A13: Beyond compliance WISER response

WONDERFUL ON TAP

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Beyond Compliance

Severn Trent Water's response to Water Industry Strategic Environment Requirements (WISER)

17th August 2018

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Introduction

Our customers continue to place a high value on the natural environment. So do we. We're committed to protecting and improving our environment not only through investing in improvements and ensuring we maintain our assets effectively to prevent failure, but also by valuing environmental benefits in our decision making and by seeking to work in partnership with others to deliver mutually beneficial outcomes.

Our PR19 Plan reflects this ambition, with investments, Performance Commitments and Outcome Delivery Incentives that build on our industry leading compliance record to drive innovation and partnerships that deliver benefits for wildlife and communities.

This document summarises our plans against the expectations the Environment Agency and Natural England set out in the Water Industry Strategic Environmental Requirements (WISER).

Meeting the expectations of WISER

The environmental commitments that we are making in our PR19 plan deliver comprehensively against the Water Industry Strategic Environmental Requirements (WISER) developed by EA and NE.

We have mapped our PR19 plans to WISER and shared this with the EA area teams to provide confidence that we have addressed the breadth of the Water Industry Strategic Environmental Requirements (see Annex 1). We will continue to track delivery against WISER with the EA area teams through established joint governance meetings.

Delivering and maintaining excellent environmental performance

We have made a commitment to be 100% compliant with our licences and permits and meet and sustain a target of zero serious pollutions by 2020. Our AMP7 business plan reiterates those commitments.

We entered the current five year period (2015-20) with a strong track record. We were amongst the best in the sector on compliance with consistently good asset health in most areas. But we had to work hard to get to this position, bringing the EA closer to scrutinise our operations, including them in the development of our plans, and fostering an open and honest dialogue when problems occurred. This collaborative approach has resulted in significant performance improvements. As a result we have secured 4* status - awarded by the EA for exceptional environmental performance – for the third time in the last five years.

Our AMP7 plan (2020-25) builds on that strong foundation. It also responds to the growing awareness of the health of our natural environment and its importance for communities. Our customers and stakeholders should expect:

- sector leading levels of compliance will be maintained;
- a continued focus on driving down sewer flooding and pollution incidents;
- significant environmental improvements that are prioritised, proportionate, cost beneficial, affordable and consistent with the government's 25 year plan;
- wider environmental benefits become part of our everyday decision making;
- investment in partnerships that identify and maximise benefits from sustainable solutions to the challenges we face in addressing flooding, water quality, water resource management and biodiversity enhancement;
- stronger emphasis on the benefits of a circular economy;

- sustained emphasis on getting the basics right, for example staff competency, operating procedures, 'golden measures' to monitor asset health;
- stronger emphasis on customer engagement to promote responsible sewer use and demand management and
- an innovation culture that draws on expertise and insights from staff, customers, stakeholders, academia and international experience.

Revisiting our long-term strategy

We developed a long term strategy as part of our 2015-20 business plan that takes us to 2045. We believe the core tenets of this strategy remain just as relevant today but have reviewed the detail in the context of changes in our operating environment. Key features include:

Developing an adaptive asset base to deliver WFD improvements

Our vision for 2045 is to be operating a set of assets that make a positive difference to the environment and have delivered our part in meeting the government's 25 year strategy objectives. Specifically we expect to have addressed all of our Water Framework Directive reasons for failure, where it is cost beneficial to do so, and enhanced biodiversity within the areas that we operate.

Leveraging the benefits of a river catchment solution

We've always looked to create synergies between environmental improvements and maintenance requirements. We're now using data and modelling to review – at a catchment level - the needs and capabilities of all existing assets in a catchment before considering options to deliver improvement. Each catchment will be unique with a range of sewage treatment works of differing asset type, size, condition, compatibility with nutrient removal, and capacity to meet future demand, and requires knowledge and expertise to design a solution which delivers improvements and risks

Long-term drainage and wastewater planning

Recent publications – including Ofwat's Resilience Task and Finish Group, the government's draft Strategic Policy Statement to Ofwat, and Ofwat's draft PR19 methodology – make clear the need to make improvements in the approach to long term drainage and wastewater planning. We will include our draft Drainage and Wastewater management plan in our PR19 plan, and will use to it to engage partners and inform future investment.

Realising the benefits of technology

Technological improvements are evolving rapidly and at lower cost – for example, we're investigating an innovative new fibre optic monitoring and communication system for sewers. Our desire to innovate shows our strategic aim of achieving zero customer reported failures. The ability to understand what is happening across a large proportion of our network in real time will enable a step-change in how we intervene to prevent failures and prioritise the investments that we make. It will also be a key enabler for autonomous robotics and artificial intelligence systems.

Investing to maximise the benefits of a circular economy

Our long term strategy is to extract maximum value from the sewage and sludge that we treat by generating products that can be recycled. We already recycle 100% of our sewage sludge to farmland for beneficial reuse, generate energy and recover grit. But we are also investigating technologies that could enable our treatment plants to be transformed from energy and resource-consuming facilities to production plants and bio-refineries. Closing the loop on waste, reducing the use of natural resources, protecting the environment and creating value.

The next five years – key features of our AMP7 Plan (2020-2025)

Our five year plan has been developed using a range of factors including affordability (for both today's and tomorrow's customers) and the need to deliver environmental objectives in a prioritised, proportionate and cost-beneficial way that is consistent with the government's 25 year plan. Key features include:

Leading the sector on compliance

We plan to deliver 100% compliance with all of our environmental discharge permits and with biosolids recycling standards, which are basic customer and regulatory expectations. We have an excellent track record of delivery in this area, both in terms of performance and cost efficiency. Our plan will deliver continued high performance and will drive further efficiency in this area.

