Appendix 1
Past Performance and lessons learnt

Section 1

Introduction

A Purpose of this Appendix

1.1 We are committed to understanding our customers' and stakeholders' needs and expectations of us, and we devote considerable resources to ensure we deliver for them all day, every day. We recognise that despite delivering many of our performance commitments, over AMP6 we have sometimes fallen short of the performance expected of us and that we expect of ourselves. Most notably with regards to leakage, trunk mains bursts and pollutions.

1.2 We are dedicated to addressing the underlying drivers of our performance and during AMP6 we have implemented a number of strategic changes to ensure we are set up to deliver excellence for our customers, our stakeholders and the environment.

1.3 This appendix sets out our approach to understanding and addressing our AMP6 performance issues; how understanding the underlying factors affecting our performance has driven strategic changes across the entire business; and how these changes are already enabling us to improve our performance over the rest of AMP6 as well as deliver our AMP7 commitments and obligations.

1.4 Separately to this appendix, we have developed a more detailed reconciliation of our AMP6 performance, including our proposed adjustments and how they are in line with the PR14 reconciliation rulebook. Please see our PR14 Technical Reconciliation[1] for more information.

1.5 This appendix is structured as follows:

- Section 2 explains our strategic review of our business in response to the critical operational failures in the first two years of AMP6, and how this has revealed the underlying drivers of our performance and our priorities for addressing them.
- Section 3 sets out the key drivers which were driving our performance; how they affected our performance; and how we are addressing those drivers to improve our performance for AMP6 and beyond.
- Section 4 explains the additional investment we are making to improve our performance, and the results we are now observing to provide confidence that moving forward we will meet the needs of our customers.
- Section 5 provides our conclusion.

[1] Thames Water, CSD013-PR19-PR14 Technical Reconciliation

Section 2

Rebuilding our strategy to deliver for customers

A Our strategic review

2.1 We are committed to delivering the outcomes and performance our customers and stakeholders expect from us. Overall, we have delivered on the majority of those expectations, however, in a number of areas, our performance has fallen short of what is expected of us.[2] In particular, our performance on leakage, trunk mains bursts, pollution incidents, and sewer flooding, combined with other critical operational failures such as major information system outages brought home to us that we could not deliver our AMP6 commitments or meet customers' long-term needs without a substantial overhaul of how we deliver as a business.

2.2 Our performance made it clear that to be a truly leading performer in the sector we needed to significantly change our approach and raise our game which resulted in a review of our company strategy, our delivery plans and our internal governance. Led by our CEO, and supported by our Board and shareholders, our strategic review initiated a radical reassessment of our strategy, our operations and our plan. Our review was focussed on learning from our operational issues; understanding our customers' expectations; and how future challenges may affect our ability to deliver for our customers. The review was built on the following foundations:

1) Deep customer insight from direct feedback from customers during our day to day operations, as well as the emerging views we were receiving as part of our extensive PR19 customer engagement work.[3]

2) Operational learnings from our past performance, both failures and successes, focused on drilling down to understand the underlying factors of our performance not just the specific technical causes of a particular failure or success. These lessons provided key insights that our strategy and plan needed to address.

2.3 This was supplemented with a number of key external inputs which would ensure our review not only helped address short term operational issues, but developed a strategy that delivered our vision in the long term:

- Market and regulatory analysis looking at the changing regulatory environment and what that might mean in terms of expectations for a water company into the 2020s and beyond.

[2] Thames Water, CSD013—PR19-PR14 Technical Reconciliation
[3] Thames Water, CSD005-AWS02-PR19-Proactive customer engagement

- Cost and benchmarking analysis of our current performance compared to frontier comparators and the actions we need to take to deliver frontier levels of efficiency.
- Value chain and capability analysis of our existing capabilities against our resource and skill requirements, identifying where we need to grow and strengthen in-house capability and where we should look to partner with other organisations.

B Our strategic review findings

2.4 The review recognised that there were a number of aspects of our business that were performing well and it was important to recognise these to ensure we continued to drive strong performance in these areas. Notable examples included:

1) **Health & Safety** – Delivery of our services and commitments relies on the well-being of our people. We have had three years of outstanding health and safety performance and introduced a number of award-winning initiatives to support our employees. This has resulted in a 33%[4] reduction in lost time injuries across our entire supply chain and our Chief Health & Safety Officer being recognised by the Institute of Occupational Safety & Health as one of the Top 15 most influential leaders[5] – the only one from the utility sector.
2) **Energy Generation** – Our commitment to maximising the value of the resources we treat has led to a significant increase in the amount of renewable energy we generate, making us the largest generator of electricity from sludge in the UK.[6]
3) **Water Quality** – We have consistently delivered high quality drinking water this AMP and proportionately have the lowest number of water quality complaints across the industry.[7] Having said that, we are not complacent and with our commitment to continually improve water quality and resilience, we have developed a transformational improvement programme which has been agreed with the Drinking Water Inspectorate ('DWI').
4) **Community Projects and Engagement** – During the AMP we worked with many organisations to provide community access to a number of our assets. Most notably we worked with the London Wildlife Trust to provide access to the 211 hectare Walthamstow Wetlands which is now recognised as Europe's largest urban wetland reserve. Over 280,000 visitors have enjoyed the site since it opened.[8]

2.5 However, the review of the operational issues concluded that there were a number of cross-cutting factors underlying our AMP6 performance:

- Our operating model did not easily support collaborative working, which at times resulted in a disjointed approach to resolving customer issues.

