected by pollution and the careless use of water.

Students have learned how to use a key to identify the wildlife they spot, as well as having the opportunity to test the quality of the water they're visiting, either using chemical analysis or invertebrate monitoring.

Visits can be tailored to any age group, from pre-school up, making them a great option for all ages.

Helping housing association residents save on water and energy.

Helping housing association residents save on water and energy.

Thames Water is working with housing providers to deliver in-home visits for their residents to help them save water, energy and money. We've partnered with ZapCarbon to combine both water and energy advice through EnergySave Plus Water. The EnergySave programme has already helped 25,000 homes in the South East become more water and energy efficient.

Background.

The EnergySave programme was originally developed by ZapCarbon to help residents of housing provider London and Quadrant (L&Q) to save money in times of financial hardship. ZapCarbon are award-winning experts in delivering behaviour change programmes which help people to cut their carbon and financial footprints by reducing water, electricity and gas consumption, as well as the amount of waste they produce.

EnergySave.

Through tailored in-home visits and ongoing behavioural coaching, this programme helps residents are helped to gradually reduce how much they spend on energy.

The EnergySave home visit and 12-month support programme has now reached over 25,000 homes - making it the largest non-governmental energy scheme of its kind in the UK. On average, EnergySave households have saved £208/year through pure energy savings, and now can reduce their water and energy bills by an additional £69/year through water efficiency measures, with a combined household saving of over £277/year.

- **431 water and energy visits carried out in three month pilot**
- **Residents can save more than £270/year**

Plus Water.

Energy and water efficiency are directly linked because hot water is a major source of energy use, accounting for around 20% of the average household's energy bills. Reducing the amount of hot water used directly reduces heating costs as well as metered water bills.

Water efficiency was added to the Energy Save scheme in December 2016 to increase savings for residents and to pilot innovative partnership delivery.

During the visits, residents get water and energy saving advice that's tailored for them and their household. By taking them through each area of water use, with a special tablet-based app, and asking a number of customised questions, advisors are able to show a 'live view' of where savings can be made, producing a bespoke water savings plan for every home.

Following the visits, residents receive a copy of their water saving plan through the post or by email to share with their household, increasing the reach of the advice even further.

In addition to this customised advice, residents can get a wide range of our water-saving devices installed in their homes. They're also told about our affordability and extra care services.

Benefits.

- Saving residents energy
- Saving residents water
- Saving residents money
- Tailored household advice
- Increasing residents' and customers' satisfaction
- Improving the efficiency of homes
- Tackling fuel poverty
- Reducing CO_2 emissions
- Identifying vulnerable residents
- Signposting residents to further assistance

Feedback from residents.

Independent audits show that an overwhelming 97% of residents said they would '*recommend the service to friends and family*'.

'I was very happy with the visit from the L&Q man - he gave us some advice which was helpful. I'm very pleased with my savings kit.'

'If they hadn't sent anyone round I would not have known how much I could save on my bills.'

Encouragingly, 89% of residents say that they'll maintain their new efficient habits as a result of the visit.

Funding and delivery.

The EnergySave Plus Water programme is delivered by ZapCarbon, and funded by L&Q and Thames Water.

ZapCarbon manages and delivers this programme of visits with a team of highly trained field agents. They also use a range of coaching technology tools to help residents after each home visit.

Looking forward.

Running these water and energy efficiency engagement programmes side by side has proved to be highly effective – not just for residents, but in terms of delivery costs too.

We'll continue to deliver the EnergySave Plus Water project with ZapCarbon in 2017/18.

- **Partnership working with housing associations**
- **Each visit saves around 60 litres of water per day**
- **97% would recommend this service to family and friends**

Water Efficiency Schools Programme.

Case study – March 2017

Water Efficiency Schools Programme.

Our Water Efficiency Schools Programme (WESP) is an industry leading behaviour change and school engagement project, and a central component of our wider water efficiency programme. Being able to engage with a whole school community, in the way that we do, makes sure that our messages stay in the minds of this key group.

The WESP project is innovative in the way it engages the whole school community with water efficiency, and how it works at home and in school.

The project uses peer-to-peer influencing to widen the reach of the programme and to make sure that the key messages are remembered. We offer each participating school a comprehensive programme of practical and educational measures, including a free water audit for the school, up to £500 worth of free retrofit plumbing equipment, and a multi-visit programme of interactive workshops.

- **Engaging with 35,000 pupils**
- **Free school water audits and £500 free retrofit plumbing**
- **Saving over 7.3 million litres of water**

Wide reach, successful delivery.

Since this programme started in 2014, we've engaged with 170 school communities – and we've provided real water savings to schools as part of an innovative engagement and education programme with thousands of pupils and their families. We have also:

- Delivered nearly 400 workshops in schools since 2014
- Engaged with approximately 35,000 pupils
- Saved over 7.3 million litres of water per year

Winning formula.

This programme is unique in the way it sets out to engage the whole school community – from pupils to caretaker to families – and deliver lasting behaviour change alongside real water savings. In 2016 the project was recognized at the nation-wide Waterwise Awards with a second place in the education category.

Our interactive workshops ensure students don't just understand water efficiency issues, but are also encouraged to spread this learning throughout the school. Workshops in the past year have included creating an 'eco team' within each school. These teams were taught how to run an interactive game, using water and energy saving messages, with their peers. They were then encouraged to invite classes from around the school to take part.

In secondary schools, teams were asked to create and develop a water efficiency campaign. Support was provided to help them select key messages and methods of delivery, but the teams themselves came up with their own ideas for the project itself.

Alongside the workshops and campaigns, each school is provided with a free water audit, and a budget of £500 for retrofit devices and equipment. This means we identify valuable water savings for the school, creating reductions in their bills.

Building on the relationship.

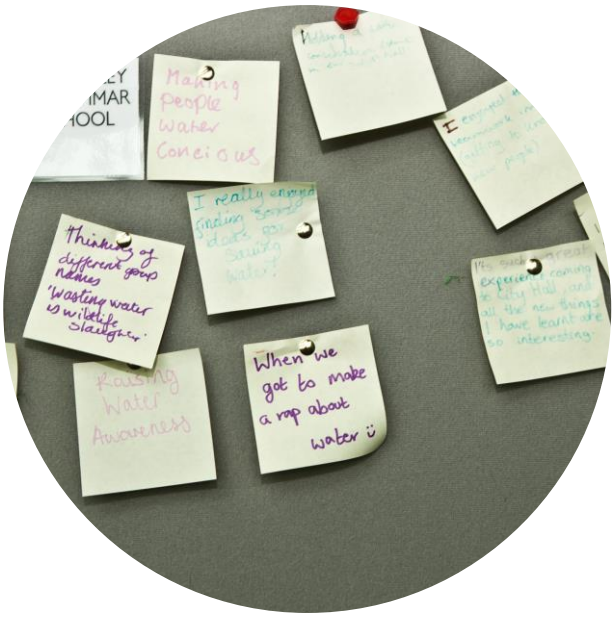
Following the success of our visits, we held a celebration and awards event for 15 of the schools who took part. The event was held at City Hall, London, and students were challenged to present their water efficiency campaigns as a case study.

Their presentations included the changes they'd made in school and their local community, as well as findings from each project. Students were given the opportunity to present their work in the prestigious main Assembly Chamber at City Hall, with their work being judged by a panel.

The winning school was awarded a fun trip to Walthamstow reservoir to see one of our Sites of Special Scientific Interest (SSSI).

Longer term outcomes.

The benefits of this project go far beyond water savings and the number of people we've engaged with. By fully evaluating the activity using comprehensive before and after surveys, we've been able to determine how actions and attitudes to water use have changed. Overall, we've seen a positive shift in attitudes, showing how successful the programme has been.



Deephams Sewage Treatment Works upgrade.

Case study – March 2017

Deephams sewage treatment works upgrade.

We're investing over £250 million to upgrade our Deephams sewage treatment works. This involves bringing the site up to date in terms of capacity, energy generation, resilience and odour control, while still continuing to process the waste of the 800,000 people it serves.

Our upgrade works at Deephams have had to be carefully managed – taking processes offline and rebuilding them sequentially, without losing any sewage treatment capacity while this was being done. The flow of raw sewage coming into the works can't be turned off, and the quality of the treated discharge has to be maintained.

A more sustainable upgrade.

Part of the success of this project has been the management team's ability to make the upgrade more sustainable. By reusing the site and many of the original structures and materials, our new design has reduced the need for waste to go to landfill.

Soil which was excavated to build tanks and other structures has been kept on site. To cut the number of lorry movements, we carried out as much prefabrication as possible elsewhere. This reduced emissions and disruption, and made the project safer for the local community and our people at Deephams.

- **99 per cent improvement in odour reduction**
- **300 weeks of apprenticeship employment**
- **200 weeks of local training**
- **53,000 tonnes of concrete demolished, reprocessed and reused on site**

Odour improvement works.

Since 2010 we've carried out a number of improvements to reduce odours from the works, and local residents have noticed the smell starting to diminish.

Significantly reducing odour nuisance at Deephams is a big part of our plans to upgrade this site. So we're planning to spend around £24m on measures to control odours produced by the smelliest parts of the works, including covering of tanks and installing equipment to capture and clean any odorous air.

The following parts of the site are being covered:

- The inlet – where raw sewage enters the site
- The primary settlement tanks – used at the first stage of the treatment process
- The first part of the aeration tanks – used at the second stage of the treatment process
- The secondary sludge digesters – used to treat solid waste left over from the treatment process

All these improvements will mean that the odour produced by the sewage works will be significantly reduced. Once the upgrade work is finished, the number of properties in the area most affected by odour from the sewage works will be reduced by 99 per cent.

Thames Water

Causes of odour.

Unfortunately, we'll never be able to guarantee that any sewage treatment works will be completely free from odour. This is because sewage can give off smells when it's treated and moved around during the treatment process.

Although it's mainly water, sewage contains polluting materials that produce gases when they're treated or turn septic. These gases can be released into the air and cause odour if that part of the works is exposed.