Taking a phased approach to WFD improvements

Our proposed improvements for 2020-25 have been developed in close collaboration with the EA and other stakeholders, ensuring that proposals are cost-beneficial and affordable to our customers. Our proposals are evidence based – unambiguous evidence of a failure to meet WFD standards and that the failure is clearly attributable to our actions or activities – together with data to show that it would be fair and proportionate to contribute to resolving the failure in 2020-25 while remaining on track to deliver our WFD requirements by 2027.

We recognise there is some uncertainty relating to measures that will be confirmed in River Basin Management Plan 3, which will not be finalised until 2021. To manage this uncertainty, we've adopted a real options approach which allows us to commit to meeting the 2027 deadline without asking our customers to pay in advance for improvements which may not be needed.

This approach, supported by our customer research, differentiates those 'amber' schemes in WINEP3 which deliver multiple benefits – which we consider are more certain – and those that do not. This process has helped us identify a subset of amber projects that do not deliver wider benefits in our plan and that we would not want to proceed with until we receive formal Ministerial approval. The schemes will proceed for delivery once approval is received, with delivery generating points on our WFD performance commitment which, in turn, will generate financial rewards through the outcome delivery incentive to reflect the investment made. This approach is similar to the successful use of the WFD performance commitment in AMP6.

Reducing pollutions by tackling blockages

Blockages in our sewers are the leading cause of pollutions. We have developed a revised risk and consequence model which will enable proactive targeting of the sewers that are most likely to cause a pollution. The model allows us to simulate a blockage in every length of pipe and understand where the sewage is going to escape. We can then use our flood mapping software combined with LiDAR data (ground profile information) to predict where the sewage is going to flow and whether it is going to get into a watercourse, either directly or via a highway drainage or surface water sewer system. This helps us predict the likelihood of pollution. We can then overlay this with our consequence factors to help us target the most serious risk first.

In the next five years we will use this to help us address these high pollution risk sewers through surveying, cleaning and repairing/replacing where necessary. Where the risk is very high we will also be considering the use of permanent monitoring to provide an early warning of blockage build up.

Reducing pollutions from pumping stations through innovation

Our second highest cause of pollutions is failures of equipment at pumping stations and bursts on rising mains. We have been trialling a number of innovations in this space that we intend to roll out at scale in the next five years. These include

- Intelligent pumping station controls which allow us to prevent, or fix remotely, a number of the failures that could have caused pollution such as the clogging up of pumps with wet wipes.
- Transient pressure monitoring to optimise pressure regimes to reduce stress and, once in place, give us the ability to provide early failure warnings to reduce pollutions.
- Pro-active risk register, that uses data on site history and vulnerabilities to prioritise maintenance.

Improving the wellbeing of communities

Our WFD programme is primarily designed to deliver river quality improvement benefits. However, we recognise that river improvement work will also deliver other incidental benefits to the community and the wider environment. We have mapped out the extra benefits accruing from our programme to ensure that our investments deliver maximum benefit to both our customers and the environment including amenity, priority habitats, protected areas and improving areas of low social mobility and/or high deprivation.

Enriching biodiversity in our region

We're committing to deliver habitat restoration and improvement work across 1,090 hectares in our region. We will work in partnership with third sector organisations, such as the Wildlife Trust, through the CaBA (Catchment Based Approach), Moors for the Future and other partnerships to deliver projects at the local community level that benefit the environment and contribute towards the UK government's 25 year plan. We will also identify land that is now surplus to operational requirements, which could give us opportunities to work with local communities and deliver enhancements to their local environment.

Using markets to drive environmental innovation

We intend to continue our roll out of Advanced Anaerobic Digestion (AAD), building upon the capacity delivered at Minworth and Strongford in AMP6. Three new AAD sludge treatment plants are planned in areas where we expect significant population growth, quality enhancement schemes and where we want to open up the potential to trade with other wastewater companies. These investment will improve energy recovery and reduce sludge volumes, and so deliver both an environmental and financial dividend.

Delivering the Water Industry National Environment Programme

Our AMP7 business plan commits us to delivering WINEP 3 in full, by 2025. This reflects our decision not to request deferral of investment offered by the Environment Agency in a letter dated 23rd of May 2018.

Approximately 75% (by value) of our WINEP3 obligations are at 'Amber' status, the vast majority of which are WFD improvement measures for which certainty will come with ministerial sign off on RBMP3 at the end of 2021. As described above, we intend to part fund our obligations through a real options mechanism rather than include the full cost in our PR19 Plan to protect customers' from paying in advance for improvements that will not proceed. **This is no way affects our commitment to deliver WINEP3 in full and by the individual project dates specified within the programme.**

Implementing our Water Resource Management Plan

Our AMP7 water resource investment for 2020-2025 is aligned with the Water Resource Management Plan strategy for balancing supply and demand in the context of long-term sustainable abstraction.

We have used an adaptive planning approach to select a mix of demand management, supply side and water trading options to ensure we can maintain supply in a way which better protects the environment and prepares for the impacts of climate change. Our interventions are designed to deliver 133 Ml/d improvement by 2025 and are targeted in the water resource zones with the greatest need (Nottinghamshire, North Staffordshire and the Strategic Grid).

