

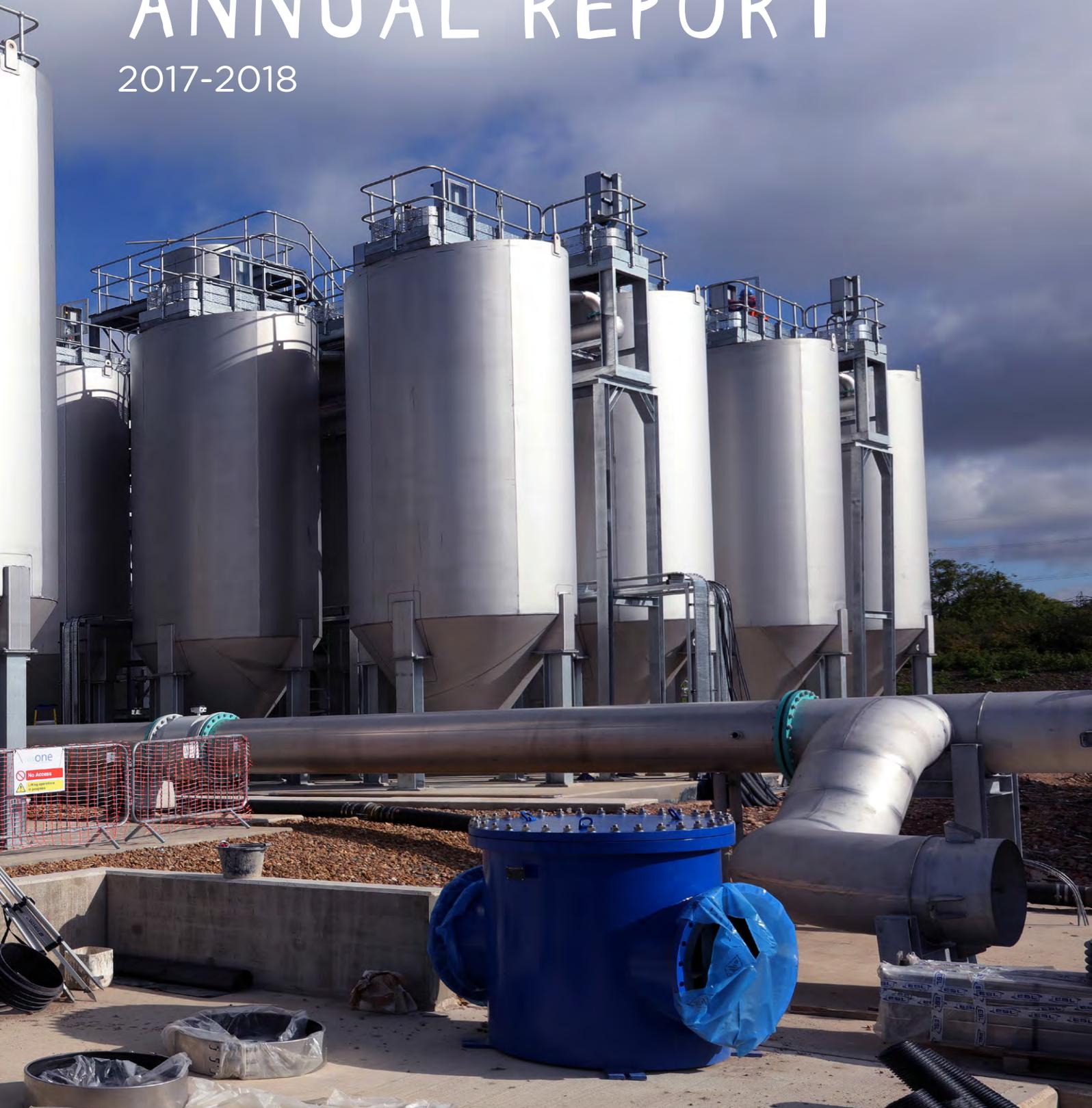


Responsible Business  
of the Year  
2017



# GREEN BOND ANNUAL REPORT

2017-2018



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# THE 2017 GREEN BOND SUMMARY