The amount of odour from a sewage treatment works depends on a range of factors, including what's in the sewage, how long it's taken to arrive at the works, how it's treated, the direction and strength of the wind, and how warm the weather is (sewage can smell more on hot days). There's no way for us to control many of these factors.

Reducing environmental impact.

Another of the aims of our upgrade is to meet European and national standards for water quality in rivers. These standards will improve water quality and biodiversity in the River Lee, Lee Navigation and Salmon's Brook, which the treated wastewater from Deephams flows into.

We've made every effort to consider this scheme's environmental impact - from minimising construction traffic to helping wildlife by building new nest-boxes for birds on the site.

Involving the community.

We've been keeping the residents next to the site informed about the progress of our upgrades. We regularly invite our neighbours inside the gates to see the scheme's progress and suggestions from the community about improving the timings of our construction work have been taken on board.

In addition, we've raised more than £20,000 for local and national charities and embraced our Give Someone a Start (GSAS) scheme, helping people with challenges who may have been out of work for a while to get back in work by offering them experience on site.

Working with the local JobCentre Plus, we put our GSAS candidates through a construction industry programme and helped them to obtain an NVQ level 2 in health and safety. From this scheme, eight people are now in full-time employment, and two of them are working on the upgrade at Deephams.

Proposed reduction in odour after this upgrade

Working together.

Achieving these successes has taken huge amounts of effort from everyone involve – from all the people at AMK (the joint venture between AECOM, Murphy and Kier that has carried out the project) to our customer liaison operation which has worked tirelessly to keep our neighbours engaged and informed during the work.

Collaboration and innovative thinking have enabled our whole enthusiastic team to overcome the many challenges they've faced, in order to deliver the best solution and real success at Deephams. The project is due to be completed by late 2018.

Thames Water

‘Storm chasing’ - proactive catchment management.

‘Storm chasing’ - proactive catchment management.

We use models to monitor the performance of our sewerage network - providing real time operational management to inform our investment decisions. We’re also using these models to improve our readiness for adverse weather events by monitoring rainfall across our region and identifying potential impacts on our sewer network. This is known as ‘storm chasing’.

What we do.

To meet customer demand and protect the environment for future generations, we’ve developed a new approach to managing our wastewater network - moving from the traditional reactive response (‘something has gone wrong’) to a new proactive approach (‘can we stop something going wrong?’). By using our models to predict how rainfall will impact our sewer system, we can proactively inform and prepare the business by:

- Alerting the rest of our business about where, when and how rainfall will impact our region
- Sending text or email alerts to specific managers or operational staff, telling them that they need to drain down tanks or pumps to prepare for the rainfall event
- Working with operational colleagues to help provide real time information on responding to the event, so we can minimise its impacts on the ground and on our customer service.

- **Storm chasing to predict and model flows in our sewers**
- **Prevented 27 potential pollutions and 52 blockages**
- **Saving 389kWh of electricity**

How it works.

We’ve set up a continuous feed of rainfall data from the Meteorological Office, which gives us data from actual rainfall that has occurred and predicted rainfall patterns up to 24 hours ahead.

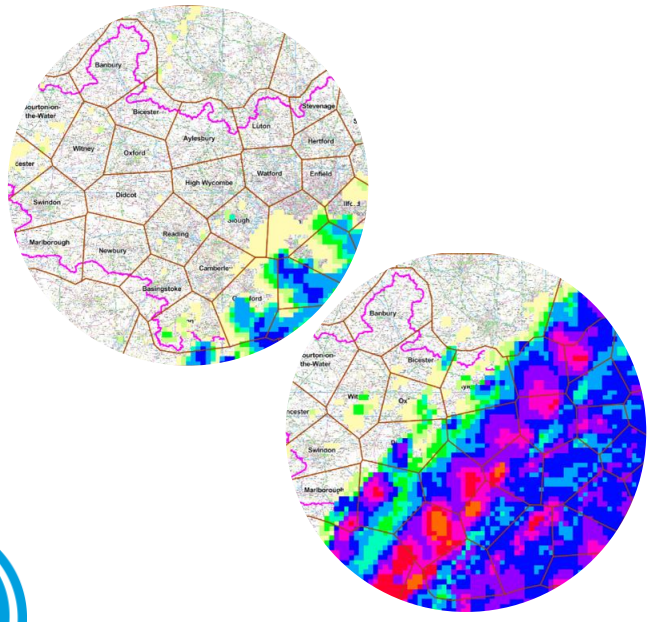
We receive this data at five minute intervals in one kilometre squares for our entire region, so we can anticipate the depth as well as the intensity of the rain expected to fall.

Using our models, we’re able to simulate our sewers’ response to rainfall. We continuously feed rainfall data - a combination of what has actually fallen and what is expected to occur - into our models to give us the best possible insight into the flows likely to occur in the sewers.

When necessary, we can also link our models with groundwater levels, as well as actual tide and river levels for the River Thames.

Data analytics.

By combining existing data sets and then graphing, displaying and analysing this against an asset, we are able to understand the asset performance and deterioration. We can then intervene and subsequently prevent failure of that asset. In 2016/17, we estimate this prevented 27 pollutions, 52 blockages and saved 389 kWh of electricity.



Real time management.
We're using this modelling technology for other parts of our business, too - not just responding to rainfall and storm events.

Real time monitoring.
Our Real Time Management (RTM) of networks system is something we're developing to help us instantly identify our network's status and health. It also provides predictive responses to data about events, allowing more informative and effective management of our assets to avoid service failures, and optimise the performance of our network and treatment works.

Using a range of data and systems - including hydraulic models of our network, rainfall radar, telemetry data and continuous network simulations of predicted weather patterns – means we're able to plan our operations and responses more effectively.

Our real time monitoring capability provides a range of benefits that we're actively developing, such as:

- Better predicted network response to current and weather forecast conditions
- Improved understanding of how our assets work and the opportunity to spot trends in performance
- Advanced warning of flows due to be received at the treatment works to enable the works to prepare.

Pollution tracking.
Our new pollution tracker enables us to manage potential pollution incidents - by helping controllers to spot issues early, minimise impact, find the root cause and where possible stop it from occurring.

Using geo-spatial analysis, we're able to understand the availability of assets, wet well levels, changes in energy use and other metrics, which can all be analysed to help us manage our wastewater system.

Our root cause analysis tool identifies contributory causes such as communication failure, as well as the physical causes like equipment failure. All the information gathered from the root cause analysis process is captured and delivered to the relevant areas of the business in the form of tracked learning themes and specific actions.

Adverse weather modelling.
By identifying potential weather events using predictive modelling with six-hour, 36 hour and five-day weather forecasting, we're able to predict potential weather, and inform and prepare our business. This adverse weather modelling includes prolonged hot weather, as well as snow, ice and storm chasing.

With these early warnings, we can deploy our resources proactively to areas which need them, using our new Logistics Management Centre (LMC). Our proactive event management approach to adverse weather helps inform the business and ensures business readiness.

OHES environmental response.
To help us understand the impact of potential pollution incidents, ensure the appropriate level of response and maximise learning to prevent repeat incidents, it's essential to gather robust environmental data as soon as possible – preferably while the incident is still ongoing.

We work with specialist environmental consultants, OHES, who respond to potential pollution incidents and gather water quality data such as dissolved oxygen and ammonia. An OHES environmental specialist can typically be on site to support our network engineers and operational staff within an hour of being deployed.

This approach is currently the only one of its kind in the water industry – and it's another clear demonstration of our commitment to reducing and mitigating pollution incidents. We're also able to share water quality information with the Environment Agency when needed.

Future developments.
We're already making real-time decisions, and the next stage will be fully automating these decisions so that our models and assets can interact directly to make changes and deal with the impact of weather.

We'll continue to develop and embrace new technology in order to provide the best and most reliable service possible for our customers and help protect the environment.

Thames Water

Sunny Littleton pumping station.

Case study – March 2017

Sunny Littleton pumping station.

Last year Littleton raw water pumping station (RWPS) underwent a significant upgrade to make the energy intense process of pumping raw water more energy efficient. This upgrade, including the installation of photovoltaics (PV), has been a great success, so Littleton is now the lowest cost raw water abstraction site in London.

Background.

Littleton RWPS opened in 1925 to draw water from the Thames at Laleham and supply our Queen Mary reservoir. In the 1950s, the station received major investment to decommission one steam pump and modify the other three to run with electric motors.

The scale of last year's upgrade was huge, focussing on nearly all aspects of the station's operation. It included replacing the main electrical switchboard, fitting more efficient motor equipment, installing a new automated control system to increase energy efficiency, and a 1.5MW PV array to reduce our electricity consumption from the National Grid.

Delivering the upgrade.

The project delivery team was inspired by our ambitions as a business to install more renewables across our sites. Forward planning and teamwork resulted in minimal disruption to our raw water pumping process and operations while we constructed and commissioned the PV system.

- **1.5MW photovoltaic installation**
- **Generating 1.4GWh per year**
- **£220,000 yearly efficiency savings**

The benefits.

Overall, the upgrades and installation of PV has increased the performance of the site, while also making it more flexible, reliable and energy efficient.

By allowing all three pumps to run concurrently, Littleton's capacity has increased from 400 to 700 Ml/d. We've been able to significantly increase our range of abstraction from the Thames, which gives us greater flexibility - for instance, being able to abstract during times of low flows in the river.

We're able to save operating costs of £220,000 a year as a result of increasing the site's efficiency by better management of the abstraction sites, more energy efficient assets, and optimised control of the pumping station. We've also reduced our exposure to the volatility of the energy markets for the next 20 years or more.

Reduced electricity from the Grid.

In the graph below, overall electricity demand at our Littleton site is shown in purple.

As the sun shines, the photovoltaic system starts generating renewable electricity (shown in red).

This is mirrored by a reduction in the amount of electricity taken from the grid (shown in blue).

