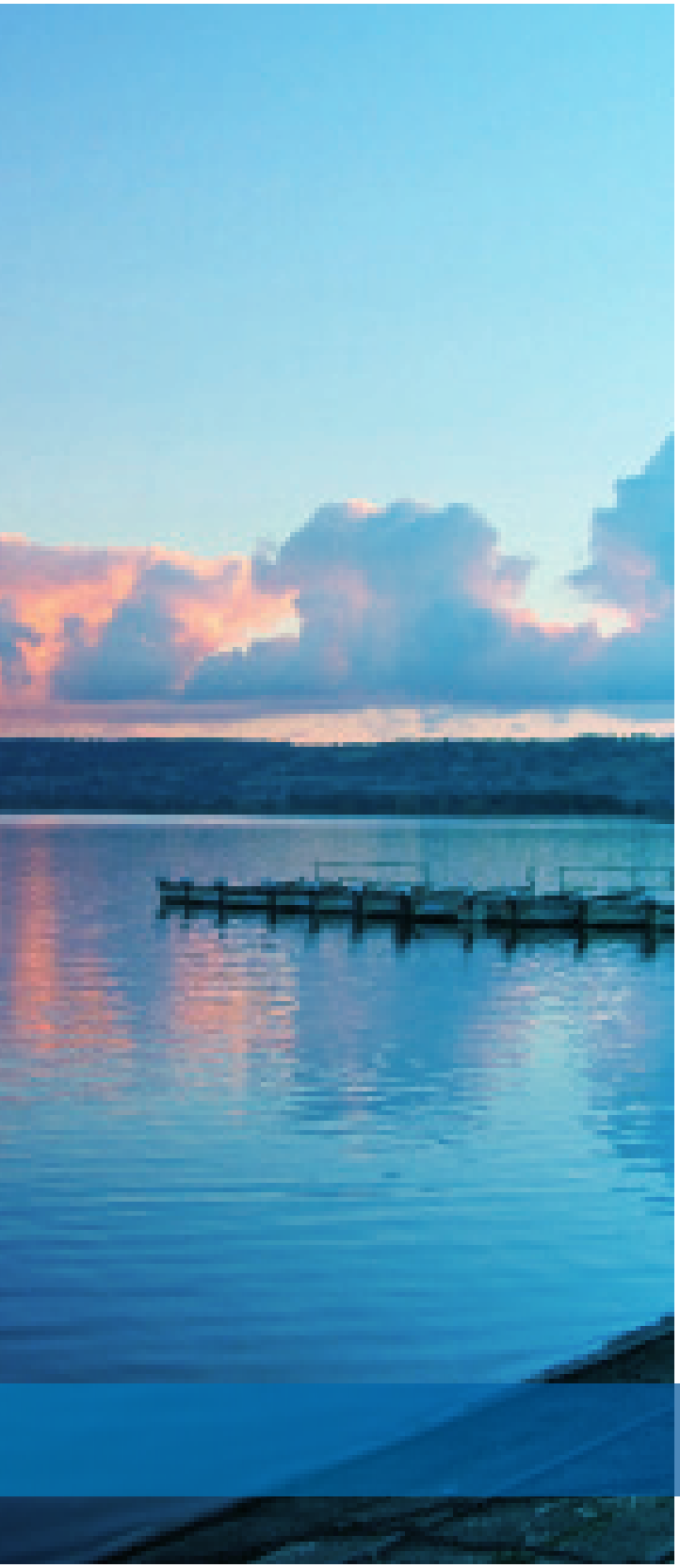

STATEMENT OF CASE

'Our vision is to meet our customers' expectations by providing an outstanding water service in a sustainable and affordable way'

BRISTOL WATER

Bristol Water Statement of Case

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Part A: Executive Summary and Overview

Section 1. Executive Summary and Structure of Statement of Case

1 Executive Summary and Structure of Statement of Case

1.1 Bristol Water's request for a redetermination

1. The U.K. water industry has benefited from a worldwide reputation for a stable and transparent regulatory regime while also introducing innovation to the sector. The Price Review 2014 (**PR14**) included several evolutionary advancements such as the approach to totex, significantly enhanced customer engagement and non-household retail competition. This resulted in final determinations that, on an industry wide basis, provided 5% bill reductions to customers and aggressive performance targets for companies to meet over the next five years. While the implementation of PR14 has been recognised as a success, the specific Final Determination for Bristol Water (**FD14**) is one that, unfortunately, is very far from meeting the needs of our customers or of the Company. As such, we find ourselves in this redetermination process.

2. On 5 February 2015 Bristol Water's Board decided to accept the retail price controls that formed part of Ofwat's 12 December 2014 FD14 for 2015-2020 (or **AMP6**), and to reject the wholesale price control. The wholesale price control was rejected for the following reasons:

   - **'cost assessment' -** insufficient allowance to enable delivery of the outcomes that customers want and an unrealistic assumption of what is required in order to run the business. FD14 only allowed £409m compared to the £541m proposed in our Business Plan, which we consider to be the result of Ofwat's over-reliance on unreliable cost models and a limited process to review exceptions to those models;
   - **'cost of capital'** - the cost of capital allowed of 3.6% is insufficient to cover the actual financing costs of Bristol Water; and
   - **'financeability'** - the resulting 23% reduction in bills means that Bristol Water is unfinanceable under FD14.

3. On 12 February 2015 Bristol Water requested Ofwat to refer FD14 to the Competition and Markets Authority (**CMA**) for redetermination. That process was initiated by Ofwat on 4 March 2015. This Statement of Case (**SoC**) is Bristol Water's initial submission in that process and is intended to provide the CMA with the information necessary to undertake its redetermination.

4. Whilst there are some differences in view between Ofwat and ourselves in relation to the two retail price controls, on balance we consider that the PR14 process for retail has been challenging but reasonable. Accordingly, our Board accepted both retail price controls. We understand, however, that the redetermination means that all aspects of FD14 may be reviewed, and not just areas where there is disagreement between the parties. We have, therefore, provided full oversight of all elements of FD14.

1.2 Bristol Water embraced Ofwat's PR14 process

5. For PR14, companies were asked to place customers at the heart of the process. We were asked to understand our customers' expectations and priorities and to translate these into outcomes for the business to achieve, and performance measures against which we could be assessed and held to account.

6. We were encouraged by Ofwat to ensure that the interventions we proposed to deliver those outcomes meet the right needs, will take place at the right time, and represent the most cost-beneficial solution from a total expenditure (**totex**) perspective.[1] Importantly, we were challenged to ensure that both the interventions themselves, and the associated costs, are efficient.

7. This needed to be embodied within three separate price controls setting cost expectations, and associated revenue, for three distinct parts of our business - our wholesale activities, our retail household activities, and our retail non-household activities.

8. Finally, we were tasked with engaging with customers to set our own incentives, in the form of rewards and penalties, which will drive our performance throughout AMP6.

9. We understood the challenges posed by PR14, and have responded accordingly. Our approach to PR14 has embraced not only the letter, but the spirit of the methodology put forward by Ofwat, the principles of which we support and welcome.

1.3 Customer engagement was key to Bristol Water's planning and proposals

10. Customers have played a fundamental and crucial role in shaping every element of our plan. As early adopters of Ofwat's Customer Challenge Group through our Local Engagement Forum (**LEF**),[2] we took an approach to customer engagement and research that was robust, representative and overseen by the LEF at every step, and ensured that customers' views played a central role in the evolution of our aims, outcomes, performance commitments and proposed packages of activities. In particular, our two-stage approach to acceptability testing allowed us to adapt our Business Plan in response to customer views. This resulted in a Business Plan which 92% of households surveyed supported, and which in our response to Ofwat's DD14 saw a reduction in average household bills of 4.5%, or £9 in real terms, to £188 (see Table 1 below).[3] This is in line with the industry results from PR14, with Ofwat's final determinations proposing an average decrease in prices across the industry of 5% (see Figure 1 below). Following

[1] Totex, or total expenditure, is the sum of all costs associated with a company or range of its activities, regardless of how those costs are treated in financial terms. As such it is a combination of operating expenditure and capital expenditure.

[2] The LEF consists of members representing customers, local authorities, businesses and environmental groups, including CCWater, the Drinking Water Inspectorate, the Environment Agency and Natural England.

[3] Bristol Water Representation on the PR14 Draft Determination October 2014 ('**Bristol Draft Determination Representation October 2014**') (SOC048).

updates as at the date of this submission in line with market conditions, the SoC assumes an average household bill of £187.

11. Indeed, for Bristol Water, PR14 has not just been about the Business Plan and Ofwat's review. Having learnt from our experience at PR09, including the need to seek a redetermination from the Competition Commission (**CC**), we have taken steps to embrace the spirit of PR14 in a holistic way. This has led to some fundamental changes in the way we structure and operate our business. Our outcomes are the building blocks for our longer-term strategic planning over the next 25 years, as reflected in our 25-year strategy 'Water in the Future' and our Water Resources Management Plan (**WRMP**), and already form the basis for our internal reporting. Our overall approach to PR14 and the governance structures put in place to ensure Board involvement and ownership have been accepted by Ofwat. We have also received independent external challenge and assurance across the breadth of our plan and processes, that we have used to set ourselves stretching cost assumptions. As such, we believe that we have willingly embedded within our business practices and PR14 planning the strategic shift in the industry that Ofwat wanted.

1.4 Impact of FD14 on Bristol Water is unsustainable

12. The most significant reason for seeking a redetermination from the CMA is the difference between our Business Plan and FD14 regarding the assessment of the appropriate level of costs to deliver the agreed outcomes. In particular, Ofwat has concluded that our level of wholesale totex during AMP6 should be £409m, whereas our Business Plan proposed expenditure of £541m. The FD14 assessment is insufficient to deliver the outcomes customers want and is an unrealistic assumption of what is required in order to run the business. In particular, Ofwat has not considered whether the resulting level of operating costs is achievable in practice, including the immediate reduction of approximately 18%.

13. Driven by the reduction in costs, and as demonstrated in Table 1 below, FD14 reduces our average household bill by £36 in 2015/16 from £198 to £162, reducing further to £152 for the remainder of the period. [4]

Table 1: Household Average Bills (£, 2012/13 prices)

	14/15	15/16	16/17	17/18	18/19	19/20
Bristol Water SoC	198[5]	187	187	187	187	187
Ofwat FD14	191	162	152	152	152	152

Source: FD14/Bristol Water Analysis[6]

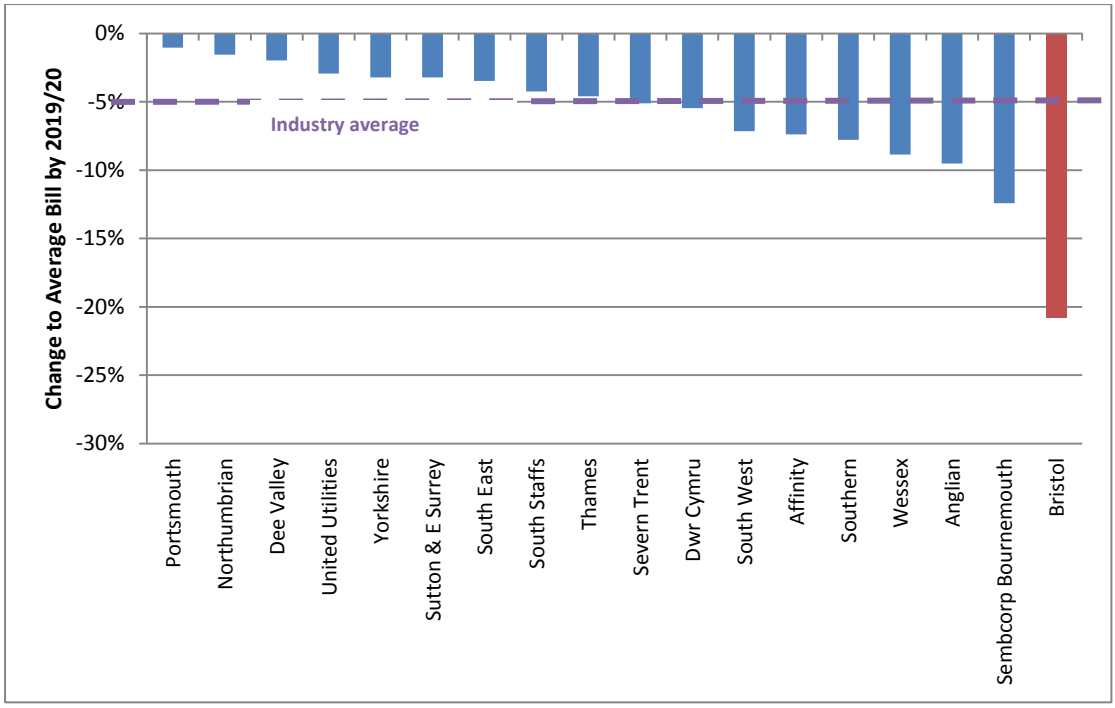
14. Overall, this amounts to a 23% reduction in bills compared to the industry average of 5% as demonstrated in Figure 1 below.

[4] Ofwat's FD14 shows the 15/16 movement as being from £191 to £164. Our figures are based on the actual average bill received for 14/15, and our forecast of the average bill for 15/16 using our actual tariffs and revenue base.

[5] Due to changes in inflation assumptions since submission of the DDR, our average household bill now represents £198 in 12/13 prices. The DDR refers to an average household bill of £197.

[6] Final Price Control Determination Notice: Company Specific Appendix - Bristol Water ('**Bristol Water Final Determination**') (SOC229)

Figure 1: Impact of FD14 on average bills across the industry



Source: Bristol Water analysis of Ofwat final determinations for the industry

1.5 Our approach to developing our Business Plan was consistent with good industry practice

15. In seeking a redetermination, we demonstrate that we have set the outcomes that our customers have expressed they want, and that our approach to planning means we have identified the most appropriate scope of activities in order to deliver those outcomes in a cost-efficient totex manner. We outline our approach to customer engagement and the way in which customer feedback was used throughout the process. We provide the CMA with an explanation of our approach to planning activities and expenditure, including the identification of the maintenance needs of our network and asset base. We show the interaction between the PR14 Business Plan and the longer-term strategic planning in the WRMP, particularly in relation to issues of resilience and how we will balance future supply and demand in light of social, economic and environmental challenges, whilst maintaining the levels of service customers want. We have made use of good practice from across the industry to ensure that our capital programme represents the best overall package of activities that will deliver outcomes in a timely and efficient way.

16. Our Business Plan reflects the operational circumstances that Bristol Water must deal with on a day-to-day basis. This includes the fact that Bristol Water has the second oldest mains network and the second highest proportion of complex water treatment works in the industry, with over 98% of our deployable output of water needing to be put through complex treatment to meet the requisite quality standards. These factors impact on the scope of the activities we need to undertake, as well as the associated cost.

17. We consider that an appropriate approach to cost assessment for a company in the context of a regulatory price setting process is to derive costs using an asset based

assessment of activities, timing and costs, which should reflect an appropriate balance of risk and efficiency challenge. That assessment should ensure that each key set of cost components, such as operating expenditure (**opex**), infrastructure and non-infrastructure capital maintenance (**capital maintenance**) and capital enhancement (**enhancement**) are considered separately, as well as together in a whole totex package. This should be tested with customers through acceptability research to assess consistency with need as expressed through outcomes, as well as affordability. Those costs should then be cross-checked through benchmarking and the use of econometric models to ensure that the engineering results fall within an appropriate range. That cost assessment process should result in allowed costs that enable the Company to deliver the agreed outcomes.

18. We will show that this is consistent with the approach Bristol Water has taken in developing the Business Plan:

- our interventions have been derived based on need, identifying solutions through optioneering, cost benefit analysis, full whole life costing and the application of challenging efficiency targets;
- we have made use of optimisation techniques to determine the most appropriate combination of interventions to deliver the outcomes at low cost, and have carried out a range of benchmarking at both a scheme and programme level to ensure that our costs fall within an acceptable range;
- customer testing of different service packages, to assess their willingness to pay and retain focus on customer priorities has ensured that customers have played their part in shaping the proposed programme;
- constraints have been used based on affordability to reject cost-beneficial schemes when shaping the optimal package;
- our approach and Business Plan proposals have been scrutinised by various independent experts (Atkins, ICS and CH2M Hill), and assured by Mott MacDonald and Atkins; and
- further benchmarking of our costs by Oxera through the use of disaggregated econometric models during the latter part of the PR14 process also confirms that the costs in our Business Plan are credible when compared to the rest of the industry.