Our plan includes:

- Short and long term measures to remove or offset the environmental impacts of abstractions, and to help the associated water bodies achieve WFD objectives. In the short term we propose localised environmental protection measures (including river restoration) that will allow us to continue to abstract from some sources until we can put longer term solutions in place to reduce or stop abstraction. We estimate this improve around 120.5km of low flow river;
- Accelerating our metering strategy – we plan to increase the proportion of metered households from 45% to 65% in 2020-25. This will require us to treble our current run-rate. This will be achieved by installing meters proactively and offering customers the opportunity to switch based on information on what their measured bill would be.
- Driving down leakage – we plan to move away from the traditional campaign led leakage control strategy to a more proactive data driven targeted approach. This will allow us to improve awareness, detection and response times all in a more efficient manner. Coupled with more effective mains replacement and network calming activity, we believe that we can deliver a 15% reduction in leakage by 2025 in a more cost effective way than before.
- Working with our customers to improve how water is valued – we plan to extend our water education programme to deliver 19 Ml/d saving by 2025. We'll use a range of channels – outreach visits delivering workshops, interactive school lessons and assemblies – and focus on schools in order to inspire a generation to drive behavioural change. The message will cover both how to use water wisely and its importance to health and well-being. We'll also continue to focus on current bill payers too - including text messages, targeted letters and advertising on buses, trains, print media and through social media.
- Investing in new water supply schemes to deliver 68.5Ml/d of new deployable output / strategic transfer capacity into the Strategic Grid, North Staffordshire and Nottinghamshire zones.
- Making an early start on developing a third party site to deliver new strategic storage by 2030.

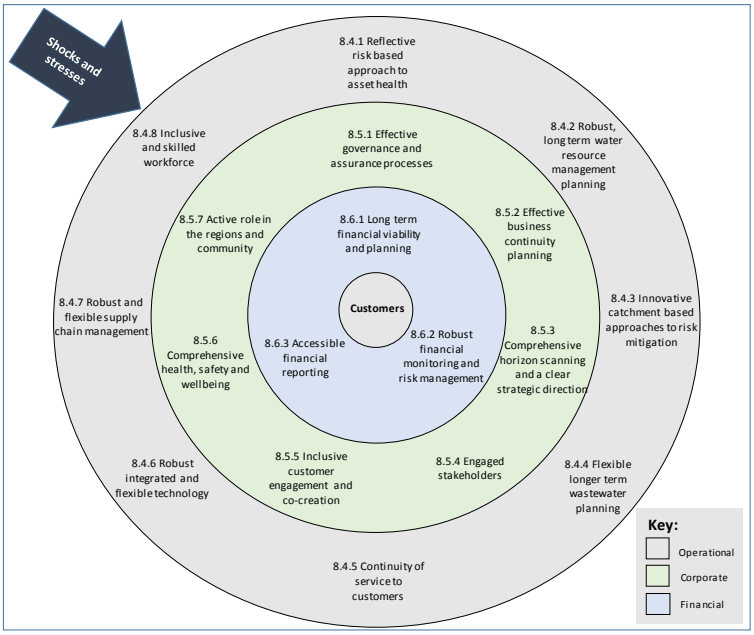
Resilience

Our customers expect us to deliver a reliable service 24/7, 365 days a year, and also expect us to invest and take decisions to ensure we can do this reliably into the future. In an ever more complex and less certain world, we also need to view resilience in its broadest sense, and ensure our operational, corporate and financial systems and process are robust to external shocks and stresses. Resilience underpins how we'll deliver better outcomes in AMP7 and beyond.

To help find the optimal resilience response to risks to our critical infrastructure, processes, systems and networks, we apply the Cabinet Office's 2011 '*Keeping the Country Running*' '4Rs' four box model (resistance, reliability, redundancy and response and recovery).

We've also worked with leading consultants experienced in resilience best practice and to create a framework that allows us to take a systems approach to resilience. This brings together the processes and activities already in place, with the approach set out by Ofwat, into a single framework – our *resilience wheel*. Approaching resilience through our resilience wheel ensures we think about the short-term risks and longer term trends that could impact our ability to deliver service – both business as usual and during times of external stress - and what we do to avoid, cope and recover from this disruption.

The resilience in the round framework we've adopted – our resilience wheel



Water Resource Management Planning

The options analysed in our draft WRMP are underpinned by significant investment to improve our asset modelling. We've continued to link our maintenance needs with supply/demand modelling, and have extended our approach to reflect the adaptive pathways approach as recommended by UKWIR as best practice. Our approach enables us to dynamically model potential interventions to allow us to better plan for uncertainty and the impact on water availability. This gives us a high degree of confidence that we're prioritising demand side and supply side (including leakage management and behavioural change) solutions - while taking account of our interactions with the water environment - and in a way which allows us to adjust our strategy as we become more certain about needs and solutions.

The options are also informed by extensive customer research and co-creation. Customers have some key principles they expect us to consider in defining solution, ranging from sustainability, best value, responsible use of resources and avoiding environmental harm. Our WRMP is built on our customers' views, and mapped out over a 25 year plus time horizon and our asset deterioration to drive maintenance is modelled over a 25 to 40 years horizon.

Resilience through water trading

Over the last decade we have strived to lead the sector's thinking on water trading as an option to provide a lower cost and more sustainable solution to meet water resource demand, increase resilience and deliver better value for customers.

We support more collaboration between water companies' resource planning to drive a more resilient sector nationally. As active members of all regional water resources workgroups we're focused on how to make sustainable and resilient water trading between the usually wetter north-west and the drier south-east a reality. We've commissioned joint research with United Utilities and Thames Water to understand customers' views on trading and found customers see water scarcity as a national issue, to be coordinated by water companies, the regulator and government.

Flexible, long term wastewater planning

Taking a flexible and forward looking approach to planning and risk mitigation is critical to the resilient operation of our wastewater system. We have a well-developed approach to our long term wastewater planning that we believe is at the forefront of the sector. Key components of our approach include:

- Mitigating stress at source and minimise the consequence of failure, working collaboratively with local authorities, EA and developers, to manage surface water sustainably and integrate drainage planning at a catchment level.
- Building in resilience by removing single points of failure on our treatment works a where possible. Where it is too costly or impractical to replicate systems we take a risk based approach to mitigation for example raising sensitive electrical components above flood level so treatment works can recover quickly in the event off flooding.
- A continued to shift from a largely reactive 'fix on fail' approach to a preventative operation and maintenance plan for our most critical assets making our assets more reliable in the short term while reducing costs in the long term by extending useable asset life.
- Reducing likelihood and impact of power loss – by adopting a twin-track approach to self-generation and supply, and ultra-low energy treatment processes - 64 of our largest sites are already self-supplied, and we've developed innovative treatment processes, such as vertical flow reed-beds, which can easily be operated by small generators or small scale off-grid renewables.