[4] Thames Water, CSD021-PR19-Thames Water Annual Report and Annual Performance Report 2017-18, p53
[5] Institution of Occupational Safety and Health, June 2018
[6] Water UK, Carbon data share report 16/17
[7] DWI, Chief Inspector's Report, 2017
[8] Thames Water, CSD021-PR19-Thames Water Annual Report and Annual Performance Report 2017-18, p25

- We had become over reliant on external capabilities and this reduced our ability to prevent issues from arising and resolve them quickly.
- Our internal governance and monitoring processes did not always provide us with the information we needed to understand our performance and quickly respond to issues.
- In a number of circumstances our ability to identify and understand risk was insufficient to mitigate the risk of asset failures and insulate our customers from impact of those failures.
- Our data systems had become dispersed and hence there was insufficient integrated insight about our operations and our customers, which was inhibiting our ability to provide consistently excellent services to our customers.

2.6 Table 1 below shows how these five key themes map to the operational issues we experienced in the first two years of AMP6, and shows how our experience on the recent freeze-thaw event validates these findings.

Table 1: Factors affecting our performance mapped to key AMP6 operational issues

	Key areas of operational failures						
	Leakage	**SOSI**	**Trunk mains**	**System outages**	**Pollution incidents**	**Sewer flooding**	**Freeze-Thaw**
Operating model	x		x	x	x	x	x
Internal capabilities	x			x			
Internal governance	x	x	x		x		
Approach to risk		x	x		x	x	x
Data quality	x		x		x	x	x

Source: Thames Water, Internal Document

Leakage

2.7 In 2016-17, we missed our leakage Performance Commitment for the first time in over ten years. The scale of the shortfall and delayed reporting on the issue to our Board meant the size of the failure was such that we would not be able to fully recover our leakage position for some years. As a result of these failures, Ofwat found us in breach of the Water Industry Act 1991,[9] and our instrument of appointment.[10]

2.8 Our review of our leakage performance found that there were three clear factors that had driven our failure to meet our target:

[9] Water Industry Act 1991, Section 37
[10] Thames Water, Instrument of Appointment, Condition F, Paragraphs 6A.1 and 6A.2A

1) We had limited visibility of what was driving our leakage reduction and whether our activities and investment were effective.
2) We had no clear governance over the leakage activities being delivered by our Infrastructure Alliance, including the mix and level of activities.
3) We were incurring higher than planned unit costs meaning, we were delivering less than we expected for the investment we were making.

Security of Supply Index (SOSI) and Environmental Performance Assessment (EPA)

2.9 Intrinsically linked to our leakage performance, is our AMP6 performance on SOSI. In 2016-17 and 2017-18, we did not meet our SOSI target of 100%,[11] which was primarily driven by not meeting our leakage target.

2.10 Following our 2016-17 SOSI shortfall, we forecast that we would meet our SOSI target with a small surplus and we planned on that basis. However, we were not prepared for the impact of the cold weather which occurred at the end of February 2018 and the subsequent thaw, which significantly increased demand. Given the timing of the cold weather, it was impossible to recover our SOSI position by the end of March 2018 and as a result we did not meet our 2017-18 SOSI target. The failure to meet SOSI also affected our performance against the EPA and we were only able to achieve a 2-star rating in 2016.[12]

2.11 Our review found:

- We did not have a full systems understanding of the impact of individual issues on other performance areas.
- Our monitoring of our performance against the EPA was not frequent enough to enable us to take corrective action more quickly.
- We did not have sufficiently worked up mitigating options that we could deploy quickly to address SOSI shortfalls.

Trunk mains bursts

2.12 There were eight high profile bursts in London between October and December 2016, which caused significant disruption to our customers and the general public. As a result, we initiated forensic and strategic reviews of the trunk mains bursts, which made a number of recommendations of how we needed to improve our approach to the four asset lifecycles: asset planning, asset operations and maintenance, asset monitoring, and event response and aftercare, as well as other necessary changes to our business.