19. Details of the totex sought in our Business Plan, compared to Ofwat's FD14, is set out in Table 2 below.

Table 2: Bristol Water PR14 Business Plan Wholesale Totex and Ofwat's determinations

£m 12/13 prices	Bristol Water Business Plan	Ofwat FD14
Opex	228.4[7]	188.4
Capital maintenance	156.2	129.6
Base totex	**384.6**	**318.0**
Enhancement	152.3	91.2
Totex	**536.9**	**409.2**
Major Schemes		
Cheddar Reservoir No 2	42.8	-
Southern strategic support	28.1	23.4
Cheddar Water Treatment Works	20.8	17.3
National Environment Programme	11.0	9.1
Trunk Mains lining (discoloured water contacts)	10.2	8.5

Source: Bristol Water SoC; FD14[8]

1.6 Ofwat's approach to cost assessment is not sufficiently robust

20. In comparison, we demonstrate that Ofwat has not followed a robust approach to the assessment of costs, and that this is why there is such a significant gap between FD14 and our Business Plan. For example, in taking an approach that neither involves any bottom-up assessment of costs, nor considers opex and capex elements separately, but instead is reliant on a top-down econometric model supported by 'cost exclusion cases' (see below), Ofwat has followed a process that is narrow in scope leaving it prone to the limitations of its modelling.

21. In particular, for Bristol Water, the inherent weaknesses within the models used by Ofwat, such as its inability to fully account for the explanatory factors that drive differences in expenditure between companies, means that Ofwat has significantly underestimated the expenditure we need to deliver our outcomes and run the business.

22. The model used by Ofwat, which is new for PR14 and was published after submission of the original business plans, has been the subject of industry and expert criticism. Testing of the model suggests that it is unstable and extremely sensitive to minor changes in the data used. For example, the exclusion of an individual company significantly changes the results. Comparison of the output of the model for Bristol Water to alternative econometric models also clearly shows the results of the Ofwat model to be an outlier. Based on that expert analysis and comment, we believe that the model is not a robust basis for determining an appropriate level of totex for Bristol Water and should not be relied upon by the CMA in its redetermination.

23. These issues have been compounded by the approach taken by Ofwat to the assessment of the cost exclusion cases, for items of expenditure falling outside the model, which has resulted in some items being rejected on the grounds of need, such as Cheddar Reservoir Two. Others received only limited funding on the basis of significant but unjustified

[7] Reflects reduction of circa.£4m in input price pressure.

[8] Bristol Water Final Determination (SOC229). The FD14 numbers are based on an assumed apportionment of Ofwat's allowance.

efficiency challenges, despite these schemes and interventions being evidenced through our thorough intervention planning process.

24. We demonstrate that the additional adjustment made by Ofwat in relation to Bristol Water's special factors in FD14, which increased Bristol Water's cost baseline, was insufficient to adequately address the gap as it was not capable of recognising or rectifying the full extent of weaknesses within the overall cost assessment process.

25. We also provide evidence that Ofwat's suggestion, that the cost gap can be attributed to our alleged inefficiency, cannot be sustained by reference to historic assessments of our efficiency, our position comparative to the rest of the industry, and the external expert support for the efficiency challenges contained within our Business Plan cost estimates.

1.7 What is the appropriate cost of capital for Bristol Water?

26. Whilst wholesale totex may represent the largest single gap between the FD14 and our Business Plan, it is not the only component that impacts on revenues, customer bills and the Company. There are a number of other key building blocks that are relevant. Of these, a key issue is ensuring that the allowed rate of return reflects Bristol Water's actual cost of capital. Ofwat's FD14 contains an industry-wide weighted average cost of capital (**WACC**) of 3.6%, which is below our estimated WACC of 4.37% and is not reflective of our actual debt obligations, risks and business characteristics.

27. We suggest that a reasonable approach to calculating the different elements of the cost of debt and equity would support a higher cost of capital than that proposed by Ofwat. In addition, we believe that Ofwat has underestimated the incremental costs and timing of financing for the small water-only companies and, in particular, has proposed a poorly justified rationale for not allowing most of the water-only companies, including Bristol Water, from recovering even the higher cost of debt which Ofwat has accepted will be incurred by such companies, including the cost of embedded debt.

28. We have calculated our cost of capital to be 4.37% based on:

- our cost of embedded debt, which we show was efficiently incurred;
- our expectations as to the cost of raising finance over AMP6, supported by expert analysis and market evidence; and
- our assessment of the cost of equity, which is based on the CC10 assumptions on Bristol Water's asset beta contained in the CC's 2010 redetermination of our 2010-15 price control (**CC10**) and the CMA's recent assessment of market return.

29. This is demonstrated in Table 3 below.

Table 3: Weighted average cost of capital - comparison of Bristol Water and Ofwat positions

	Bristol Water	Ofwat FD14
Gearing	62.5%	62.5%
Risk-Free Rate	1.25%	1.25%
Market Return	5.25%	5.5%
Asset Beta	0.3675	0.3
Cost of Equity	6.4%	5.65%
Cost of Embedded Debt	3.15%	2.75%
Cost of new debt	2.0%	2.0%
Overall cost of debt	3.15%	2.6%
Cost of Capital Vanilla	**4.37%**	**3.74%**
Wholesale Cost of Capital Vanilla	4.37%	3.6%

Source: Bristol Water SoC; FD14.[9]

1.8 Other areas of difference arising from FD14

30. The redetermination should also take into account other areas of difference arising from FD14. This includes:

- **'serviceability penalty' -** Ofwat's decision to apply a serviceability penalty for performance during 2010-2014, which we do not consider to be applicable by reference to the underlying events and the test that should be applied; and
- **'incentive targets'** - FD14 amendments to three of our proposed performance commitments intended to incentivise performance during 2015-2020, which we consider to be unrealistic and will lead to unavoidable performance penalties.

1.9 Need to ensure that Bristol Water is financeable

31. It is essential that the overall package envisaged by the price controls, and the resultant impact on revenue, ensures that Bristol Water is financeable. Whilst we are confident that our Business Plan is financeable, we would not be financeable under FD14. This stems partly from the underlying position in relation to costs, but also from the nature of the tests that Ofwat has applied. For example, not identifying opex on a standalone basis has impeded Ofwat's ability to properly apply the relevant credit metrics.

32. We consider that the most appropriate approach to this assessment is to target credit ratings with appropriate headroom above minimum investment grade levels, and to use relevant credit metrics that reflect the way in which the rating agencies would make their assessment. Scenarios should be run to test financial resilience and ensure that there is sufficient headroom to deal with any shocks during the period. Equally, the tools available to remedy any financeability concerns should be used appropriately including, in particular, the Pay as You Go (**PAYG**) rate which is a new tool for PR14 that can be used to address modest financeability problems with minor impact on customers. It allows companies to choose the right split between 'fast money' (revenue from customers in the period under review) and 'slow money' (additions to the regulatory capital value, or RCV), and should be set to reflect the mix of totex contained in the determination, ensure an appropriate customer bill profile and address short-term financeability concerns.

[9] Bristol Water Final Determination (SOC229) Table reference A.7.4.1

1.10 Scope of the redetermination

33. In summary, in carrying out its own redetermination of our price controls for 2015-2020, we would like the CMA to reach a redetermination which sets out and ensures:

- the right scope of activities to deliver the outcomes that our customers want;
- the right level of costs for us to deliver those outcomes, using the most appropriate approach to cost assessment which we consider should incorporate a bottom-up engineering approach that is validated through the use of benchmarking and econometric modelling;
- an appropriate level of efficiency target to be reflected in those costs, that is challenging but practically achievable over the period and reflects a reasonable and acceptable level of risk;
- the right level of WACC that reflects Bristol Water's actual costs of debt and equity and enables it to earn a reasonable return;
- that Bristol Water will be able to finance its functions whilst delivering what our customers want and expect; and
- that when all other factors are taken into account, such as the serviceability penalty and incentive targets, we have the right wholesale price control for Bristol Water and our customers.

34. A determination which satisfies all of the above should be consistent with the statutory duties applicable to the CMA, namely to protect the interests of consumers, enable us to carry out our functions, and ensure that we are able to finance these activities whilst earning an appropriate return on capital and continuing to maintain an investment grade credit rating.

35. The purpose of our SoC, therefore, is to provide the CMA with the necessary tools and information to allow it to carry out this redetermination. Whilst we have sought to shine a light on the main areas of difference between our Business Plan and FD14, why we consider the difference to have arisen and how we believe it can be resolved, we recognise the potential scope of the CMA's review and have provided a comprehensive overview of all aspects of the Business Plan and FD14.

1.11 Structure of the Statement of Case

36. The SoC is split into three main parts:

- **Part A: Executive Summary and structure of SoC** (includes **Section 1**) – this provides an overview of the reasons why a redetermination is necessary and a summary of the key financial information and operational facts needed to understand Bristol Water's Business Plan, FD14 and the main areas of difference;
- **Part B: Background information** (includes **Sections 2 to 7**) – this sets out details of the regulatory and legal framework for the industry in general, and PR14 specifically, as well as outlining the approach taken by Bristol Water to the development of its Business Plan; and

- **Part C: Determining the level of revenue for Bristol Water** (includes **Sections 8 to 17**) – this contains details of the substance of the price controls, with a particular focus on areas of difference between Bristol Water's Business Plan and FD14.

37. We note that the CMA's mandate under s.12 WIA '91 requires it to carry out a full redetermination. As such, every aspect of the referred determination is potentially reviewable by the CMA. With that in mind, we have prepared a SoC that is comprehensive and covers each of the three price controls included as part of FD14. Our Board accepted the two retail price controls and, as such, these have been addressed in less detail than the wholesale price control which is the primary source of differences between the parties.

38. To assist the CMA in its review a glossary of key terms and abbreviations is provided at Appendix One and a summary of the key financial information is set out at Appendix Six. A full list of all of the supporting documents referred to in this SoC is provided at Appendix Two.

39. A more detailed overview of each of the Sections within these three Parts is provided below.

No.	Title	Description
Part A: Executive Summary and overview of Statement of Case		
1	Executive Summary and structure of Statement of Case	• Overview of the reasons why Bristol Water has sought a determination. • Introduces the main themes that run throughout this SoC.
Part B: Background Information		
2	Regulatory framework	• Legal and regulatory context for Ofwat's price review and the CMA's redetermination. • Introduces the key stakeholders and their roles. • Outlines the duties that apply to Bristol Water, Ofwat and the CMA. • Details current policy regarding economic regulation and the recently evolved framework for PR14, including the introduction of multiple price controls.
3	Background to Bristol Water	• Provides the CMA with the background information about Bristol Water that it needs to understand why Bristol Water has the Business Plan it has, and the challenges that it faces. • Introduces Bristol Water as a company, including its corporate structure and how it operates on a day-to-day basis. • Overview of the key characteristics of the region and operating environment in which Bristol Water provides services to its customers. • Highlights those aspects which impact on Bristol Water's Business Plan, such as the complexity of the water treatment it undertakes, and other relevant features of the supply network and local demand. • Describes Bristol Water's performance during AMP5, comparative to the CC10 redetermination for PR09.
4	The PR14 methodology and process	• Overview of Ofwat's methodology for PR14, including how it differs from previous price reviews. • Identifies the key principles, including the prominence of customer engagement and the move to a totex-focused regime. • Sets out the process that Ofwat followed and details the key assessment stages. • Highlights Bristol Water's broad acceptance and support for the PR14 methodology

		and principles, with the exception of Ofwat's approach to cost assessment which is discussed in more detail in Sections 9 and 10.
5	Bristol Water's approach to PR14	• Introduction to Bristol Water's approach to PR14. • Overview of the process followed, and how the component parts fit together. • Demonstrates how Bristol Water responded to Ofwat's PR14 challenges, both in relation to the Business Plan and how it has impacted on the business more broadly. • Sets out the approach taken to risk within the Business Plan. • Details Bristol Water's PR14 governance and the role of the Board in ensuring the quality of the process and the Business Plan itself.
6	How customers and stakeholders have shaped our plan	• Demonstrates that Bristol Water's Business Plan was developed by customers, for customers, and ensures that customers' interests, both current and future, are protected. • Explains how customers and stakeholders helped to shape Bristol Water's Business Plan. • Introduces the LEF, its members and their expertise, and the role that the LEF played. • Outlines the different phases of customer engagement and research and the external assurance received. • Details how customer input impacted the evolution of the Business Plan at every stage. • Sets out the outcomes and performance measures identified through customer engagement. • Details the willingness to pay and acceptability research carried out with customers to test the overall package of proposed interventions and expenditure.
7	Translating customer-led outcomes into our plan and our approach to assessment of totex	• Details Bristol Water's approach to translating the customer-led outcomes into a package of interventions and solutions. • Introduces the concept of totex and explains how it is embedded in Bristol Water's approach to intervention planning. • Demonstrates that our approach to intervention planning, cost assessment and cost efficiency is consistent with PR14 methodology and industry good practice. • Explains how Bristol Water assessed need and identified solutions through optioneering and cost benefit analysis based on a full whole life cost approach. • Sets out Bristol Water's approach to identifying costs and ensuring the application of challenging efficiency targets, including through benchmarking at a scheme and programme level. • Identifies how optimisation tools were used to determine the most optimal combination of interventions to deliver the outcomes at the lowest possible cost. • Outlines the impact of customers through willingness to pay and acceptability testing. • Details the external review and assurance for the approach and the resulting plan.
Part C: Determining the level of revenue for Bristol Water		
8	An introduction to determining the level of revenue for Bristol Water	• Introduces Part C and explains how the following Sections detail the different components that determine the right level of revenue for Bristol Water. • Outlines the revenue building blocks relevant to each of the three price controls and notes where they are dealt with in more detail. • Sets out the approach of Bristol Water and Ofwat to regulatory depreciation and taxation.
9	Base totex: the scope of our programme and proposed costs	• Sets out the scope of the wholesale programme relating to maintenance and how it will deliver the outcomes by reference to need and timing considerations. • Details the two main areas of base totex – opex and capital maintenance – and how they have been derived. • Explains how Bristol Water has ensured that its costs reflect challenging efficiency targets. • Demonstrates how benchmarking of costs, schemes and the programme has been used to test efficiency assumptions and validate the plan. • Details the external review and assurance received for the maintenance programme and associated costs.
10	Wholesale enhancement	• Sets out the scope of the wholesale programme relating to enhancement and how it will deliver the outcomes by reference to need and timing considerations.

	programme and associated totex	• Details the costs associated with enhancement and how they have been derived. • Outlines the most significant schemes and why they represent the most appropriate solution, including in particular Cheddar Reservoir Two, which was not accepted in FD14. • Explains how Bristol Water has ensured that its costs reflect challenging efficiency targets. • Demonstrates how benchmarking of costs, schemes and the programme has been used to test efficiency assumptions and validate the plan. • Details the external review and assurance received for the enhancement programme and associated costs.
11	A critique of Ofwat's approach to cost assessment and the impact on Bristol Water	• Explains the nature of the totex gap issue identified above and provides the relevant background information that builds on the information provided in Sections 7 and 9. • Demonstrates that Ofwat's approach to cost assessment is not robust, and should not be replicated by the CMA. • Outlines why the approach taken by Ofwat is narrow, and the consequences this has. • Describes how Ofwat's model does not take sufficient account of the relevant explanatory factors that drive differences in expenditure between companies. • Explains why Ofwat's model is unsafe by reference to industry wide and expert criticism and comparisons to alternative models. • Details why the exceptions process used by Ofwat does not adequately cover the costs shortfall or address the problems within the model. • Demonstrates that Ofwat's additional adjustment at FD14 is only a partial remedy. • Identifies the menu choice consequences that flow from Ofwat's cost assessment approach.
12	Bristol Water's cost of capital	• Explains the nature of the cost of capital issue identified above and provides the relevant background information. • Details Bristol Water's actual cost of embedded debt and the estimated cost of new debt. • Provides market data in relation to the components that establish the cost of equity, including asset beta. • Demonstrates that Ofwat's cost of capital of 3.6% is too low for Bristol Water in light of the available evidence. • Discusses Ofwat's approach to the application of a small company premium, and its use of a test linked to offsetting customer benefits. • Demonstrates that customers do benefit from Bristol Water's size, and that an appropriate cost of capital should be allowed.
13	Application of a serviceability penalty	• Explains the nature of the serviceability issue identified above and provides the relevant background information. • Details the nature of the serviceability penalty which relates to apparent service level failings during AMP5. • Describes the test applied by Ofwat and how this differs from the test intended to be applied at the time of the CC10 redetermination. • Provides details of the circumstances that have given rise to the service level failings and shows that they were outside reasonable management control. • Demonstrates that the application of a penalty is not appropriate in these circumstances.
14	Performance commitments and incentives	• Explains the nature of the incentives issue identified above and provides the relevant background information. • Outlines the process followed by Bristol Water to identify performance commitments and incentives • Demonstrates that these were challenging targets that represent the priorities and preferences of customers. • Highlights the three incentives where Ofwat has applied a different target level in FD14. • Explains why, with the level of totex and scope of interventions intended both by FD14 and the Business Plan, these targets are unachievable and will result in unavoidable penalties.
15	Retail household price	• Sets out the detail of the FD14 retail household price control as accepted by Bristol

	control	Water. • Identifies the costs associated with retail household activities. • Details the retail household margin. • Assesses the impact on customer bills and affordability.
16	Retail non-household price control	• Sets out the detail of the FD14 retail non-household price control as accepted by Bristol Water. • Identifies the costs associated with retail non-household activities. • Details the retail non-household margin. • Outlines the length and form of the price control.
17	Ensuring that Bristol Water can finance its functions	• Explains the nature of the financeability issue identified above and provides the relevant background information. • Outlines the financeability considerations relevant to an assessment of whether Bristol Water can finance its functions. • Introduces the concepts that are new for PR14, including PAYG rates and menu choice, and how these impact on a financeability assessment. • Considers the appropriate tools for a financeability assessment, including the use of internally consistent numbers, the right target credit rating and the relevant credit metrics. • Explains why Bristol Water is financeable under the Business Plan. • Demonstrates why Bristol Water is not financeable under FD14.
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Part B: Background Information

2 Regulatory Framework

2.1 Executive summary

2.1.1 Introduction

40. The purpose of this Section is to set out the legislative and regulatory framework for the water industry. It provides background and context for Bristol Water's activities as a water undertaker and the functions it must fulfil, as well as for Ofwat's PR14 review, Bristol Water's Business Plan, and the CMA's redetermination. Where relevant, it indicates how that framework has changed since the Competition Commission carried out its review of the PR09 price control in 2010.

