Cost robustness and efficiency

Annex 09

Severn Trent
29 January

WONDERFUL ON TAP

SEVERN TRENT

Contents

Appendix 1 and 2 redacted

1. Introduction

This annex provides a summary of the total expenditure in our Green Recovery proposals and a guide to how it has been represented in the data tables. Our proposals total over £730m and we have sought to provide evidence that is proportionate to the scale of the investment. Therefore, this annex provides information in three key areas:

- Evidence that provides confidence that our estimates are robust and are based on reliable, market tested costs or well evidenced assumptions. Including the commitments we are making to improve sector wide understanding of costs;
- Evidence that our costs represent efficient costs, wherever possible locking in efficiency as defined by the assumptions set out in the PR19 final determination (e.g. AMP8 WINEP); and
- Evidence that we are building on a strong process and culture for driving efficiency through design and delivery.

[redacted]

This is quite different to traditional regulatory arrangement whereby investments are funded up front, with Ofwat having a requirement to assess delivery and claw back funding to customers if the outcomes are not delivered. This is an important distinction when considering cost robustness and efficiency as we will continue to drive efficiency through design and delivery phases to minimise the overall cost to customers.

More detail on how we propose to recover costs from customers post-delivery can be found in Annex 04: Affordability and Financeability.

The final part of this annex provides details of the independent review that we commissioned consultants Arup to provide an additional level of challenge and review to our costs and approach. Overall this review shows that our proposals are in line with the level of robustness expected at this stage of development and in many cases shown to be relatively efficient compared to Arup's benchmarking.

2. Cost overview

Across our six proposals, total expenditure is £731m (net of any grants and contributions), made up of £326m for water service and £405m for wastewater service as set out in table 1.

Table 1 Green Recovery expenditure proposals (net of G&C in 17/18 prices)

Proposal	2021-22	2022-23	2023-24	2024-25	Total
Bathing rivers					**152.7**
Decarbonising Water Resources					**206.2**
Flood resilient communities					**85.0**
Taking care of supply pipes			[redacted]		**97.9**
Smart metering					**21.9**
Accelerating Environmental Improvements (AMP8 WINEP)					**167.5**
Total	**79.8**	**135.8**	**253.8**	**261.9**	**731.2**

In line with the letter issued by Ofwat on 12 January, we have allocated our proposed investment by price control, by expenditure category and enhancement purpose, utilising PR19 data tables WS1/WWS1 and WS2/ WWS2 respectively. We have provided a water total and a waste total and a breakdown for each proposal. The spreadsheet is [redacted].

When allocating expenditure by enhancement categories for water we have allocated spend across the categories provided in Ofwat's WS2 template, with no requirement to create company specific lines. For waste water we have retained the company specific lines used at PR19 (free form lines 32 to 40) and then added two additional lines for catchment management interventions (line 41) and real time bathing water quality monitoring and reporting (line 42).

2.1 Estimating approach

We have a mature and commercially focussed estimating approach which in the majority of cases we have used to generate the costs for our Green Recovery proposals. In chapter 20 and Appendix 8 of our PR19 business plan we set out our full methodology and gave examples of how we used benchmarking and market testing to drive efficiency into our 2020-25 business plan. Since then we have completed the set-up of our AMP7 frameworks and delivery model which essentially locks in the efficiencies required by our PR19 final determination.

All of our proposals have been individually costed and the details are set out in each business cases. To ensure a degree of consistency across our package we have applied the following principles to all of them:

- All costs are presented in 17/18 prices (indexed using CPIH financial year average)
- The starting point for all proposals is our unit cost database (STUCA) which draws on both past completed projects (from 2005 to date) and AMP7 contract rates.
- We have identified relevant PR19 assessments of efficient costs and retained these efficiency assumptions – this is particularly the case for Taking care of supply pipes and Accelerating Environmental Improvements (AMP8 WINEP).
- We have carried out a proposal specific assessment of uncertainty and wherever appropriate included an allowance for the cost of the uncertainty. These assumptions were reviewed as part of the independent review on costs.

- We have carried out a systematic review of overlap with our existing programme and commitments to ensure there is no overlap with investment that is already funded through PR19.
- We have included the standard overhead rate which is being applied to all of our AMP7 projects and has been reviewed by our financial auditors as part of the annual reporting process.
- We have subjected our estimates to internal checks in line with our standard governance process.

Treatment of uncertainty

Like all business plans, our cost estimates reflect the certainty that is typical at the inception/ feasibility stage of a project. With reference to Ofwat's report on Capital Expenditure estimating [1] that is likely to mean that costs are within 20-30 % accuracy. Proposals that link more closely to investments we have made in the past or where they relate to options we were already developing they will be more accurate than that and therefore we estimate that our proposals are within +/-10 to 20% accuracy. The only way to drive greater accuracy is to progress the design and set up contracts which has not been possible in the time available or without the certainty that funding will be available. However we think this level of robustness is appropriate and does not reduce the efficiency or increase risk to customers for the following reasons:

- 86% of the total costs are based on data that has already been proven to be efficient, as shown in table 2.
- Only 14% is based on non-standard items with limited past experience or ability to benchmark due to uniqueness.
- Appropriate balance across the package - our proposal is large enough and includes a mix of both certain and uncertain elements, which means some estimates will underestimate outturn costs and others will be overestimated, but in the round are likely to be within a much tighter accuracy confidence grade.
- Customers will only pay for the majority of this investment once it has been delivered and section 2 sets out how we focus on and drive efficiency through delivery to get the best deal for our customers.
- We are proposing that 100% of green recovery totex outperformance is retained by customers (as set out in Annex 11 Customer Protection).

Table 2 Basis of our estimates

Basis of estimate	Bathing rivers	Decarbonising water resources	Flood resilience	Supply pipes	Smart Metering	AMP8 WINEP	Total as %
ST unit cost database							**38%**
PR19 final determination/ cost models			redacted				**32%**
Market tested/ independently benchmarked							**16%**

[1]https://webarchive.nationalarchives.gov.uk/20140713105229/http:/www.ofwat.gov.uk/regulating/reporting/rpt_com07_faithfulcapitalexpenditure.pdf

Non-standard – bottom up build							**14%**
Total	**£153m**	**£206m**	**£85m**	**£98m**	**£21m**	**£168m**	**100%**

2.2 Shared learning on costs

In many cases our proposals seek to reveal new information, in particular, in relation to costs where there is current uncertainty or insufficient understanding of the key cost drivers or the current sector costs are too high to enable an affordable solution. Our proposals commit to making this information publicly available which offers another layer of protection for customers. We will work with stakeholders to agree the best way to share this data, but we intend to publish an annual green recovery report from 2023 so that our learning can have maximum value to all parties.