£250M

1.625% GREEN BOND  
MATURING 10 AUGUST 2025

c. 200 GREEN PROJECTS FUNDED BY THE GREEN BOND



■ Actual CO<sup>2</sup> (55,180eT)

■ Reduction in CO<sup>2</sup> (84,715eT)

61% CO<sup>2</sup>

REDUCTION FROM 2010  
CAPITAL CARBON BASELINE

## 5 ENVIRONMENTAL OBJECTIVES



CLIMATE CHANGE MITIGATION



BIODIVERSITY CONSERVATION



CLIMATE CHANGE ADAPTION



POLLUTION PREVENTION AND CONTROL



NATURAL RESOURCE CONSERVATION

## IMPACT OF £1M INVESTMENT



339  
EQUIVALENT  
TONNES  
OF CARBON (CO<sup>2</sup>)  
REDUCTION



20 JOBS CREATED  
AND/OR PERSON SECURED  
ACROSS OUR COMPANY AND  
SUPPLY CHAIN



£315,000  
EFFICIENCY AGAINST  
THE 2015 BASELINE

As at 25 May 2018

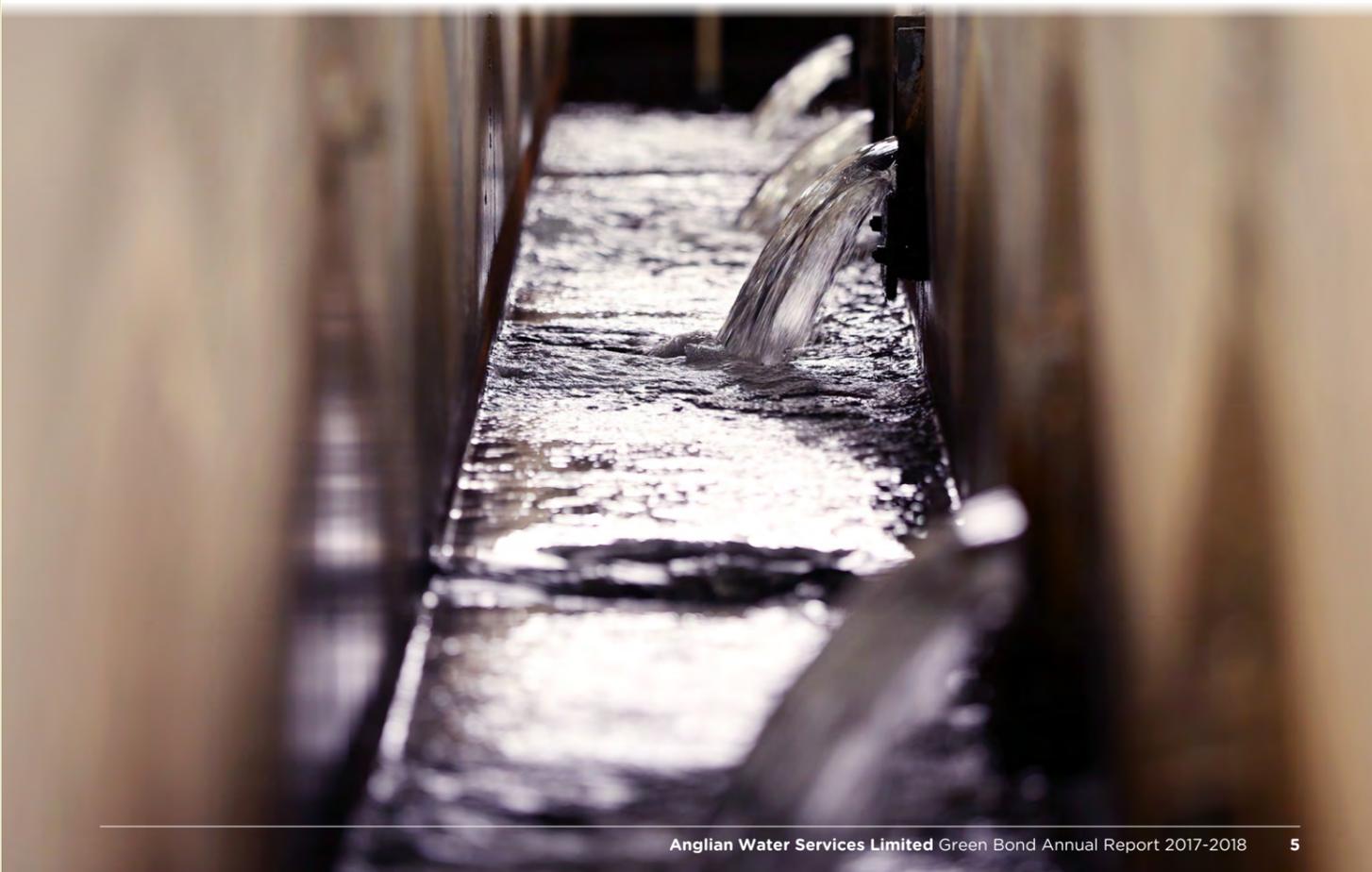
WATER IS OUR BUSINESS.  
WE HANDLE WITH CARE, AND  
WE DON'T COST THE EARTH.