2.1.2 Key themes

41. The water sector is highly regulated in relation to both the day-to-day operations of water companies, including water quality requirements and environmental concerns, as well as the economic framework for the market. Regulatory oversight is provided by multiple regulatory bodies with responsibility for different, but often overlapping, areas.

42. As a 'Water Only Company' (**WoC**), Bristol Water is subject to a wide range of duties and obligations that it must meet in the performance of its functions. This covers a broad range of considerations from ensuring supplies of water to customers, to water quality and environmental considerations. These are reflected both in Bristol Water's day-to-day operations, as well as in its medium and long-term strategic planning as embodied in the Water Resources Management Plan (**WRMP**) and Business Plan. In some instances, such as water quality undertakings, these constitute legally binding obligations.

43. As economic regulator for the sector, Ofwat is subject to Primary Duties relating to the interests of consumers, resilience, Bristol Water's ability to fulfil its functions, and the need for it to be financed to do so. It is also subject to Secondary Duties relating to, amongst other things, efficiency and sustainability, as well as an overarching duty to comply with best regulatory practice. The same duties apply to the CMA in the context of carrying out this redetermination.

44. Economic regulation, and price controls in particular, play a central role in the management of the water sector. The reforms that have taken place over the last five years have created a framework which offers increased flexibility to deal with the challenges facing the sector, particularly through the introduction of separate price controls for wholesale, retail household and retail non-household activities in this periodic review.

2.1.3 Structure of Section

45. This Section looks at:

- **overview of industry structure -** the general structure of the water industry, and a brief introduction to Bristol Water specifically (see **Section 2.2**);

- **regulators and key stakeholders -** the main regulatory bodies involved in the water sector, and their areas of responsibility (see **Section 2.3** below);
- **key legislation -** the principal pieces of legislation which govern the sector, including the quality and environmental obligations, and an indication of the specific duties and obligations placed on Bristol Water as a water undertaker (see **Section 2.4**);
- **statutory duties for Ofwat and CMA -** the statutory duties which provide the framework for regulation of the industry (see **Section 2.5** below);
- **economic regulation -** an overview of what is meant by economic regulation, and how its application to the water sector has evolved in recent years (see **Section 2.6**);
- **concept of price controls** - an explanation of the concept of price controls (see **Section 2.7**); and
- **PR14 price control framework** - details of the price control framework for water companies as currently set out in the Licence (see **Section 2.8**).

46. Please note that Bristol Water is providing this information to be used as a reference tool for the CMA's inquiry group in addition to providing the necessary regulatory background to support Bristol Water's principal propositions.

2.2 Structure of the water industry and introduction to Bristol Water

47. The current structure of the water and wastewater (also referred to as 'sewerage') industry in England and Wales dates from 1989. Before 'privatisation' there were 10 regional public sector water authorities supplying water and sewerage services and 29 privately-owned statutory water companies supplying water only, Bristol Water being one of the latter. At privatisation the water supply and sewerage functions of the ten water authorities were transferred from public ownership into the hands of the private sector, as appointed Water and Sewerage Companies (WaSCs). The WaSCs were all floated as public limited companies on the London Stock Exchange in 1989.[10]

48. Bristol Water is a 'Water Only Company' or 'WoC'. Our principal business is the provision of potable water supplies, comprising the sourcing, treatment and distribution of water, to a population of over 1.2 million people and businesses in an area of some 2,400 square kilometres encompassing the City of Bristol and surrounding area (the '**Bristol Water Region**').[11] We provide these services in accordance with our Instrument of Appointment

[10] At privatisation, existing WaSC debt was partly or wholly written off. This gave the WaSCs the capacity to borrow to finance investment programmes. In one case, however, a WaSC had debt included on its balance sheet having previously been debt free. WoCs retained their debt and largely had to cope with more restricted capex programmes whilst remaining obliged to deliver the same levels of service.

[11] Bristol Water Supply Region Map **('Bristol Water Supply Map')** (see SOC028).

(or '**Licence**')[12] and our statutory obligations and responsibilities (see **Section 2.4** below). Sewerage services locally are mainly provided by Wessex Water.[13]

49. In the interests of efficiency we provide a unified billing service with Wessex Water through a joint venture company, Bristol Wessex Billing Services Ltd (**BWBSL**).

50. We also have a small number of non-regulated activities.[14] These non-core activities include the leisure facilities provided at our reservoirs.

51. Further details of our history, corporate structure, operational environment and activities are provided in **Section 3** below.

2.3 Water industry regulators and other key stakeholders

52. Responsibility for regulation of the water sector is shared between a number of regulators and other key stakeholders. These include:

- Ofwat (see **Section 2.3.1** below);
- the Drinking Water Inspectorate (**DWI**) (see **Section 2.3.2** below);
- the Environment Agency (**EA**) (see **Section 2.3.3** below);
- Consumer Council for Water (**CCWater**) (see **Section 2.3.4** below);
- Natural England (**NE**) (see **Section 2.3.5** below); and
- the Competition and Markets Authority (**CMA**) (see **Section 2.3.6** below).

2.3.1 Ofwat

53. The Water Services Regulation Authority (also known as Ofwat) is the independent economic regulator of the privatised water industry in England and Wales. It is a non-ministerial government department, and is directly accountable to Parliament and the Welsh Government. Ofwat's primary role is to ensure that customers receive a good quality service and value for money.[15]

54. Ofwat has a board structure comprising a Chair, a Chief Executive, executive Board members and non-executive directors. Board members are appointed by the Secretary of State in consultation with the Welsh Government. The Chair of Ofwat is Jonson Cox. Ofwat's Chief Executive is Cathryn Ross, and its Chief Regulatory Officer with responsibility, among other things, for PR14 is Sonia Brown.[16] The Board is subject to

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[12] Instruction of Appointment of Bristol Water as a Water Undertaker under the Water Industry Act 1991 (**WIA '91**) **('Bristol Water Licence')** (SOC029).

[13] Map produced by Water UK, identifying the relevant water and sewerage undertakers throughout England and Wales **('Water UK Map')** (SOC288) . This map illustrates the overlap between Bristol Water and Wessex Water. A small number of Bristol Water customers receive sewerage services from Thames Water and Severn Trent Water.

[14] These activities are referred to as non-appointed businesses by Ofwat.

[15] Ofwat Website, 'about us' (SOC314).

[16] Further details of Ofwat's Board and Executive are available on its website: Ofwat Organisation Structure Webpage (SOC289).

specific rules of procedure, and Ofwat staff must adhere to the civil service code of conduct.[17]

55. A discussion of what is meant by economic regulation and, in particular, how this translates into the setting of price controls, is set out in **Sections 2.6** and **2.7** below.

56. Ofwat must have regard to the Primary, Secondary and General Duties when exercising and performing its powers and duties under the WIA '91 (see **Section 2.5** below). In addition, Ofwat must take into account guidance from Government as to the priorities for regulation of the water industry which should be reflected in Ofwat's decision making.[18] Those priorities reflect the White Paper '*Water for Life*' and require an innovative, sustainable, resilient and customer-focused water sector.[19]

2.3.2 Drinking Water Inspectorate (DWI)

57. The DWI is part of Defra (Department for Environment, Food and Rural Affairs) and acts as the regulator for the water industry in England and Wales in respect of the quality of drinking water supplies of the water companies.

58. The DWI's principal task is to ensure that water companies in England and Wales are fulfilling their statutory requirements under the WIA '91 and the Water Quality Regulations for the supply of wholesome drinking water (see **Section 2.4** below). It carries out technical audits of each water company, including an annual assessment, based on information supplied by the company, of the quality of water in each supply zone, arrangements for sampling and analysis, and progress made on achieving compliance with regulatory and EU requirements. The DWI will take enforcement action if standards are not met and appropriate action when water is unfit for human consumption.

59. There is a well established continuous dialogue between Bristol Water and the DWI with respect to the water quality standards Bristol Water must achieve, and the various legal obligations imposed by the DWI (see **Section 2.4.3.1**).

60. The DWI is also represented on our Customer Challenge Group (**CCG**), known as the Local Engagement Forum (**LEF**), which was established in accordance with Ofwat's PR14 methodology (see **Section 4**). As such it has played a role in challenging and informing the development of our Business Plan (see **Section 6** below).

2.3.3 Environment Agency (EA)

61. The EA was established under the Environment Act 1995 and is responsible, in England and Wales, for the protection and improvement of the environment. The EA also has a duty to secure the proper use of water resources. In particular, the EA's remit covers: water abstraction; water storage; water discharge; drought and water availability; registers, maps and data; and water pollution. The EA also plays a key role in surface water management and flood prevention.

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[17] Rules of procedure for the Water Services Regulation Authority (Ofwat), June 2010 **('Ofwat Rules of Procedure')** (SOC291); The Civil Service Code, 30 Nov 2010 **('Civil Service Code')** (SOC290).

[18] Defra Strategic Policy Statement to Ofwat March 2013 **('Defra Strategic Policy Statement March 2013')** (SOC030), p.1.

[19] Defra Strategic Policy Statement March 2013 (SOC030) para. 1.11.

62. The EA is particularly involved in the development of water companies' WRMPs (see **Section 2.4.4.1** below). It is responsible for revising and updating the WRP Guideline that provides a framework for water companies to follow when developing and presenting their water resource plans, in order to ensure that good practice is followed and the requirements of the WIA '91 are complied with.[20] There has been a continuous process of engagement between Bristol Water and the EA with respect to our WRMP.

63. The EA is the lead regulator responsible for overseeing delivery of the benefits of the Water Framework Directive, which establishes a strategic and common approach to setting environmental objectives for groundwater, dependent wetlands and surface water bodies across Europe. The Government has sought to take an integrated approach to the achievement of these requirements, and those set out in the Water White Paper and the Natural Environment White Paper.[21]

64. The EA is represented on our LEF, so has played a role in challenging and informing the development of our Business Plan (see **Section 6** below).

2.3.4 Consumer Council for Water (CCWater)

65. CCWater is a statutory body whose role is to provide information of use to consumers and to promote the interests of all water consumers. CCWater also investigates complaints from customers about their water company. CCWater operates through a national Board, with three sub-committees, and five regional consumer council committees. The Board comprises the National Chair, Dame Yve Buckland, five members who chair CCWater regional committees, two non-executive members, and the Chief Executive, Tony Smith, a former senior Ofwat employee.[22]

66. Bristol Water falls within CCWater's Western Region, along with Cholderton and District Water Company, Sembcorp Bournemouth Water, South West Water and Wessex Water.

67. Members of CCWater have been active contributors to the LEF, which is chaired by Charles Howeson, the Chair of CCWater's Western Region council.[23] CCWater is also represented as a member of the LEF by its Regional Policy Manager and Customer Advocate (see **Section 6** below).

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[20] Water Resource Planning Guidelines October 2012 **('WRP Guidelines 2012')** (SOC040), Section 2.7.1.

[21] Defra Strategic Policy Statement March 2013, (SOC030), para. 3.1.3..

[22] Philip Marshall, formerly Director of Customer Services at Bristol Water, has recently been appointed as Deputy Chief Executive of CCWater.

[23] During his tenure as Chair of the LEF throughout the PR14 process, Charles Howeson has not received any form of payment from Bristol Water. The same is true for all other participants in the LEF, with their participation being funded through their respective employers. As of 1 February 2015, Mr Howeson is no longer part of CCWater, but will continue in his role as Chair of the LEF for up to two years in order to have continuity for the duration of the CMA's redetermination and allow the LEF's to be represented in that process. To facilitate this, Mr Howeson will be paid to compensate him for the time spent on LEF matters. This will be paid by Bristol Water, but Mr Howeson remains fully independent. A copy of the agreement between Mr Howeson and Bristol Water will be made available once finalised.

2.3.5 Natural England (NE)

68. NE is an independent public body whose purpose is to protect and improve England's natural environment. It acts as an advisor to the Government on the natural environment, providing practical scientific advice on how to look after England's landscapes and wildlife.

69. NE has powers to advise and direct water companies with regard to their environmental impact both directly (e.g. via discharges to water courses) and indirectly (e.g. via energy use).

70. Bristol Water has a number of Sites of Special Scientific Interest (**SSSI**) sites within the Bristol Water region.[24] As such, the approach and advice provided by NE is an important input into the development of our outcomes (see **Section 6** below).

71. NE is represented on our LEF, so has played a role in challenging and informing the development of our Business Plan (see **Section 6** below).

2.3.6 Competition and Markets Authority (CMA)

72. The CMA, which was formed by the merger of the Office of Fair Trading and the Competition Commission, is an independent non-ministerial department which is responsible for investigating mergers, investigating markets and potential breaches of competition and consumer law, bringing appropriate enforcement action, co-operating with sector regulators, and considering regulatory references and appeals.

73. As part of its statutory role, the CMA is required, when requested to do so by Ofwat, to resolve a variety of disputes that may arise between Ofwat and the water companies. In particular, this includes the duty under s12 Water Industry Act 1991 (**WIA '91**) and Licence Condition B15 to review and resolve, by way of a redetermination, disputed price controls.

74. In doing so, the CMA is obliged to carry out its redetermination in accordance with the s2 WIA '91 Primary Duties, Secondary Duties and the General Duty (see **Section 2.5** below).

2.4 Regulatory and legislative framework

2.4.1 WIA '91

75. The principal piece of legislation governing the water industry is the WIA '91.[25] It was most recently amended by the Water Act 2014 (**WA '14**).[26] This legislation sets out the

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[24] An SSSI is a conservation designation denoting a protected area in the United Kingdom. Within England, the decision to notify an SSSI is made by NE. Sites that have been designated as SSSI are subject to restrictions regarding their use and development.

[25] The WIA '91 was consolidating legislation which incorporated the WA '89. It has itself been substantially amended by the WIA '99, the WA '03, the WA '14 and various other statutory provisions. Subsequent references to the WIA '91 in this document refer to it as amended.

[26] The WA '14 introduced a number of reforms that are relevant to PR14. In particular, and amongst other things, it lays the groundwork for the broader opening of the competitive retail non-household market, which is currently scheduled to take effect from 1 April 2017. It also introduces a relaxation of the merger control framework by modified the requirement to automatically refer all mergers for a Phase II review under the Enterprise Act 2002. It

framework for both regulation and operation of the water sector, as supplemented by the policy statements and guidance issued by Ofwat. **Section 2.5** below sets out in more detail the statutory duties by which Ofwat must abide when regulating the industry, and which apply to the CMA in the context of a redetermination.

76. Under the WIA '91 the Secretary of State has a duty to ensure that, at all times, there is an appointee for every area of England and Wales. Appointments may be made by the Secretary of State or, in accordance with a general authorisation, by Ofwat. Each appointed company has an individual licence and is regulated through the conditions of the licence as well as the WIA '91.

2.4.2 Licence

77. Matters covered by conditions in the licence include: the framework for price limits; accounts and the provision of accounting information; charges schemes; codes of practice for customers on disconnection and on leakage; levels of service and service targets; ring-fencing of assets and restrictions on disposal of land; asset management plans; the provision of information to Ofwat; provision of combined and wholesale water supplies; and payments to customers for supply interruptions because of drought.[27]

78. Ofwat is responsible for monitoring compliance with licence conditions and, where necessary, enforcing compliance through procedures laid down in the WIA '91. In addition, Ofwat is also bound by the licence when it comes to setting price controls (see **Section 2.8** below), therefore meaning that the content of the licence is also relevant to the CMA's redetermination.