The key areas where we will be sharing cost information include:

- Costs and effectiveness of novel technology (such as our wastewater ozone treatment).
- Costs of supply pipe replacement, broken down to fully explore cost drivers, such as costs achieved through different delivery models to really drive competition and efficiency, costs for different housing types (e.g. to address the barriers caused by complex arrangements such as joint supply pipes).
- Costs of blue-green infrastructure solutions as we seek to better understand the key drivers of cost.
- Costs associated with driving net-zero carbon impact across the different options.

More information about our proposed performance commitments and reporting on progress with delivery is included in Annex 11 Customer Protection.

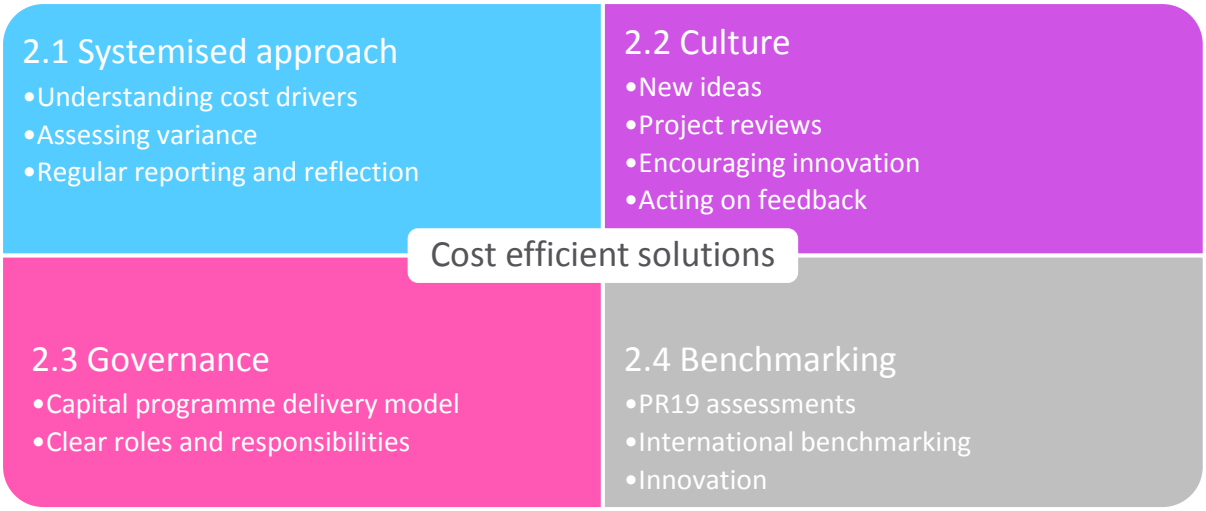
3. Continuous improvement to drive efficiency

We have a mature and robust processes for driving efficiency and continuous improvement. We reinforce and grow this through our culture and initiatives. PR19 confirmed we deliver outcomes efficiently and this strong foundation has and will continue to shape our green recovery proposals.

Due to the nature of the proposed funding arrangements for the green recovery (and the fact that customers get 100% of outperformance), we think it is relevant to include information about how we will continue to drive efficiency through the design and delivery phase of the proposals. This will ensure that the costs that customers are asked to fund are efficient and drive maximum value.

The information included in section 2 sets out our internal processes, governance and culture which demonstrates that we have a firm focus on cost efficiency. We make sure the learning from the things we do well, and the lessons from where we fall short, are elevated through the business and fed into active and future projects.

There are several building blocks that together ensure we consistently deliver customer outcomes efficiently. This section summarises them in turn, but they are not sequential. All are all needed to meet our ambitions for truly cost-efficient solutions.



3.1 Systemised approach to costs

We believe there are three main components needed to drive efficiency:

- understand cost drivers;
- assess variance throughout project delivery; and
- report and reflect on cost performance.

Our processes and systems facilitate consistent cost capture, monitoring and reporting. Systemising cost data is embedded into our business as usual activity through an auditable system (SAP). Using SAP means the way costs are captured is standardised across our business and cost data is consistent and transparent to all teams that require it.

Our systemised approach enables us to undertake granular cost reviews to understand our cost drivers across the value chain – both those inside and outside company control. We assess the variance between our forecasts and outturns to understand cost performance, where efficiencies are made,

and where there is more work for us to do. Understanding the key drivers of costs by price control enables us to take learning from anywhere in the business to target granular efficiency improvements for active projects and to account for the latest efficient practices at the planning and costing stages of future schemes.

Additionally, our cost capture methodology strikes a balance between the cost and effort of capturing granular cost data. We have optimised the use of our systems and tools to minimise the cost of capturing cost data and our system of internal monthly cost reporting against outcomes helps reinforce the systems approach and keep minds focussed on cost efficiency.

Project reviews

We have further strengthened our project review process for AMP7 as we aim to continually improve our business as usual processes. As a minimum, all projects undergo bottom up handover reviews which cover delivery against planned outcomes, costs, cost efficiency and learning points. Projects may also be selected for top down, programme level reviews based on cost, outcome criticality, innovations and/or risk. For all reviews, we identify and action areas for improvements and we promote and strengthen areas of success.

In short, this means all projects are reviewed even if we've done that work type for decades because we wish to continually challenge ourselves on all things including cost efficiency. For higher cost, critical, innovative, or higher risk projects we apply an added level of scrutiny.

For projects akin to our green recovery proposals, reviews include but are not limited to:

- a top down review of overall work programme interdependencies and systems;
- a bottom up review of programme elements, sites, schemes, techniques, outcomes, costs; and
- RAG statuses for assessed elements and to flag significance of lessons identified.

Our review methodology is holistic in approach and seeks to categorise the performance of programme elements and identify trends and common themes from the top down and the bottom up. This means that cost efficiency for example is assessed at both programme level and by specific programme stages, delivery techniques, technology or contractor.

The reviews account for final cost of solutions, including subsequent opex to build a complete picture of cost efficiency. The review process is endorsed by management who are accountable for overseeing the completion of the 'management actions'. Actions are assigned to address areas in need of improvement or to promote success into developing and active programmes to benefit the wider business and customers.

Our project review process forms a key part of our continuous improvement ambition. It enables us to learn from our mistakes and identify and action potential issues before the end of a programme. It also elevates successful initiatives within the business to promote cost efficient practices.

Management buy-in enables transparency and for bold steps to be taken when issues do occur. A prominent example of this principle in action is from 2017 when we made the difficult decision to move away from the initial Birmingham Resilience Project (BRP) delivery partner because our assurance process highlighted significant concerns that the partnership would not deliver to the required quality, timescales or budget. A decision to terminate the contract was made in customers' best interests with the support of management. The scope and delivery efficiencies that we were then able to identify allowed us to catch up with the programme delivery and complete the scheme on time and on budget.

More specific examples of how we have used the learnings from these project reviews in our green recovery proposals are included in section 3.