Building natural resilience through catchment management

Developing innovative catchment based approaches is a critical component of operational resilience allowing greater flexibility and optioneering of solutions to emerging risks. As one of the sector leaders in catchment based approaches, during AMP6 we proposed and are delivering an ambitious and innovative leading catchment management programme including:

- *Farming4Water*, our catchment management programme featuring a number of initiatives;
- *Severn Trent Environmental Protection Scheme* (STEPS), provides grants to famers to protect and improve watercourses and the wider environment;
- *Farm to Tap* focuses on managing pesticides, including metaldehyde and the impact of diffuse pollution from farms through pesticide training amnesties, and specialist visits to advise on alternative pest control measures;
- *Cash for Catchments* providing grants to land owners, farmers, community groups, and NGOs to improve water quality and wider environment; and
- supporting Catchment Based Approach partnerships, and hosting the Tame and Anker group.

Aligned to our risk-based drinking water safety plans, catchment management is now our preferred solution to manage raw water pollution risk from agriculture and other sources. Customers support this approach, especially when they're made aware of potential cost reductions and wider environmental benefits. However, they also want to be reassured that we'll take steps to ensure the success of catchment approaches.

Our approach in AMP7 builds on our AMP6 work by directly measuring the impact of catchment management on the risk controls in our drinking water safety plans, supporting delivery of wider environmental /ecosystem service benefits from catchment interventions e.g. biodiversity, carbon and flood risk management.

Climate change

STW's climate adaptation plan details our evaluation of climate risks and our adaptation plans. Although the science underpinning climate change predictions continuously evolves the key threats and opportunities, and our approach to mitigating them outlined in the plan remain robust.

Our adaptation plans have informed our business plan and WRMP along with new sources of information and techniques to understand risk and appropriate actions to mitigate them.

We await future calls for an adaptation update from Defra and will respond accordingly.

Tackling flooding

Our AMP7 plan targets repeat incidents, proactive intervention and enhancing hydraulic flooding resilience as well as a continued focus on keep getting the basics right and good quality asset data in our models to identify appropriate interventions. Key features of our plan include:

- Reducing the risk of flooding for customers experiencing repeated incidents: We have already reduced the number repeat flooding issues by 60% between 2014/15 and 2017/18 and in the next five years we plan to achieve an 80% reduction when compared to 2014/15 through a combination of skilled staff, remedial action and customer education.
- Identifying hotspots to better target interventions : In order to maintain incidents at their new record low level we will need to continue with our programmes of proactive intervention and improve our predictive capability to prevent flooding before it occurs. Because flooding is now so much rarer than it was five years ago we will need to continually improve the way we target our interventions to deliver further performance gains efficiently.
- Working in partnership: - We have been able to work in partnership with other organisations to resolve flooding that could not have been addressed in isolation. Going forwards, we are looking to increase the opportunities for co-creation and co-delivery with our partners by being more flexible with how we invest (i.e. by simplifying how we contribute to each other's schemes) and altering our performance commitment to better align how we measure risk.
- Property level resilience: Where it is not possible for us to resolve all of the flood risk in the short term we have sought to cost effectively protect individual properties from flooding. Over 700 properties will benefit from the installation of additional resilience measures in 2015-20 which have delivered more than a 90% reduction in hydraulic sewer flooding incidents in five years.
- Working to make hydraulic sewer flooding a thing of the past: We have already identified 4.1% of our customers that we believe to be at high risk during an extreme storm and we will be reviewing what measures we can take to reduce this risk. We will consider what opportunities there may be to 'design for exceedance' as a more cost effective way of reducing the risk of flooding in an extreme event than building more capacity into our sewers. Critical to this will be collaborating with other organisations to understand the system risks from this exceedance.

Innovation

We believe that in a world of rapid change and increasing uncertainty, innovation is critical if we are to drive better outcomes for our customers, our people, our investors and society.

Since the introduction of Ofwat's outcomes based incentives framework at the 2014 price review, we've embraced the opportunities provided by its new approach and thought differently about how to deliver performance.

Global benchmarking – local innovation

In 2015 we looked outside our sector to build what we believe is a best in class innovation model. We commissioned a global benchmarking exercise to capture how best-in-class companies (including Pfizer and Philips) approach innovation. The model we adopted in response includes a team with specialist innovation management roles. But we recognise there is no monopoly in good ideas for innovation so our strategy looks across STW, our customers and supply chain for ideas:

Creating an *anyone can innovate* culture:
In 2017 our chief exec spoke to 6200 staff and challenged them to come up with solutions to two of our strategic innovation ambitions:

- reduce leakage by 15% in the next 5 years; and
- reduce the amount of water we abstract by 50% in 10 years

We also launched a study programme to support staff in exploring innovative ideas across the globe

Innovation sparked by our customers
Our customers offer us a wealth of insight every day that we can use to inspire change. Our 'voice of the customer' tool provides us with instant feedback and our newly established customer panel 'tap chat' – allows us to generate and explore new ideas with over 5,000 customers (as at May 2018).

Innovation from, and for, our communities
We want our innovation to benefit our region, and in turn we look to draw innovative ideas from our regional stakeholders. In 2017 we hosted three events – an Expo, a Design Sprint and a Hackathon - focussing on solving leakage over four days at the Coventry and Warwickshire Business Festival. Three trials are currently under consideration together with exploratory work on five technologies from the Expo. And we're progressing seven ideas generated from the Design Sprint and Hackathon.