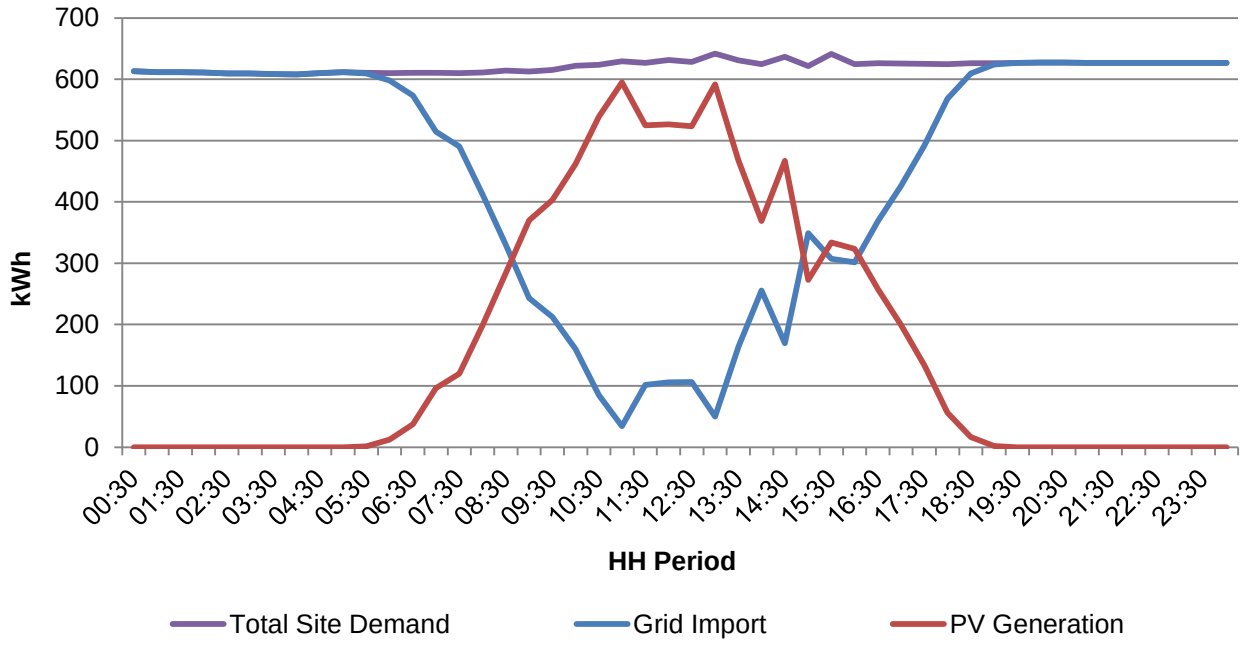
Being able to reduce our use of grid electricity saves over 640 tonnes of carbon dioxide equivalents each year. The amount of Grid electricity imported is equivalent to the consumption of almost 150 average households.

Next steps.

We'll carry out additional optimisation at this pumping station to reduce operating costs even further. We'll achieve this by:

- Load management: pumping more when the sun is shining, and less on a cloudy day to reduce electricity imported from the National Grid
- Battery storage: when PV generation is greater than our electrical demand, storing the extra energy and using it at night when the PV system is sleeping
- Commercial opportunities: exploring opportunities with the National Grid to export any surplus electricity.

Littleton won 'Carbon Reduction Initiative of the Year 2016/17' at the Water Industry Achievement Awards



Using data insight to reduce energy usage.

Using data insight to reduce energy usage.

Technology is advancing faster than ever and putting more information at our finger tips. We can use this information to become smarter about how we manage our infrastructure, make our operations more efficient, and improve the service we offer our customers.

We've developed an intelligence hub (iHub) which is a one stop shop for data across the company. It lifts data from a range of systems and allows anyone across the business to access it. The iHub will help us make more informed operational decisions on how we plan, take and move water and wastewater around our network. All this will help us to reduce our energy usage.

Benefits of models and smart data.

We've automated our production planning which allows us to plan as a closed system, alongside a cost model to calculate the price of producing water. Aligning the data from both of these tools allows us to understand our optimal production strategy, making it much more possible to reduce our energy consumption.

We've also been able to use smart technology (like meters and sensors) to create a London Underground style map of all our sites and assets in the London area. By collecting the data from these devices, we can produce a 3-D view of what's happening in London.

- **Improved data availability**
- **Investigated 600 energy use and pump issues**
- **Prevented 22 potential pollutions**
- **Saved 389MWh of electricity**

Proactive planning with iHub.

By helping to identify emerging risk in both our water and wastewater operations, we're able to prevent incidents from happening, and stop using unnecessary amounts of additional energy.

For example, if we can prevent a water pump failure, we can stop both a reservoir from emptying and a lack of supply to customers. We can also avoid having to bring water into the area in tankers, which would increase our carbon footprint and impact on cost and our resources.

We can also reduce energy consumption and help protect the environment by using the iHub for our wastewater network. We have thousands of sewage pumping stations across our wastewater region, and we can now analyse our energy use and identify potential problems sooner. Since April 2016, we've investigated 600 energy use and pump runtime events. As a result, we identified approximately 200 potential issues, prevented 22 potential pollutions and saved 389 MWh of electricity by responding to events sooner.

Developing iHub has enabled us to think differently about how we plan and react to different scenarios, in both the water supply and wastewater areas of our business.

Thames Water

Improving our vehicle fleet with telematics and engine remapping.

Case study – March 2017

Improving our vehicle fleet with telematics and engine remapping.

Innovative devices called telematics have been installed on our new vehicles to help our drivers understand how they drive and how their driving style can be improved - ultimately helping them become safer and more efficient drivers on the road. We've also remapped our vehicles to enhance their engine performance. All this helps to save fuel, money and emissions.

Background.

Our fleet of 200 cars, 1,600 vans and almost 50 HGVs covers a wide geographical area of around 5,000 square miles across London and the Thames Valley, and travels about 25 million miles each year. We switched our vehicle contract to Ford in 2014 and have replaced more than 1,000 vans. These vehicles have proved very popular with our drivers: they can be fitted out for different purposes, and they're great value in terms of price, fuel consumption and maintenance.

The telematics devices fitted to these vehicles automatically collect information about vehicle, location and driving style. Using and understanding this information allows us to build a snapshot of driving behaviour and journeys, so we can identify potential areas for development.

The information captured includes:

- Vehicle status (driving, idling, ignition off)
- Speed
- Location
- Mileage
- Driving behaviours (e.g. harsh braking, quick acceleration)

Optimising our fleet.

Our vehicles contain an Engine Control Unit (ECU) - a small computer which controls how the engine works. The manufacturers set the software on the ECU to default, and we've now remapped our vehicles by updating their default software settings to optimise the vehicles' performance for our purposes.

On average, we've seen a 7.5% fuel saving since 2014. Our fleet of vans are also fitted with speed limiters, which restrict the vehicles to 70mph, or 62mph for vehicles fitted with tow-bars.

This cuts fuel consumption, cost, and emissions even further, and helps our whole fleet operate more safely.

Inside the vehicle.

All our vehicle dashboards are fitted with a driver behaviour indicator which lets the driver know how well they're driving by displaying a series of green, yellow and red lights with an audible alert.

Each journey begins with one green light, which will continue to show if no harsh events occur. A forward facing camera in the vehicle will record the road and environment ahead of the vehicle, and video footage is captured and stored when a G-Force 'event' such as harsh braking or cornering is detected by the system.

- **Improving safety, fuel consumption and carbon emissions with telematics**
- **7.5% fuel saving after remapping engines**

Thames Water

Our current vehicle trial.

We've now fitted around 60 vehicles across the business with our new enhanced telematics device - helping our drivers understand how they drive, how their driving style can be improved, and ultimately helping them to be safer on the road.

Benefits of telematics.

By installing this new system, we'll help keep our drivers and other road users safer on the roads and identify any areas for improvement. We aim to reduce the number and seriousness of any vehicle incidents and injuries, and minimise our exposure to fraudulent motor insurance claims.

The telematics system will help reduce our fuel consumption costs and carbon emissions, and we can now capture and monitor our vehicle usage and mileage for proactive maintenance, according to how much the vehicles are used, instead of scheduled servicing. This can reduce costs, carbon emissions, vehicle damage, and wear and tear.

We're also working to improve our knowledge of the availability of our vehicles at all times, to help us can easily locate the nearest vehicles to tasks or sites – optimising our resources and reducing our short-term hire costs.

Driving to the future.

We've taken the feedback we've received from drivers trialling the system to make further improvements, ahead of rolling out telematics to all our vehicles across the business. We expect all our vehicles to be fitted with telematics by summer 2018.

We're also looking at opportunities to use alternative forms of energy, including electricity, to run our fleet. This will help our aim, as a responsible business, to reduce our emissions ahead of the UK's plans to phase out new diesel and petrol cars and vans from 2040 as a means of tackling air pollution.

Thames Water

Our energy portfolio 2016/17

296 GWh of electricity generation - enough to supply 95,000 homes

Renewable generation at 66 sites

A total capacity of 90 MW
27 MW new in AMP6

- 24 biogas CHP plants
- 2 sludge powered generators
- 2 wind turbines
- 43 solar arrays

Electricity

- £96m cost of import
- Second highest opex cost
- 1,298 GWh of consumption
  - Equivalent to 418,000 households
  - 20% renewably self-generated
- New supply contract with Haven Power
  - 100% renewable from Oct 2016
  - Over 6,000 energy supplies
- 23 sites with sub-metering

Four performance commitments

Consumption
99.9% from automatic meter readings

Carbon reduction commitment

Natural gas

Renewable private-wire supply to Beckton sewage treatment works

Thames Water

Managing water pressure in Russell Hill.

Case study – March 2017

Managing water pressure in Russell Hill.

Our 30 year old Croydon booster pumping station maintains the water pressure of the Russell Hill supply zone in South West London. By upgrading this pumping station, we'll significantly reduce energy consumption and leakage in the area.

Background.

Russell Hill water supply zone is located in South West London. Its water is supplied from two sources (Croydon booster pumping station and Russel Hill reservoir). There are approximately 46,200 properties in this water supply zone, with an average daily demand of 29Ml/d.

Most of this zone is currently over pressured in order to maintain the water pressure at the highest point of the network (Pollards Hill). The existing pumping station is almost 30 years old, and most of the equipment is passed its design life. This results in increased leakage and very high energy consumption.