3.2 Our culture

Achieving efficient costs requires all staff to buy into the ambition. Our culture means staff are:

- **well informed and up to date with the latest technology;**
- **encouraged to innovate and try new things; and**
- **focussed on continuous improvements in cost and scope efficiency and innovation.**

The drive to deliver upper quartile operational performance and cost efficiency has been a key strategic aim which has galvanised the whole organisation. We've developed training focused on outcomes and regulatory price controls and employee communications are focused on costs and efficiency. Staff at all levels are encouraged to consider efficiency improvements and everyone has a voice. Through this approach, the drive for efficiency is felt at all stages of projects, programmes and directorates.

Our annual 'Challenge Cup' competition invites employees to submit ideas for cost efficiency. This provides an opportunity for people to put forward ideas with the promise of executive sponsorship and funding to put winning concepts into action. Successful projects include boundary box clips – an innovative solution to leak repairs that removes the need for footpath excavation. We estimate that the material and time saved in the repair will deliver an annualised efficiency of £0.5m as well as providing a 'right first time' solution for the customer with minimal disruption. On a similar basis, our planning and scheduling department has been rolling out a technology called Sitemate. This has increased fieldworker productivity by creating efficiencies in the job workflow process. As a direct result we have saved 20 minutes per job inspection through improved traffic management planning. Both of these initiatives are particularly relevant for our Taking care of supply pipes and Smart metering proposals.

3.3 Governance

To achieve efficient costs, delivery itself must be efficient, controlled and monitored. Our governance:

- **ensures we only outsource when needed, and when we do, we put the right people on the job**;
- **ensures schemes receive the right level of scrutiny and approval before they begin**; **and**
- **ensures schemes are regularly scrutinised on cost and progress and lessons are identified early**.

Capital programme delivery model

At PR19 we set out our plans to establish a new supply chain for AMP7. Our new delivery model builds on the things that worked well during AMP6 and makes improvements to areas where we felt we could have been better. We have made great progress and our new approach is substantively in place. We have changed the way we deliver larger capital schemes by moving to more in-house design, which gives us more control over efficiency through innovation and thoughtful design to design for outcomes more closely.

The new delivery model puts us in a strong position to use partners in the most effective way – using large contractors on large complex schemes and small contractors for smaller jobs. Working with a combination of large, medium and small suppliers to give us better access to innovation deep in the

supply chain and the ability to contract directly with the experts we need. This operating model is built to deliver innovation benefits and spread supply chain risk. We have also invested in our systems to give us additional control and visibility of our capital programme, and an improved understanding of our costs and the costs within our supply chain.

The benefits we are driving through our new delivery model include:

- Organisational – Reduced overall programme cost by not using large suppliers who are co-located on Severn Trent sites. This reduces overheads and programme fees, and fee on fee arrangements with their supply chain.
- Value Engineering – Enhanced Expert Client function that enables TOTEX thinking and innovation. Investing in our own people to make the right investment decisions in the medium and long term.
- Cost Saving – Savings made directly through our procurement and contractual processes. We ensure the right work goes to the right sized supplier. We are more efficient in our 'batching' of work and we regulate and benchmark our supply chain performance through other commercial routes (e.g. mini-competition). This also gives us better cost transparency.
- Technology - We have invested in state of the art digital tools to support our new delivery model including a Common Data Environment to promote more effective collaboration, a Contract Event Management platform to enhance cost, contract and supplier relationship management and a suite of design tools and modelling software.
- We are building on AMP6 successes – This includes continuing with collaborative planning which has enabled us to drive significant programme efficiencies with our contractors. The use of standard products, to enable installation learning to be shared and replicated. Technology type batching, which has engendered LEAN, Safer, Better, Faster techniques to be successfully deployed.

Clear roles and responsibilities – capital programme monitoring

All capital investment case spend must be approved and when business cases exceed an approval threshold, all levels up to the approver must endorse the case first. This ensures appropriate scrutiny of developing projects right up to CEO level and that all levels are kept informed and have vested interest in the success and quality of the proposal. Endorsements mean only high-quality proposals are put forward for approval.

Table 3 Group Authorisation Arrangements

Project value	Approval level	Forum
<£250k	Sub-service Strategic lead	Sub-service Portfolio Boards
£250k - £5m	3 senior Managers	Concept & Solution Programme Board
£5m - £10m	Director	Email Approval
£10m - £20m	Finance Director	Capital Executive Committee
£20m-£50m	Chief Executive Officer	Email Approval
>£50m	STW Board	Board Paper

Every month, active and prospective projects are reviewed for financial performance, outcomes, risks and opportunities by capital portfolio boards across our 5 key programme streams. Deep dives are scheduled where concerns emerge, and this can include review of cost and delivery efficiency.

The Finance business partnering teams also provide monthly, independent challenge, with the Capital Project Assurance team and Central Enterprise Risk Management teams carrying out 2nd line reviews

on a quarterly basis. The Internal Audit function is co-sourced with PwC, and maintains an annual audit plan, reporting directly to the Finance Director and Audit Committee.

3.4 Benchmarking

We can't achieve efficient costs if we only look inwardly. We must be open minded and so:

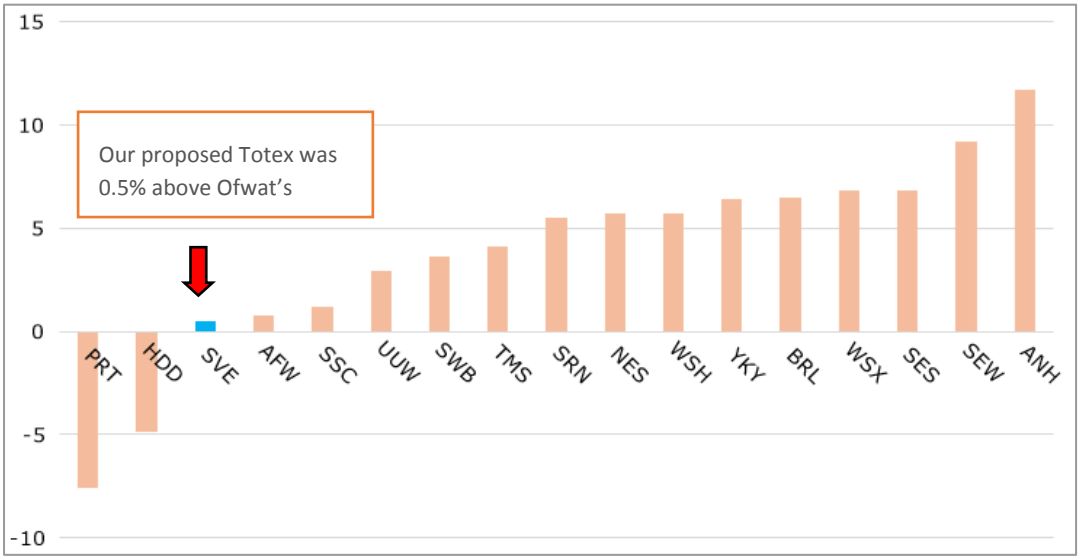
- **we scrutinise price review determinations and engage robustly in model development**;
- **we benchmark our costs and techniques with others outside our business, sector and country**; **and**
- **we foster collaboration to help others and we learn new things in return**.