2.4.3 Other relevant legislation

79. The WIA '91 is supplemented by other legislation relating, in particular, to the protection of the environment and human health as administered primarily by the DWI, the EA and NE. These laws establish, amongst other things, quality standards for drinking water, abstraction, the discharge of wastewater and other polluting discharges into the environment, and procedures governing operational development. Levels and timings of abstractions are controlled by abstraction licences from the EA and are potentially subject to restriction at times of drought. These laws are generally influenced by developments at a European level in relation to water quality and the environment. Details in relation to some aspects of this wide range of legislation are provided in the following Sections.

2.4.3.1 Water quality requirements

80. In accordance with Item 10 of Table 4 below, Bristol Water is required to ensure that water supplied for domestic or food production purposes must be wholesome at the time of supply in compliance with the Water Supply (Water Quality) Regulations 2000 (**Water Quality Regulations**).

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also represents the start of an ongoing dialogue in relation to upstream water abstraction reform. Defra has indicated its intention to legislate for abstraction reform early in the next Parliament.

[27] Conditions of a licence may be modified in accordance with the procedures laid down in the WIA '91. This provides for either modification by mutual agreement of Ofwat and the water company in question under s.13 WIA '91, or by way of reference to the CMA under s.14 WIA '91. In the event of a reference to the CMA, the CMA will apply a public interest based test to determine whether or not the modification should be made.

81. For every water treatment works and associated supply system, we are obliged to carry out risk assessments to establish whether there is a risk of supplying water that could constitute a potential danger to human health.[28] We consider the short, medium and long term control measures required to address each hazard and make an assessment of whether additional control measures are required in the catchment, at the treatment works or in the associated distribution system to ensure the supply is wholesome at consumers' taps and any risk to human health is appropriately mitigated.

82. We are required to submit the reports of these risk assessments to the DWI identifying those risks - these are known as Drinking Water Safety Plans.[29] These plans set out how we intend to address those risks. This generally takes the form of a specified scheme which Bristol Water is responsible for developing.

83. If the DWI considers that a failure is likely to recur, a company must put in place a legally binding programme of work to improve the quality of the water to the required standard. That programme of work will typically be based on the scheme that the company has developed and assessed for effectiveness and cost efficiency. There are four types of legally binding improvement programmes:

- undertakings accepted under Section 19 WIA '91 (**s19 Undertakings**);[30]
- notices served under Regulation 28(4) of the Water Quality Regulations (**Reg 28 Notices**);[31]
- authorisations granted under Regulation 20 of the Water Quality Regulations (**Reg 20 Authorisations**);[32] and
- enforcement orders served under Section 18 WIA '91 (**s18 Orders**).[33]

84. Schemes stipulated in s19 Undertakings and REG28 Notices constitute legally binding obligations that we must deliver in accordance with the specified terms and timescale.

85. Alternatively, if there are no grounds for DWI enforcement action, but the DWI believes a proposed scheme has merit in any event, the scheme can be 'Commended for Support' by the DWI (**DWI Commendation**).[34]

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[28] Regulation 27 of the Water Supply (Water Quality) Regulations 2000 (Amendment) Regulations 2007.

[29] Regulation 28 of the 2007 Amendment Regulations.

[30] An undertaking is given by the company confirming that it will carry out a programme of work to secure or facilitate compliance with the required standard, or other deficiency identified, within an agreed timescale. Failure to give an undertaking, or to comply with its terms, may trigger the DWI to issue an enforcement notice.

[31] A notice is issued by the DWI and will typically require the company to take certain steps to mitigate the identified risk.

[32] A company may apply to the DWI for an authorisation to supply water that is not wholesome if there is reason to believe that the water is failing, or is likely to fail, a standard. An authorisation is granted for a maximum period of three years, and must set out the steps the company must take in that period to achieve compliance.

[33] The DWI will proceed with its enforcement powers if any of the improvement programmes of works are not delivered as agreed in either an undertaking or notice.

[34] If a scheme has been Commended for Support, whilst this is a strong indication that it should be pursued, this does not amount to a strict legal obligation to carry out the scheme.

86. The Business Plan contains one scheme which is the subject of a s19 Undertaking. It is the metaldehyde pilot and catchment management scheme that relates to sustainable environmental impact and the quality of raw water sources.[35]

87. Within the area of safe drinking water and mean zonal compliance, the Barrow Treatment Works UV scheme and the lead communication pipe replacement scheme are the subject of Reg 28 Notices.[36]

88. The Cheddar TW Algae Removal scheme and Stowey TW pH Correction are both the subject of a DWI Commendation.[37]

2.4.3.2 National Environment Programme (NEP)

89. Bristol Water is required by Defra to include schemes in Business Plans to address adverse environmental impacts. Such obligations arise from UK and European legislation including the Water Framework Directive (**WFD**), The Countryside and Rights of Way Act 2000, The Environmental Permitting Regulations 2010 and the Eels (England and Wales) Regulation (2009) (**Eels Regulation**).[38]

90. The NEP is compiled and updated every five years by the EA and lists actions that companies must undertake. It is informed by the requirements set out in the WFD and Eels Regulation in particular. Details of our NEP activities for AMP6, which fall within four main categories of catchment management, baseline surveys, investigations and eel protection are provided in **Section 3.2.3.3** and **Section 10.2.2.2** below.

91. This is the first Periodic Review during which any NEP requirements have applied to Bristol Water and the requirements of the NEP are therefore new to the business. The NEP requirements are also considered as mandatory, being requirements of government departments and agencies and are enforced through primary legislation. Customer protection is therefore provided by penalties that can be applied for non-delivery or non-compliance. In addition, our permits to abstract water have been linked to delivery of the NEP schemes. Not delivering the required measures within a specified time period will

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35 DWI s19 Undertaking – Purton and Littleton TWs 2013 (SOC318); Purton and Littleton WTWs DWI Letter of support 2013 (SOC319).

36 Barrow TW DWI commendation for support 2013 (SOC319) and DWI Lead Strategy commendation for support 2013 (SOC320).

37 CheddarTW DWI commendation for support 2013 (SOC316), Stowey TW DWI Commendation for support 2013 (SOC317).

38 An overview of all of these requirements, including others not specifically mentioned in the SoC, as at October 2012 is provided in: Defra Statement of Obligations, information for water and sewerage undertakers **('Defra statement of obligations')** (SOC284). Defra's Statement of Objections describes the Government's understanding of the main environmental statutory obligations that apply in particular to water and sewerage undertakers over the Price Review period 2015-2020. It covers both domestic legislation and requirements of European directives and addresses water quality, the water environment, water resources, climate change, sewerage and flood risk management. Its intended audience was water companies and environmental and quality regulators. In addition, it was hoped that it would be a helpful reference document for CCWater, CCGs, Ofwat and other interested parties.

impact on our ability to renew our abstraction permits which are required in order to have access to sufficient sources of raw water (see **Section 3.4.3** below).[39]

92. Making adequate provision for the activities expected during AMP6 under NEP is a requirement of PR14 as set out in Defra's Statement of Obligations.[40]

2.4.3.3 Security and Emergency Measures Direction (SEMD)

93. The Security and Emergency Measures (Water and Sewerage Undertakers) Direction 1998, under section 208 of the Water Industry Act 1991, directs water companies to have plans to ensure the provision of essential water supply at all times. In doing so the companies shall have regard to: the Government's general policy in respect of civil emergency and national security; and any guidance, procedures and requirements from the Secretary of State, so far as such matters relate to the functions of the water companies. Bristol Water must provide the Secretary of State with a certified annual statement that such plans are in place.

94. The plans for essential water supply shall be prepared upon the assumptions that:

- water is to be provided in accordance with the companies' duties under the WIA '91;
- in the event of an unavoidable failure of piped supply such minimum supply will be provided by alternative means;
- priority will be given to the domestic needs of the sick, elderly, disabled, hospitals, schools and other vulnerable sectors of the population; and
- that regard is had for the needs of non-domestic users.

95. These plans shall make provision for:

- trained and experienced personnel;
- strategically stored stockpiles of sufficient types and quantities of equipment and materials;
- dedicated emergency communication facilities;
- analytical services, dissemination of information and other back up services;
- carrying out security work on vital installation and protection and surveillance on other installations;
- suitably equipped permanent or mobile accommodation to act as command and control centres; and
- training of all staff who may be called upon.

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[39] For example, the Regulation 17(4) of the Eels Regulation requires that on or after 1 January 2015 Bristol Water must ensure that eel screens are installed in at seven abstraction points. Each of those sites has been granted an exemption notice to give Bristol Water time to comply (**EA Eels Exemption Notice**). The exemption period varies, but for four of the sites requires the screen to be in place by 31 March 2021. Any changes to the programme of works, including extension to the completion dates, have to be agreed with the EA. If the work is not completed prior to the expiry of the exemption period, Bristol Water will be in breach of this legal obligation. A copy of the letter from the EA providing details of the exemption notices is attached at)(SOC280.

[40] Defra Statement of Obligations (SOC284) Section 2.3.

2.4.4 Duties applicable to Bristol Water

96. Water companies are regulated by reference to relevant legislation, principally the WIA '91, and in accordance with the conditions of their licences. These rules inform the scope of the functions that Bristol Water is required to deliver. Bristol Water's ability to fulfil these functions must, in turn, be facilitated by the regulatory activities of Ofwat and the CMA (see **Section 2.5.1.2** and **Section 2.5.1.3** below). An overview of the main obligations as they apply to Bristol Water is set out in Table 4 below.

Table 4 Summary of key duties applicable to Bristol Water

Item	Key Duty	WIA Section Number
General Duties		
1	Develop and maintain water supply system to meet all demand obligations	Section 37
2	Prepare and develop water resources management plan (WRMP) and review annually	Section 37A
3	Prepare and maintain drought plan	Section 39B
Supply Duties		
4	Comply with mains requisitions for domestic supplies	Section 41
5	Domestic supply connections	Section 45
6	Self lay mains adoption	Section 51A
7	Domestic supply duty	Section 52
8	Non-domestic supply duty	Section 55
9	Pressure and constancy of supply for domestic purposes and hydrants	Section 65
Quality and sufficiency of supply		
10	Wholesomeness of water (without deterioration from source) for domestic use and food production including compliance with Water Supply (Water Quality) Regulations 2000 (as amended)	Sections 67, 68, 69 and 213
Customer Service		
11	Establish and promote customer complaints procedure	Section 86A
12	Promote customers' efficient use of water	Sections 93A and 93B
Information provisions		
13	Keep register relating to consents to discharge	Section 197 (in relation to s166)
14	Keep and maintain access to Waterworks map	Section 198
Miscellaneous		
15	Exchange metering information between undertakers	Section 205
16	Comply with national security or civil emergency directions	Section 208

Source: DDR Appendices Oct 2014 (SOC020), Appendix 2.

2.4.4.1 Long term strategic planning obligations: WRMP

97. The WA '03 introduced a statutory requirement for all water companies to have a long term plan for managing water resources in their area of operation – the WRMP.[41] The WRMP sets out our 25-year approach to balancing supply and demand in light of the social, economic and environmental challenges facing the industry. Customer and stakeholder input is essential to ensuring that the right balance is struck in developing the WRMP. Indeed, the legislation mandates wide consultation, with both a pre-draft WRMP

[41] Section 37 WIA '91. The legal requirements for the WRMP are defined in the *Water Resource Management Plan Regulations 2007 (SI 2007/727)*

plan consultation with stakeholders and a public consultation on the draft WRMP. The process is overseen by the EA with the final WRMP approved by Defra.

98. Defra, along with the EA and Ofwat, has set out guidelines and statutory directions for addressing long term supply demand balance issues through WRMPs, including the Water Resources Planning Guidelines issued in June 2012. The principles behind WRMP guidance are to ensure that future continuity of water supply is maintained in an environmentally sustainable way at the least financial cost over the long term:

> *"Water and Sewage Companies should continue to actively plan for new development and increasing demand on both water and sewerage networks, and to engage with planners, consumers, developers and others to ensure that the system is resilient and capable of supporting sustainable growth."*[42]

99. Clearly, there is room for overlap and interaction between the WRMP and the Business Plan, as well as the roles performed in relation to each by Defra, the EA, the DWI and Ofwat. The Water Resources Planning Guidelines note that the WRMP will be the basis of the assessent of supply-demand balance when considering price limits:

> *"The Government expects Ofwat to use its role as a statutory consultee to identify at an early stage any proposals within a WRMP that would be inconsistent with its approach to the price determination process."*[43]
>
> *"More broadly, the Government expects that Ofwat will engage proactively with the other regulators and take their views into account in formulating its thinking."*[44]

100. Our WRMP formed the basis for our PR14 Business Plan. We engaged in widespread consultation in relation to the WRMP, and all stakeholders, including Ofwat, had the opportunity to comment on the proposals. Of the schemes and suggestions considered in the WRMP, which have subsequently been included in the Business Plan, the only scheme for which Ofwat has disputed the need in the context of FD14 is Cheddar Reservoir Two (see **Section 10.6** below).

2.5 Duties applicable to regulators

101. In exercising and performing the powers and duties set out in the WIA '91 relating to the regulation of water undertakers, including the setting of price controls, or in carrying out a redetermination thereof, Ofwat and the CMA must do so in the manner it considered best calculated to comply with the duties set out in the WIA '91.

102. The WIA '91 duties fall into three main categories:

- the Primary Duties (see **Section 2.5.1** below);
- the Secondary Duties (see **Section 2.5.2** below); and

[42] Defra Strategic Policy Statement March 2013 (SOC030), para. 3.8.2.

[43] Defra Strategic Policy Statement March 2013 (SOC030), para. 2.17.

[44] Defra Strategic Policy Statement March 2013 (SOC030), para. 2.18.

- the duty to comply with principles of best regulatory practice (see **Section 2.5.3** below).

103. Each Primary Duty has equal weight, and no one Primary Duty should take priority over the other Primary Duties. The Secondary Duties are subordinate to the principles contained in the overarching Primary Duties.[45]

2.5.1 Primary Duties

Box 1: The Primary Duties

The Primary Duties	
In accordance with s2(2A) WIA '91, Ofwat must exercise and perform its powers and duties under the WIA '91 in a manner that it considers is best calculated:	
"(a)	*to further the consumer objective;* (see **Section 2.5.1.1** below)
(b)	*to secure that the functions of a water undertaker and of a sewerage undertaker are properly carried out as respects every area of England and Wales;* (see **Section 2.5.1.2** below)
(c)	*to secure that companies holding appointments under Chapter 1 of Part 2 of this Act as relevant undertakers are able (in particular, by securing reasonable returns on their capital) to finance the proper carrying out of those functions;* (see **Section 2.5.1.3** below)
(d)	*to secure that the activities authorised by the licence of a licensed water supplier and any statutory functions imposed on it in consequence of the licence are properly carried out; and*
(e)	*to further the resilience objective"* (see **Section 2.5.1.4** below)

Source: s2 WIA '91.

104. Each of these Primary Duties is considered in greater detail in the following Sections.

[45] The hierarchy between the Primary Duties and the Secondary Duties is well established: Competition Commission Determination Report August 2010 **('CC Determination 2010')** (SOC011) para. 2.10-2.11; Defra Strategic Policy Statement March 2013 (SOC030), p.1 (Duties Summary box); Ofwat Website, 'duties' (SOC315).

2.5.1.1 Further the consumer objective

Box 2: Further the consumer objective (the "Consumer Duty")

The Consumer Duty

In accordance with s2(2A)(a) WIA '91 Ofwat must exercise and perform its powers and duties under the WIA '91 in a manner that it considers is best calculated to further the consumer objective:

"(2B) The consumer objective mentioned in subsection (2A)(a) above is to protect the interests of consumers, wherever appropriate by promoting effective competition between persons engaged in, or in commercial activities connected with, the provision of water and sewerage services.

(2C) For the purposes of subsection (2A)(a) above the Secretary of State or, as the case may be, the Authority shall have regard to the interests of—

(a) individuals who are disabled or chronically sick;

(b) individuals of pensionable age;

(c) individuals with low incomes;

(d) individuals residing in rural areas; and

(e) customers, of companies holding an appointment under Chapter 1 of Part 2 of this Act, whose premises are not eligible to be supplied by a licensed water supplier,

but that is not to be taken as implying that regard may not be had to the interests of other descriptions of consumer.

(5A) In this section—

"consumers" includes both existing and future consumers; and

"the interests of consumers" means the interests of consumers in relation to—

(a) the supply of water by means of a water undertaker's supply system to premises either by water undertakers or by licensed water suppliers acting in their capacity as such; and

(b) the provision of sewerage services by sewerage undertakers."

Source: s2 WIA '91.

105. The Consumer Duty, therefore, requires Ofwat to protect the interests of consumers in relation to their supply of water. In the context of regulation of what is considered an essential service, the need to ensure that consumers are properly protected, and their interests taken into account, has been recognised by all stakeholders within the industry as being of fundamental importance.