**Sustainability is just how we do business - all day, every day. Increasingly environmental and social risk management is influencing the debt markets and issuing a green bond provides us with the opportunity to demonstrate how we operate our business.**

We clean water to the highest standard, deliver it to millions of homes and businesses, while balancing the requirements of this precious resource with nature and agricultural needs. We do all this while continually striving to minimise the environmental impacts of our operations. To quote HRH The Prince of Wales: "It is not necessarily a choice between making money on one hand and doing the "right thing" on the other. On the contrary, once it is recognised that business as usual is "unsustainable" it follows naturally that those organisations which develop resilient models will be the ones that succeed".

Long-term access to secure supplies of water is one of the most pressing environmental and economic challenges the world faces today, and getting to grips with that is not something that can wait until tomorrow. So we want to lead the way in raising awareness about how essential water is to life, to people and the environment, and to a vibrant and growing economy too.

\* Source: Accounting for Sustainability website



# REDUCING CARBON

**Reducing carbon is embedded within Anglian Water's strategy, its targets and its communication activities. This can be illustrated with reference to our Energy Initiative and our Renewable Energy Strategy.**

The Energy Initiative is both a 'hearts and minds' and an investment programme. It is led by a dedicated carbon & energy team and it makes use of 'champions' located within operational teams to promote carbon and energy reduction. One of the tools used to support the Energy Initiative is our Energy Efficiency Monitoring System (EEMS). This system monitors the efficiency of our most energy intensive assets and networks allowing us to respond to energy efficiency in a timely manner.

Currently, the vast majority of our renewable energy is generated by our biogas Combined Heat and Power (CHP) engines. The biogas is produced at our Water Recycling Centres during the anaerobic digestion of sewage sludge. The renewable energy output from our fleet of CHPs will continue to grow with further investment and operational optimisation. We also have three large wind turbines and we are working with our framework partners to roll-out over a hundred thousand solar panels on our sites. Our framework partners are funding and building the solar arrays and providing us with the opportunity to buy discounted - and renewable - power.

# GREENHOUSE GAS EMISSIONS

**In providing our services we are confronted by some of the biggest global challenges, including the effects of climate change and the need to make the most of finite resources to provide for a growing population.**

At Anglian Water, we are determined to play our part in tackling these global problems. We are cutting our carbon emissions; reducing the energy and materials used to maintain our infrastructure; generating our own renewable energy; increasing the efficiency of our equipment; driving out waste and finding uses for the by-products of our treatment processes in pursuit of a truly circular economy.

By doing so, we also continue to reduce costs, drive innovation and set a powerful example for others to follow.

Our carbon reduction goals: Not only are carbon emissions strongly linked to a changing climate, they are also an excellent proxy for energy and materials we consume in building and maintaining our infrastructure. Our leading approach in measuring, managing and reducing both operational and capital carbon continues to deliver considerable financial savings and innovation through our company and supply chain.

We follow the principles set out by HM Treasury's Infrastructure Carbon Review to release the value of low carbon solutions in how we build and operate.