PR19 assessments

PR19 showed us to be efficient overall, but it also highlighted we still have much to learn. We have since undertaken reviews on aspects of our retail costs and water network plus where Ofwat's analysis showed us to be inefficient compared to our peers. We have begun to understand why and to make improvements.

It is worth noting though, that we do have a track record of efficient costs, and we placed overall the third best company at PR19 for our view of total expenditure versus Ofwat's. Only Portsmouth Water and Hafren Dyfrdwy performed better than Severn Trent Water. The same foundation of costing processes and methods we used at PR19 are in place today but we have continued to improve them, learn from the things we do well and where we fall short and we continue to challenge ourselves on cost efficiency as set out in this chapter.

Figure 1 Comparison between companies' proposed totex and Ofwat's PR19 assessment



International cost benchmarking

We periodically participate in external benchmarking exercises such as European Benchmarking Co-operation (EBC). We exchange information with utilities from outside the UK who are recognised as leaders in adopting innovation – including in the US and the Netherlands – and research organisations such as the Dutch Water R&D Network and the North America based Water Research Foundation. And currently, we believe we are the only UK water company to subscribe to BlueTech Research, which

provides an evaluation and benchmarking service for technologies from around the world. In addition, we've just re-joined TR61 – WRC administered water sector benchmarking.

Benchmarking innovation

We undertake global benchmarking and visit other parts of the world to understand how organisations are dealing with significant global challenges, such as climate change and water scarcity. A recent visit to Singapore, for example, has strongly influenced our thinking on metering, leakage and how we could increase the technical skills of our workforce with a centre of excellence for learning. It has also helped us build global collaborative networks in Asia, Australia and the US.

We also learn from outside our business by helping others and encouraging cooperation and collaboration within and across industries. For example, our proposal for decarbonising water resources includes a demonstrator water treatment works which we will make available for others to learn from. We hope this will be a catalyst for sharing best practices within the industry and an enabler for continuous collaboration and cost efficiencies to be realised.

In April 2019 we joined forces with 12 water companies from across the globe to create the World Water Innovation Fund (WWIF). This globally collaboration is designed to tackle some of our sector's biggest challenges and opportunities and therefore protect the future of water for everyone. The member companies are coming together to share their learning through unprecedented trials, research, disruptive thinking and ground breaking technology. Live trials are currently focussing on:

- low cost digital meters
- process emissions
- circular economy
- pipe condition assessment
- no dig repair technology
- leak detection.

Market testing our unit costs

As mentioned above we have been developing an internal unit cost database for over a decade, which now contains a wealth of information on the costs of activity undertaken since AMP5. This database is periodically updated to reflect recent actuals and more recently to include the AMP7 tender costs, so that teams can access this data when generating cost estimates. Figure 1 is an extract from our unit cost data base which shows how we have driven efficiency over time, in particular across asset groups which make up a large part of our overall capital programme. This shows that we have consistently driven efficiencies over time, whereby AMP7 costs are expected to be between [redacted] lower than the equivalent costs in c2013 (the data point used for PR14 costs) and on average [redacted] more efficient than our AMP6 actual costs.

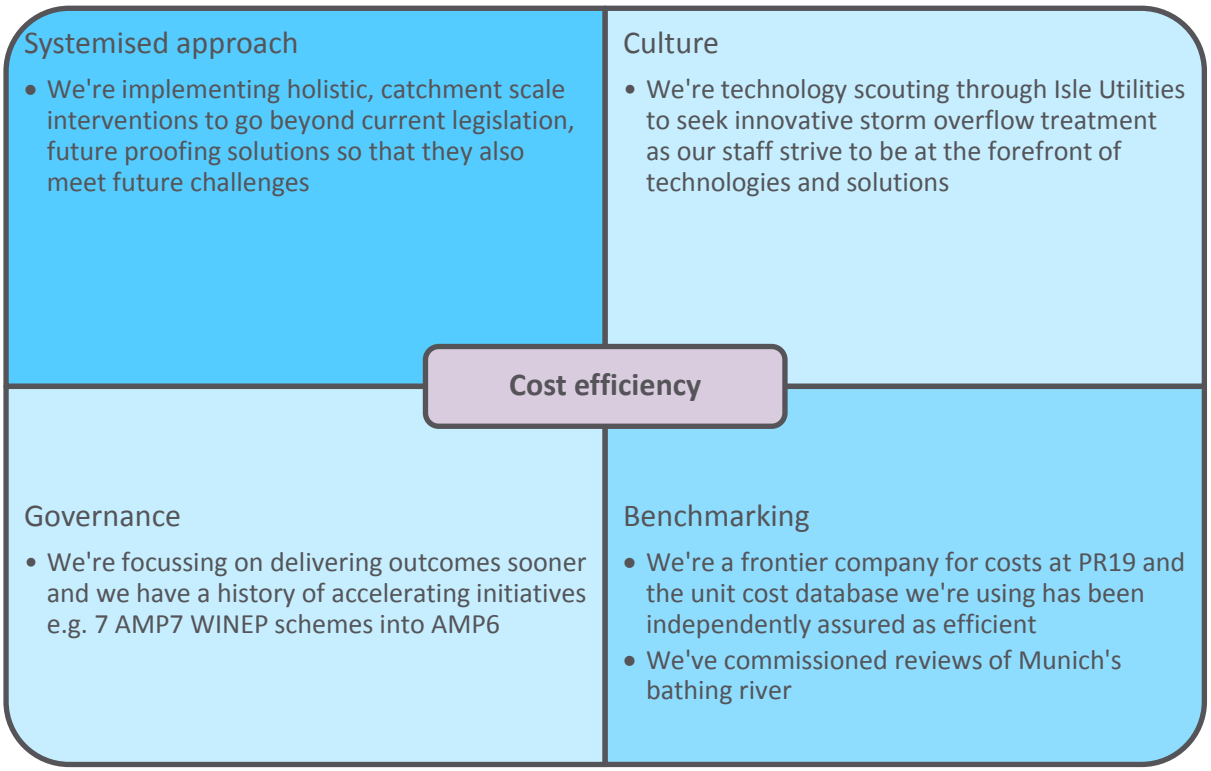
Figure 2 unit cost reductions since PR14

[redacted

4. Ensuring our Green Recovery proposals are efficient

This section summarises some of the highlights for each green recovery proposal to demonstrate that our general processes and cultures described in section 2 have actively shaped our proposals.