106. For PR14, Ofwat has placed the consumer objective at the heart of its regulatory approach (see **Section 4.2.9** below). Bristol Water endorses this emphasis and has embraced the challenge, ensuring that customers have been able to engage on all aspects and at all stages of the development of the Business Plan, from identifying priorities, developing these into outcomes, and translating outcomes into a programme of work (see **Section 6** and **Section 7** below). Our approach to planning, including the use of whole life costs to determine the most cost-beneficial schemes, means that our Business Plan takes into account inter-generational risks and considerations. Given the level of acceptability expressed for our Business Plan through customer research and the endorsement of the LEF, it is clear that it is a plan which reflects and supports consumer's interests at an affordable and appropriate level of cost which is, therefore, consistent with both the language and the spirit of the Consumer Duty.

2.5.1.2 Secure that Bristol Water can properly carry out its functions

Box 3: Secure that functions are properly carried out (the "Functions Duty")

The Functions Duty
In accordance with s2(2A)(b) Ofwat must exercise and perform its powers and duties under the WIA '91 in a manner that it considers is best calculated to secure that Bristol Water's functions as a water undertaker are properly carried out.

Source: s2 WIA '91.

107. As a WoC, Bristol Water's functions in its capacity as a water undertaker under the WIA '91 include the general duty:

> *"s37(1) It shall be the duty of every water undertaker to **develop and maintain an efficient and economical system of water supply** within its area and to ensure that all such arrangements have been made—*
>
> *(a) for **providing supplies of water** to premises in that area and for making such supplies available to persons who demand them; and*
>
> *(b) for **maintaining, improving and extending** the water undertaker's water mains and other pipes,*
>
> *as are necessary for securing that the undertaker is and continues to be able to meet its obligations under this Part." (emphasis added)*

108. In addition, Bristol Water must ensure that that we satisfy water quality standards, meet expected levels of customer service and are able to secure essential water supplies in the event of an emergency. The range of obligations to which we are subject, and which inform the scope of our functions are contained in various pieces of UK and EU legislation, as well as within our Licence. A more detailed description of the range of applicable rules and associated functions for Bristol Water is provided at **Section 2.4** above.

109. In some instances, the manner in which we carry out our functions is a matter for us to determine. For others, such as s19 Undertakings or Reg 28 Notices from the DWI, or the EA Exemption Notice requirements for eel protection, we are obliged to carry out a particular action within a specified timeframe in order to satisfy the obligation (see **Sections 2.4.3.1** and **2.4.3.2** above).

110. All activities included in our Business Plan are considered important components in ensuring that we are able to carry out our functions properly.

111. Clearly, it is a crucial part of Ofwat and the CMA's role to ensure that Bristol Water is able to carry out these functions as a water undertaker. In order to secure this, price controls should ensure that the full range of activities deemed necessary to carry out the functions is accounted for.

112. The Functions Duty is intrinsically linked to the Finance Duty described in the following Section.

2.5.1.3 Secure that Bristol Water can finance its functions

Box 4: Secure that Bristol Water is able to finance the carrying out of its functions (the "Finance Duty")

The Finance Duty

In accordance with s2(2A)(c) Ofwat must exercise and perform its powers and duties under the WIA '91 in a manner that it considers is best calculated to secure that Bristol Water is able, in particular by securing reasonable returns on its capital, to finance the proper carrying out of its functions.

Source: s2 WIA '91.

113. The Finance Duty has three central strands:

- for the return on capital received by Bristol Water to be considered reasonable, it should be at least equal to Bristol Water's cost of capital;[46]
- the opex and capex projections and the cost of debt and equity (and therefore the WACC) should be reasonable;[47]and
- Bristol Water should be able to access sufficient finance to properly carry out its functions - its revenues, profits and cash-flow should enable Bristol Water to raise finance on reasonable terms in the market, whilst complying with its Licence obligation to "*maintain at all times an issuer credit rating which is an Investment grade rating*".[48] [49]

2.5.1.4 Further the resilience objective

Box 5: Further the resilience objective (the "Resilience Duty")

The Resilience Duty

In accordance with s2(2A)(b) Ofwat must exercise and perform its powers and duties under the WIA '91 in a manner that it considers is best calculated to further the resilience objective:

"(2DA) The resilience objective mentioned in subsection 2(2A)(e) is -

(a) to secure the long term resilience of water undertakers' supply systems […] as regards environmental pressures, population growth and changes in consumer behaviour, and

(b) to secure that undertakers take steps for the purpose of enabling them to meet, in the long term, the need for the supply of water […] to consumers,

including by promoting –

(i) appropriate long term planning and investment by relevant undertakers, and

(ii) the taking by them of a range of measures to manage water resources in sustainable ways, and to increase efficiency in the use of water and reduce demand for water so as to reduce pressure on water resources."

Source: s2 WIA '91.

114. The Resilience Duty is a recent introduction, and as such there has been little formal interpretation of its scope. It is clear, however, that it envisages long term planning by companies to ensure that their networks and supply systems will be able to withstand all

[46] CC Determination 2010 (SOC011), para. 9.2.

[47] CC Determination 2010 (SOC011), para. 10.9.

[48] Bristol Water Licence Condition F6A.6 (SOC029). See **Section 2.4.2** above for further details.

[49] CC Determination 2010 (SOC011), para. 10.9.

challenges and hazards, including floods, droughts and other weather events, as well as taking action to influence customer demand and water usage patterns.[50]

115. In this context, the Resilience Duty is clearly informed by the conclusions of the Pitt Review, which was commissioned in response to the 2007 floods that severely disrupted water supplies to approximately 300,000 people in Gloucestershire for up to three weeks.[51] The Pitt Review called for a more systematic approach to building resilience into critical infrastructure to improve the overall resilience of essential services, especially to disruption from natural hazards.

116. Another key driver for the Resilience Duty was the Government's concern about the 2012 drought, which occurred immediately prior to the wettest summer ever.

> *"The water White Paper that we published in 2011 articulated a powerful case for planning now to protect the resilience of our future water supplies. That message was underscored by the events of last year. In 2012 there was flooding on one day out of five, and drought on one day out of four. There were 6,000 flood warnings and alerts, and hosepipe bans affected more than 20 million people. We need to take account of the impact of environmental pressures, population growth and patterns of demand on essential services; to reduce pressure on the water environment that we all rely on; and to reform the aspects of the system that institutionalise short term thinking, focusing instead on long term resilience.*
>
> *To support the required change in behaviour, the clause creates a new primary duty to further the resilience objective. It has been given wide scope, to recognise the fact that water resources are managed in the natural environment and to reflect the need for innovative solutions, demand management and planning and investment that look to the long term."*[52]

117. At a broader level, the Resilience Duty links to the Government's guidance on improving the resilience of critical infrastructure and essential services, which categorises the water sector as one of nine sectors providing essential services upon which daily life depends.[53] That guidance indicates that there are four main components of infrastructure resilience: resistance; reliability; redundancy; and response and recovery.[54] Each of these will play a

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50 Ofwat published some guidance on resilience planning in the context of outcomes-focused regulation in May 2012 - 'Resilience - outcome focused regulation - principles for resilience planning' Ofwat and Mott MacDonald, May 2012 **('Ofwat and MM - Reslience, Outcome focussed regulation May 12')** (SOC035).

51 Learning lessons from the 2007 floods full report, The Pitt Review June 2008 **('Pitt 2007 Flood Report June 2008')** (SOC033).

52 Dan Rogerson, Parliamentary Under-Secretary of State for Environment, Food and Rural Affairs, Public Bill Committee, Tuesday 10 December 2013

53 Natural Hazards and Infrastructure - A guide to improve resilience of critical infrastructure 2011 **('Infrastructure Resilience Guidance 2011')** (SOC034), Section 2.2.

54 Infrastructure Resilience Guidance 2011, (SOC034), Section 2.11.

role when assessing future compliance with the Resilience Duty, and have formed part of Bristol Water's approach to resilience.[55]

118. Bristol Water has taken a layered approach to resilience in its Business Plan, ensuring that broad, relatively straightforward and low cost options are implemented where they can be effective and realistic. This includes considering potential supplies from neighbouring companies.[56] Only when all such practical mitigations are in place do we consider implementing significant capital schemes to mitigate resilient supply risk.[57] In taking this approach we have followed relevant guidance, and learnt from past experience.[58] Whilst five resilience options were put forward for detailed assessment, only one resilience scheme has been included in the Business Plan for completion in AMP6 as part of the resilience outcome – the Southern Resilience Scheme (see **Section 10.2.2.4.2** below).

119. The broader aspects of the Resilience Duty, such as the need to prepare for the impact of future population growth, are reflected in Bristol Water's planning growth for AMP6 and beyond, with relevant schemes including the construction of the Cheddar Reservoir Two (see **Section 10.2.3** below).

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55 Resilient Supply – Supporting Information, Level 3 Wholesale Plan December Submission **('Resilient Supply - December Plan')** (SOC037), p.3.

56 Resilient Supply December Plan (SOC037), p.8.

57 Resilient Supply December Plan (SOC037), p.1.

58 Our FBP09 identified major resilience schemes that would have benefitted over 670,000 consumers. Planned delivery of these schemes spanned AMP5 and AMP6 periods with a total capital expenditure of £104m (2007/08 prices). Of these, we received support only for the Durdham Down scheme designed to provide supply resilience to 184,700 people living in Bristol, which has now been successfully delivered on time and within budget. One of the schemes not supported, designed to provide approximately 10,000 people living in the Tetbury supply zone with improved resilience, was considered by us to be of sufficient importance that delivery of this scheme was funded by Bristol Water and has been successfully completed during AMP5 (see also **Section 3.6** below).

2.5.2 Secondary Duties

Box 6: The Secondary Duties

The Secondary Duties

In accordance with s2(3) WIA '91, Ofwat must exercise and perform its powers and duties under the WIA '91 in a manner that it considers is best calculated:

*"(a) to promote economy and efficiency on the part of companies holding appointments under Chapter 1 of Part 2 of this Act in the carrying out of the functions of a relevant undertaker; (*see **Section 2.5.2.1** below)

(b) to secure that no undue preference is shown, and that there is no undue discrimination in the fixing by such companies of water and drainage charges;

(ba) to secure that no undue preference (including for itself) is shown, and that there is no undue discrimination, in the doing by such a company of

(i) such things as relate to the provision of services by itself or another such company, or

(ii) such things as relate to the provision of services by a water supply licensee or a sewerage licensee;

(c) to secure that consumers are protected as respects benefits that could be secured for them by the application in any particular manner of any of the proceeds of any disposal whenever made) of any such of a company's protected land or of an interest or right in or over any of that land;

(d) to ensure that consumers are also protected as respects any activities of such a company which are not attributable to the exercise of functions of a relevant undertaker, or as respects any activities of any person appearing to the Secretary of State or (as the case may be) the Authority to be connected with the company, and in particular by ensuring –

(i) that any transactions are carried out at arm's length;

(ii) that the company, in relation to the exercise of its functions as a relevant undertaker, maintains and presents accounts in a suitable form and manner;

(iii) that, if the person is a licensed water supplier, its licence does not authorise it to carry on any activities in the area of the company;

(e) to contribute to the achievement of sustainable development." (see **Section 2.5.2.2** below)

Source: s2 WIA '91.

120. The two most commonly referenced Secondary Duties are considered in the following Sections.

2.5.2.1 Promote economy and efficiency

Box 7: Promote economy and efficiency on the part of companies (the "Efficiency Duty")

The Efficiency Duty

In accordance with s2(3) WIA '91 Ofwat must exercise and perform its powers and duties under the WIA '91 in a manner that it considers is best calculated to promote economy and efficiency on the part of Bristol Water in the carrying out of its functions.

Source: s2 WIA '91.

121. Ofwat has a Secondary Duty to promote efficiency under Section 2(3)(a), WIA '91. Combined with Ofwat's Primary Duty to protect the interests of consumers, this means that a demonstrably inefficient company should not be allowed to pass on the costs of such inefficiency to customers for an extended period. As such, price regulation is intended to ensure that companies are sensibly challenged to achieve improved efficiency in relation to costs incurred.

2.5.2.2 Contribute to sustainable development

Box 8: Contribute to the achievement of sustainable development (the "Sustainability Duty)

The Sustainability Duty
In accordance with s2(3) WIA '91 Ofwat must exercise and perform its powers and duties under the WIA '91 in a manner that it considers is best calculated to contribute to the achievement of sustainable development.

Source: s2 WIA '91.

122. Guidance on how the Sustainability Duty can be met is contained in the Defra Strategic Policy Statement, which incorporates Defra's social and environmental guidance to Ofwat. This guidance is clearly influenced by the Water White Paper and the NE White Paper which set out a vision and strategic direction for the future of the sector. The Defra Strategic Policy Statement states that the Sustainability Duty requires Ofwat "*to act in accordance with the Government's vision for the long term interests of our economy. In practice this means encouraging companies to develop business plans and invest in outcomes that support growth, whilst continuing to ensure they meet the needs of their current and future customers*."[59]

123. In particular, the Sustainability Duty is framed by reference to Ofwat's five sustainability principles which are aimed at ensuring:

- a safe and reliable water and sewerage service for consumers that minimises the impacts on the environment now and in the future;
- consumers continue to get a fair deal and receive a level of service that consistently meets their needs;
- financially robust sectors that are able to meet consumers' needs at a fair cost, into the future;
- companies that remain accountable to their customers; and
- use of the best available information to support decision making.[60]

124. This is consistent with the approach taken by Bristol Water in the context of its Business Plan and WRMP, for example in relation to the growth schemes generally, and Cheddar Reservoir Two in particular (see **Section 10.2.2.3** below).

2.5.2.3 Best Regulatory Practice

Box 9: Duty to have regard to principles of best regulatory practice (the "General Duty")

The General Duty
The General Duty provides that:
"2(4) In exercising any of the powers or performing any of the duties mentioned in subsection (1) above in accordance with the preceding provisions of this section, the Secretary of State and the Authority shall have regard to the principles of best regulatory practice (including the principles under which regulatory activities should be transparent, accountable, proportionate, consistent and targeted only at cases in which action is needed)."

Source: s2 WIA '91.

[59] Defra Strategic Policy Statement 2013 (SOC030), para. 2.12.

[60] Ofwat Website, 'Sustainability' (SOC313).

125. In establishing the framework for PR14, and implementing its review, Ofwat is obliged to have regard to these principles of best regulatory practice, which echo the principles of good regulation initially defined by the Better Regulation Taskforce in 1997. These principles have since been supplemented by various pieces of guidance, including the BIS Principles[61] and the Defra Strategic Policy Statement.[62] The BIS Principles are similar to those in WIA '91, and are: accountability; focus; predictability; coherence; adaptability and efficiency.[63]

126. The Defra Strategic Policy Statement represents the way in which the BIS Principles are intended to be applied to the water sector.[64] In particular, it set out the following priorities for regulation of the water industry which the Government expects Ofwat to reflect in its decision making.

Table 5: Regulatory Priorities

An innovative water sector in a transparent and predictable regulatory regime	Ensuring that the water sector remains an attractive investment prospect
Supporting economic growth	**A sustainable and resilient water sector**
Effective engagement with other regulators and stakeholders	**Taking decisions in the long-term interests of society, environment and economy**
Intergenerational equity: long term vs. short term investment	**Ecosystems services – commitment to catchment management**
Managing water resources effectively	**National Environmental Programme (NEP)**
A customer-focused water sector	**A fair deal for customers**
Extra support for vulnerable customers and those who struggle to pay	**Increasing choice and improving service through competition**

Source: Defra Strategic Policy Statement (see SOC030)

127. As discussed in **Section 2.6** below, since PR09 there have been some major shifts in the approach to economic regulation generally, and price controls specifically. The CMA will need to judge for itself whether the nature of the changes, such as the use of new methodologies and models, and the way in which these tools have been used by Ofwat, is consistent with the principles of best regulatory practice (see, for example, **Section 11**). To the extent that the CMA has doubts in this regard, then the CMA should use its discretion to adopt the methodology and model that it considers will achieve the right outcome for this redetermination in light of the Primary Duties with reference, where required, to the Secondary Duties detailed above.

2.6 Economic Regulation

128. The purpose of this Section is to provide an overview of what is meant by economic regulation, and how its application to the water sector has evolved in recent years, with particular reference to the regulatory framework that underpins PR14 and this redetermination.

[61] BIS principles for economic regulation 2011 **('BIS Principles 2011')** (SOC038).

[62] Defra Strategic Policy Statement 2013 (SOC030).

[63] BIS Principles 2011 (SOC038), p.4.

[64] BIS Principles 2011 (see SOC038), p.13.

129. The nature of the water industry in England and Wales is such that each water company operates as a monopoly supplier within its defined region.[65] In the absence of normal market competition acting as a constraint on pricing, economic regulation of the water industry takes place primarily in the form of price controls set by Ofwat in accordance with the WIA '91 and the provisions of each company's licence.