Collaborative delivery.

Our solution to this over pressured zone will be delivered collaboratively between Thames Water and Eight$_2$O. We'll upgrade the Croydon booster pumping station with new pumps, as well as installing variable speed drives and a control system.

- **Estimated energy reduction of 860,000kWh per year equivalent to the consumption of over 270 households**
- **Potential reduction in leakage by one million litres of water per day**
- **Cost saving on electricity consumption**

We'll also build a new booster pumping station for Pollards Hill, which will decrease the pressure in the rest of the zone – as well as increasing resilience in the area by letting more water into Russell Hill reservoir. Installing more control valves will also help us optimise flow and pressure in this zone.

Benefits for South West London.

All these improvements will have big benefits for our energy usage, carbon footprint and leakage targets. We expect this project to reduce our energy consumption by an estimated 860,000kWh a year, and cut leakage by about one million litres a day. Our ability to provide water in South West London will also be enhanced by an extra 4Ml/d – equivalent to supplying more than 6,000 additional properties.

Logistics Management Centre.

Logistics Management Centre.

Our Logistics Management Centre (LMC) plays a key role in delivering enhanced resilience and service to our customers and improving our carbon footprint. This new look business unit is focussed on delivering innovation and continuous improvement, as well as environmental benefits.

Background.

Our Logistics Management Centre (LMC) was established in April 2016. It began as a single point of contact for waste tankering, and now includes a whole range of equipment and services - from hiring pumps, hoses and generators, to holding a comprehensive stock of essential items in strategically placed hubs and distribution centres to support the resilience of our whole business.

Having these services managed centrally by a dedicated team of experts means we're able to manage our resources and services more efficiently, at a reduced cost. In turn, this lets our operational team focus more fully on our customers' needs.

A new way of working.

Our previous tankering operation was split between a number of different contracts and ways of managing this service, which made it harder to keep track of our tankers. As a result, vehicles weren't always fully utilised, or they left sites half full. This meant we were paying for capacity we hadn't used, or there were delays in getting jobs done.

To resolve this, the LMC became a 24 hour, seven day a week service with a single point of contact for all of Thames Water's operational needs. This has made ordering tankering and equipment quicker, easier and more transparent in terms of costs, with accurate reporting.

As well as introducing new systems, our upgraded LMC is helping us to learn even more about how our business runs. In future, the LMC will be able to provide us with better advice and help us find the right solution for any logistics issues.

A new approach to logistics.

By using the latest software, the LMC is transforming the way we plan and schedule tankers, plant hire, pumps and equipment for flood management.

All this will help us provide more cost-effective solutions and a faster response when we need it. We'll be able to see where all our mobile assets are, and use industry leading software to devise the best possible plans to fulfil our customers' needs.

By reducing the journeys and distances our people and vehicles travel, we'll cut our carbon footprint, cost, reduce community disruption, and contributes more widely to our nine sustainability themes.

More effective use of our vehicles also means we can get more work done in a day with the same or fewer resources. We can also lower the overall costs of providing our service, and improve response times. Finally, we'll gain a clearer view of where we spend our money on logistics, and free ourselves up to focus on customer issues.

- **LMC is a 24 hour, seven day a week, one stop shop**
- **Delivering innovation and continuous improvement as well as environmental benefits**

Winner of the 'Supply Chain Excellence Awards - Customer service and support category 2016'

Thames Water

Our supply chain performance.

Our supply chain performance.

British Water is a trade association which represents a significant proportion of our supply chain, including suppliers, contractors and consultants. They run a survey annually which aims to identify how suppliers compare water companies to each other across nine key categories and 48 more detailed elements including areas like contractual approach, attitude, procurement and impact on supply chain.

This performance survey is only completed by the supply chain. So it's an important part of understanding how we're perceived as a client in the market.

Improving our performance.

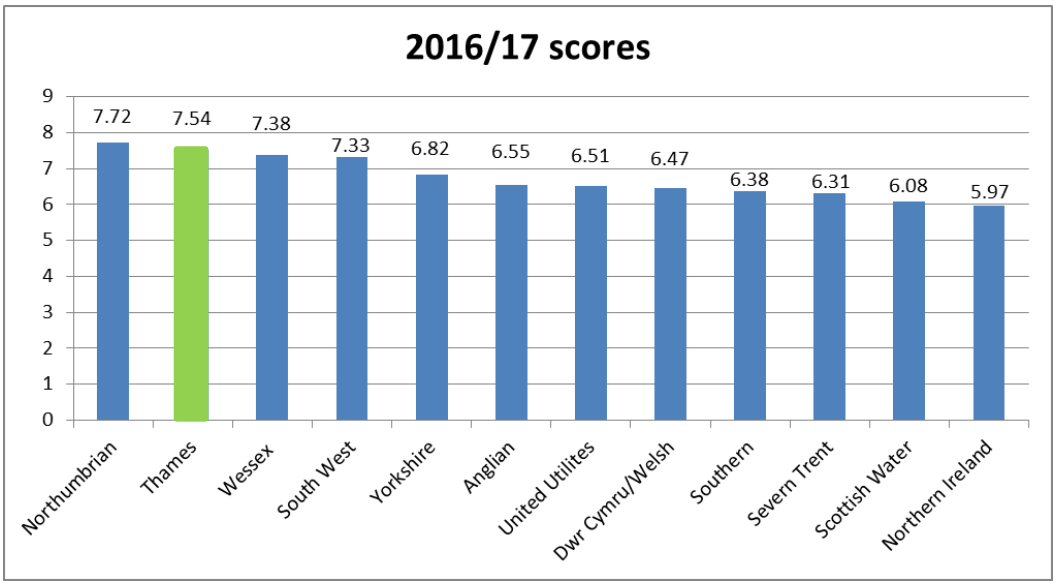
We've been working really hard across our business to improve our communication, engagement and collaboration with key supply partners and alliances – and now we're starting to see the benefits of this approach.

The survey's results for 2016/17 showed that Thames Water achieved an overall score of 75 per cent, compared to 62 per cent in 2015/16, and an industry average of 68 per cent. This has moved us up to 2nd place overall.

The key highlights.

- We scored above the industry average in all areas of the survey
- We scored higher than every other company for following policy (e.g. health and safety)
- We scored joint highest for communication and procurement.

- **Placed 2nd in annual company performance survey**
- **Above industry average in all areas of the survey**



Bringing skills into our industry.

Case study – March 2017

Bringing skills into our industry.

The Skills Accord is an initiative which aims to use procurement to promote sustained investment in the skills that our sector needs most. This is vital because one fifth of the energy and utilities sector's skilled workers are approaching retirement age, and 36% of vacancies in the sector are currently proving hard to fill (higher than any other UK sector).

Background.

The Skills Accord was developed by five lead companies within the energy and utilities sector: Thames Water, Amey, National Grid, SSE and UK Power Networks. The initiative now has 27 signatories.

It has set five robust and challenging commitments to make sure companies use responsible procurement practices to encourage investment in skills at every point in the supply chain.

To ensure the skills gap is tackled, all 27 signatories have committed to supporting the sector's target of enrolling 5% of their workforce in formalised training. All the signatories will promote this throughout their supply chains by means of a greater focus on skills across the procurement lifecycle.

- **Skills Accord initiative to help tackle the skills gap in the energy and utilities sector**
- **Sector target to enrol 5% of the workforce in formal training**

Looking forward.

The Skills Accord was in a pilot phase until April 2017, and the 27 signatories are now being encouraged to roll it out through their supply chains.

Thanks to the Skills Accord, the energy and utilities sector is poised to tackle the skills gap by investing in training for many years to come – leading to a sustainable workforce in the future.

Thames Water is very proud to be leading on this vital initiative.

Axford and Ogbourne pipeline: licence reduction.

Axford and Ogbourne pipeline: licence reduction.

In consultation with the Environment Agency (EA), we've committed to help protect flows in both the River Og and River Kennet, a Site of Special Scientific Interest. In March 2017 we completed the Axford and Ogbourne pipeline, which has allowed us to stop abstracting water from the Og and reduce our abstraction from the Kennet. The new 18km pipeline brings water to 30,000 homes in south Swindon from the Farmoor Reservoir in Oxfordshire.

Our environmental and technical teams worked hard to make sure appropriate measures were put in place to manage environmental risks and ensure sustainable water supplies to the south Swindon area. This meant working closely with landowners including the Honda car plant, Network Rail and the Woodland Trust, as well as local stakeholders and regulators such as Swindon Borough Council and the EA.

Background.

The new pipeline crosses a railway, two rivers, a number of roads and goes under the M4, carrying water from the Blunsdon and Farmoor reservoirs, north of Swindon, to the Whitefield reservoir complex south of Swindon.

- **Helping to protect flows in the Rivers Kennet and Og**
- **Significant archaeological discoveries**

Saving rare chalk streams.

This alternative supply has been installed to help protect flows in the Rivers Kennet and Og. The Kennet is one of around only 200 chalk streams in the world, and it's a Site of Special Scientific Interest (SSSI). It also provides a home for wildlife such as water voles and brown trout.

As well as the pipeline, the scheme includes three new water pumping stations, one of which is a completely new building designed to blend into the agricultural landscape.

Protecting archaeological discoveries.

Another highlight has been the major programme of archaeological work which was undertaken along the full course of the pipeline scheme to record buried remains before construction began. The scale and significance of these archaeological remains are of national importance.

One of the most important finds was an extended area of the Roman town of Durocornovium near Swindon, including a cemetery, which will now be protected as part of the wider scheduled monument site.

Thames Water

Roman pits and ditches were found adjacent to the A346. Traces of prehistoric settlement were also evident, with enclosures, a round house and a ring ditch burial mound. Medieval ridge and furrow agriculture and a well-used trackway leading to Badbury were recorded.

Five Roman coins were also found. The earliest (and most worn and corroded) is a rare silver denarius struck for the emperor Vitellius in AD 69, either in Gaul or in Spain. The remaining four coins are all issues of the emperor Trajan (2nd century AD).