**In 2017, the World Economic Forum highlighted extreme weather events, water crises, and failure of climate change mitigation and adaptation as significant risks**

# CIRCULAR ECONOMY

**Central to our goal of becoming a zero waste company is the move to a circular economy approach to reuse and recycling, where we stop seeing materials as waste.**

It is important that we stop viewing and treating materials as waste, and find alternative uses for the materials produced as a by-product of our operations. Properly managed, almost everything can have a use and a value, which would help to power a circular economy based on reuse and recycling.

We continue to work on improving the quality of the data we collect to get the clearest possible view of what happens to the materials produced as a by-product of our operations. This year data from across the business shows 89 per cent of our waste being put to beneficial use.



# SIX CAPITALS

**In our recent Strategic Direction Statement we describe ourselves as a “Natural Capital Business”, relying on healthy ecosystems to supply water, to help manage floods and to help us recycle water after it has been used. Whilst recognising that our primary resource and our operational activities are embedded in natural ecosystems, we also understand that a successful business must be supported by a strong foundation underpinned by the remaining five capitals and an understanding of the role they play in delivering success for our customers, the communities in our region and all those who rely on an efficient, effective and affordable water services.**

Understanding the interplay between the six capitals, Natural, Social, Human, Manufactured, Financial and Intellectual is not something new to our business. Since 2015 we have recognised this framework, in our Integrated Annual Report and Accounts, and illustrated how these are at work in delivering our business plan. Ingoldisthorpe on page 16 is a really good example of natural capital decision making in action.

In AMP7 we aim to build an understanding and utilisation of capitals into the heart of our decision making.



# USE OF GREEN BOND FUNDS

All capital expenditure follows Anglian Water's AMP 6 (2015-2020) Governance Framework and is subject to BSI (British Standards Institute) PAS2080 verification. This is a standard launched by the Green Construction Board to encourage a consistent approach to the management of carbon by all involved in infrastructure. It sets out principles and components to manage whole life carbon emissions and deliver reduced carbon over the whole value chain.

Accordingly, all capital expenditure which Anglian Water undertakes is capable of being an Eligible Green Project for inclusion in an Eligible Green project category, outlined in the Green Bond Principles, being related to: "sustainable water and wastewater management including sustainable infrastructure for clean and/or drinking water, wastewater treatment sustainable urban drainage systems and river training and other forms of flooding mitigation".

# ANGLIAN WATER'S 2017 GREEN BOND

On 10th August 2017, Anglian Water received the Settlement of the funds from the £250m 1.625% Green Bond maturing 10 August 2025, which was issued in accordance with ICMA Green Bond Principles, 2017. c. 200 projects are being financed with the proceeds.

The net proceeds received were £247.8m. Funds will be transferred out of the Capex bank account as expenditure is undertaken. Anglian Water will maintain a buffer of additional Green Bond projects over the Green Bond proceeds with additional collateralisation of circa 30%.



# GREEN PROJECTS

All Water and Water Recycling expenditure undertaken by Anglian Water falls within the eligible project categories recommended in the Green Bond Principles 2017.

However, for reporting and monitoring purposes in accordance with the Anglian Water Green Bond Framework certain projects are selected into a "Green Bond Portfolio".

Total spend as of 25th May 2018 across the projects allocated to the 2017 Green Bond Portfolio is £203m achieving a reduction of 84,716 tonnes of carbon, 61% less than the 2010 baseline, which is subject to the PAS2080 verification.

# ELIGIBLE GREEN BOND PROJECTS

**Sustainable Water Management Projects with a reduced climate footprint:**

- Capital Maintenance
- Enhanced Service Level
- Growth (Supply Demand)
- Quality

**Sustainable Water Recycling Projects with a reduced climate footprint:**

- Capital Maintenance
- Enhanced Service Level
- Growth (Supply Demand)
- Quality

# GREEN BOND PORTFOLIO

Cumulative Eligible Green Projects in the Eligible Green Portfolio as at 25/05/2018 are summarised in the following table:

Eligible Green Projects	Sustainable Water Management £m	Sustainable Water Recycling £m	Total £m
Capital Maintenance	35.633	53.460	<b>89.093</b>
Enhanced Service Level	21.409	8.026	<b>29.435</b>
Growth (Supply Demand)	26.708	28.812	<b>55.520</b>
Quality	21.192	100.113	<b>121.306</b>
<b>Grand Total</b>	<b>104.943</b>	<b>190.412</b>	<b>295.354</b>
Spend Financed To Date			<b>203</b>
Net Proceeds			<b>247.8</b>
2010 Baseline CO <sup>2</sup> (eT)	Actual CO <sup>2</sup> (eT)	Reduction in CO <sup>2</sup> (eT)	Reduction in CO <sup>2</sup> (%)
<b>139,895.70</b>	<b>55,180.17</b>	<b>84,715.53</b>	<b>61</b>

Funds totalling £203m have been transferred from the Capex Reserve Bank Account in order to fund the expenditure on the Portfolio, which leaves £44.8m to be invested in additional spending as of 25th May 2018.



# FEATURED PROJECTS

The project categories contribute to five “environmental objectives”:

- 1.  CLIMATE CHANGE MITIGATION
- 2.  CLIMATE CHANGE ADAPTION
- 3.  NATURAL RESOURCE CONSERVATION
- 4.  BIODIVERSITY CONSERVATION
- 5.  POLLUTION PREVENTION AND CONTROL

We are mapping our contribution to the United Nations Sustainable Development Goals (SDGs).



	Capital Maintenance	Enhanced Service Level	Growth	Quality	Environmental Objectives	SDGs
Sustainable Water Recycling	Chalton - Water Recycling Centre			✓	1   3   5	6   9   12   15
	Ingoldsthorpe - A Natural Capital Solution			✓	1   4   5	6   9   11   15
	East of Kettering - Sewerage Network		✓		1   2   5	6   9   11   13
	Chelmsford - Sludge Treatment Centre	✓	✓			1   2   4
Sustainable Water Management	Twelve Acre Wood & Eriswell 2			✓	1   4	6   9   12   15
	Ipswich - Water Discolouration	✓			1   3	6   9   12
	Grafham - Resilience Project		✓		1   2   3	6   9   12   13
	Heigham - Water Treatment Works			✓	1   3	6   9   15



## CHALTON

### WATER RECYCLING CENTRE

Chalton Water Recycling Centre in Bedfordshire has been transformed into the biggest sand filtration site in Europe. The site's treatment lagoons have been retired and 30 12-metre-high sand filters installed to provide tertiary treatment and better protection for the area's sensitive environment. The filters will break down ammonia in the final stages of sewage treatment, removing it from the water that is returned to the environment at the end of the process. This should safeguard the nearby Flitwick Moor, which is a Site of Special Scientific Interest (SSSI). The filters were prefabricated in Ireland by Colloide Engineering Services, before being shipped to site.

The £12.9 million scheme also involved installation of the two new balance tanks. Building the filters off-site meant less disruption for people living in the nearby village of Chalton, cutting the time spent on site by half. Along with the use of 3D modelling and the reuse and repurposing of existing infrastructure, the off-site build also helped to reduce the project's carbon footprint.

Key highlights were the use of 'Rocky' the sniffer dog (pictured below) who aided the trapping and relocation of a population of Great Crested Newts which were identified within the development footprint. There was a focus on re-using existing assets on site as much as possible which reduced the need to build new assets, saving not only on cost but also carbon.

TOTAL PROJECT SPEND

**£12.9m**

CAPITAL CARBON SAVING

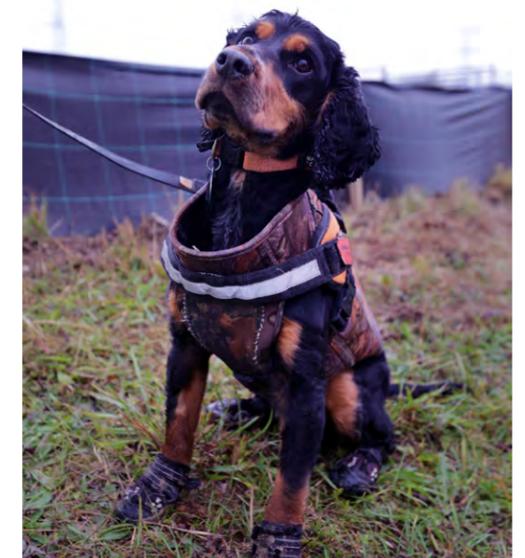
**44%, 1,242eT**

**£8m BELOW PLAN**



Embodied Water Consumption Saving (m3)