2.13 We are already delivering plans to address the findings of the trunk mains strategic and forensic reviews, and these lessons also provide important insight for our company-wide

[11] Thames Water, CSD021-PR19-Thames Water Annual Report & Annual Performance Report 2017/18, page 29
[12] Environment Agency, Water and sewerage companies' performance 2016

strategic review. The root cause analysis of our trunk mains burst performance, including how we respond to bursts, showed:

- We needed to improve our understanding of both risk and the consequences of asset failure, to inform a long-term asset replacement strategy.
- Limited data on assets inhibited our ability to predict asset failure and given the difficulty of collecting data from trunk mains, we needed to investigate innovative ways of measuring asset condition.
- There was insufficient governance in a number of areas including monitoring of trunk mains and associated assets, and we needed to move to a Single System Owner model to address limited direct line of sight between risk governance of our network operations and corporate risk governance.
- Our ability to respond as an integrated business across our internal teams and supply chain partners fell short of the expectations of our customers.

Information System outages

2.14 During 2016 and 2017, we suffered from a series of major information system failures, which disrupted our operations and affected our ability to deliver services to customers. A review of the outages showed we were over reliant on our external capability to design, deliver, operate and maintain our information systems. This limited our ability to prevent and respond quickly to issues, and also resulted in a lack of internal insight and operational capability of our core information systems and networks.

Pollution incidents

2.15 In March 2017, we received the largest environmental fine ever issued by the courts in England for repeated illegal discharges of sewage between 2012 and 2014. The pollution incidents, which occurred at multiple sites in Oxfordshire, Buckinghamshire, and Berkshire, caused significant damage to the environment and distress to the public.

2.16 While our performance against the number of category 1-3 pollution incidents has improved by over 50%[13] since 2013 and we have taken significant steps to address our failures, we have experienced some major incidents this AMP, which were predominantly related to unconsented discharges from our sewage treatment works. There are also a small number of historic incidents that remain under investigation by the Environment Agency ('EA') and which may result in further court action.

2.17 We are, therefore, not complacent about the risk of pollution incidents and we fed the findings from the EA's and our own investigations of pollution incidents into the strategic review to ensure it addressed the underlying factors which enabled repeated, avoidable pollution incidents to occur over two years.

2.18 At that time, the lessons were:

[13] 2016/2017 performance compared to 612 category 1 to 3 pollution incidents reported in 2012/2013 (Thames Water Annual Performance Report 2013/14)

- Our company culture did not consistently value or promote the prevention of pollution incidents compared to other requirements such as sewage treatment works compliance, and health and safety.
- Our governance structure did not always support the escalation of risks and issues through the management structure to allow early action to be taken.
- Our ability to understand and respond to data from our assets affected our ability to respond to issues quickly before they escalated.

Sewer flooding

2.19 Flooding from our sewers is distressing and unpleasant for our customers and we are dedicated to reducing the number of properties at risk of flooding and the number of properties affected by sewer flooding each year.

2.20 In 2015-16, we fell significantly short of our commitment to reduce the number of sewer flooding incidents and there were 1,403 internal sewer flooding incidents compared to our target of 1,168. Root cause analysis of our performance revealed:

- We had insufficient insight into the cause of flooding caused by inconsistent field data collection.
- We needed to improve our understanding of how our assets affected the risk of customers flooding to improve our proactive solutions.
- Our commercial arrangements with our supply chain where not sufficiently incentivising our partners to respond to customers at high risk of sewer flooding in order to prevent a service failure.

Freeze-thaw event

2.21 At the end of February 2018, the UK experienced a sustained period of sub-zero temperatures, 'the Beast from the East', which was then followed by a rapid thaw in early March 2018. The speed of the thaw had an extreme impact on both our network and our customers' pipes with a significant amount of leakage occurring as temperatures rose rapidly above zero. Our customers were severely affected because of the large number of bursts (particularly on customer-side pipes). In particular, between 2 and 3 March 2018, demand increased by an average of 270 Ml/d, 70% of which was caused by supply pipe leakage.[14]

2.22 The freeze-thaw event occurred just as we were starting to mobilise the recommendations from our strategic review. Learnings from our subsequent internal investigation and Ofwat's review of the event have been used to validate the findings and recommendations from our strategic review. The key lessons from the event include:

- Our identification and understanding of risk was too focused on historical experience – because the impact on our operations of the rapid thaw was unprecedented, our models did not predict the scale of the impact on our customers.

[14] Thames Water, CSD021-PR19-Thames Water Annual Report and Annual Performance Report 2017-18

- Our event plans were not sufficiently developed in some areas to enable us to respond quickly to the unexpected impact of the thaw on demand, for example we did not have pre-agreed bottled water sites.
- Our operating model and commercial arrangements affected our ability to bring in additional out-of-hours resources to respond to the incident as it accelerated.
- Insufficient real-time information about our network inhibited our ability to identify and respond to new operational issues quickly, and prevented us from providing our customers with up to date information about what was happening.
- Limited information about our customers made it harder to identify affected customers and provide them with proactive communications and support. For example, we were unable to identify all of our customers who needed additional support accessing alternative water supplies, and we know affected customers were not always aware of the availability of free bottled water.