Safeguarding our environment.

The main aim of the project was to help protect flows in the Rivers Og and Kennet. We also took extra care while were constructing the pipeline:

- We cleared vegetation under the supervision of expert ecologists, and have now reinstated it to the landowner's satisfaction
- We adjusted the route to avoid disturbing great crested newts and important habitats for other species
- We used directional drilling to avoid direct impact on rivers and the sensitive plants and animals they support.

The successful delivery of this project has enabled us to help protect the flows of the Rivers Og and Kennet.

Efficiently supplying water to customers.

The pipeline carries water from the Farmoor and Blunsdon reservoirs to the Whitefield reservoir complex south of Swindon. Three new booster stations were needed to pump the water almost 18km. We have used gravity as far as possible to move the water, limiting the amount of pumping needed.

Reducing construction time.

We needed to build a new booster station at The Marsh. We chose a steel frame with a modular construction system to reduce the amount of time spent on construction. This also allowed us to finish the structure with wood cladding.

Sensitive design.

The Marsh pumping station was designed to resemble a barn, and its cladding has the appearance of wood to blend into the environment. We also planted a screen of trees and hedgerows to improve biodiversity.

Providing resilience.

The Axford and Ogbourne pipeline will be in place for many years, so we've allowed space for future growth and additional resilience in the networks which are served by the scheme.

At The Marsh booster station we incorporated flood resilience interventions to reduce surface water runoff. These include a retention pond and permeable paving called Hexapath.

Walton eel screens.

Case study – March 2017

Walton eel screens.

We've installed a series of travelling band screens to stop eels being sucked into the reservoir at our Walton advanced water treatment works. This will protect the eels and help with the recovery of this endangered species.

Background.

We worked closely with our suppliers, Bridges and Steelways, to create protective eel screens for our advanced water treatment works at Walton. These moving band screens are designed to stop eels getting into the reservoir and allow them to continue their migration up and down the river. The screens' small mesh prevents the eels from passing through, while an auto-wash feature enables the screens to self-clean without hampering the flow of water into the treatment works. The design is modular, so that all eleven screens and frames could be easily installed from a floating pontoon.

Working offsite.

The modules were constructed at Bridges' factory in Midsomer Norton, providing the benefits of a controlled working environment, free from the risk of delays and potential hazards on site.

The steelwork was designed to fasten onto a frame fitted by the piling contractor. This connection was made above the water level, so that once the pilings had been built, almost all the following works could be done from the bank or from the pontoon.

Our construction team visited the factory to see a demonstration of the installation process. This meant that as soon as the components reached the site, they knew how to install them correctly.

Benefits of the scheme.

The new screens have reduced embodied carbon, operational carbon and energy demand to just 22 per cent of what was originally proposed in our business plan. The screens are also cutting operational carbon by an average of 9.6 tCO_2e per year, and are saving 39 MWh per year of electricity compared to our business plan. In addition to these savings, the screens were installed at £200,000 below the original budgeted costs.

Our approach to delivering this scheme meant we didn't need to close the footpath next to the river, and we minimised disruption by limiting our time on site.

What's next?

There are another nine sites where we need to install eel screens at the intakes. Now we've successfully proven the effectiveness of this modular approach at Walton, we can repeat the process at our other sites.

- **Protecting endangered eel populations**
- **Saving 9.6 tCO_2e/year and 39 MWh/year of electricity**
- **Minimising disruption and keeping footpaths open**

Thames Water

Hampstead reservoir membrane, London.

Hampstead reservoir membrane, London.

We're installing an 'intelligent' membrane to keep high quality water in our Hampstead service water reservoir.

Background.

Membranes are used to keep water in reservoirs protected from outside contaminants. On a number of recent occasions, our Hampstead service water reservoir has suffered from water quality failures because of leaks in its membrane. To address this issue, our original plan was to replace the entire existing membrane and drain away surface water.

What we did.

Instead of digging up and lifting the old membrane, we're laying the new membrane system over it at a reduced depth, so less soil needs to be removed. We've opted for a system that detects leaks, triggers an alarm, and drains surface water away from the reservoir.

How does it work?

The 'intelligent' membrane we're installing has a 24/7 monitoring system to detect leaks and provide security against tampering or other damage. On top of the membrane, there's also a drainage system which carries potentially-contaminated rainwater and surface runoff away from the site.

Working closely with our supply chain.

We worked closely with the leading membrane technology supplier, Sensor UK, to develop this solution. So we've been able to deliver an innovative system and minimise the amount of digging required.

- **Ensuring high water quality for our customers**
- **Providing protection for bees**
- **Using a Power Cube hybrid generator to reduce noise and emissions**

A more sustainable outcome.

Because the 'intelligent' membrane provides leakage detection and allows any leaks to be located with high levels of accuracy, our maintenance costs will be less, and we can be confident in the membrane's integrity.

We were able to lay this membrane at a shallower depth, which reduced the amount of digging we had to do. This meant we didn't have to take so much material off site, or store it on site, where space is limited.

As a result, noise and impact on local residents was reduced, and our carbon footprint was smaller too.

We've also reduced our noise and carbon impact by using a Power Cube hybrid generator, which charges a battery during the day and uses this power to run essential systems at night.

Additional environmental benefits.

We're always trying to enhance the environment and improve biodiversity whenever we can, so we've used this project as an opportunity to install a screen to protect bees at Hampstead reservoir. The screen shields the bees from woodpeckers, with holes that are just big enough for bees to get through.

Thames Water

‘Storm chasing’ - proactive catchment management.

‘Storm chasing’ - proactive catchment management.

We use models to monitor the performance of our sewerage network - providing real time operational management to inform our investment decisions. We’re also using these models to improve our readiness for adverse weather events by monitoring rainfall across our region and identifying potential impacts on our sewer network. This is known as ‘storm chasing’.

What we do.

To meet customer demand and protect the environment for future generations, we’ve developed a new approach to managing our wastewater network - moving from the traditional reactive response (‘something has gone wrong’) to a new proactive approach (‘can we stop something going wrong?’). By using our models to predict how rainfall will impact our sewer system, we can proactively inform and prepare the business by:

- Alerting the rest of our business about where, when and how rainfall will impact our region
- Sending text or email alerts to specific managers or operational staff, telling them that they need to drain down tanks or pumps to prepare for the rainfall event
- Working with operational colleagues to help provide real time information on responding to the event, so we can minimise its impacts on the ground and on our customer service.

- **Storm chasing to predict and model flows in our sewers**
- **Prevented 27 potential pollutions and 52 blockages**
- **Saving 389kWh of electricity**

How it works.

We’ve set up a continuous feed of rainfall data from the Meteorological Office, which gives us data from actual rainfall that has occurred and predicted rainfall patterns up to 24 hours ahead.

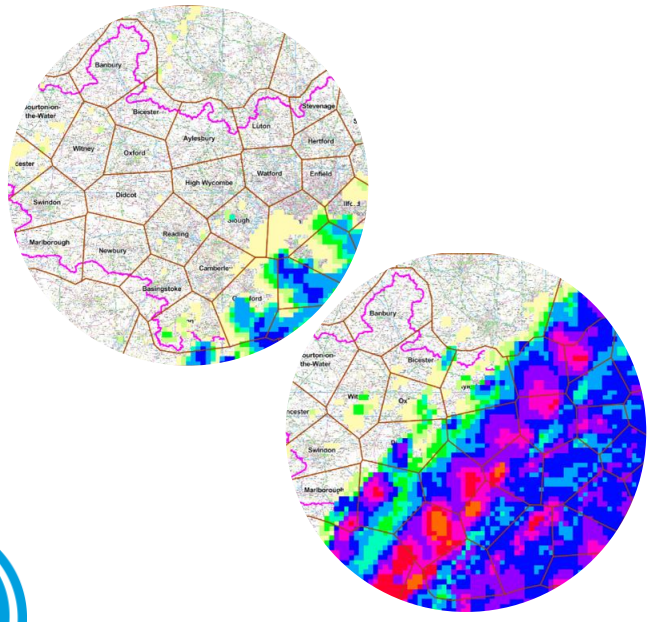
We receive this data at five minute intervals in one kilometre squares for our entire region, so we can anticipate the depth as well as the intensity of the rain expected to fall.

Using our models, we’re able to simulate our sewers’ response to rainfall. We continuously feed rainfall data - a combination of what has actually fallen and what is expected to occur - into our models to give us the best possible insight into the flows likely to occur in the sewers.

When necessary, we can also link our models with groundwater levels, as well as actual tide and river levels for the River Thames.

Data analytics.

By combining existing data sets and then graphing, displaying and analysing this against an asset, we are able to understand the asset performance and deterioration. We can then intervene and subsequently prevent failure of that asset. In 2016/17, we estimate this prevented 27 pollutions, 52 blockages and saved 389 kWh of electricity.



Real time management.
We're using this modelling technology for other parts of our business, too - not just responding to rainfall and storm events.

Real time monitoring.
Our Real Time Management (RTM) of networks system is something we're developing to help us instantly identify our network's status and health. It also provides predictive responses to data about events, allowing more informative and effective management of our assets to avoid service failures, and optimise the performance of our network and treatment works.

Using a range of data and systems - including hydraulic models of our network, rainfall radar, telemetry data and continuous network simulations of predicted weather patterns – means we're able to plan our operations and responses more effectively.

Our real time monitoring capability provides a range of benefits that we're actively developing, such as:

- Better predicted network response to current and weather forecast conditions
- Improved understanding of how our assets work and the opportunity to spot trends in performance
- Advanced warning of flows due to be received at the treatment works to enable the works to prepare.

Pollution tracking.
Our new pollution tracker enables us to manage potential pollution incidents - by helping controllers to spot issues early, minimise impact, find the root cause and where possible stop it from occurring.

Using geo-spatial analysis, we're able to understand the availability of assets, wet well levels, changes in energy use and other metrics, which can all be analysed to help us manage our wastewater system.

Our root cause analysis tool identifies contributory causes such as communication failure, as well as the physical causes like equipment failure. All the information gathered from the root cause analysis process is captured and delivered to the relevant areas of the business in the form of tracked learning themes and specific actions.