4.1 Creating bathing rivers



Defra's preferred approach is setting longer-term objectives at river catchment level that cover both existing and foreseeable future requirements. In support of this and efficient costs, we're designing solutions that use the legislation's direction of travel to get ahead and design strategies that beat current and short term future legislation – to be compatible with future needs. We've learned from the past where we have had to revisit sites when legislation changes and we know that a piecemeal approach to delivering outcomes does not deliver cost efficiency. On this basis, we're implementing holistic, catchment scale interventions, baking in cost efficiencies by making sure that current deliverables account for future challenges aligned to the core bathing river objectives.

We pride ourselves on our environmental leadership and we consistently look to deliver outcomes sooner and we have a history of successfully accelerating initiatives. For example, in AMP6 we brought seven WINEP schemes forward and successfully delivered them ahead of their planned AMP7 timescale. Our processes are flexible and facilitate this approach which complements our ambitions to efficiently deliver longer term benefits as part of our bathing rivers objectives.

In addition, our catchment management approach to improve surface water run-off into rivers is cited by the DWI as industry leading and we continue to push the boundaries by scouting for innovative and cost efficient solutions, techniques and technologies and benchmarking from elsewhere. For example, we're working with Isle Utilities to seek innovative storm overflow treatment and we have commissioned reviews of Munich's bathing river scheme to extract learning and feed this into our

proposals to further our understanding of global treatment solutions to remove pharmaceuticals and priority substances at efficient cost.

We are also investing [redacted] in our new 'low carbon and resource recovery' testbed at Redditch wastewater treatment works, trialling new processes to help deliver our triple carbon pledge and contribute to circular economy objectives as we continue to strive for cost efficient innovative solutions.

Since there are no rivers in the UK that meet the bathing waters standards, we do not know the true cost and complexity of delivering bathing water quality in rivers. Our two pilots will generate insights into the costs, benefits and technologies needed for a wider-scale rollout, helping inform not only our future strategy, but those of water companies across the UK.

Our proposed pilots on the Avon and Teme include the installation of advanced disinfection treatment. Whilst there is not an obvious link between the disinfection of sewage effluent for bathing water and the removal of phosphate, it is the case that both require the installation of good tertiary solids removal to work effectively. There is therefore some synergy between meeting bathing water and WFD objectives when it comes to implementing process upgrades at sewage works.

Examples of how we have targeted efficient costs for elements of this green recovery proposal are below:

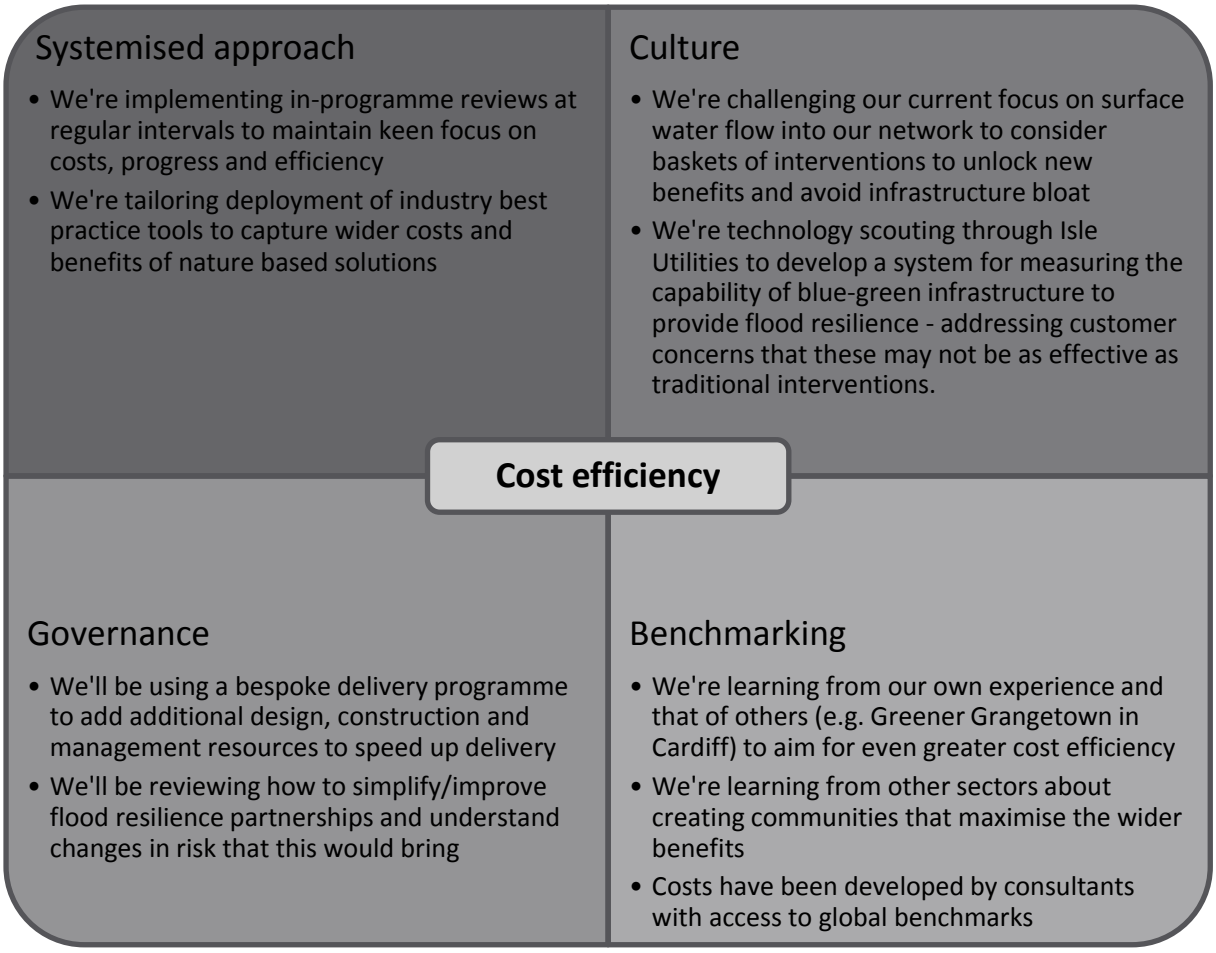
Installing advanced treatment at our sewage works

As part of the assessment to determine our approach, we have analysed case studies from across Europe to assess costs and effectiveness of outcome delivery and relate them to the UK context. We have also assessed options using our unit cost curves to lock in efficiencies delivered over AMP6.

Improving storm overflow performance

We have used sewer hydraulic modelling to generate maximum spill volumes from the storm overflows identified, and used these volumes to generate cost estimates in the unit cost database. We have assumed zero spills per year to bake in future cost efficiencies as described above. In addition, standard items derived from our unit cost database were independently benchmarked at PR14 and PR19 by EC Harris/Arcadis and shown to be efficient. They also formed the bottom up costing tool for our PR19 business plan which placed us as one of the frontier companies compared to Ofwat's modelled cost baseline.