The power of data
We're constantly evolving with technology to become a truly insight driven organisation. Our information and data transformation programme's first exercise focussed on leakage. Working with a strategic partner in advanced analytics, we've created a model that uses 24 algorithms and 2.7 billion rows of existing operational data to identify the characteristics – e.g. age, changes in flow and pressure – that lead to leaks. By applying these algorithms to data about the characteristics of the remainder of our network to predict where issues could arise, the trial has been able to reduce leakage detection time by on average seven working days.

Looking to the future

We've structured our innovation strategy around five ambitions to help us respond in this rapidly changing world. They're enablers of our wider company strategy – focusing on AMP7, 2040 and beyond - and endorsed by our Board. Because they're designed to inspire and challenge us - we've made them bold and ambitious. And they respond to our Water Forum (customer challenge group) who have challenged us to explore the potential of Artificial Intelligence to process data and generate real insights to serve our customers.

Our strategic ambitions focus on radical change

Create a carbon neutral business and turn waste into products	Reduce the amount of water we abstract by 50% in 10 years	Reduce leakage by 15% in the next five years	Reduce service failures by at least 30%	Explore how AI & robotics can help automate at least 30% of our production and support services activities

These ambitions are focused on radical change - to face into the issues that challenge our sector and not only improve how we do what we currently do, but also fundamentally change it.

They build on the game-changing initiatives we've been working on over the last AMP. For example, we're already pioneering urban catchment with a flagship project near Redditch. This trial is designed to build our understanding of operational models, product recovery, enhancing resilience and carbon neutral wastewater operations.

Examples best practice

UK firsts for zero energy wastewater treatment in our rural communities

In our 2015-20 business plan, we set ourselves the challenge to make a step change in how we deliver our wastewater services by 2050. We wanted to find more sustainable approaches to delivering wastewater services in our smaller rural communities – at lower cost to our customers – but without compromising on the environmental compliance they expect.

We've worked with our supply chain to identify technologies and catchment management approaches that are capable of providing reliable treatment, require little operator intervention and facilitate community involvement.

Our first off-grid facultative pond system

Llys Rhysnant is our first off-grid wastewater treatment works. It delivers robust treatment to an environmental consent standard for a small catchment of 25 houses in in Powys, Wales. Treatment is delivered by a series of three facultative ponds that operate without energy input or the need for regular desludging. Performance is observed by online flow and quality monitors powered by renewable energy to ensure the work is truly 'off-grid'.

Using vertical flow reed beds

Hulland Ward is the UK's first two stage vertical flow reed bed system for municipal sewage treatment. It delivers robust treatment against an ammonia consent standard for a village of 910 people in Derbyshire. The reed beds minimise the carbon footprint of the works by operating with extremely low energy input and avoiding the need for regular desludging.

Our trials at Hulland Ward and Llys Rhysnant have revealed significant potential benefits for our customers and rural communities:

- lower whole life cost (potentially c.40%);
- effluent quality monitors powered by renewable sources;
- naturally resilient to mains power failure;
- very low requirement for operator intervention; and
- more opportunities for community engagement

Emerging opportunities

Our horizon scanning has also found other opportunities including trial small scale anaerobic treatment systems, new technologies for nutrient removal at rural sites, and exploiting wetlands to achieve high quality effluents and enhance biodiversity. We'll be trialling them in AMP7 to explore their potential with a view to embedding them in design standards for AMP8.

The world's first model using real time satellite and rainfall data to predict pesticide levels in rivers

We have been working with University of Sheffield to develop the world's first metaldehyde prediction model. This ground-breaking model predicts the concentration of metaldehyde in rivers up to 48 hours in advance, which enables us to suspend abstraction and avoid failing the water quality standard for pesticides.

For most catchments, this approach will enable us to halve the concentration of metaldehyde – avoiding potential failures of the water quality standard and reducing the investment required in treatment solutions. The estimated benefit is a reduction in capex of >£30 million and a reduction of opex of £1 million per annum.

Investing in large scale phosphorous removal trials – and embedding success into BAU.

Working closely with our academic research partners and our design and construction supply chain we've invested £4 million in a state of the art test rig at our Packington sewage treatment works, in order to trial a variety of innovative new phosphorus removal technologies. The Packington demonstration trial complemented the national low phosphorus trial that followed a couple of years later. But the fact we started early allowed us to implement innovative solutions in AMP6 and hence realise the benefits sooner.

For example the *Magnetite ballasted coagulation process (CoMag)* process combines a coagulant, a magnetite ballast and a polymer to produce a weighted precipitate that settles very quickly and effectively. The trial was successful and showed the potential for delivering very low phosphorus levels.

As a result we are already installing the process at Finham sewage treatments works in Coventry, one of our largest sewage works to achieve a very tight phosphorus limit of 0.22mg/ while **saving £8.7 million** in capes on this one scheme alone.

The rollout of new technologies trialled at Packington, will deliver AMP6 totex efficiencies of over £13.6 million, a rapid return on investment. For AMP7 we envisage further totex savings of at least a similar scale, reducing costs to customers and, crucially, making environmental protection more cost-effective.

Using river restoration techniques to improve habitats and ecological resilience to low flows

Our draft WRMP includes short and long term measures to remove or offset the environmental impacts of abstractions, and to help the associated water bodies achieve Water Framework Directive objectives. In the short term we propose localised environmental protection measures that will allow us to mitigate risk until we can put longer term solutions in place to reduce or stop abstraction.