Adverse weather modelling.
By identifying potential weather events using predictive modelling with six-hour, 36 hour and five-day weather forecasting, we're able to predict potential weather, and inform and prepare our business. This adverse weather modelling includes prolonged hot weather, as well as snow, ice and storm chasing.

With these early warnings, we can deploy our resources proactively to areas which need them, using our new Logistics Management Centre (LMC). Our proactive event management approach to adverse weather helps inform the business and ensures business readiness.

OHES environmental response.
To help us understand the impact of potential pollution incidents, ensure the appropriate level of response and maximise learning to prevent repeat incidents, it's essential to gather robust environmental data as soon as possible – preferably while the incident is still ongoing.

We work with specialist environmental consultants, OHES, who respond to potential pollution incidents and gather water quality data such as dissolved oxygen and ammonia. An OHES environmental specialist can typically be on site to support our network engineers and operational staff within an hour of being deployed.

This approach is currently the only one of its kind in the water industry – and it's another clear demonstration of our commitment to reducing and mitigating pollution incidents. We're also able to share water quality information with the Environment Agency when needed.

Future developments.
We're already making real-time decisions, and the next stage will be fully automating these decisions so that our models and assets can interact directly to make changes and deal with the impact of weather.

We'll continue to develop and embrace new technology in order to provide the best and most reliable service possible for our customers and help protect the environment.

Thames Water

Bin it
– Don’t Block It.

‘Bin It – Don’t Block It’.

The most common reason for failure in our sewer network is when our pipes get blocked. Unfortunately, in most cases, this is caused by customers putting the wrong things down the drain, like cooking fat and wet wipes.

Despite our best efforts, some blockages lead to sewer flooding in homes and gardens – a truly miserable experience for our customers. If sewer flooding reaches rivers and streams, it causes pollution incidents too.

‘Bin It - Don’t Block It’.

‘Bin It - Don’t Block It’ is our ongoing customer engagement programme which aims to change customer behaviour by illustrating the problems created when drains get clogged with items that simply shouldn’t be there.

We’ve run successful customer education campaigns for several years, so we know this approach can reduce the number of blockages and the floods they can cause.

- **We clear 85,000 blocked pipes each year at a cost of £12m**
- **85% of blockages are caused by customers putting the wrong things down the drain**
- **88% of people said our campaign made them think about how they disposed of wet wipes**

Targeted campaigns.

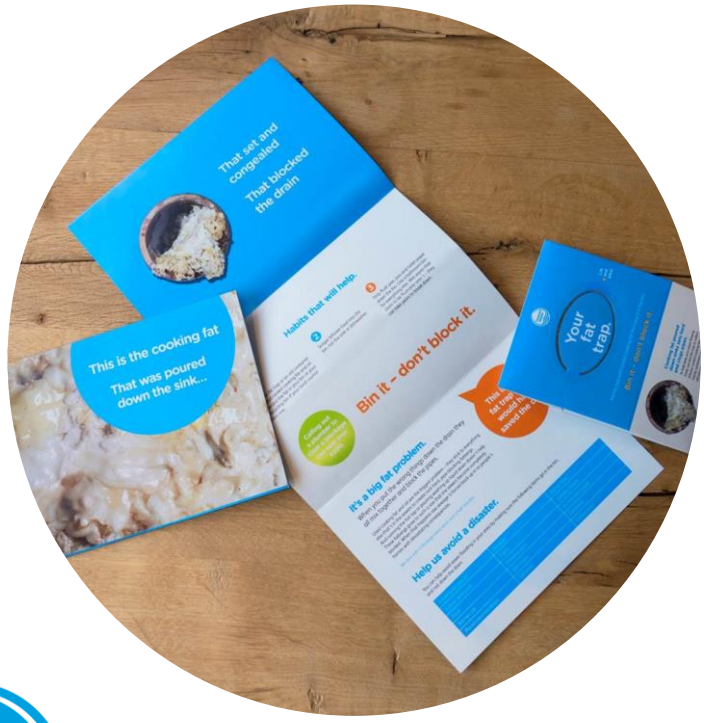
Our efforts were focused in areas most at risk from blockages, floods and pollution.

We were able to select the worst blockage hotspots by looking at the last three years of sewage incidents in 12,000 areas across our network.

For our 2016/17 campaigns, we identified 391 key hotspot areas and created an annual plan to reach customers in 223,000 homes.

In 2016/17 we completed eight campaigns, including:

- 598,000 mailings
- Adverts at 750 poster sites
- 30 inserts in local press in the worse areas
- Digital advertising with 300m digital impressions
- Free fat trap mailed to 223,000 households.



A new approach.

Our research told us that behaviour change is more likely if we communicate the personal consequences of a blockage.

We reflected this in our campaigns and adopted a ‘cause and effect’ theme for our programme. Highlighting two of the most common causes of sewer blockages, this allowed us to show how certain items can have a disastrous impact on individuals and homes.

Taking one cause at a time, we started out with how to dispose of cooking fat and oil, and then moved onto wet wipes.

We used engaging stories to communicate the devastating emotional and physical consequences of a blockage.

Fat traps.

We know if customers are given simple tools to avoid the problem, then this can trigger behaviour change. So we sent a free fat trap to all customers in our target areas to encourage them to start collecting cooled cooking fat and oil before putting it in the bin.

More than half of the people surveyed after the campaign said they now use their free fat trap rather than pouring leftover fat, oil and grease down the sink.

Wet wipes.

We also wanted to reinforce the message that household toilets and pipes are only designed to dispose of the 3 P’s. Our campaign encouraged people to use a bathroom bin for anything that wasn’t pee, poo or [toilet] paper.

We followed this campaign with a survey to measure how successful our communications had been. Our survey told us that this campaign had been Thames Water’s most effective yet - with 88% of people saying it had made them think about how they dispose of wipes.

Thames Water

Tackling misconnections in our catchments.

Tackling misconnections in our catchments.

Misconnections happen when wastewater or sewage pipes are mistakenly connected into surface water drains. This is usually accidental, but it's causing pollution in watercourses across the country.

Foul sewers collect wastewater from toilets, sinks and appliances like washing machines and dishwashers, and take it to the nearest sewage works to be treated.

Surface water drains are separate - collecting rainwater that runs off roads and roofs. This water is then diverted to a local river or stream to prevent your home from flooding, while also boosting water levels in the environment.

The environmental impact.

If a property is misconnected, the wastewater will go straight into the river. Untreated sewage kills wildlife, damages the natural environment and puts our health at risk.

Are misconnections illegal?

Under Section 109 Water Industry Act 1991 it is unlawful to discharge foul water into a sewer provided for surface water when separate public sewers are provided for foul water and surface water. It's also an offence to put raw sewage into rivers and streams.

Property owners could face the risk of an expensive bill to put this right. They could even be prosecuted and fined up to £50,000 if they don't do anything about it.

- **Misconnections are unlawful**
- **We estimate as many as 60,000 properties are misconnected in our region**
- **Potential £50,000 fine for misconnections**

Our catchment investigations.

Once a contaminated outfall has been discovered (when foul water is going where it shouldn't), we can trace the pollution back to its source.

During these investigations we can also identify other issues that cause pollutions to local watercourses. In addition to misconnections, this can also include private blockages and illegal fly tipping of trade waste.

We have a specialist pollution tracing contractor who investigates our sewer network to identify misconnected properties. We use a range of techniques including:

- Visual assessments
- Dye tracing
- CCTV
- Wire caging
- Water quality sampling

Visual assessments.
Identifying the type of pollution in the local watercourse can give us an indication of where it's coming from. For instance, an outfall polluted mainly with grease and fat suggests that it could be from a local restaurant.

The types of pollution in wastewater discharges are often toxic to aquatic life, and deplete the natural oxygen levels in the water which are essential to support a healthy ecosystem. This often results in the growth of sewage fungus, a mass of filamentous bacteria that grows in response to excessive nutrients in the water.

We may also be able to spot misconnections by looking at the outside of properties. For example, we check all roof drainpipes and guttering for any additional connections. Sinks and washing machines should never be plumbed into drainpipes.

Dye tracing.
This involves putting a teaspoon of colourful, fluorescent dye down sinks, toilets, appliances and drainage gullies so we can follow where it goes. The bright dye shows where wastewater is flowing, and helps us check that properties are properly connected. The dye isn't permanent, and doesn't cause any staining.

CCTV.
We can use crawler CCTV systems to follow our network of sewers, and identify any misconnections where wastewater enters the surface water drains.

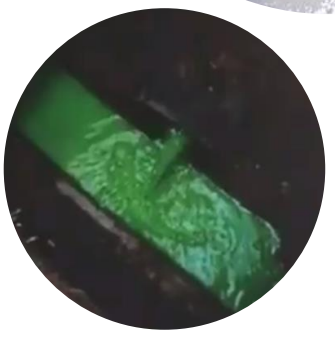
Wire caging.
We hang wire cages inside the drainage network to catch toilet and kitchen waste, and other evidence of pollution as it's flushed out of toilets and sinks, and flows down to the watercourse. This can also help identify problem areas in our catchments.

Water quality sampling.
Misconnections and the pollutions they cause are often difficult to detect, due to their intermittent nature and the fact they may not always be visible. However, the wide range of possible pollutants can all be sampled and checked for, monitored and used as indicators for the source of the pollution.

What can you do?
Taking the time to make the right connection can have huge implications for your local watercourses. Make sure your property is connected right first time - visit www.connectright.org.uk for more information and to find an accredited plumber.

connect right

Stop pollution



Thames Water

Nine Elms SuDS project.

Case study – March 2017

Nine Elms SuDS project.

To keep rainwater out of the sewer network, we're installing an ambitious and innovative sustainable drainage system (SuDS) to ease the pressure on the existing sewerage system as a result of a number of high profile projects planned in the Nine Elms area of Vauxhall, South London.

Background.