4.2 Flooding resilient communities



If we continue with our existing flood resilience approach i.e. focusing on the outcome of surface water flow entering our network, we face a future of trying to consistently outbuild the effect of larger, higher intensity and more frequent storm events. This will lead to bloated infrastructure that is underutilised most of the time but placed under huge strain during storm periods – a major allocative inefficiency.

The proposed programme will work with partners, innovators and decision makers to develop a basket of interventions for deploying at scale across wider catchments, regularly comparing to counterfactuals – and in doing so we will unlock significant short and long term economic, social and environmental benefits.

- Our counterfactual costs were developed using our unit cost database. Standard items derived from this process were independently benchmarked at PR14 and PR19 by EC Harris/Arcadis and shown to be efficient. They also formed the bottom up costing tool for our PR19 business plan which placed us as one of the frontier companies compared to Ofwat's modelled cost baseline.
- Project on costs have been derived from our current programme performance and the risk allowance has been validated against an analogous sample of flooding programme interventions.
- Blue-green infrastructure opportunities have been identified based on detailed analysis on the potential to install a wide suite of interventions across the Mansfield Catchment. Interventions have been costed using scalable bottom up intervention costs derived from analogous schemes

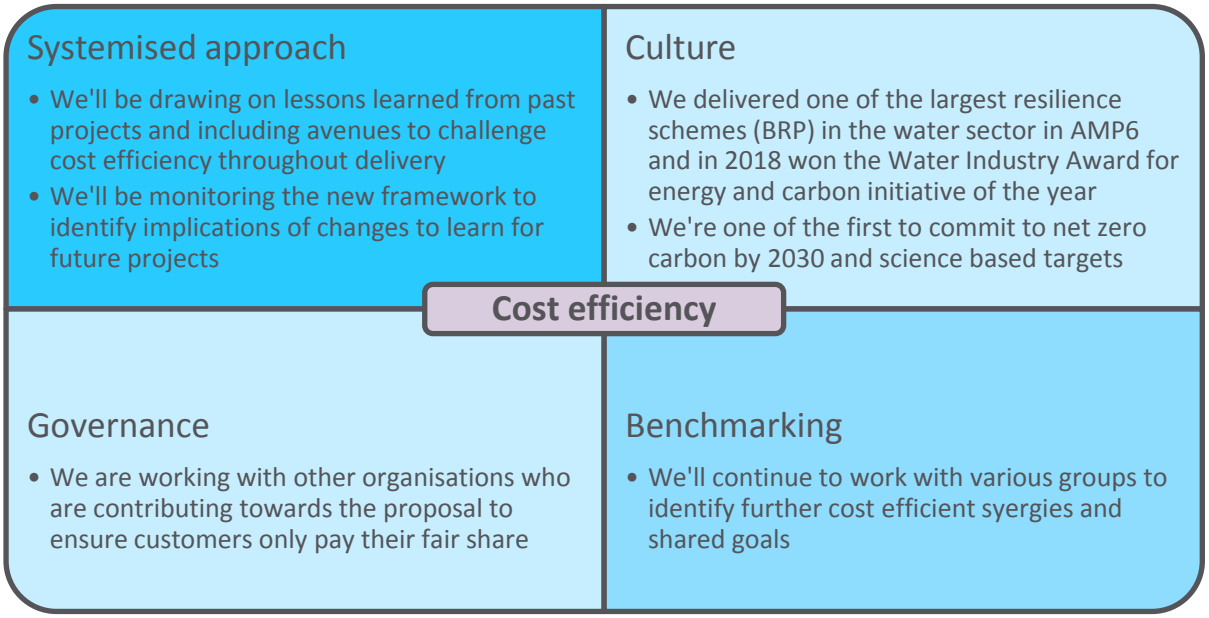
and published literature. These have then been benchmarked by our specialist partners on interventions completed by other companies in the UK and abroad.

- We have utilised the learning from the £169m investment in enhancement to increase sewer capacity in AMP6. This includes a wide range of solutions from simple short-term property level flood mitigations to strategic investments to alleviate widespread internal and external flooding, e.g. interventions to reduce risk to 400 properties across the town of Newark.
- We have been learning from the experiences of others to inform our understanding of how to achieve the same outcomes, at greater scale, quality and at more efficient cost. We have been learning from the Greener Grangetown SuDS green infrastructure project in Cardiff to bolster our thinking around cost efficient, integrated and flood resilient urban solutions that majors on customer outcomes.

We have a strong track record of partnership delivery on wastewater network projects. However, we are not intending to utilise existing Frameworks which are designed to deliver the size and scale of the AMP7 programme. Instead we are calling on our learning to implement bespoke delivery programmes that will add additional design, construction and management resources drawing on local businesses within the catchment.

The findings of our review of our AMP6 WFD delivery, taught us a lot about forecasting costs over the life cycle of projects with uncertain scopes at the outset. Given current uncertainty in the precise flooding programme, it is important for us to account for lessons we have learned in past delivery. We will implement in-programme reviews at regular intervals to maintain a keen focus on costs, progress, efficiency etc. to mitigate the risk of inefficiency creeping in because the scheme programme is not fully confirmed.

4.3 Decarbonising water resources



This proposal will help to set a new standard for a sustainable, net-zero, resilient water supply that breaks the cycle of prioritising one type of environmental benefit over another. We have two key projects that maximise cost efficiency by using their natural surroundings:

- [redacted]

- Our expansion of the treatment works will utilise innovative natural treatment processes using river gravel beds to reduce the overall footprint, chemical usage and carbon emissions that would result by using traditional approaches.

We will continue to look for further synergies and shared goals to future drive efficiency for our customers through collaborations such as with:

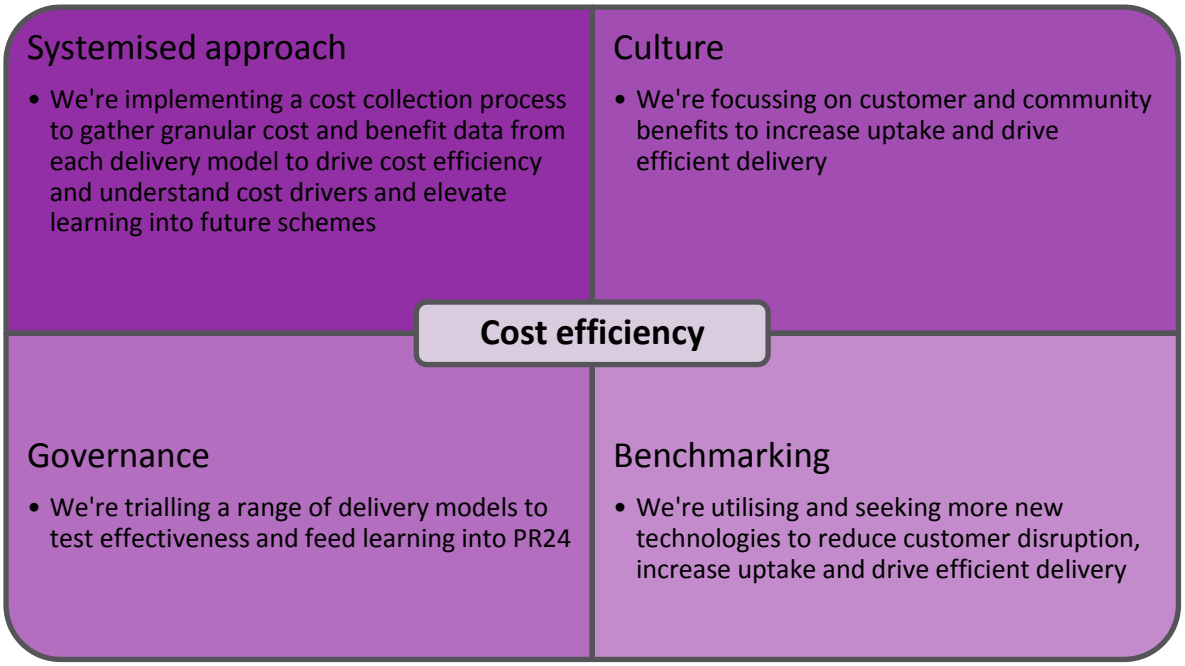
- **Energy providers** on how to maximise our use of, and potential generation of green energy.
- **Delivery partners** to ensure any investment delivers the biggest benefit to both the supply chain, job market and local economies.
- **Regulators and partners** on how to value benefits and prioritise the historically conflicting carbon and environmental drivers so that the sector is ready to apply and deliver a decarbonised Regional Water Resource plan in 2023.

We will draw in lessons learnt from our vast past experiences of successful delivery of a variety of schemes to ensure cost efficiency. We have a track record for innovation and are well placed to set the new standards. For example, in AMP6, we successfully delivered one of the largest resilience schemes (BRP) in the water sector with the management team overseeing delivery. We actively secured expertise from outside of sector, with a proven track record of delivering large scale civil engineering infrastructure projects. We've also closely collaborated with our supply chain. This has substantially increased the expertise of those managing the end to end programme, enabling us to mitigate risks and manage issues to drive programme efficiency.

Throughout the design and construction of the programme we have continually reviewed each element of the design, as well as our approach to construction and programme risk to seek the most cost-effective solution whilst maintaining the outputs we promised for our customers.

We incorporate efficiencies into our proposed scheme costings based on past experience, lessons learned, wider industry experience and benchmarking data. At the planning stage of our programme we have also included avenues through which we can continue to challenge costs and efficient practices in the future. Our efficiency journey does not stop when programmes start. The [redacted] water treatment works will allow on-site trialling of new technology to continue seeking innovative and cost-efficient solutions.

4.4 Taking care of supply pipes



We're implementing a cost collection process to gather granular cost and benefit data from each delivery model to drive cost efficiency and understand cost drivers and elevate learning into future schemes. One of the aims of the pilot is to get more granular costs and to really understand the costs and benefits of different models and how they change when multiple drivers are targeted. At the current cost this appears to be an unaffordable problem - so getting a systemised cost collection process is imperative.

We have learned that cost efficient scheme delivery often depends on the quality of customer engagement and when investing in customer engagement, a little goes a long way.

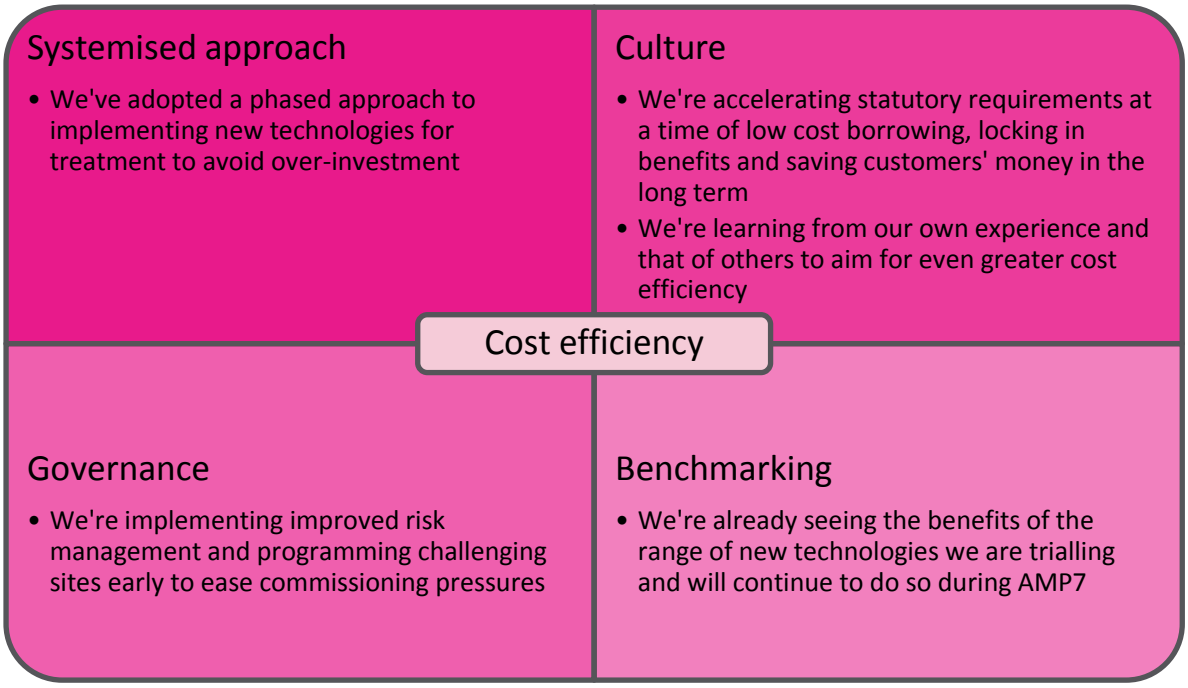
We're focussing on customer and community benefits to increase uptake and drive efficient delivery. Customer engagement costs make up less than 2% total proposed programme cost but getting it right has the potential to realise large scale efficiencies for overall programme delivery.

Successful customer engagement is likely to increase uptake in target areas because the benefits of replacement will be communicated effectively and made attractive by proposing less disruptive and more advanced technology e.g. pipe pulling and directional drilling and offering green space enhancements to the property and/or community. This means we will realise multiple benefits:

- Greater customer uptake in target areas means we can replace supply pipes in community batches at properties in close proximity to each other. This will increase cost efficiency due to reduced travel, traffic management and labour costs at programme level.
- Utilising more advanced techniques will also reduce excavation and reinstatement costs.