C Strategic review conclusion

2.23 Ultimately, our strategic review concluded that only by fundamentally transforming our company would we be able to fully address the performance issues we were facing and deliver the resilient services that our customers expected from us in AMP6 and the future. At the heart of the findings, was a recognition that:

- Our operating model was limiting our ability to deliver excellent levels of services to customers and a complete redesign of the operating model was needed to improve transparency, remove barriers to collaboration and increase efficiency;
- The only way of delivering sustainable returns for investors is through delivering exceptional performance outcomes for our customers and the environment, and that ultimately the long-term interests of investors were aligned with delivering in the long-term interests of customers; and
- To ensure enduring first class services to customers we needed to focus on delivering a clear set of strategic priorities aligned with our vision and strategy.

2.24 As explained in our business plan, our key strategic priorities are:

- Deliver brilliant customer engagement to create lifelong advocacy;
- Invest in resilient systems and assets;
- Protect and enhance the environment;
- Build a collaborative and capable team, dedicated to serving our customers; and
- Use data from customers, operations and the environment to make better decisions.

2.25 We have already mobilised the delivery of our strategic priorities and we are delivering four significant transformations to how we operate as a business, including:

- Completely revising our AMP6 business plan around our strategic priorities to ensure we can meet our AMP6 commitments;
- Restructuring our operating model;
- Overhauling our commercial relationships with our supply chain, including the three alliances we established for AMP6; and

- Transforming the governance of our company.

2.26 We explain in Sections 3 and 4 of our Business Plan how these key priorities and immediate changes are addressing the drivers of our past performance and how they are already starting to deliver improvements for AMP6.

Section 3

The drivers of our past performance and how we are transforming our business to deliver for customers

A How we are addressing our drivers of past performance

3.1 In this section, we discuss how we are addressing the lessons learnt from the past, and for each we discuss:

- How they were affecting our performance;
- How the strategic review recommendations are addressing the issue; and
- Where we are already starting to see results from the changes we are making.

B Our operating model

3.2 Our review of incidents such as trunk mains bursts, as well as our performance on key customer service performance indicators, revealed to us that our operating model was inhibiting our ability to provide seamless end-to-end journeys for our customers, thereby affecting the level of services our customers experienced. This was due to our operating model being set up around the delivery of our four main price controls, with each area being a discrete business unit. This model did not reflect how our customers see us and incidents such as trunk mains bursts, and flooding events showed that we needed our business to work more closely to provide the services and support our customers need and expect.

3.3 We have therefore implemented a new operating structure that moves away from the four separate business units and to a series of integrated functions that work collaboratively together to deliver the best outcomes for our customers. For example, while incidents and emergencies such as flooding, trunk mains bursts, and supply demand events are focused on the delivery of one service, customers are often affected by the loss of both clean water and wastewater services. Our “One Thames” model is, therefore, designed to support us in delivering an integrated approach to providing services.

3.4 We launched our new operating model in April 2018 and we have already taken significant steps to deliver greater integration between key customer delivery areas of the business. For example, we have:

- Migrated 15 customer contact functions into a single area to allow us to integrate all of our customer channels and to provide a more coherent customer experience.

- Moved all of our operational functions under one Chief Operating Officer to enable us to improve our understanding of our entire operation, to take a more consistent approach to operating and maintaining our assets, and to simplify the interface with customer service.
- Established a new integrated business planning and asset management function to improve how we make short and long-term decisions about our operations and investment in assets, to enable the implementation of a Systems Operator approach to our business, and to support the strengthening of our internal engineering and scientific skills.
- Built a new IT team with responsibility for our systems architecture, programme delivery of system changes, and operation of the systems. This includes taking responsibility of our large project to deliver a new customer relationship management and billing system.
- Launched a new capital delivery and business change function, designed to review and improve the performance of our capital project delivery and our business-wide transformation programmes.

3.5 Our reorganisation will form a major foundation of the delivery of our AMP7 plan. While we are still in the process of embedding the new ways of working, we are already seeing benefits from trialling greater integration between our water and wastewater operational teams when we respond to incidents. On trunk mains bursts, for example, we started deploying both clean water and wastewater operational teams in 2017. This allows our clean water team to focus on fixing the issue with our network, while our wastewater team supports the response to the flooding and is also able to engage directly with affected customers – providing the information and support they need. In October 2017, a trunk mains burst at Euston Station showed how well this approach worked in practice and as a result there were no customer complaints about the incident and we received positive feedback about our response.

C Reliance on external capabilities

3.6 During 2016 and 2017, we suffered from a series of major information system failures, which severely impacted both service and operational delivery. Reviews of these failures revealed that as an organisation we were too reliant on buying in external support in areas where we should have been growing strong, internal capabilities. This affected our ability to manage and resolve these issues quickly for the benefit of our customers.

3.7 Our review found that this was also an issue across other areas of our business, where we were dependent on external resources for scientific and engineering capabilities. Through our reorganisation, we are strengthening our engineering, scientific, digital and service capabilities and we have already appointed a Chief Engineer and Chief Scientist to support the strengthening of in-house technical planning, modelling and engineering skills.