The Nine Elms Partnership, made up of Lambeth and Wandsworth councils, the GLA and developers Ballymore, wanted Thames Water to have a close look at everything that was planned in the Nine Elms area – the new US and Dutch embassies, the extension to the Northern Line, the Thames Tideway Tunnel and 21,000 new homes.

This area, previously occupied by industrial and large commercial premises such as Royal Mail, had been served by Victorian 'combined sewers', which receive both surface water and foul water. With the additional demands that this development would put on the sewer network, we decided to establish an innovative SuDS to free up space in the existing sewers.

- **UK's biggest SuDS project**
- **£14.5m SuDS scheme**

Working with others.

This project has seen close co-operation between Thames Water and the Nine Elms Partnership, as well as other occupants of the site including Royal Mail, the US and Dutch embassies and the Environment Agency.

We've worked hard to minimise impacts on stakeholders. For example, the Royal Mail depot in Westminster needed to remain open, so we used tunneling while we were working in that area instead of open trenches. We also revised our programme to let the developers continue with their construction work.

How will the SuDS work?

Instead of running into the sewer network, as at present, rain water which falls on the area between Vauxhall and Battersea Power Station will be channelled into large underground pipes. A new pumping station will discharge it into the Thames.

By keeping this surface water separate from the wastewater or sewage, we can reduce the size of the pipes we need, as well as pumping and treatment requirements.

Thames Water

Other eco-friendly innovations.

This big engineering project will be complemented by a variety of eco-friendly innovations in the new housing developments, including:

- Green roofs
- Ditches containing filtering vegetation
- Streets with rainwater gardens

These will allow water to evaporate into the atmosphere, irrigate plants, and reduce the volume of rainwater flowing into the river.

A sustainable outcome.

By keeping much of the rain water out of the sewers, we'll have extra capacity to serve new developments and improve our resilience to floods in the downstream sewer network. In collaboration with stakeholders, we've ensured improved public amenity and improved biodiversity across this whole site.

We've chosen construction materials that reduce the embodied carbon of the project by 35,000 tonnes, compared to the original plan. This includes reusing and recycling 6000m^3 of material.

Minimising disruption and congestion.

We knew that there was a lot of construction work in the same area, including Royal Mail and the extension of the Northern Line. To minimise disruption to our customers in the area and to avoid long periods of congestion, we worked together to coordinate our activities.

Twenty 4 Twenty.

After our SuDs project at Nine Elms, we will be contributing £20m in this AMP towards other projects delivering sustainable drainage like rain gardens, swales and permeable paving.

By the time we've completed this programme, we hope to have removed at least 20 hectares (around 30 football pitches) of hard, impermeable surfaces such as concrete and asphalt. This will help to reduce the risk of sewer flooding and pollution after heavy rainfall.

The Nine Elms scheme alone will deliver 14 hectares of that target for £2.5 million less than we had budgeted – which means we can use this money to deliver on the rest of our plans.

We'll be focusing on areas served by combined sewers - those that collect not only the foul water from toilets and sinks, but also surface water which lands on roofs and hardstanding areas when it rains.

All this is just the start of our long-term plans to lessen the strain on the sewerage network as the UK's population grows, our towns and cities become more intensively urbanised, and the world's climate changes.

Thames Water

Retrofitting SuDS in London – Counters Creek.

Retrofitting SuDS in London - Counters Creek.

We've successfully completed a partnership project to retrofit three sustainable drainage systems (SuDS) in West London as part of the Counters Creek flood alleviation scheme.

Background.

Counters Creek is one of London's 'lost rivers' and became a combined sewer in the 19th century. Urban creep has led to a 20 per cent loss of green space between 1970 and 2007. The area has over 40,000 basements, with many of these at risk of sewer flooding.

In urban areas like London, there are many buildings and paved surfaces. These intercept rainwater, stopping it from soaking into the soil, and diverting it into local sewers. During heavy downpours, these sewers can fill to capacity and overflow. This often happens at the lowest point of the system - for example, toilets and sinks in basement properties.

One of the ways we're looking to deal with sewer flooding in the Counters Creek area and other areas across London is by installing sustainable drainage systems (SuDS) which soak up, store and slow down rainwater flowing into our sewers during heavy rainfall.

- **Successful SuDS retrofit pilot**
- **Different types of SuDS fitted in London streets**
- **Providing evidence for future use of SuDS to help prevent urban sewer flooding**

Melina Road, Shepherd's Bush

SuDS pilot project.

We've completed the construction of three retrofitted sustainable drainage schemes (SuDS). This was a successful collaborative partnership project with the local communities, the London Borough of Hammersmith and Fulham, and the Royal Borough of Kensington and Chelsea.

This pilot project will provide evidence to show how SuDS can be fitted into existing London neighbourhoods and across wider urban areas, and whether such systems can manage rainwater in a better way to provide a viable solution to the problem of sewer flooding.

Three London streets.

The three streets that were selected for the pilot project were:

- Mendora Road, Fulham
- Melina Road, Shepherd's Bush
- Arundel Gardens, Kensington

Each street represents different housing types in London. Each one also has a main sewer, and little connectivity with other streets, which allows us to monitor the performance of the SuDS more accurately.

Thames Water

Different types of SuDS.

Different types of SuDS have been installed in each street so we can compare the effectiveness of each system. The SuDS are connected to flow monitors that will provide data for us to analyse over the next two years. Each street can be compared to a similar street without any SuDS (a 'control' street) so that the impacts of our SuDS can be accurately assessed.

We've used attenuation crates (similar to plastic egg boxes) or coarse gravel for the main type of drainage system. Each system is surrounded by a plastic geotextile membrane, similar to pond liner. Permeable top surfaces were chosen for local suitability - including permeable block paving, permeable asphalt and specially planted gardens.

Rainwater filters through these permeable top surfaces and then through the crates or gravel. This slows the speed and decreases the volume of water flowing into the sewers, which reduces the risk of flooding during periods of heavy rainfall.

Melina Road, Shepherd's Bush

Mendora Road, Fulham

Arundel Gardens, Kensington

Mendora Road, Fulham.

Mendora Road is relatively narrow with typical terraced housing and small front gardens. We installed two types of SuDS. On one side of the road, we put attenuation crates under a top surface of permeable block paving. On the other side of the road we used coarse gravel under the block paving. Each system is connected to a flow monitor to measure the performance of the systems.

Melina Road, Shepherd's Bush.

Melina Road has a mix of housing with flats and terraces. It's next to a park, and half of the street is pedestrianised near Hammersmith Academy school. In this pedestrianised area, we've built four rain gardens and planted drought tolerant plants. Underneath the soil of the gardens, we've installed a layer of attenuation crates. The gardens were designed with the help of local residents, and the students helped us plant the gardens.

Arundel Gardens, Kensington.

Arundel Gardens is a wide, tree lined street in a conservation area with five storey terraced homes, many converted to apartments. We installed attenuation crates across the width of the road, with a shallow top surface of porous asphalt.

Next steps.

We'll analyse the data from these pilot schemes over the next two years, and use this to evaluate the performance of SuDS as a way to address sewer flooding. The data will be also be used to improve hydraulic modelling of SuDS systems, and optimise the performance of these systems for even more SuDS installations in the future.

Thames Water

A cleaner, healthier River Thames.

Case study – March 2017

A cleaner, healthier River Thames.

The Thames Tideway Tunnel is the second of two major new tunnels designed to collectively capture sewage from the 34 most polluting combined sewer overflows built by the Victorians in London.

Why it's needed.

London's Victorian sewerage network has done a superb job for the last 150 years, but it simply can't keep up with the demands of the capital in the 21st century. Future-proofing is urgently needed.

The sewers built by Sir Joseph Bazalgette in the 1860s still form the backbone of London's sewerage system today. They're in excellent working condition, but they've run out of capacity. Built when London's population was two million, and designed for four million, they're now struggling to serve a capital city with more than eight million people - a figure that continues to rise.

The Thames Tideway Tunnel will stem the flows from the 'combined sewer overflows' (CSOs) identified by the Environment Agency as the most polluting, and connect up with the Lee Tunnel. This has already been constructed by Thames Water to take wastewater, otherwise destined for the river, to Beckton sewage works in East London.

A cleaner, healthier river.

In August 2015, the water regulator Ofwat issued a licence to Bazalgette Tunnel Limited, which trades as 'Tideway', to design, build, commission and maintain the tunnel. Construction began in 2016 and is scheduled for completion by early 2024.

Tideway's challenge is to build the 25km tunnel, up to 65m below London. Its vision is to reconnect London – and Londoners - with the river. This is because delivering a cleaner, healthier River Thames will have many benefits for the people who live and work in London, and those who use the river for public amenity and leisure. It will also rejuvenate the river economy, and provide new areas of public realm on its banks.

The tunnel in numbers.