**1,124 (86%)**





# INGOLDISTHORPE



# IPSWICH

## A NATURAL CAPITAL SOLUTION

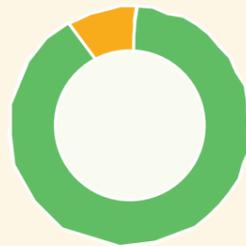
In partnership with the Norfolk Trust, Anglian Water has built a wetland alongside an existing Water Recycling Centre (WRC) in Ingoldisthorpe, Norfolk. The aim of the plan was to provide an outline for improvement of the ecological status of the River Ingol, guided by the Water Framework Directive (WFD).

Anglian Water's Water Recycling Centre removes the majority of substances that could affect the ecological status in line with environmental permits. The wetland filters it further. Treated water will pass through the wetland before it's returned to the River Ingol, which is a chalk stream. Wetlands remove nitrogen and phosphorus through a combination of physical, chemical, and biological processes. These naturally occurring processes absorb, transform and remove the nutrients and other chemicals as water slowly flows through the wetland. The wetland has also attracted breeding birds, amphibians, bats and water voles.

Norfolk Rivers Trust constructed, maintains and operates the wetland, which is made up of four shallow interconnected ponds, planted with native chalk wetland species. The plants naturally remove ammonia and phosphate from the water before it goes back into the river. In conjunction with wider improvements made to plant and equipment at the Water Recycling Centre, this example of green infrastructure has yielded an 89% reduction in capital carbon versus the 2010 Plan baseline – significantly above the 60% target by 2020.

**1 MILLION LITRES OF WATER PASS THROUGH THE CENTRE EACH DAY. A 6,238 POPULATION SERVED.**

TOTAL PROJECT SPEND  
**£3m**  
CAPITAL CARBON SAVING  
**89%, 1,472eT**



EMBODIED WATER CONSUMPTION SAVINGS (m3)  
**123 (53%)**

POWER SAVING PER ANNUM (kWh)  
**15,674 (6%)**



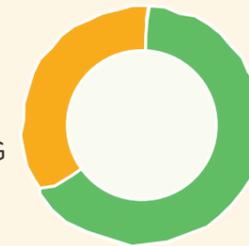
## WATER DISCOLOURATION

Anglian Water is spending £5.1m on addressing discolouration in the water in the highly populated area of Belstead in Ipswich. This discolouration is caused by levels of manganese and iron caused by the old pipes. To overcome this, 15km of the network has been repaired and replaced over a yearlong period.

The project delivered an outstanding 69% carbon reduction versus the 2010 baseline, which is above Anglian Water's 2020 vision of a 60% reduction. 95% of the material extracted from the ground in the operation was put back into the ground, which drastically reduced the levels of emissions from vehicles, the cost and the level of time to carry out the work. Investing now in this scheme will mean a higher quality of drinking water for the area, reduced disruption in the future and reduced running costs for years to come.

Directly affected by service transfers to the new mains we laid over 1000 properties. Part of the scheme replaced the outlet main from Stone Lodge Tower, which supplies three District Metered Areas; so benefitting the following: St Joseph's College (total pop 2933), Chantry (total pop 3658) and Sheldrake Drive (total pop 2969). The mains identified for replacement (c. 15km originally) were selected from the 80km total within the 3 District Metered Areas by modelling.

TOTAL PROJECT SPEND  
**£5.1m**  
CAPITAL CARBON SAVING  
**69%, 1,632eT**



**15KM OF NETWORK REPAIRED OR REPLACED**

**95% OF MATERIAL EXTRACTED, RETURNED TO THE GROUNDS**

**A 9,560 POPULATION SUPPLIED**

EMBODIED WATER CONSUMPTION SAVING (m3)  
**16,832 (91%)**



### SLUDGE TREATMENT CENTRE

This project improved compliance with the Biosolids Assurance Scheme for cake – a stabilised organic material used by farmers as a fertiliser. It saw enhanced digestion with a 30% increase in gas generation which is used for electricity. A reduction of carbon from the original design of c.330eT will be achieved.