Localised low flow environmental protection measures fall into two broad categories:

- Local flow support measures that provide additional water to localised river reaches in times of low flow from reservoir release or borehole sources
- Catchment and river restoration improvements to mitigate or remove pressures that exacerbate low flows e.g. channel modification, lack of instream habitat, pollution, sedimentation and barriers to the movement of fish.

We are already using this kind of approach in AMP6, but on a smaller scale. For example, we are implementing a ten year plan to resolve the legacy of unsustainable abstraction in the Bromsgrove groundwater unit and the associated impacts on the Battlefield Brook.

Our plan is to scale up this kind of approach in AMP7 with local environmental measures in 17 waterbodies, as part of a wider Restoring Sustainable Abstraction (RSA) programme that aims to improve 27 waterbodies in total (including 2 schemes still to be decided with EA). Our estimate through options appraisal found this RSA programme will improve over 120km of low flow river.

We will engage with local stakeholders and landowners and aim to develop catchment partnerships to assist in the implementation of these schemes. We will also work with existing partners and collaborate with the CABA network to deliver these improvements.

Annex 1

Mapping WISER expectations against STW's plans and activities

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Enhancing the environment

Water Body Status (Water Framework Directive)		
1	Measures to prevent deterioration in current water body status.	STW engaged with EA as they developed WINEP3 obligations and these are included in our plan.
2	Measures to improve water body status.	Our AMP7 investment targets improvement at approximately 150 waterbodies covering 2000km of river.
3	Work with stakeholders and Catchment Based Approach (CaBA) partnerships to explore integrated solutions at a catchment scale.	Provision made in our business plan to support partnership working through CaBA partnerships. This builds on our experience in AMP6.
Bathing waters		
	NA	
Shellfish waters		
	NA	
Biodiversity and ecosystems		
1	Measures that contribute to meeting and or maintaining conservation objectives of Natura 2000 sites (Special Areas of Conservation (SAC) & Special Protection Areas (SPA)) and Ramsar sites.	Our plan includes a range of WINEP3 measures discussed and agreed with the EA and NE to deliver improvements to SACs and SSSIs, including several SSSI lakes, and the rivers Mease and Eye. Catchment specific investigations are also included to identify options to address residual issues in the Wye SAC and Blythe SSSI.
2	Measures that contribute to meeting and/or maintaining Favourable Condition targets for Sites of Special Scientific Interest (SSSI).	
3	Measures that contribute to priority habitat and species outcomes as well as other biodiversity actions and measures to enhance ecosystem resilience on your own land or in the catchments within which you operate	We're committing to deliver habitat restoration and improvement work across 1090 hectares in our region – a significant step up from pour 2015-20 programme. Our biodiversity strategy for PR19 and Biodiversity Performance Commitment will ensure delivery. Farming4Water Performance Commitment and WFD Performance Commitment will also contribute to biodiversity and ecosystem resilience.
4	Measures that contribute to the conservation objectives of Marine Conservation Zones.	NA
Sustainable fisheries		
1	Screen abstractions and outfalls to prevent the entrainment of eels and salmon.	We are on track to complete AMP6 eels screens and investigations. WINEP3 obligations for fish screening are included in plan.
2	Address barriers to the passage of fish.	Our plan includes WINEP3 investigations into barriers to fish passage.
Invasive non-native species (INNS)		
1	Prevent deterioration by reducing the risks of spread of INNS and reducing the impacts of INNS.	WINEP3 obligations to manage risk and impact of INNS are included in plan.

2	Reduce the impacts of INNS, where INNS is a reason for not achieving conservation objectives or good status.	PR19 environment strategy to look at INNS included in AMP7 base plan.
3	Understand pathways of introduction and spread of INNS.	
Urban waste water		
1	Measures to protect newly identified sensitive areas.	WINEP3 obligations included in our plan and will be delivered by 2025.
2	Measures to improve wastewater treatment where population thresholds are exceeded.	
3	Maintain sewers to demonstrate sewer leakage to ground is minimal, especially in Source Protection Zones.	We have included investment in our plan to maintain the condition of our sewers which will be measured through our ***Asset Health Performance Commitments*** on sewer collapses and blockages. As and when we become aware of any issues with sewer exfiltration in SPZs we will address them by rehabilitating, replacing or diverting sewers as appropriate.
Drinking Water Protected Areas (DrWPA)		
1	Catchment measures to prevent deterioration in water quality and to reduce the need for additional treatment.	Our plan for AMP7 includes the continuation of our 27 current catchment schemes plus eight new schemes recommended through our AMP6 NEP. Our catchment management activities involve us working with landowners to deliver catchment specific advice campaigns. The aim of our catchment schemes is to protect our current sources from water quality risks, ensure no deterioration, help improve the resilience of our assets, and generate wider environmental benefits. We employ a mix of in-house and partnership agricultural advisers to drive delivery via a range of tools, including specialist advisory support and incentives (Severn Trent Environmental Protection Scheme (STEPS) capital grant scheme and product substitution payments).
2	Catchment measures to improve water quality to reduce the level of existing treatment.	Our ***Farming4Water Performance Commitment*** for AMP7 to will address risk and improvement.
Chemicals		
1	Measures to prevent deterioration (includes load standstill measures).	WINEP3 obligations are included in our plan and will be delivered by 2025.
2	Measures to achieve compliance with environmental quality standards (EQS).	
3	Work with business customers and catchment partners to explore alternatives to end of pipe treatment solutions.	We plan to explore catchment solutions to address diffuse pollution to negate or supplement end-of-pipe solutions.