3.8 We have also overhauled our Technology Transformation Alliance to reduce the scale of activities we outsource. We are now insourcing around 60% of all IT activities, including systems architecture, IT programme delivery, service management, and help desk

support. To ensure we have the right skills and systems to deliver our operations, we are hiring 150 permanent IT professionals and have committed to investing £60m to modernise our IT infrastructure by the end of AMP6.

3.9 We have already started to see a material improvement in our IT performance and we have seen the number of priority incidents reducing by two-thirds and significant reductions in the time it takes to resolve an incident. We have also completed the first stage of our migration from traditional mainframe systems to the cloud to enhance our IT resilience.

D Our governance and monitoring

3.10 In 2016-17, we missed our leakage performance commitment for the first time in over ten years. It was only late in 2016 when our Board realised that we were facing a significant shortfall in performance compared to where our performance needed to be for that point in the year. Around the same time, we were prosecuted for repeated, severe pollution incidents and received the largest ever environmental penalty given by the English courts. Our review of these failures provided us with a stark warning that our governance processes were not working effectively, and were not providing our Executive Team and Board with the information and transparency they needed to identify developing issues and take fast corrective action to prevent issues from escalating.

3.11 As a result of these lessons, we have undertaken a complete overhaul of our internal governance as well as the governance of our alliances to ensure:

- Complete transparency of monthly performance across our commitments;
- Risks are identified and escalated quickly through the management structure;
- We have greater control of our supply chain and the work they deliver for us; and
- We have greater visibility of our supply chain and their performance.

3.12 We have already seen improvements as a result of these changes, for example, stronger performance management of our Infrastructure Alliance has resulted in a 20% decrease in the unit cost from our partners, and we are expecting a further 10% decrease later this AMP, with further efficiencies targeted for AMP7.

3.13 As well as strengthening the internal governance processes and monitoring, we have also overhauled our corporate governance. Our performance failures combined with the complexity of our financial arrangements have undermined customers' trust and confidence in us, and as a result, we undertook a review of our corporate governance arrangements.

3.14 Supported by our new majority shareholders (whose interests of long-term, sustainable returns align with our customers' long-term needs), and led by our new independent Chair, we have reviewed four key governance areas:

- Transparency;
- Board composition and independence;
- Dividend policy; and
- Executive remuneration.

3.15 As a result of the review, we have either completed or are in the final stages of:

- Closing our two companies registered in the Cayman Islands. While they don't provide us with a tax benefit, as is commonly thought, customers and stakeholders have told us that their existence reduces their trust in us.
- Reviewing other legacy, dormant companies and where possible winding them up as quickly as we reasonably can.
- Improving the level of transparency in our annual reports so that our customers and stakeholders have a clearer understanding of our performance and how we operate as a company. Additionally, as our leakage performance is of particular performance to our customers, we have launched a webpage dedicated to reporting on our progress against our leakage recovery plan.
- Reviewing the composition of our Board and its skills to ensure it has strong independence and sufficient breadth of operational experience to allow effective challenge on all issues.

3.16 In addition, we have changed our dividend policy to reinforce the independence of the TWUL Board from that of our holding company; and to provide public transparency as to how we will consider whether to declare a dividend. This policy has underpinned our Board's decision not to pay dividends to external shareholders until 2020 at the earliest.

3.17 We have also revised our Executive remuneration policy to directly align Executive pay with our performance against the commitments we have made to our customers. The keystone to this policy has been our CEO only receiving a bonus in April 2020, upon delivery of our key customer commitments.

3.18 For further details of our plans to build trust and confidence in Thames Water please refer to Appendix 9 – Delivering Trust, Confidence and Assurance.[15]

E Our understanding and management of risk

3.19 Our performance over the first two years of the AMP, on trunk mains and the freeze-thaw event, revealed that we need to improve our understanding of risk across the business, and the consequences of the risk crystallising. In particular, the severe freeze-thaw event in March 2018 highlighted to us the need to identify, understand and prepare for low probability/high impact events in a way that we have not previously needed to, as well as the need for more investment in resilient systems and assets.

3.20 The gaps in our risk management capability have not just affected our operational performance but also underpin our customer service performance, and this can be seen in our inconsistent performance in complaints handling, customer satisfaction metrics and the Service Incentive Mechanism (SIM). To address this gap, we are strengthening our internal scientific, technical, engineering and modelling capability to improve how we identify and understand risk, as well as increasing and improving the operational data we

[15] Thames Water, Appendix 9-PR19-Delivering trust, confidence and assurance

collect as a business. This will provide us with clearer information as to what is happening across our operations, and will enable us to make informed decisions as to the action we need to take for the benefit of our customers.

3.21 We are also developing new tools to help identify where our assets are at high risk of failure. For example, we are developing new ways to improve our knowledge of the condition of trunk mains and their risk of failure. To do this we are developing an industry-leading test rig which will help us work with suppliers and the wider industry in developing new asset condition assessment tools. These tools will, in the future, support how we identify the areas of our network at highest risk of failure and allow us to target investment accordingly.