Regarding the capital maintenance scope of the project, funds were spent on: replacing pumping assets associated with the transfer of digester sludge, replacing Sludge Treatment Centre odour control units, refurbishing primary sludge tank, replacing digester feed tank (to replace the gas holder), new buffer tanks and mixers, new odour control for new Sludge Treatment Centre tanks, thickening plant for Primary Sludge, a new Primary Sludge Tank (instead of a refurbishment), Sludge Thickening Building, as well as elevation of equipment to avoid flood area.

Funds were also used for this project for enhancement, which included: reinstating the pasteuriser by replacing most of the key components. Replacing spiral heat exchangers with tubular type as the original spiral heat exchangers had problems encountered when the pasteuriser was previously on line. Also there is a new strain press to ensure effective screening of sludge pre digestion, a Degas Tank, Wash Water System, New Pasteuriser Centrifuge Feed Well Tank and finally elevation of equipment to avoid flood area.

### RESILIENCE PROJECT

Our treatment works at Grafham are the largest in our region. This enhancement project is an example of continual innovation in the building of ever more resilient systems to meet challenges of growth and climate change. It is a £28million scheme to make supplies of clean drinking water to more than 600,000 people more secure, designed to accommodate growth in one of the fastest growing regions in the country. It pioneers the use of existing infrastructure to reverse flows in mains linking Grafham and Wing Water Treatment Works, and utilises a state-of-the-art storage reservoir (at Diddington) and pumping station. The resilience scheme achieved the same outcome as the original plan would have, but at half the cost. We built the largest pre-cast service reservoir in Europe, at 40 megalitres - the equivalent of 16 Olympic swimming pools. The final scheme came in £32m cheaper and saved 61% of embodied carbon of the original design.

Further optimisation projects are also underway at the Grafham treatment works, including reducing energy and pumping during the filter backwash cycle. This optimisation has realised annual cost savings around £60,000 and will save around 856,000 m3 of water (the majority being fully treated potable water) from being wasted and returned to the raw water reservoir per year – from where it would need to be pumped back out and treated again, this equates to almost 4 days output of Grafham per year.

**TOTAL PROJECT SPEND**  
**£10m**

**CAPITAL CARBON SAVING**  
**24%, 330eT**



**30% INCREASED GAS GENERATION**

**TOTAL PROJECT SPEND**  
**£28m**

**CAPITAL CARBON SAVING**  
**61%, 26,845eT**



**£32 MILLION BELOW PLAN**

**600,000 MORE PEOPLE WITH SECURE CLEAN DRINKING SUPPLIES**

MAINTAIN RENEWABLE POWER (kWh)

**444,000**

BACKWASH WATER SAVING PER ANNUM (m3)

**856,000**

POWER SAVING PER ANNUM (kWh)

**40,475**



# HEIGHAM



# EAST OF KETTERING

## WATER TREATMENT WORKS

Heigham Water Treatment Works (WTW) is the main supply of water to Norwich and supplies an average of 42MI/d of water sourced from the River Wensum at several locations. Potable water is pumped into the Norwich Public Water Supply Zone feeding a multitude of storage reservoirs, booster pumps and properties.

The main raw water abstraction for the treatment works has historically been taken from Costessey Pits, a bankside storage area next to the River Wensum approximately 7km away from the water treatment works and away from the urban area of Norwich. Here it provided a more favourable water quality and buffering capacity to manage sudden water quality changes in the river. This scheme protects the environment along the River Wensum and secure supplies for the growing city of Norwich. This project impacts on 98,142 properties around 200,000 people.

Following the Habitats Directive Review of Consents, the Environment Agency (EA) has identified where reductions in licensed abstractions are required. Anglian Water is forecasting deficits in deployable output from Heigham due to the abstraction reductions at Costessey imposed by the EA's Restoring Sustainable Abstractions programme. Therefore, in order to meet demand, an ultrafiltration membrane plant with a controlled abstraction regime was produced in line with new abstraction licence, which is required to treat larger volumes of the lower quality water at Heigham.

There were blended strategies included into the project, which were Eel Screens (Hydrolux positive exclusion screens) to prevent Eels and fish to enter the systems, as well as a new flood protection door for the Household Pumping Station.