130. The first price control was initially set for ten years from 1 April 1990. Subsequently the frequency of periodic price reviews was changed to every five years. The first review took place in 1994, and has been reviewed on a five-yearly basis since then.

2.6.1 Review of the approach to economic regulation

131. Following PR09, Ofwat undertook a wide-ranging in-depth review of its approach to economic regulation to see if it was fit for purpose in light of the challenges facing the sector.

132. At the same time, a number of independent reviews into the sector also took place:

- the **Pitt Review** – a review of the 2007 floods chaired by Sir Michael Pitt, which identified lessons from those floods (see **Section 3.3.2** below);[66]
- the **Cave Review** – a review of competition and innovation in water markets chaired by Professor Martin Cave, which examined the role that competition and innovation could play in ensuring the sector has the solutions and tools necessary to meet the challenges of the future;[67]
- the **Walker Review** – a review of charging for household water and sewerage services chaired by Anna Walker, which examined fair and sustainable charging for these services;[68] and
- the **Gray Review** – a review of Ofwat and consumer representation in the water sector, commissioned by Defra and led by David Gray, which assessed whether Ofwat was fit to face the challenges of the future.[69]

133. These reviews contributed to the development of the Government's Water White Paper '*Water for Life*' which was published in December 2011.[70] It sets out the challenge of increased water scarcity due to climate change and demographic trends and highlights an

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[65] There are some circumstances in which the incumbent company will not be the supplier, such as private supplies and inset appointments. For some non-household large users, the customer-facing entity will be a water supply licensee.

[66] Pitt 2007 floods report June 2008 (SOC033).

[67] Independent review of competition and innovation in water markets: Final Report Prof Martin Cave April 2009 **('Cave review of competition and innovation 2009')** (SOC055).

[68] The Independent review of charging for household water and sewerage services final report Anna Walker, December 2009 **('Walker review of charging for households 2009')** (SOC056).

[69] Review of Ofwat and consumer representation in the water sector David Gray, July 2011 **('Gray review of Ofwat and consumer representation 2011')** (SOC057).

[70] 'Water for Life' White Paper 2011 (SOC177).

increased emphasis on resilience, long term planning and customer focus. It also develops an ecosystems approach in the context of the water environment.[71]

134. In order to prepare for PR14, Ofwat embarked on its '*Future Price Limits*' project. This project considered reforms to what price controls look like, how price controls are set, and the approach to business planning. The Future Price Limits project considered the various reviews mentioned above and the Water White Paper, and developed a vision for a new framework for economic regulation. It concluded that whilst many of the specific tools used by Ofwat remained valid and effective, broader changes to the approach to setting price limits were needed in order to be able to deliver continued efficiency gains and improvements in service standards to customers. This is because whilst the environment in which the sector operates has changed substantially in the 22 years since privatisation, with more changes ahead, the framework for price controls had remained largely static. Ofwat stated:

> *"it has become too inflexible, opaque and potentially confusing to deliver sustainable benefits in a less certain future".*[72]

135. Given the importance, however, of stability, consistency and transparency within the sector to reassure investors, Ofwat acknowledged that this should be an evolutionary process, not a revolutionary one.[73]

136. Based on this learning, Ofwat identified the following challenges as being crucial to any evolution of the framework:

- **climate change** - which increases the risk of water scarcity and flooding risk in the future, as well as requiring us to find new, lower-carbon ways to deliver the outcomes we need;
- **population growth and the number of smaller households** - particularly in areas where water is already scarce. This further increases the risk of water scarcity and flooding in urban areas;
- **rising customer expectations and growing affordability issues** - both of which imply a need to ensure that regulation facilitates better customer-facing outcomes; and
- **stringent environmental standards** - efficient compliance highlights the need for innovation as well as the continuing importance of being able to attract investment.[74]

137. Ofwat considered that to achieve and maintain sustainable water and sewerage services it would need to:

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[71] See also: 'The Natural Choice', Natural Environment White Paper, June 2011 **('The Natural Choice White Paper 2011')** (SOC058), which established the Government's commitment to taking an ecosystems approach to integrate environmental management on both land and water.

[72] Ofwat, Future price limits - a consultation on the framework **('FPL - consultation on framework 2011')** (SOC059), p.8

[73] FPL - consultation on framework 2011 (SOC059), p.8.

[74] FPL - consultation on framework 2011 (SOC059), p.8.

- **incentivise more efficient use of water** - to help address water scarcity issues arising from climate change and population growth;
- **facilitate better customer-facing outcomes** - to address changing consumer expectations and issues of affordability;
- **continue to enable efficient investment in the sectors** - at a low cost of capital to deliver what seems likely to be a continuing large capital expenditure programme;
- **help to tackle climate change** - by enabling the companies to deliver service in an efficient and low-carbon way, or by contributing to national emissions targets when in the interests of customers; and
- **reduce the burden of the price control process** - while giving the companies scope and incentives to innovate by moving away from an overly prescriptive, rules-based approach towards a simpler, incentive-based regulatory framework that gives the companies room to innovate and seek different ways of delivering the outcomes we need.[75]

138. A key outcome of this process was Ofwat's conclusion that it should set separate price controls for retail and wholesale services to create stronger and more targeted incentives on the customer facing services companies provide. This should drive companies to deliver better customer service at a lower cost, whilst also encouraging greater efficiencies within the wholesale business. To give effect to such a change, it was necessary to revise Licence Condition B which sets out the price control framework. The new framework, which was introduced by way of a licence modification in 2013, is detailed in **Section 2.8** below.

139. Further guidance on how the framework could be shaped, how change could be introduced, and how Ofwat should regulate the industry was provided by Defra in November 2012 in its '*Strategic Policy Statement*'[76] for Ofwat, which expands on the general '*Principles for Economic Regulation*'[77] identified by BIS in 2011, and sets out the following priorities for regulation of the water industry which the Government expects Ofwat to reflect in its decision making:

- an innovative water sector in a transparent and predictable regulatory regime:
  - a transparent and predictable regulatory regime, ensuring that the water sector remains an attractive investment prospect;[78]
  - supporting economic growth; and
  - effective engagement with other regulators and stakeholders.[79]

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75 FPL - consultation on framework 2011 (SOC059), p.8.

76 Defra Strategic Policy Statement 2013 (SOC030).

77 BIS principles 2011 (SOC038).

78 "The framework for economic regulation should provide a stable and objective environment enabling all those affected to anticipate the context for future decisions and to make long term investment decisions with confidence", and "the framework of economic regulation should not unreasonably unravel past decisions, and should allow efficiency and necessary investments to receive a reasonable return, subject to the normal risks inherent in markets". At the same time "the framework of economic regulation needs capacity to evolve to respond to changing circumstances and continue to be relevant and effective over time": BIS Principles 2011 (SOC038), p.5.

- a sustainable and resilient water sector:
    - Ofwat's sustainability duty – taking decisions in the long term interests of society, environment and economy;
    - intergenerational equity: long term vs. short term investment;
    - ecosystems services – commitment to catchment management;
    - managing water resources effectively; and
    - specific schemes in the NEP.
- a customer-focused water sector:[80]
    - a fair deal for customers;
    - extra support for vulnerable customers and those who struggle to pay; and
    - increasing choice and improving service through competition.

140. These principles and policy drivers have been important factors in the development of the specific framework for the PR14 periodic review, including in particular the focus on customer engagement, outcomes and the role of 'totex'. Details of the PR14 methodology are set out in **Section 4** below.

141. Ofwat's FD14 has to be viewed through the prism of these policy pronouncements.

2.7 Concept of price controls

142. The purpose of this Section is to provide an explanation of the concept of price controls, and details of the price control framework for water companies as set out in the Licence.

143. Price controls are a key tool within the economic regulatory toolkit. The system of price controls is intended to allow water companies sufficient revenue in order to finance the efficiently costed activities necessary to meet their statutory duties, whilst also incentivising future efficiency improvements (see **Section 2.5** above).

144. The price control needs to reflect, therefore, a number of factors including the scale of a company's capital investment programme relating to both maintenance and enhancement works, its cost of capital and its operational and overhead costs, together with the scope for a company to improve its efficiency. In particular, price limits need to be sufficient to allow the water companies to:

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[79] In this respect, Defra advocates a spirit of evolution, rather than revolution: "Where Ofwat introduces reforms to its regulatory framework, Government expects these to deliver clear benefits to customers. Reform should be well signalled, based on solid evidence and introduced at a measured pace. This should build on the recognised strengths of the existing regime, avoiding unnecessary uncertainty and respecting the fundamental principle that policy decisions are a matter for Government.": Defra Strategic Policy Statement 2013 (SOC030), para. 2.5.

[80] "The Water White Paper puts customers at the heart of decision-making in the water sector. In 2011 Ofwat published 'Involving customers in decisions about water and sewerage services' which set out the key principle that, where a company can demonstrate effective customer engagement and widespread support for a well evidenced business plan that delivers value to customers, Ofwat will subject that plan to a lower degree of scrutiny. The Government supports this approach and expects Ofwat to incentivise companies to listen to their customers and deliver affordable and innovative services that reflect their changing expectations. In considering information about customer willingness to pay, Ofwat will need to balance their responsibilities to both current and future customers." Defra Strategic Policy Statement 2013 (SOC030), para. 4.12.

- finance their functions (and be able to raise sufficient capital to enable this);
- run their businesses day-to-day to meet all service, quality and environmental compliance obligations;
- maintain asset systems for current and future customers;
- ensure a sufficient balance between supply and demand for both services;
- meet drinking water standards;
- meet obligations on environmental improvements decided by Ministers; and
- make other desirable drinking water quality, service and environmental improvements.

145. Historically, Ofwat has set a single price control in the form of 'K'.[81] As part of the overall package of reform, however, the Licence conditions which establish the price control framework were modified in 2013 to allow for a variable approach in future price controls. Details of that new framework are provided in the following Section (see Section 2.8). A key feature of the new framework is that it allows Ofwat a degree of flexibility in the context of each periodic review of those price controls to design exactly what the price control will look like. Ofwat's approach to price controls for PR14, and a description of how it arrived at its preferred methodology, is provided in **Section 4** below.

2.8 Licence framework for price controls for PR14

146. The purpose of Condition B of the Licence is to empower Ofwat to make determinations to set Price Controls in respect of the charges to be levied by and/or revenue allowed to a water company for the supply of water services,[82] and to carry out Periodic Reviews to assess whether one or more of the Price Controls should be changed.[83] Bristol Water is obligated to levy charges in a way best calculated to comply with the Price Control(s) determined by Ofwat.[84]

147. Under Condition B Part I of Bristol Water's Licence, "Price Control" is defined as:

> *"a control set by the Water Services Regulation Authority, pursuant to a Periodic Review or an Interim Determination, or deemed to be so set by virtue of sub-paragraph 15.2, in respect of the charges to be levied by and/or revenue allowed to an Appointed Business or any part thereof (having regard to its costs) and such matters ancillary to the said control, by way of a determination pursuant to this Condition."*

[81] To reach K, Ofwat would review a company's business plan and assess its future revenue needs. It would make assumptions about the efficient capex and opex required for the company to carry out its functions and meets its planned capital programme. Ofwat also made assumptions about the cost of borrowing, capital charges, and future operating and capital efficiency savings. Ofwat then set price limits by forecasting the revenue needed to run the business efficiently based on those assumptions. It then compared this with the revenue the company would receive if its revenue only changed in line with the Retail Prices Index (**RPI**). The difference then provided the value for K in each of the relevant years of the price control period.

[82] Bristol Water Licence (SOC029), Licence Condition B.1.1

[83] Bristol Water Licence (SOC029), Licence Condition B.1.2

[84] Bristol Water Licence (SOC029), Licence Condition B.8.1

148. "Periodic Review" is defined as:

> *"a review conducted by the Water Services Regulation Authority for the purpose of determining one or more Price Controls in accordance with Part III of Condition B, but so that references in Part IV of Condition B to a Periodic Review shall exclude any review carried out under paragraph 10 of that Condition and shall include the determination by the Competition and Markets Authority of the relevant questions or, as the case may be, the disputed determination referred to it under paragraph 15 of Condition B".*

149. As noted above, Licence Condition B underwent a considerable modification in 2013, moving from a single price control to multiple price controls for wholesale and retail activities.

150. The Licence goes on to separately set out the scope of the periodic review in the context of Retail Activities and Wholesale Activities. The relevant rules are set out in Table 6 below.

Table 6 Comparison of Periodic Review for Wholesale and Retail Activities

Periodic Review	
Wholesale Activities	**Retail Activities**
Definition: Licence B.2 "Wholesale Activities" means all activities undertaken as part of the Appointed Business apart from Retail Activities.	**Definition: Licence B.2** "Retail Activities" means such activities that constitute the provision of goods or services by the Appointee directly to one or more End-Users, and such activities ancillary to such provision including ownership of meters, and that are so designated from time to time (which designation, for the avoidance of doubt, shall be reversible) by the Water Services Regulation Authority or by such person or persons as may be nominated by the Water Services Regulation Authority to do so, but for the avoidance of doubt shall not include the following: (a) water resources, raw water distribution, water treatment or treated water distribution (as each of those is defined in the Water Services Regulation Authority's Regulatory Accounting Guideline 4.04); or (b) in so far as the ownership of meters is so designated, the ownership of meters that were installed at, or in order to measure supplies to, End-Users' premises on or before the date of such designation.
Issues to be determined: Licence B.8.4 **(1) one single Price Control, such Price Control consisting of, in each Charging Year:** **(a) the percentage change (expressed, in the case of an increase, as a positive number, in the case of a decrease, as a negative number, and, in the case of no change, as zero) in the Retail Prices Index between that published for the month of November in the Prior Year and that published for the immediately preceding November; and**	**Issues to be determined: Licence B.8.3** (1) what is the appropriate nature, form and level of one or more Price Controls in respect of the relevant part or parts of the Appointed Business; (2) how the Appointee shall, in respect of each such Price Control applicable to it, demonstrate the compliance referred to in sub-paragraph 8.1; and (3) for how long each such Price Control in respect of the Appointee shall last (being a period of consecutive Charging Years).

(b) a number, "K", which may be a positive number or a negative number or zero **which together shall be expressed as a percentage, and which shall limit the change in the charges to be levied by and/or revenue allowed to the Appointed Business in each Charging Year in respect of the Wholesale Activities concerned; and** **(2) how the Appointee shall, in respect of each such Price Control applicable to it, demonstrate the compliance referred to in sub-paragraph 8.1.**	
Duration: Licence B.8.6 **Each Price Control determined under sub-paragraph 8.4 pursuant to a Periodic Review shall be set:** **(1) for the five consecutive Charging Years starting on 1 April 2015; and** **(2) thereafter, for each period of five consecutive Charging Years starting on the fifth anniversary of the first day of the period in respect of which the immediately preceding Periodic Review was carried out.**	**Duration: Licence B.8.5** Each Price Control determined under sub-paragraph 8.3 pursuant to a Periodic Review shall be set for a period which shall be a number of Charging Years to be determined by the Water Services Regulation Authority, in conjunction with its determination pursuant to sub-paragraph 8.3, in each case starting on 1 April, with the first such period starting on 1 April 2015, provided that no such period shall exceed five consecutive Charging Years.

151. As Table 6 indicates, Bristol Water's Licence provides for a single five-year price control for wholesale activities in the supply of water. It also permits Ofwat to set multiple price controls for retail services - the nature, form, level and duration of which will be determined as part of the periodic review process.

152. It was considered that the flexibility of multiple price controls would allow Ofwat and companies to respond to the challenges they face in future years, as well as creating the ability to use appropriately targeted controls and incentives for the different parts of each companies' business.[85] It is also clear that in the future, these controls may be set independently for differing periods, therefore creating different rhythms of review for each control.

153. PR14 is the first price review in which this new framework for multiple price controls has been used. For Bristol Water, Ofwat has set three price controls:

- a five year price control for Wholesale activities;
- a five year price control for Retail Household activities; and
- a two year price control for Retail Non-Household activities.

154. Bristol Water's Board accepted the two retail price controls, but rejected the wholesale price control. In making a decision on each price control separately, we were mindful of the structure within the Licence, and the way in which the price controls might be set in future years, as well as the following guidance from Ofwat which was provided in the DD14 and confirmed in FD14:

[85] The mechanism for interim determinations of these price controls has been retained in the modified Condition B Part IV of the Licence (SOC029).

"As we explained in our final methodology statement, these separate controls are binding, confirmed through the modifications already made to the price setting elements of companies' licence conditions. This means that the companies cannot recover more revenue than allowed under each specific price control and cannot transfer costs between the controls. The revenue allowance for each price control is determined by the costs specific to that particular price control. This provides the companies with more effective incentives. It also helps to avoid distortion to the nonhousehold market, which will be fully open to competition from 2017, as provided for in the Water Act 2014."[86]

2.9 Conclusions on regulatory framework

155. In carrying out its redetermination, the CMA will fulfil its Statutory Duties, and achieve the right balance between the Primary and Secondary Duties and the sometimes competing interests those duties are intended to protect.