3.22 Our growing understanding of the risk of failure and the consequential impact on customers has underpinned a significant part of our business plan, and our plan is focused on increasing the resilience of our systems and assets to ensure we can meet society's long-term needs, and insulate customers from severe events such as the one experienced in March 2018.

F Data quality to provide insight of our operations and customers

3.23 Our AMP6 performance has driven home to us how we need to increase and improve the quality of the data we collect, in order to be able to deliver excellent services to our customers in a way that meets individual customer needs. In particular, our performance in SIM and customer satisfaction metrics, trunk mains, sewer flooding; and in responding to incidents such as the recent freeze-thaw, has revealed the importance of developing real-time visibility of our operations, and holding up-to-date, accurate information about our customers' requirements.

3.24 Improving customer, operational and environmental data across the entire organisation is a strategic priority for our business and a critical enabler of the performance our customers expect of us in AMP7. We are already taking steps to address this and are:

- Transforming our core systems to provide the foundation for our AMP7 digital transformation plans. This includes delivering in AMP6: improved HR, supply chain management, and asset management systems. This has also included the migration of our mainframe to a more resilient, efficient cloud platform.
- Building digital (software) development capability to rapidly release new, innovative digital tools and applications across the company that are tailored to our needs. For example, we are developing a new workforce management platform and website to allow us to access and analyse real-time data and connect engineers directly with our customers where needed.
- Continuing the development of our critical 'data factory' products to provide the foundation of a real-time data platform. The following four products, which are being delivered over AMP6, will improve our visibility of key areas of our business including:
    - Customer experience across all key journeys;
    - Real-time customer data and alignment with operational data;

- Real-time supply demand headroom position and forecasts across our 93 water systems; and
- A calm-network model that measures real-time stress across our water systems, allowing us to predict and prevent bursts.

3.25 These enablers will underpin the delivery of our AMP7 business plan and services to our customers. They will ensure we are better placed to respond quickly to operational issues as they arise and limit the impact on customers. Where customers are impacted by operational issues, for example the recent freeze-thaw event, they will provide us with the information we need to respond to our customers' needs.

Section 4

Investing more to secure delivery for customers in AMP6 and beyond

A AMP6 expenditure: performance against PR14 final determination baselines

4.1 Following our strategic review, we completely reviewed our company business plan to ensure it could deliver the performance our customers needed it to deliver. It was clear from the review that significant further investment was necessary to deliver our commitments to customers by the end of AMP6, and to put us in a firm position to be able to deliver our AMP7 commitments. Please find more information on our forecast performance for AMP6 in CSD013-PR14 Technical Reconciliation.

4.2 Our shareholders are dedicated to ensuring we are able to deliver exceptional performance and they have been completely supportive of our decision to make further investment to undertake additional levels of activity in key areas of our business, substantially above that included in our PR14 final determinations. This is evidenced in Table 2 below which provides an overview of our totex expenditure to date, and forecasts for the rest of AMP6 versus our final determination. As can be seen, we are spending considerably more on wholesale water and wastewater services. This investment is a commitment from our Board and shareholders to put the long-term interests of customers first.

Table 2: Summary of AMP6 expenditure versus allowed expenditure at PR14[16]

	Actual		Forecasts			Total
(£m, 2012/13 prices)	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**2019/20**	
Wholesale Water Totex						
Allowed[17]	627.8	668.4	688.0	677.2	655.2	3,316.6
Actual*[18]	696.3	739.3	782.2	862.1	739.6	3,819.5
Over/(under) spend	68.5	70.9	94.2	184.9	84.4	502.9

[16] Please note totex figures are adjusted for third party costs and pensions
[17] Thames Water, PR14 Reconciliation submission, July, Totex menu model – water
[18] Thames Water, PR14 Reconciliation submission, July, Totex menu model – water

Wholesale Wastewater Totex**						
Allowed[19]	847.9	788.2	792.4	703.1	611.2	3,742.8
Actual* 20	901.6	809.6	778.2	721.3	585.3	3,796.0
Over/(under) spend	53.7	21.4	(14.2)	18.2	(25.9)	53.2
TTT Totex – non-land						
Allowed[21]	157.2	62.6	54.4	51.1	23.4	348.7
Actual* [22]	94.3	43.7	36.2	32.1	19.9	226.3
Over/(under) spend	(62.9)	(18.8)	(18.1)	(19.0)	(3.5)	(122.4)
TTT Totex –land						
Allowed[23]	25.8	19.9	2.9	7.2	0.8	56.5
Actual[24]	22.3	31.7	-1.8	6.4	8.5	67.0
Over/(under) spend	(3.5)	11.7	(4.7)	(0.8)	7.8	10.6
Household Retail – total allowed cost to serve (exc. net margin)						
Allowed[25]	149.3	150.5	153.9	155.6	160.0	769.4
Actual[26]	152.2	154.1	153.9	152.9	162.6	775.8
Over/(under) spend	2.9	3.6	0.0	(2.7)	2.6	6.4