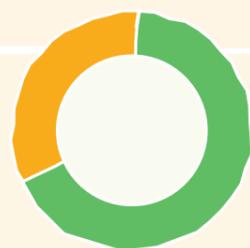
## SEWAGE NETWORK EXPANSION

This scheme is required to increase the sewerage network capacity to accommodate flows from 5,500 new properties, for 11,095 people, in the East of Kettering and reduce the risks of flooding and pollution from over-capacity. A reduction of carbon from the original design of c.975eT will be achieved.

This Section 98 Requisition Infrastructure is primarily required to convey flows from 5,500 new properties in the East of Kettering. The project was deferred from AMP5 (2010-2015) as delivery would be in AMP6 (2015-2020). There was Great Crested Newt population revealed along the lower sewer route and the developer has mitigation in place

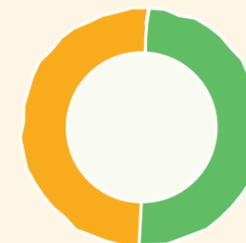
This project utilises downstream capacity provided by the Ise Valley Relief Sewer and Ise Valley Thermal Product Solutions (TPS) upgrades delivered in AMP5. Development is being constructed in phases starting from the west which is furthest from the proposed pumping station location. To ensure that all developers participating in the development can connect to the pumping station, the scope of the requisition includes a section of sewer upstream of the pumping station.

**TOTAL PROJECT SPEND**  
**£29m**  
**CAPITAL CARBON SAVING**  
**62%, 4,265eT**



**42MI/d\* OF WATER SUPPLIED TO NORWICH**

**TOTAL PROJECT SPEND**  
**£6.4m**  
**CAPITAL CARBON SAVING**  
**49%, 1,081eT**



**AN 11,095 POPULATION ACCOMMODATED**

**EMBODIED WATER CONSUMPTION SAVING (m3)**  
**48,161 (99%)**

**POWER SAVING PER ANNUM (kWh)**  
**2,095,214 (88%)**

\*MI/d = Mega litres per day

**EMBODIED WATER CONSUMPTION SAVING (m3)**  
**48 (30%)**

**POWER SAVING PER ANNUM (kWh)**  
**62,050 (39%)**



# TWELVE ACRE WOOD & ERISWELL 2

## WATER TREATMENT WORKS

This project at Eriswell 2 is for the protection of 35,092 properties, around 75,000 people, from a predicted increase in future nitrate levels. By changing the location and restricting external construction works, this project ensured strict mitigation for disturbance of the migratory path of Stone Curlews. Codson Hill reservoir is fed from three sources: Eriswell 1, 2 and Twelve Acre Wood. Eriswell 1 does not currently have concerns with rising nitrate levels but Eriswell 2 and Twelve Acre Wood do.

To combat the increased future nitrate levels, an ACWA (Assess, Communicate, Work, Achieve) “NiTreat” nitrate removal plant has been installed at Eriswell 2. This Project included new chlorine disinfection, chemical dosing and standby power generation.

Twelve Acre Wood is a small site with an ACWA “NiTreat” plant installed in 2008. The “NiTreat” system (pictured above) is based on true counter current continuous ion exchange utilising a unique multiport valve (IEX valve) for distribution of feed and regeneration flows to multiple resin vessels. The treated water from the “NiTreat” plant typically has a nitrate level concentration of less than 5mg/l as NO<sub>3</sub> and when blended with untreated water provides final water with a nitrate level concentration below 43 mg/l as NO<sub>3</sub>.

The Eriswell 2 Project provides resilience from a predicted increase in future nitrate levels for 75,000 people who receive their water supplies from Codson Hill Reservoir.

**TOTAL PROJECT SPEND**  
**£4.5m**

**CAPITAL CARBON SAVING**  
**37%, 983eT**

**A 75,000  
POPULATION  
PROTECTED**

**EMBODED WATER CONSUMPTION SAVING (m<sup>3</sup>)**

**118 (61%)**

**POWER SAVING PER ANNUM (kWh)**

**55 (31%)**



anglianwater

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LED10/08/2018