Length: 25km for the main tunnel. Two long connection tunnels will be 4.6km and 1.1km long

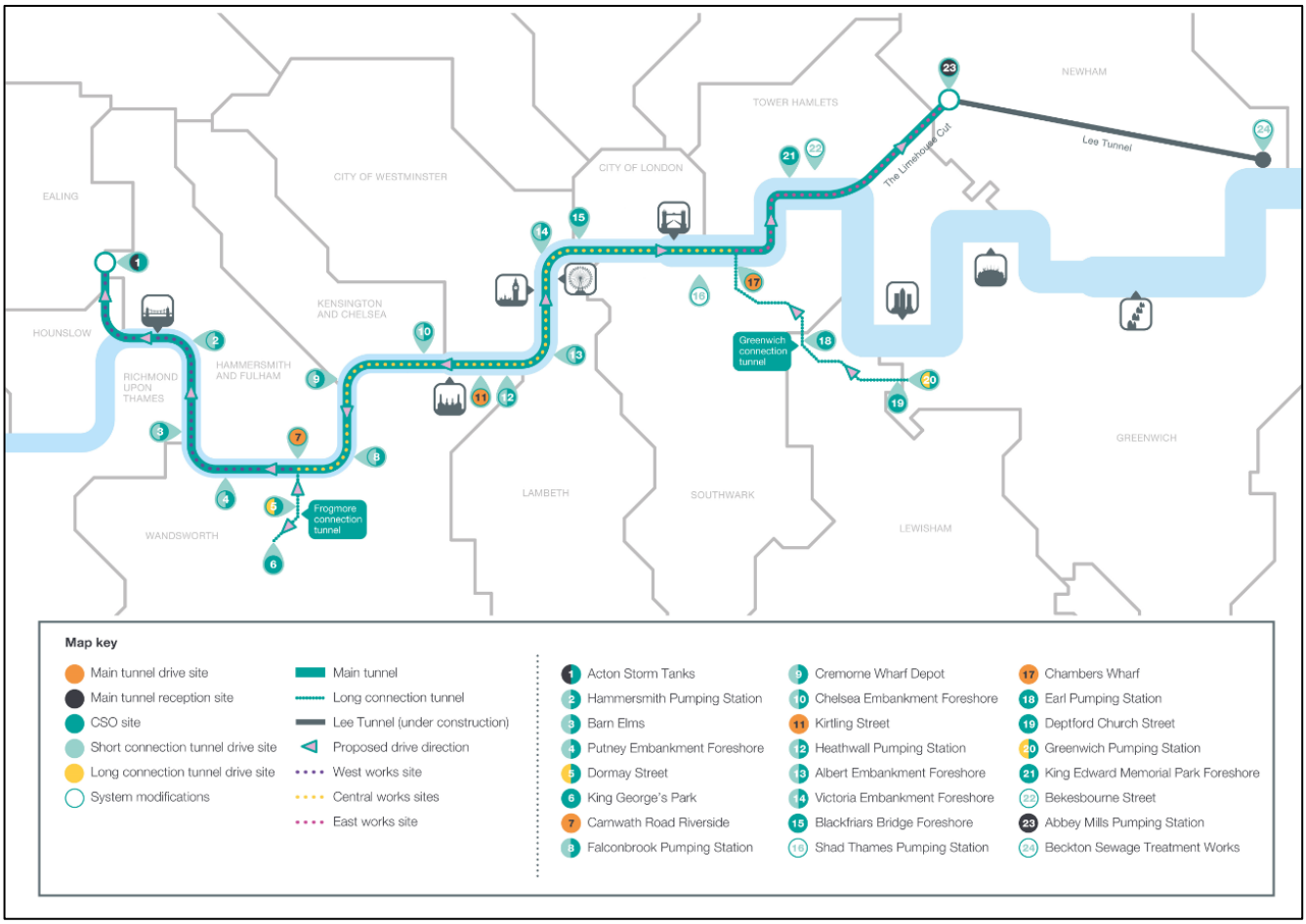
Depth: In order to be self-cleaning the tunnel needs to fall one metre every 790m. Starting from 35m deep at Acton Storm Tanks, it will finish at 65m deep at Abbey Mills Pumping Station

Diameter: The internal diameter of the main tunnel will be 6.5m between Acton Storm Tanks and Carnwath Road Riverside, and then 7.2m to Abbey Mills Pumping Station

Capacity: 1.24million cubic metres

Design life: 120 years

The Lee Tunnel has already been completed and will be linked to the Thames Tideway Tunnel once this is finished.



The route of the Thames Tideway Tunnel.

At 25 kilometres long, up to 65 metres deep, and more than seven metres in diameter at its widest, the Thames Tideway Tunnel will be the biggest infrastructure project ever undertaken by the UK water industry.

The tunnel will generally follow the route of the River Thames so that it can intercept the CSOs along the riverbanks. It will pass underneath all the rest of London's infrastructure, and through a variety of different ground conditions on its way from Acton to Limehouse. From here, it will run north-east to Abbey Mills pumping station, and connect to the Lee Tunnel.

Delivering a lasting legacy.

Tideway is committed to delivering the best value for money for Thames Water's customers, while maximising the long-term benefits for Londoners. Tideway has signed up a team of world-class contractors to offer sustainable and cost-effective methods of construction.

Innovative thinking in the design phase has already reduced the tunnel from the 32 kilometres that were originally proposed, down to 25 kilometres, and cut the number of construction sites from 45 to 24.

The scale of the project means that it presents a historic legacy opportunity, and it's vital that every pound spent on the tunnel is used in a way that creates maximum value for the project, the economy, the environment, and the people of London.

Tideway has set out its legacy objectives in its Legacy Statement, and has made a total of 54 specific commitments to demonstrate that they're being delivered.

For example, the project has pledged to create more than 4,000 direct, sustainable jobs. One in 50 of these will be an apprenticeship, and 25 per cent of the workforce will come from the 14 London Boroughs along the tunnel route. The project will create nine new areas of public foreshore, and open up new parts of the Thames Path. As a founding supporter of the Thames Skills Academy, Tideway will also deliver a new, skilled generation of river workers for the future.

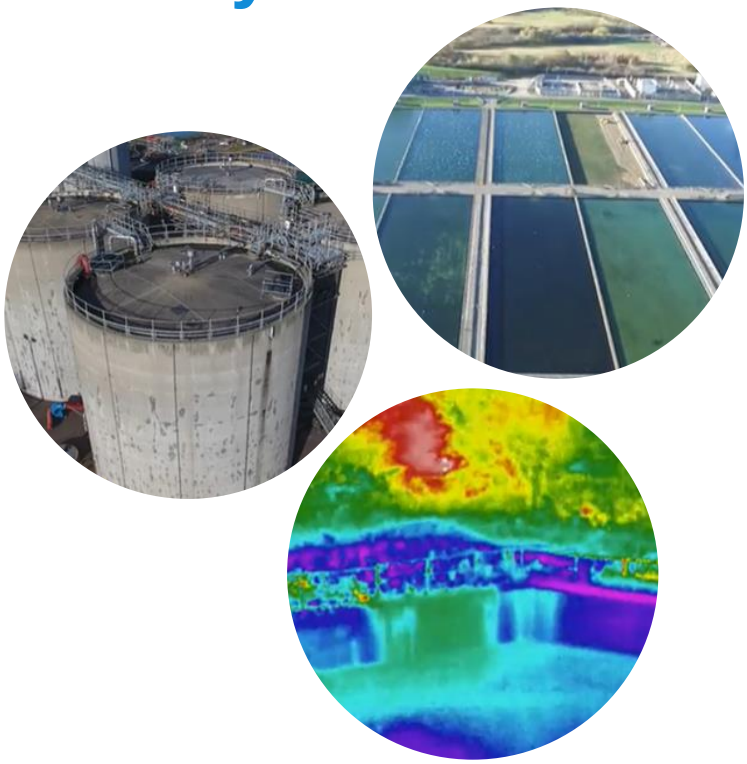
To find out more about Tideway's lasting legacy, visit: https://www.tideway.london/

Thames Water

Drone technology – our eye in the sky.

Drone technology – our eye in the sky.

We're reducing health and safety risks as well as saving money by using drones to inspect digesters, cranes and other equipment. This reduces the number of inspections which our people have to carry out in person.



Benefits of drones.

Drones offer solutions to many of the daily challenges and risks in our business:

- Health and safety
- Cutting costs
- Data and information

Health and safety is an important reason for using drones, giving us safer access to confined or hard to reach places like roofs, towers and watercourses. Using drones for inspections can really reduce the cost of traditional forms of access such as scaffolding, cherry pickers and scissor lifts. They can also be used to gather information about the condition of our sites and assets, which helps us with maintenance and investment decisions. A wide range of information can be safely and accurately recorded, and we're already planning to use drones for more than 85 days in 2017/18.

"It's fascinating what's been achieved already. Drones can drastically reduce the safety risk by avoiding people working in dangerous areas or heights as well as save millions of pounds"

- Karl Simons, Head of health, safety, security and wellbeing

How we use them.

Our suite of drones includes high resolution zoom and thermal imaging cameras. These can be used in all sorts of scenarios, improving the speed, accuracy and safety of many of our activities:

Asset inspections: quickly capturing vast amounts of information over large areas, helping to identify and resolve issues fast, before any risks emerge. By viewing our large slow sand filters from above, we are able to assess the health of these assets by easily identifying discolouration.

Enhanced access: drones can help with safe inspection of structures where height or confined space present risks, including gantry cranes, digesters, shafts and tunnels. We have hundreds of digesters that need internal and external inspections.

Thermal imaging: we're already using thermal imaging cameras on our drones to detect leakage. Alongside accurate, real time aerial views of the ground, we can see the scale of the leak and pinpoint the source. We can also monitor temperatures in our network, carry out asset health inspections and identify intruders on our sites.

Thames Water

Apprentice of the Year 2016/17.

Apprentice of the Year 2016/17.

Attracting and developing the pipeline of talent coming into our business is key to helping us sustain a skilled workforce. Our apprentice programme helps us to 'grow our own' talent by developing skilled people who develop through on and off-the-job learning to meet our future demands for skills and technological expertise.

Eight Thames Water apprentices have completed four year courses and continued their prosperous careers as fully qualified technicians.

Kayne Chambers-Blucher, 22, from Oxford, was presented with the prestigious Apprentice of the Year award at a graduation ceremony for mentors, managers and apprentices to mark the end of the programme.

The newly qualified dual-skilled technician said: 'I think the apprentice programme is great, I really enjoyed it and I learned a lot. It was one of the best I have found as I have mates who are doing similar apprenticeships for other companies, and I learnt a lot more and received more qualifications out of it than they did. I think it's amazing really. You get introduced to a very closely bonded group, and then if you go out on site people take you under their wing and help you.'

- **Kanye Chambers-Blucher won Apprentice of the Year**
- **Eight apprentices have completed our four year course**

Celebration of hard work.

Lawrence Gosden, managing director for wholesale waste, said to the apprentices: 'This is a celebration of all of the hard work you have all put in over the last four years of your apprenticeships, recognising your fantastic achievements and giving you an opportunity to step back and think about what you've achieved over the course of the programme.'

At the awards ceremony, Lawrence went on to say: 'We recruit apprentices like you with the intent of them becoming our technical subject matter experts. It'll require drive and ability to continue learning, but it's doable. You could well be the directors of the future.'

For more information on Thames Water's apprentice scheme, visit thameswater.co.uk/apprentice