** adjusted for third party and pensions, including transition spend.*
***wholesale wastewater totex excludes adjustment to return underspend on Counters Creek to customers.*

[19] Thames Water, PR14 Reconciliation submission, July, Totex menu model – wastewater
[20] Thames Water, PR14 Reconciliation submission, July, Totex menu model – wastewater
[21] Thames Water, PR14 Reconciliation submission, July, Totex menu model - TTT
[22] Thames Water, PR14 Reconciliation submission, July, Totex menu model - TTT
[23] Ofwat, Final price control determination notice: company specific appendix – Thames Water
[24] Thames Water, PR14 Reconciliation submission, July, Totex menu model - TTT
[25] Ofwat Final price control determination: company-specific appendix – Thames Water
[26] Thames Water Analysis, based on Data table R1, Total residential, line 14

4.3 While our spending on retail services to household customers is broadly in line with the FD allowance, we are spending approximately £560m (12/13 prices)[27] more on our core wholesale businesses and we provide a high-level summary of the additional investment on wholesale water and wholesale wastewater below. We also explain the underlying factors for the overall savings in our TTT price control.[28]

Wholesale Water

4.4 We are currently forecasting that our wholesale water totex for AMP6 will be about £500m[29] higher than the allowance set out in the PR14 Final Determination (FD).[30] The key items contributing to this overall overspend are:

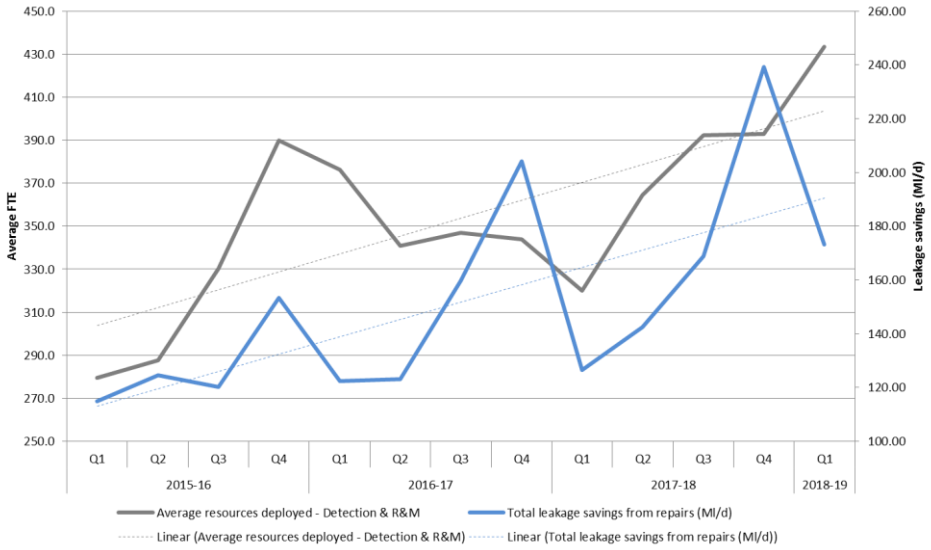
- Significant additional investment to reduce leakage, which has been one of our greatest areas of focus in AMP6, driven by our missed leakage target in 2016-17. This increased investment of £123m[31] is necessary to bring our performance back in line with our AMP6 commitments by the end of 2020.
- In addition to the extra investment, the increased level of leakage and the inefficiency of our Infrastructure Alliance arrangements meant our expenditure on leakage was higher than it should have been by c.£85m.[32] We have agreed to bear the full cost of this overspend.
- Increased investment of nearly £90m[33] to rehabilitate trunk mains in our highest risk locations in central London; to install additional remote-operable valves to improve the speed of our response to future bursts; and to install real-time monitoring devices to constantly monitor for leaks which could result in mains bursts.

4.5 To date, our additional investment on wholesale water totex is already delivering performance improvements on leakage and trunk mains:

- On leakage, we estimate the additional resources we have deployed have delivered significant improvements in leakage reductions and Figure 1 below shows that between April 2015-16 and June 2018-19 we deployed on average 55% more resources which has driven an increase of 51% in estimated leakage savings from repairs.

[27] In Table 2
[28] Thames Water, PCD60-PR19-Thames Tideway Tunnel
[29] Please see Table 2
[30] Ofwat, Final price control determination notice: company-specific appendix – Thames Water
[31] Thames Water, Environment Agency Annual Review 2017-18, Section 3.5 (£138m in 2017-18 prices)
[32] PR14 Reconciliation Submission, Leakage Adjustment, July 2018
[33] Thames Water, TSD217-PR19-Thames Water Annual Report and Annual Performance Report 2016-17 (£97m in 2016/17 prices)

Figure 1: Estimated leakage savings versus average resources deployed



Source: Thames Water Analysis

- We have improved our initial response time to incidents on our trunk mains network from two hours in 2016-17 to just over one hour, and we have plans to enhance this further by recruiting a dedicated shift team of 24 full time employees to respond to trunk mains failures.
- We have also improved how we provide customers with support during trunk mains incidents, by creating a team of specially trained customer representatives to attend the incident and provide customers with the information and support they need during the incident; as well as developing clearer customer literature on how customers can claim under our insurance.