Improving Resilience

Flood Risk Management

1	Co-operate with other risk management authorities in exercising your flood risk management functions.	We employ a team of three people whose sole role is to engage with the EA Flood Risk Management Teams and the 28 LLFAs across our region. In preparation for AMP7 we have consulted with all RMAs in our region, provided them with all of our flooding information and asked them to share their priorities to build a pipeline of opportunities to collaborate.
2	Co-ordinate and share information with Cat.1 and 2 responders.	Regular engagement with the Local Resilience Forums (LRFs), including exercising, to test our procedures, identify areas for improvement and to increase competency. We run a number of events every year. We engage external stakeholders in exercises and attend other externally run events whenever we can.
3	Comply with statutory reservoir safety requirements.	We have a good record of compliance and will maintain our robust reservoir monitoring and maintenance programme.
4	Develop a clear and systematic understanding of service and system risks and include options for reducing the likelihood of future service failures and service failures that lead to flooding.	We have developed our 'Resilience in the round' approach for PR19. We have engaged with specialists at Arup to complete a review of all of our current approaches to resilience and help us identify any gaps in understanding service or system risks. To understand flood risk to our assets we have reviewed all of our major sites and identified potential actions that could improve flood protection or recovery (in line with the NFFR). We will also be developing Drainage and Wastewater Management Plans which will help identify, and plan for, the risks of flooding both to, and from, our assets. We have developed a number of AMP7 PC/ODI's that will help drive our resilience ambition, including - Risks of sewer flooding in a storm (1 in 50 year) (the common wastewater resilience measure), Green Communities (creating natural and social capital through our investment), Collaborative Flood Risk Resilience (our replacement for our AMP6 Partnership Working measure that will provide more flexibility to work collaboratively on multi-linked flood risk issues) and Biodiversity (improving biodiversity of our land to support environmental resilience).
5	Reduce sewer flooding of homes and businesses trending towards zero.	We have made a significant step change in our performance on sewer flooding in AMP6. For AMP7 we are proposing to at least maintain our upper quartile performer position through to 2025, with the potential to go further supported by the PC/ODI mechanism.
6	Reduce the number of properties at risk of flooding.	We will be continuing to invest to reduce the number of properties at risk of hydraulic sewer flooding. For AMP6 we replaced the DG5 Register approach with our own risk based methodology for prioritising which risks we invested in. This has paid dividends as we have had an average of only 23 hydraulic related internal flooding incidents a year over the first 3 years of AMP6 (excluding a period of extreme weather in June 2016) compared to an average of 95 in AMP5. We are proposing a very similar sized hydraulic flooding programme in AMP7 as we have had in AMP6. We will continue to address the highest flood risk issues and also to use our models to predict new flood risks that may arise and how resilient our network is to severe weather events.

7	Take every opportunity to increase the number of partnership flood schemes achieving multiple benefits.	For AMP7 we are proposing to amend our current Partnership Working PC to be more outcome focussed and better align with how our potential partners measure flood risk. We believe this change will provide us a better incentive structure, a more flexible approach and overall a better outcome for our partners and customers. To support this we have consulted with all RMA's in our region, provided them with all of our flooding information and asked them to share their relative priorities to help us build a pipeline of potential opportunities to collaborate.
8	Work with government and other utilities to take forward the recommendations of the National Flood Resilience Review.	In response to the NFRR we have identified all our water treatment assets serving over 25,000 people that are vulnerable to the EFO (extreme flood outline - equivalent to 1 in 1,000 year flood event). We have also responded to a request from Defra to undertake a similar exercise for assets serving more than 10,000 people. We are proposing to deliver resilience schemes in a phased approach across successive AMPs with action prioritised on population, our assessment of risk, failure impact, cost:benefit and customer willingness to pay.
Future Drainage		
1	Use the 21st Century Drainage Programme workstreams on storm overflows and drainage capacity metrics to inform business plans.	The SOAF process has been used to inform entries into WINEP3 for investigations for high frequency CSO spillers. As part of the capacity work stream we were able to use our advanced hydraulic models to provide a detailed capacity assessment for 93% of our catchments which was a significantly greater coverage than any other company.
2	Maintain networks and WwTWs to reduce the risk of future failures.	Provision is made in our plan to maintain our systems and provide for future demand.
3	Event duration monitoring on high significance storm overflows.	We have included provision for a further EDM installations in AMP7 which to bring our total coverage to over 97% of our CSOs.
4	Ensure compliance with permitted flow to full treatment settings.	We will be installing additional monitoring where required to demonstrate compliance with flow to full treatment. Where we are non-compliant, or at risk of exceedance, we will be taking actions to identify the root cause and take appropriate action to ensure compliance.
Water Resources		
1	Solutions to meet water resources management plan outcomes or measures to protect the environment form the supply-demand component of business plans.	Following Defra expectations and WRMP technical guidelines, the WRMP makes provision for achieving River Basin Management Plan objectives for the region. New Increasing Water Supply Capacity PC holds us accountable to WRMP schemes.
2	Assess resilience of your water supply system to predicted droughts and other non-drought water supply hazards.	The WRMP includes appraisal of extreme drought scenarios and potential need for additional expenditure. Our *Drought Resilience Performance Commitment* holds us accountable.
3	Measures to reduce demand and per capita consumption.	Our draft WRMP includes a programme of demand management measures including leakage reduction, water efficiency, household metering. Customer education and leakage PCs commit us delivery.