156. The water industry is highly regulated at both an operational and economic level. This impacts on the way that Bristol Water runs its business on a day-to-day basis, as well as on its approach to strategic business planning. In particular, the range of regulatory and legislative obligations to which Bristol Water is subject also informs the scope of the functions that it needs to be financed to carry out in accordance with the Functions Duty and Finance Duty.

157. The changes to the PR14 framework, and the methodology Ofwat has developed, place customers at the heart of the process. This has lead to PR14 being very different in many respects, both substantive and procedural, from past price reviews (see **Section 4** below). By embracing the changes throughout its approach to PR14, Bristol Water has ensured that it has a developed a Business Plan that reflects the requirements of the Resilience and Sustainability Duties, and which satisfies the Consumer Duty. The challenges it has placed on itself through cost assessment and benchmarking also ensures that the Efficiency Duty is met by Bristol Water's Business Plan. This is demonstrated in the following Sections that describe Bristol Water's approach in more detail (see for instance **Section 6, Section 7** and **Section 9**).

[86] Final Price Control Determination Notice: Company Specific Appendix - Bristol Water **('Bristol Final Determination')** (SOC229), p.4.

3 Background to Bristol Water

3.1 Executive summary

3.1.1 Introduction

158. This Section provides an introduction to Bristol Water, its corporate background, operational structure and how the business is run. In particular, it aims to help the CMA to put Bristol Water's Business Plan and this redetermination in its proper context by providing some essential background information in relation to the characteristics of the region in which Bristol Water operates including details of Bristol Water's raw water sources, treatment requirements and distribution network. This should help the CMA to understand some of the drivers behind the proposals contained in the Business Plan, particularly in relation to ongoing maintenance and future enhancement.

159. Where relevant, it also provides an update on changes to Bristol Water since it last appeared before the CC in 2010, and outlines how Bristol Water has performed during AMP5 relative to its FBP09 and the CC10 redetermination.

3.1.2 Key themes

160. Bristol Water is a Water Only Company (**WoC**) based in the South West of the UK, supplying water to over 1.2 million people and businesses. Over 56% of the properties supplied are situated in the large complex urban area of Bristol, which alongside other urban areas accounts for just 11% of the total region supplied by Bristol Water.

161. Bristol Water is a well-managed company, with a management team that understands its business thoroughly, and a Board that provides strategic leadership and effective governance. It plays a strong role in the local community, and is committed to delivering its services responsibly, sustainably and efficiently.

162. Whilst all water companies are subject to the same regulatory framework (see **Section 2** above), each company faces its own unique set of circumstances relating to the region in which it operates, and the local characteristics of supply and demand. This is set against the company's background and its historic investment profile. The application of the regulatory framework, particularly in the context of setting price controls, should take account of these differences where it is appropriate to do so.

163. Bristol Water obtains around 45% of its raw water resources from river abstraction, the majority of which comes from the Sharpness Canal and which is of variable and often poor quality. The quality issues mean that the complexity of the water treatment Bristol Water has to carry out is increased, with over 98% of Bristol Water's water being supplied from a treatment works classified as highly complex. This is around 10% higher than the industry average, and means that Bristol Water's associated operating and capital costs for water quality treatment are higher than average.

164. The Bristol Water region is hilly, which impacts on its ability to move water around the network. In particular, it means that Bristol Water needs a large number of pumping

stations. As Bristol Water's pumping requirements are slightly higher than average, its associated maintenance costs are also likely to be slightly higher than average.

165. The age of a company's asset base has an impact on the levels of operational maintenance required, as well as driving the need for replacement. Bristol Water's asset base is significantly older than the industry average, and it has the second oldest mains network in the UK. As such, its associated maintenance costs are likely to be higher than the industry average.

166. The combination of these factors presents some real issues for Bristol Water, which has implications for the scope of activities required to continue delivering the expected levels of service and quality, as well as the associated cost implications. As set out in **Sections 9.4** and **9.5** below, disaggregated models conclude that overall Bristol Water's maintenance costs should be £44m higher than the average cost per population supplied, taking into account impact of water quality, topography, demographics and age of assets. This indicates that Bristol Water's particular characteristics do have a real impact on its costs, but as is demonstrated in **Section 11**, this is not reflected in the cost assessment approach utilised by Ofwat for PR14.

167. During AMP5, Bristol Water has performed well and met all of its performance targets. It has coped with challenging circumstances at times, including the substantial flooding in 2012 and 2014, and has delivered all the major outputs required as part of the PR09 programme embodied in the CC10 redetermination. It has done this whilst spending at a level that is consistent with the expenditure assumptions contained in CC10. Bristol Water has also been responsive to the concerns of customers regarding resilience, as well as the needs of the network, and has actually increased the scope of the programme delivered in AMP5 to include an extended mains replacement scheme to provide resilience for Tetbury – a scheme included in Bristol Water's FBP09 for PR09, but not funded under the CC10 redetermination (see **Section 3.6.3.4** below)

3.1.3 Structure of Section

168. In particular, it provides:

- **corporate background and structure -** an overview of Bristol Water's corporate background and organisational structure, including details of how the Company is run at a strategic and operational level (see **Section 3.2**);
- **features of region** - a description of the key features of Bristol Water's region, including its geography, geology and hydrology, topography and demographics, and what impact this has on the risk of flooding and other incidents (see **Section 3.3**);
- **supply network characteristics -** the characteristics of Bristol Water's supply network (see **Section 3.4**);
- **demand profile** - the nature of the demand profile served by Bristol Water (see **Section 3.5**);
- **CC10 impact and AMP5 performance** - a discussion of the impact of the CC10 redetermination of the PR09 price control, lessons learnt from that process, and

a description of how Bristol Water has performed during AMP5 against the CC10 assumptions, showing that Bristol Water's financial returns were consistent with CC10 expectations (see **Section 3.6**).

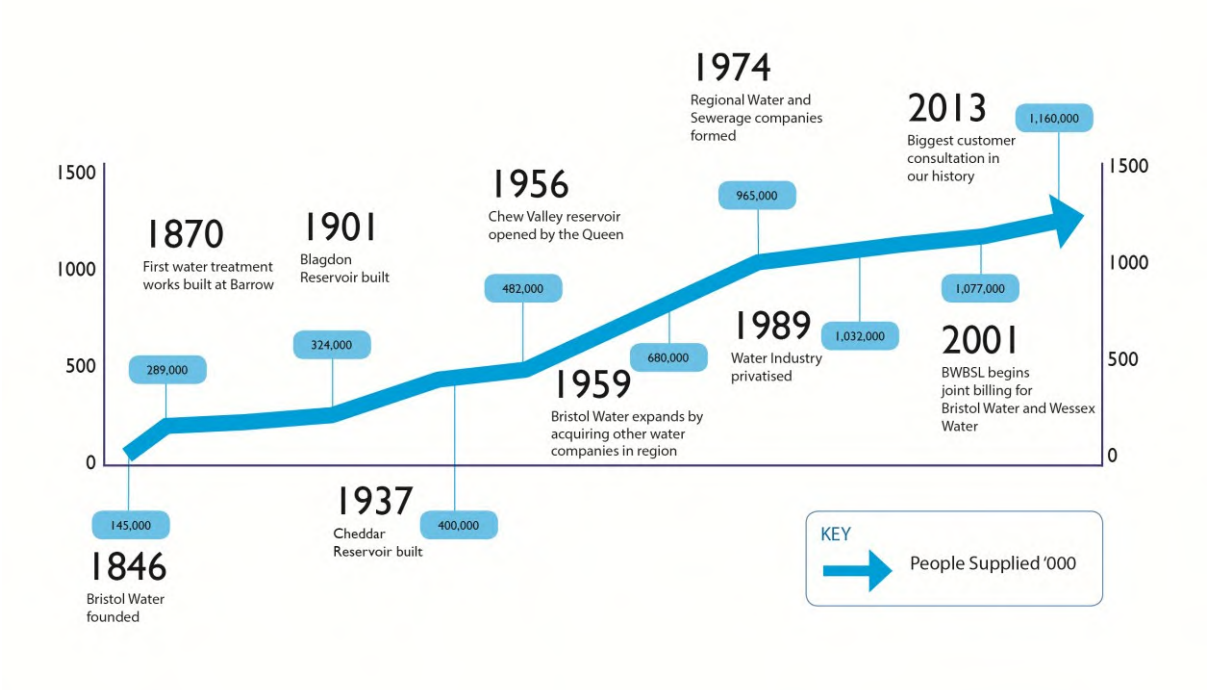
3.2 Corporate background and organisational structure

169. This sub-section provides information on Bristol Water's corporate history and current corporate and organisational structure.

3.2.1 Corporate History

170. Bristol Water, as it exists today, is the result of almost 170 years of amalgamation of independent water undertakings within the current Bristol Water supply region.[87] Throughout our history, we have been a private company, initially as a Statutory Water Company and then as a Stock Exchange listed "plc" on conversion in 1991. Indeed, we are one of the oldest independent Water Companies still operational today. This Section provides a brief overview of our origins and development as demonstrated in Figure 2 below.[88]

Figure 2: Bristol Water's Development



Source: June Business Plan[89]

171. The Bristol Waterworks Company was incorporated as a statutory company by Act of Parliament in 1846. Originally focused on supplying Bristol itself with clean water, it developed a number of raw water sources, including a reservoir at Barrow Gurney, and

87 Bristol Water's registered number is 2662226.

88 For readers interested in a more detailed history of Bristol Water see The History of Bristol Waterworks Company 1846-1946 ('**Bristol Water 1846-1946**') (SOC041); The Story of Bristol Waterworks Company 1939-1991('**Bristol Water 1939-1991**') (SOC042). For a summary of that history, please see: Bristol Water Website, 'our history' (SOC321).

89 Bristol Water PR14 Business Plan overview June 2014 ('**June Business Plan**') (SOC001)

embarked on a programme of building the relevant distribution infrastructure. As demand grew, supply spread to the surrounding areas. The switch from organic growth to growth by acquisition began in 1952 with the takeover of the Portishead District Water Company. Eighteen further local water undertakings, owned by a mixture of local rural and urban councils, were amalgamated into Bristol Water between 1952 and 1964.[90] This means that we have had to incorporate various different supply networks into the company. In some instances these are still not fully integrated for a mixture of logistical and cost-related reasons.

172. On 12 November 1991, the Bristol Waterworks Company became Bristol Water plc, a subsidiary of the newly incorporated Bristol Water Holdings plc.[91] Under a Scheme of Arrangement there was a restructuring of the capital of the Bristol Waterworks Company and shareholders were issued with shares in Bristol Water Holdings plc, in place of their shareholding in the Bristol Waterworks Company. Bristol Water plc is still a listed company owing to the issuance of a corporate bond and preference shares.

173. In 2003, under another Scheme of Arrangement, there was a further restructuring of the group to facilitate a more efficient balance sheet and Bristol Water Group plc was established as the ultimate group parent company to facilitate a return of capital to shareholders which took place in 2004 and 2005.

174. In June 2006, all of the shares of Bristol Water Group plc were acquired by Sociedad General de Aguas de Barcelona SA (**Agbar**) for £10.60 per ordinary share, an acquisition cost of £170m. The company was de-listed from the London Stock Exchange on 15 June 2006. Bristol Water Group plc was re-registered as a limited company on 3 October 2006 and renamed Agbar UK Ltd in 2009.

175. Under a share purchase agreement dated 5 October 2011, CSE Water UK Limited (**CSE**) acquired a 70% shareholding in Agbar UK Ltd. Capstone Infrastructure Corporation (**Capstone**) is the ultimate parent company of CSE. Capstone is a company incorporated in Canada and listed on the Toronto Stock Exchange. The controlling stake in Agbar UK Ltd was acquired for £215m.

176. Following the transaction, Agbar remained in possession of 30% of the issued ordinary share capital of Agbar UK Ltd. Agbar UK Ltd was then renamed Bristol Water Holdings UK Limited (**BWHUKL**). In May 2012, the Itochu Corporation of Japan acquired a 20% share position in BWHUKL through a stock purchase for total consideration of £43.5m from CSE. Agbar is a wholly owned subsidiary of Suez Environnement Co., a French utility company listed on the Paris Stock Exchange

177. A structure chart showing the ultimate ownership of Bristol Water and the identity of the other companies within Bristol Water Core Holdings Limited (**BWCHL**) is set out in Figure 3 below.

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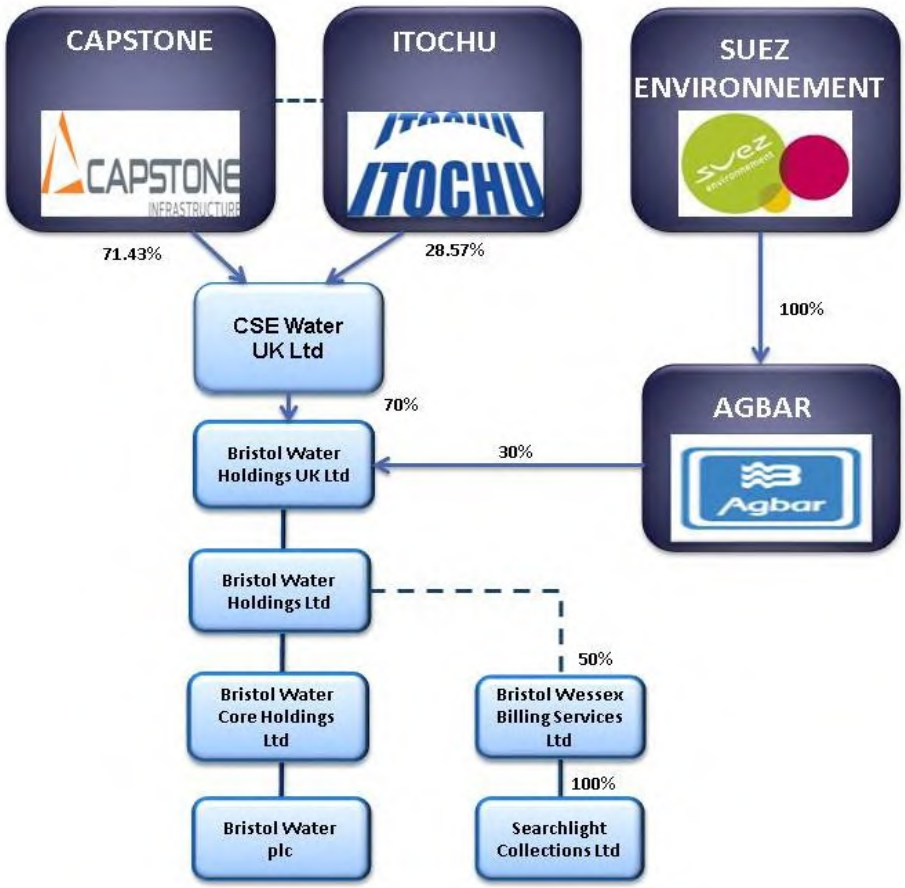
[90] See a map illustrating growth of separate areas pre-acquisition ('**Area of supply growth map**') (SOC043).

[91] Bristol Water Holdings plc was incorporated on 19 July 1991 and is now known as Bristol Water Holdings Limited.

Figure 3: BWCHL ownership structure



Source: Bristol Water

3.2.2 Organisational structure

3.2.2.1 Board

178. During the last five years, the Bristol Water Board has undergone some major changes, including the appointment of a new Non-Executive Chairman, Keith Ludeman. The Board also comprises three Executive Directors; four independent directors and six non-independent Non-Executive Directors. The Board has a wide range of relevant experience for running the company.[92]

179. The Board is committed to maintaining the high standards of good corporate governance throughout the business and has endorsed the UK Corporate Governance Code 2010. Having already adopted such an approach, we welcome Ofwat's increased focus on the role of governance and the need to comply with recognised standards, as we agree that this will be positive for the industry generally, and ultimately for customers in particular.

[92] For further details regarding the identity and background of the individual members of the Board, see (SOC044).

180. Our Board has been involved at every stage of our journey with the PR14 Business Plan and has taken strategic leadership responsibility throughout. The Board contributed to its development, provided input into its drafting and supported the position the company has taken. We provide further detail of the role of our Board in corporate governance and assurance both generally, and specifically in relation to PR14, in **Section 5** below.

3.2.2.2 Senior management

181. Bristol Water's Executive Team comprises:

- Luis García: Chief Executive;[93]
- Mick Axtell: Finance Director;[94]
- Mike King: Regulatory Director;[95]
- Robert Brito: Operations Director; and
- Stephen Robson: Director of Human Resources and Legal.