We're trialling a range of delivery models to test effectiveness and feed learning into PR24. By trialling a range of delivery models, from in house delivery, to third party contractors, to offering a grant scheme, we will gather evidence on costs, techniques and customer views to inform and support policy makers to enable the industry to move forwards in this area. Learning from the delivery of these proposals will feed into our PR24 plans and our lead-free strategy.

4.5 Acceleration of environmental improvements (AMP8 WINEP)

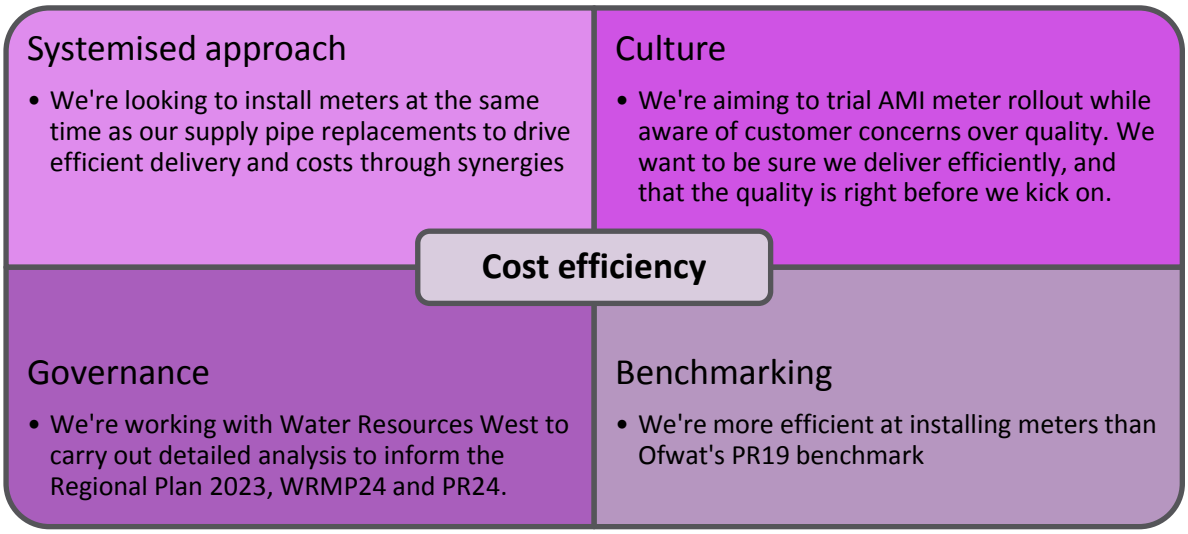


We have vast experience and learnings from the delivery of 112 WINEP schemes in AMP6, 7 of which were brought forward from AMP7. In section 2 we outlined the improvements we have made to our post-delivery project reviews to enable learning and continual improvements to be implemented on subsequent project deliveries. We have recently completed a review across our environment programme and for cost efficiency, the following learning has been taken into account and implemented into our green recovery proposal:

- To avoid overinvestment in unnecessary treatment equipment, we have adopted a systemised and phased approach to implement new technologies for treatment. In AMP6, the phased approach allowed levels of treatment to be progressively tested with a view to adding further treatment options based on the success of each phase.
- We have also implemented a systematic 'source to estuary' approach to delivery of the Water Framework Directive. This enables review of performance of sewage works upgrades in the upper reaches of the catchment before the precise requirements lower down the rivers are finalised.
- To help ease pressure on commissioning resource and improve certainty of the programme outcomes we will implement improved risk management and early programming of challenging sites. This is particularly important for the green recovery as the timescales are more compressed than normal.
- To avoid delays in programme delivery, which results in increased costs, we will ensure:
  - Effluent quality data is continuously monitored and visible to the delivery teams so drifting performance can be factored in the risk management during delivery to reduce the risk of protracted commissioning by adopting a 'right first time' approach.
  - existing site performance (including flow and load) is updated in our SAP system and wider capital maintenance needs will be considered when project planning is carried out
  - a minimum of at least 6 months is set aside for commissioning and optimisation.

We're also learning from experience of others, e.g. vertical flow reedbed process trial from Scottish Water.

4.6 Smart metering



This is an area where we are learning from the experience of others. Higher meter penetration, and stronger data capture, will materially enhance network intelligence, enabling targeted interventions, including private-side loss reduction, enabled by data collected at property boundaries. For context, Singapore (4.8% leakage) and Tokyo (3.2%) are c100% metered.

We are also aware that the energy sector's push into the world of smart metering saw a first-generation wave of meters that fell short of expectations. This undermined the reputation of smart meters in the eyes of customers, significantly slowed their rollout and has left a legacy of customers with sub-optimal meters across the country. We plan to learn from this experience by trialling smart meters to test whether it can fulfil its potential and do so at a cost that is reasonable for customers.

We have looked for synergies with the supply pipe replacement proposals to drive efficient delivery and costs through synergies. We also expect to achieve delivery efficiency as a result of the chosen location as property density is high and the telecoms technology and capacity is already in place and sufficient to handle the data it generates. We have identified close to [redacted] of synergies between these proposals which we have locked into our estimates.

5. Independent review of costs

In line with the expectation set out in the letter to companies on 25 November, which stated "The cost estimates and the efficiency of the specific proposals are expected to have been through a third party assurance process.", we have commissioned Arup to undertake an independent review of our estimates. The scope of their review included:

- Independent benchmarking, using a variety of sources, on a selection of the most material costs (up to 10 discrete asset/ processes) to assess the robustness of our estimate;
- Review our approach and proposed costs to assess the robustness of our estimate and likely accuracy.

The review covered five of our six proposals. Due to the time constraints and the fact that our Accelerating Environmental Improvements (AMP8 WINEP) case is based directly on our PR19 efficient costs which were assessed as efficient by Ofwat at PR19 we made a risk based decision to exclude that proposal from this scope.

The assessment of the flooding costs is included as part of the wider scope of work carried out by Arup and is detailed in the full business case for Flood resilient communities.

The full report is [redacted] , but the key findings include:

Table 4: Overall findings of Independent Review

Assessment area	Decarbonising water resources	Bathing rivers	Supply pipes	Smart meters
Independent cost benchmarking	Appropriate	Good	Good	Good
Overall approach	Good	Good	Good	Good
Wider observations and considerations	Good	Good	Good	Good
Uncertainty	Good	Good	Good	Good
Risk	Good	Good	Good	Good

Flood resilient communities was also assessed as robust but using a different methodology

Overall this shows that our proposals are inline with the level of robustness expected at this stage of development and in many cases shown to be relatively efficient compared to Arup's benchmarking.