4	Achieve a downward trend for leakage with rates at or below the sustainable economic level of leakage.	Our business plan sets a stretching target for at a 15% reduction in leakage over the period 2020-2025.
5	Assess universal metering in water stressed areas.	We do not currently have any official “water stressed areas” and therefore universal metering is not open to us. However our business plan and draft WRMP contain ambitious targets for improving meter penetration.
6	Ensure agreed and up to date plans are place to manage a drought.	Our statutory Drought Plan is being updated for consultation. The drought scenarios and assumptions are aligned with our draft WRMP
7	Demonstrate that Defra’s Guiding principles for water resources planning have been met.	Our draft WRMP includes provision for achieving Defra's Guiding Principles
8	Incorporate sustainability changes into supply forecasts.	WINEP sustainability reductions and WFD licence changes are incorporated into WRMP. Our final WRMP will be updated to reflect position from WINEP3 once it has been confirmed by the SoS.
9	Current abstractions and operations, and future plans support the achievement of environmental objectives.	*WFD Performance Commitment* will commit us to fulfil our WINEP3 obligations.
Climate Change		
1	Report on understanding of risks from climate change and how they are being addressed via Adaptation Reporting Power (ARP) reports.	STW's climate adaptation report sets out our evaluation of climate risks and our adaptation plans. This has informed our business plan / WRMP. We await future calls for update from Defra and will respond accordingly.
2	Reduce total carbon emissions.	STW is committed to driving down GHG emissions and we have been accredited by the Carbon Trust since 2009. Our activity includes: i) The focus on efficient energy use will remain a high priority for controlling costs in AMP7 with knock on benefits for reducing GHG emissions. ii) Renewables, ScT PLC generate more renewable energy than any other company and we continue to innovate in energy generation from waste stream iii) We have made a strategic commitment to move to non-fossil fuel vehicles in our fleet as they become commercially available.
3	Ensure Adaptation Reporting Power (ARP) report commitments are consistent with, and embedded within, business plans.	See (1) above

Excellent Performance

Regulatory compliance and sludge		
1	A plan in place to achieve 100 per cent compliance for all licences and permits.	Our business plan will reaffirm our commitment to 100% compliance - building on our success through AMP6 that has seen us ranked first on the EPA treatment works compliance measure - underpinned by the wastewater treatment compliance ODI.
2	100% compliance with environmental permit conditions at WwTWs with descriptive not numeric limits.	
3	Serious pollution incidents must continue to trend towards zero.	We are committed to delivering and sustaining zero serious pollutions and improvements in self-reporting.
4	Trend to minimise all pollution incidents (category one to three) by 2025. There should be at least a 40% reduction compared to numbers of incidents recorded in 2016.	Our AMP7 pollution target (category one to three) is to achieve and maintain upper quartile industry performance through 2025 and longer term. We have an ambition to further improve the UQ benchmark for the industry and thereon deliver the levels envisaged in WISER. EPA 4 * performance continues to be an important environmental benchmark for us and our PR19 plan covers 5 of the 6 metrics in the EAP. Activity in our plan to deliver further reductions in pollutions involve a catchment approach which focusses on hotpots in the catchment covering a range of solutions such as health checks, sewer repairs, sewer cleanse, detailed schemes and advanced monitoring dependent on the risk. We will be targeted on forecast UQ as per Ofwat's methodology but this will not stop us working to outperform this metric beyond UQ and strive to achieve industry leading EPA4* each year. It should be recognised that improvements to reach the PC targets of forecast UQ are not given additional funding and represent an additional efficiency challenge on top of the expected reduction in totex. We are incentivised to try and drive the number of pollutions lower than UQ through the ODI mechanism as set by Ofwat and thus we will be aiming to outperform beyond UQ on a cost effective basis.
5	Effective management of transferred private sewers and pumping stations with low levels of pollution incidents.	In AMP 5 and 6 we have invested to bring transferred private sewers and pumping station up to an acceptable standard. We will continue to invest to maintain and improve these assets in AMP7. For private sewers we are incorporating proactive mapping, surveying and cleaning/repairs for hotspot areas for blockages, flooding or pollution. For pumping stations we are looking at the possibility of bringing maintenance activities in house (it is currently contracted) to improve our efficiency and standards.

6	No D, E, or F rated sites under Operational Risk Appraisal OPRA for waste related sewerage service Environmental Permitting Regulations permits.	We see compliance as crucial underpinning to our ambition to become the leading bioresource operator in England. We are holding training sessions for the managers in our newly formed Bioresources function to upskill them on - permit roles & responsibilities, pollution prevention, site emissions, nuisance avoidance. We also hold quarterly meetings being held with EA representatives to discuss waster permitting risks and opportunities.
7	Compliance with flow requirements, including MCERTS certification, at WwTWs	Provision is made in our AMP7 plan to ensure compliance and MCETS certification.
8	High levels of self-reporting of pollution incidents with at least 80 per cent of incidents self-reported by 2025. More than 90% of incidents self- reported for WwTWs and pumping stations.	We have achieved an average of 78% self-reporting in the last 3 years. By the end of AMP6 we will have installed an additional 3000 monitors through our CSO EDM and Network Monitoring Programmes. We have also trialled some innovative monitoring approaches as part of our Smart Network Model Areas. Our plan includes for rolling out some of the technologies developed through the Smart Networks programme that will deliver additional monitoring at WwTW's, Pumping Stations, CSO's and Foul Sewers. We anticipate this will enable us to deliver higher levels of self-reporting in AMP7.
9	Business plans include all measures identified within the Water Industry National Environment Programme and these are planned well and completed to agreed timescales and specification.	Our AMP7 business plan commits us to delivering WINEP 3 in full, by 2025. This reflects our decision not to request deferral of investment offered by the Environment Agency in a letter dated 23rd of May 2018.
10	Sample and provide data in relation to self-monitoring under Operator Self-Monitoring (OSM), Urban Waste Water Treatment Directive (UWWTD), Flow monitoring and UV disinfection.	Our 2017 Operator Monitoring Assessment (2017) states *"Overall there has been a continued improvement in the standard of the sampling programmes with several assessments moving to Excellent." . Our AMP7 plan will support ongoing investment and improvement.*
11	Manage sewage sludge treatment and re-use so as not to cause pollution to land, surface water or groundwater.	We have a performance commitment for PR19 to cover sewage sludge compliance - the target is 100% for each year of AMP7.