Wholesale wastewater

4.6 We are forecasting to spend £53m[34] more on wholesale wastewater totex in AMP6 than included in our PR14 FD. The two key items contributing to this overall overspend are due to the necessary additional investment to:

- Reduce the risk of failure of sewers crossing railway lines. Early in AMP6, we experienced several sewers failing under railway lines and as a result we have been working with Network Rail to: redesign our risk framework to understand the risk of our sewers failing and the likely triggers for failure, undertake survey work and where needed rehabilitate our sewers. This has resulted in an additional investment of £35m.[35]
- Invest an extra £24m[36] in reducing the risk of sewer flooding through increased sewer cleaning; greater customer education; and the introduction of a team of

[34] See Table 2
[35] Thames Water, Internal Analysis
[36] Thames Water, Internal Analysis

inspectors to prevent fats, oils and greases (FOGs) being disposed of into sewers. Table 3 provides more information on the scale of the investment we are making.

Table 3: AMP6 activities to reduce the risk of sewer flooding

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Sewer flushing (km)	106	304	326	441	600	600
Customer education (no. of properties)	189,000	97,000	207,000	288,000	300,000	300,000
Network protection (NHH customers brought to compliance)[37]	0	0	0	150	3900	3900

Source: Thames Water, Internal Document

Thames Tideway Tunnel (TTT)

4.7 We are forecasting overall to spend £111m[38] less than included in our FD at PR14. The majority of underspend is driven by savings associated with the project's "non-land costs" i.e. those costs included in the TTT totex menu to develop and deliver the TTT project. Specifically, we have achieved savings from:

- A successful DCO application which meant applications for a judicial review of the decision were not accepted;
- Contract award savings and reduced design work on Bekesbourne Street, Shad PS, and the siphon tunnel at Beckon STW; and
- Efficiencies arising from the accelerated delivery of enabling works, which were delivered to meet Bazalgette Tunnel Limited's ambitious delivery plan.

Household Retail

4.8 The majority of the difference between allowed and actual expenditure is due to the depreciation profile of our programme to deliver a new customer relationship management and billing ('CRMB') system. In our PR14 business plan, we included depreciation in each year of the AMP, however, we have not yet recognised any depreciation in the AMP and 2019-20 will be the first year in which we start to apply depreciation. Offsetting this change is our continued investment to improve services for our customers, increasing customer

[37] In 2017-18, we piloted using a small team of inspectors to inspect food establishments in relation to the disposal of FOGs into our sewers. The inspectors work with customers to educate them about best practice and if necessary enforce compliance. Due to the success of the pilot we have significantly increased the size of the team so we can reach c. 9% of the food businesses in our area.

[38] Please see Table 2

satisfaction and unwanted contacts to achieve a forecasted SIM score of 82.5 by the end of AMP6.[39]

4.9 In addition, we have spent more on the delivery of our CRMB system as a result of revising the technical specifications to reflect customers' current expectations. Since PR14, customer expectations of customer experience have evolved significantly and as a result we have continued to review the functionality that our CRMB system needs to deliver. In light of further customer research and reflecting the movement in technology (including the cloud based and real-time responses), we have updated the specification of our CRMB system. Our new system will now give customers increased opportunities to self-serve with automation leading to 24/7 availability of many of our services.

[39] Thames Water, CSD013-PR19-PR14 Technical Reconciliation

Section 5

Conclusion

5.1 We have gained vital insight into the key drivers affecting our AMP6 performance and we have taken significant steps to address the underlying causes and transform our business. This transformation has been led by our Board and our Executive Team, and we have the full support of our new shareholders who are 100% committed to making the necessary changes to deliver the outcomes previously promised to our customers. This has been demonstrated by the significant, additional investment made to help us get back on track, and a revised Board structure to ensure independence to make the right decision for customers.

5.2 The lessons learned from our review in 2017 have not only been incorporated into our PR19 plan to drive customer outcomes in AMP7, but have accelerated improvements in AMP6 to provide the foundation for a step change in performance now and in the future.

5.3 We have started to see performance improvements. While we know we still have some way to go we are committed to bringing our performance back in line with expectations by the end of AMP6. We are pleased with the improvements made, and we are confident that the rest of our business transformation will provide us with firm foundations for a strong performance in AMP7.[40]

[40] Thames Water, CSD013-PR19-PR14 Technical Reconciliation
Thames Water, Appendix 2-PR19-Engaging and delivering for our customers for more information on our AMP7 Performance Commitments