182. For further details of our senior management, an organisational structure chart is provided as a supporting appendix to this document.[96] In total, the senior management team have over 335 years' cumulative experience of working for Bristol Water, and all are fully conversant with the business and the challenges that Bristol Water faces.[97]

3.2.2.3 Bristol Water staff

183. Bristol Water, as at 14 June 2014, employed 463 Full Time Equivalents (**FTEs**) in the Appointed Business.[98]

184. Our headcount has been slowly increasing which reflects the growing size and complexity of the business. In particular, it reflects the impact on the business of the size of the capital programme for AMP5. The case for recruitment for each new position requires the approval of the Executive Team**.**

185. Providing a safe and secure supply of water depends upon having skilled staff. Over half of our staff are classified as skilled. Our operational staff are required to work effectively with complex plant and systems, and sometimes with dangerous chemicals and high voltage power systems.

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[93] Appointed on 1 April 2009.

[94] Appointed on 30 January 2014.

[95] Appointed in November 2010. Mr King had previously acted as Head of Competition and Regulation since January 2002.

[96] See Bristol Water Organisation Structure Chart 2015 ('**BW Organisation Chart**') (SOC045).

[97] The remuneration policy for senior management is set by the Board's Remuneration Committee. Salaries are set on appointment with reference to market rates. Subsequent annual pay rises are the same for all staff. The executive bonus scheme rewards profit performance, against budget, against Ofwat assumptions and against targets, and the meeting of constant service targets, together with an assessment of individual performances. The same service and budget targets are used for all staff bonuses. Long-term incentive plans are in place for AMP5 for the Executive Team. See Bristol Water Annual Report 2014 ('**Annual Report 2014**') (SOC046), p. 72.

[98] In 2013/14, Bristol Water's total payroll cost including pension costs was £20.8m (see Annual Report 2014 (SOC046), p. 89). We have operated an annual bonus scheme for all employees for a number of years. An element of this bonus is related to performance of customer service outputs. This creates added focus for our staff, and provides a link between staff management processes and the achievement of our asset planning objectives.

3.2.2.4 Property interests

186. The types of property owned by Bristol Water range from water sources (e.g. springs, reservoirs and boreholes), treatment works, distribution infrastructure (e.g. main and pumping stations) and other buildings (operational centres and leisure sites). These are described in more detail in **Section 3.4** below. Bristol Water also has a number of residentially tenanted properties on or close to operational sites built or acquired when sites were manned. A full list of properties owned by Bristol Water is available upon request.

187. Our Head Office is located at Bridgwater Road, Bristol BS13 7AT. Approximately 200 members of our staff operate from this site. A further 154 people work from the nearby Bedminster Depot in Bishopsworth Road. We have occupied the head office site since the 1960s, and it is currently undergoing its first major extension and renovation project since that date which will enable the closure and sale of the Bedminster Depot during 2015 and the relocation of the staff based there to Head Office. The remainder are based at the other main operational sites owned by Bristol Water, or operate on a floating basis as mobile workers. Nearly all of our properties are held as freehold. It is a company policy to dispose of any property that becomes vacant or is no longer needed operationally.

3.2.3 How we run the business

188. Bristol Water's prime objective is to deliver high-quality and reliable supplies of water to its customers in accordance with its legal and regulatory obligations. This is reflected in the Bristol Water vision statement set out below that has formed the central driver behind our PR14 Business Plan (see also **Section 5** below):

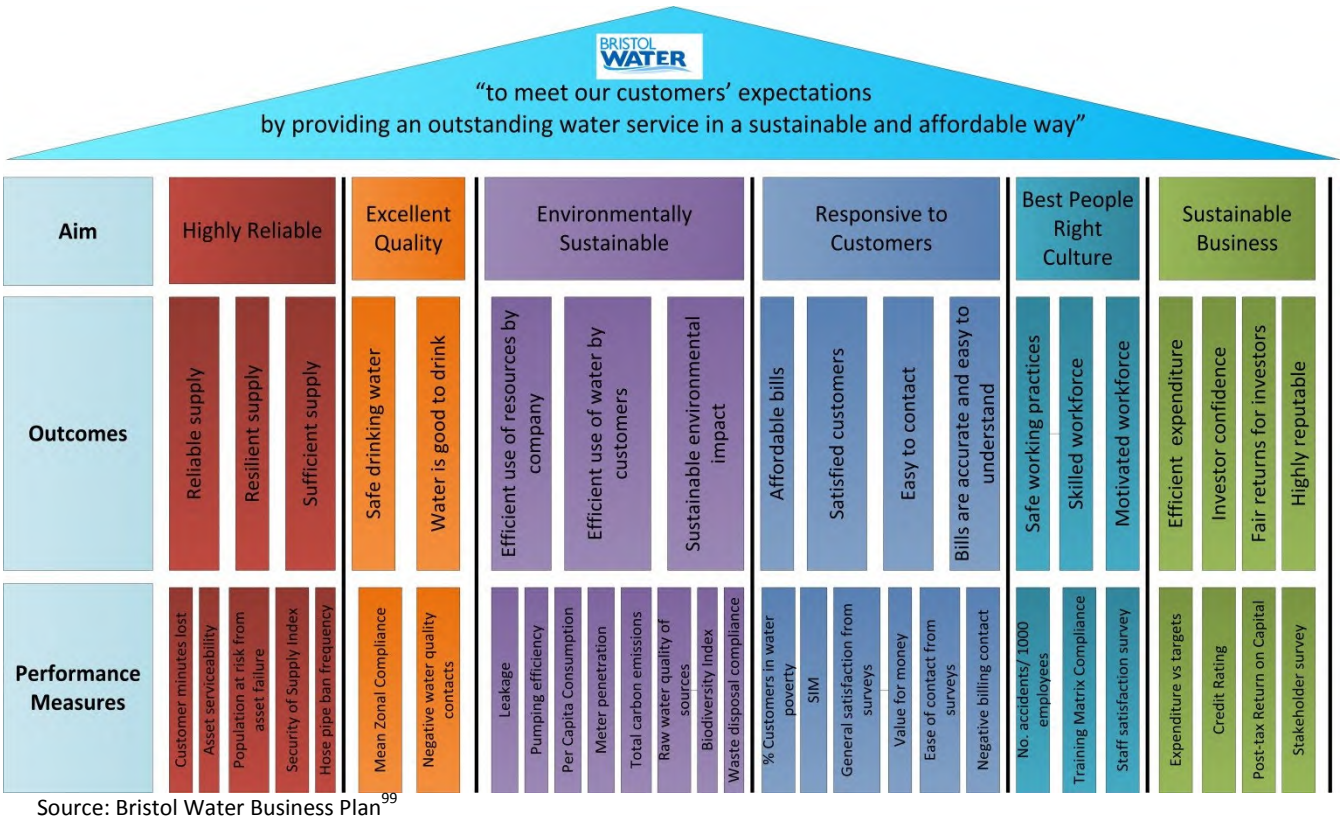
"Our vision is to meet our customers' expectations by providing an outstanding water service in a sustainable and affordable way."

189. Our vision can also be seen throughout the various company policies that Bristol Water has in place, both formal and informal. Some are described in the following Sections.

3.2.3.1 Overarching approach

190. We have embraced Ofwat's PR14 vision (see **Section 4** below) by focusing on our outcomes and embedding these throughout the business. For instance, we have developed KPIs that monitor our performance to deliver these outcomes. These are reviewed monthly and acted upon accordingly (see **Section 5.3** below). An overview of our outcomes and performance measures is provided in Figure 4 below.

Figure 4: Outcomes and performance measures



Source: Bristol Water Business Plan[99]

191. An overview of how each of these aims translates into our corporate policies is provided in the following sub-sections. This is not intended to act as a comprehensive list of all company policies, but instead provides some key highlights.[100]

3.2.3.2 A highly reliable service

3.2.3.2.1 Level of Service

192. This is the frequency that customers may expect hosepipe bans or other water use restrictions, required as a consequence of unusually hot or dry periods. Bristol Water's approach to long-term strategic planning is based on the premise that such restrictions

[99] Bristol Water PR14 Business Plan, Company Wide Plan, June 2014 (**'June Company Wide Plan'**) (SOC005).

[100] The business operates under a suite of policies which cascade throughout the business and are regularly reviewed by a sub-committee of the Board. The key policies are: Asset Management; Business Continuity Management; Business Improvement and IT Function Overview; Corporate Customer Relations; Cyber Security; Energy Management; Environmental Management; Finance Function Overview; Health & Safety; Human Resources Overview; Procurement; Project Management; Quality Management; Risk Management; Water Quality Management; and Water Resource Management.

will not be required more than once in every 15 years on average.[101] This is one of the factors taken into account in our approach to water resources planning.

3.2.3.2.2 Asset management activities

193. Bristol Water must rely on its assets to deliver the desired level of service to customers, and so achievement of objectives must be done through effective asset management practices. Our approach to managing our assets is driven by the commitment from senior management to ensure a proactive culture and organisational structure that embeds the core elements of asset management from board to asset.[102] Our short-, medium- and long-term business objectives have been developed with a clear understanding of asset management principles supported by the behaviours, skills, competencies and the drive for continual improvement that are fundamental to meet our goals and targets.

194. This approach is underpinned by well-established methodologies and is driven by the desire to manage the whole life of our assets from the identification of a need through creation, operation, maintenance, decommissioning and disposal in order to provide our customers with their preferred levels of service, deliver our outcome commitments and meet statutory and regulatory standards in a sustainable way.

195. Asset life cycle activities are directed by a set of outcome performance targets, which have been (predominantly) identified as important by our customers. Such targets are incorporated into our regular reporting systems so that progress and compliance are continually monitored. We consider that our approach is consistent with best practice, and appropriate to enable us to fulfil our statutory and regulatory functions in an efficient way. For details of how it impacts on our intervention planning approach to PR14 see **Section 7** below.

3.2.3.2.3 Drought

196. Our Drought Plan, published in 2012, sets out the policies and procedures we have in place to implement various levels of resource use and demand management if a dry period develops into a drought.[103] This is another factor taken into account in the context of water resources planning.

3.2.3.3 Environmentally sustainable services

3.2.3.3.1 Environment

197. Our environment policy sets out our commitments to conserve and enhance the natural environment and a programme to minimise energy consumption, waste and other harmful

[101] Water Resources Management Plan 2014 (**'WRMP 2014'**) (SOC039), p. 18.

[102] Asset Management, Wholesale Plan Level 3 December Submission **('Asset Management December Plan')**(SOC292). This document provides a detailed description of our approach to asset management, set in the context of our Business Plan.

[103] Bristol Water Drought Plan 2010 **('Drought Plan 2010')** (SOC226). The Drought Plan addresses the short-term responses to the impact of drought, whereas the WRMP considers the longer-term planning issues including growth and climate change.

emissions.[104] Our policy is designed to satisfy our legislative and regulatory obligations, as set out in **Section 2.4** above.

198. As discussed in **Section 2.4.3.2** above, a key driver of activity and expenditure in AMP6 is the new NEP obligations. Bristol Water's NEP obligations apply in the four key areas identified in Table 1 below. Each of these issue areas is intended to cover both investigations and interventions.

Table 7: NEP obligations

Issue	Description
Catchment Management	Preliminary catchment investigations have indicated that the main cause of pollution within the Bristol Water region and consequent deterioration of our water sources is agricultural practice - particularly dairy farming. Catchment protection measures proposed include a partnership approach with landholders to implement works such as improved yard drainage, fencing of watercourses, slurry storage covers and improvements to tracks and gates to prevent cattle trampling.[105]
Baseline Surveys	NEP phase 5, which has not yet been released by the EA, is expected to impose requirements regarding watercourses affected by our abstractions at Chew and Blagdon. Through discussion and engagement with EA we have now agreed a change from the draft scope of this aspect of the NEP, which also included our water abstraction at Gurney Slade. This abstraction will not be included in the scope of NEP phase 5 although may return to later phases of the NEP. Baseline measures are likely to include surveys, watercourse channel modifications for flow and habitat management, and watercourse protection such as fencing.[106] The measures may ultimately involve changes to our compensation flow regime to return the watercourses to a more natural flow profile.
Invasive Species Investigations	This covers the NEP obligations to investigate protected plant species at Blagdon, and to investigate the potential presence of invasive species across our property portfolio. invasives surveyed will include invasive plants such as Japanese knotweed, Himalayan balsam and crassula helmsii as well as invasive animal species such as zebra mussels, quagga mussels, killer shrimp and American signal crayfish.[107]
Eel protection	Eel protection measures proposed include screening, surveys, investigation into appropriate fish pass systems, habitat creation and education programmes.[108] Our business plan for this aspect of the NEP accepts a significant financial risk that we may not be able to agree the innovative approach we have proposed, which diverges from the strict interpretation of the Eel Regulations (see also **Section 3.2.3.13** below).

Source: Bristol Water analysis

199. Details of our specific proposals to satisfy these obligations are provided in **Section 10.2.2.2** below.

3.2.3.3.2 Leakage

200. Bristol Water operates an active leakage control policy across its entire distribution network.[109] Leakage has been maintained at or below our short run ELL of 54 Ml/d for the

[104] Bristol Water Environmental Policy 2008 (**'BW Environmental Policy 2008'**) (SOC225).

[105] Bristol Water PR14 Business Plan, Cost Exclusion Cases June 2014 (**'June Cost Exclusion Cases'**) (SOC006), p. 189.

[106] June Cost Exclusion Cases (SOC006), p. 200.

[107] June Cost Exclusion Cases (SOC006), p. 206.

[108] June Cost Exclusion Cases (SOC006), p. 209.

[109] See WRMP 2014 (SOC039) Section 6.2.1 for further details of this policy.

past 10 years. The WRMP is based on a target total leakage level of 49 Ml/d[110] and includes a new Leakstop scheme which offers customers a subsidised replacement of their supply pipe if it leaks for a second time.[111] The WRMP target assumes a 'no deterioration' approach that sets baseline maintenance policies that offset the anticipated deterioration in an aging network and increase in supply pipe leakage.[112]

Table 8: Leakage figures 2004 – 2014/15 forecast

Leakage	2004 / 05	2005/ 06	2006/ 07	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013 / 14	2014/15 forecast
Actual	53	53	54	53	54	53	50	43	42	44	47
Target	54	54	54	54	54	54	52	51	50	49	49
Economic Level	54	54	54	54	54	54	54	54	54	54	54

Source: Bristol Water analysis

3.2.3.3.3 Metering

201. At present, approximately 42% of household properties and 90% of non-household properties are metered. All new properties will be metered according to current policy.[113] We plan that the numbers of un-metered households switching to a metered supply will be maintained at the historic outturn levels of 3% of the un-metered household base long term. We plan to have metered all non-household customers by 2015 (where it is economic to do so).[114]

3.2.3.3.4 Water efficiency

202. Working with local businesses and other organisations (see **Section 3.2.3.6** below), we have provided water efficiency support that has outperformed our target level and enabled non-domestic customers to save a total of over 1.7 billion litres of water - Bristol City Council won an international award as a result of the savings it was able to implement based on the support we provided. Our domestic water efficiency programme has also consistently outperformed our target level, helping domestic customers to save a total of over 2 billion litres since 2010. Our approach on water efficiency will extend in Green Capital year (see **Section 3.2.3.6** below), engaging with local communities and stakeholders on the part they can play in water saving. We consider water efficiency to be an important component in the basket of measures used to balance supply and demand, as well as contributing to our resilience and sustainability objectives.[115] This is reflected in our WRMP (see **Section 2.4.4.1** above).

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110 WRMP 2014 (SOC039), p. 99.

111 WRMP 2014 (SOC039), section 6.2.

112 WRMP 2014 (SOC039), Section 6.2.

113 WRMP 2014 (SOC039), p. 94.

114 WRMP 2014 (SOC039), p. 18.

115 WRMP 2014 (SOC039), p. 19. See also WRMP p. 93 for details of Bristol Water's water efficiency policy, and details of the activities undertaken to fulfil its statutory duties to promote the efficient use of water. Our policy is consistent with Ofwat's Good Practice Guidelines for water efficiency initiatives.

3.2.3.4 Responsive to customers

3.2.3.4.1 Commitment to customers

203. We work hard to provide excellent customer service. We endeavour to treat each customer as an individual and should problems occur, we aim to resolve them in a timely and fair manner. In principle, an approach is adopted as if the customer has a choice of water supplier and we do not wish to lose their business.

204. We continually work to improve the services we provide to meet customer expectations whilst acknowledging that their requirements and expectations change over time. Independent monthly and annual customer satisfaction research is carried out so that we can measure customer satisfaction. In the annual household customer survey carried out in February 2014,[116] for the second year running 93% of respondents stated that the service they received was excellent, very good or fairly good. 83% of all respondents felt that we have a good reputation; a 1% increase from the previous year.

3.2.3.4.2 Affordability

205. Bristol Water is committed to assisting those customers that struggle to pay their water bills. We provide a number of measures to assist those household customers who are experiencing difficulty paying their bills. We were one of the first three companies to introduce a company social tariff in line with the guidance issued by government in the summer of 2012 and we introduced our social tariff in 2013/14.

206. Our 'Restart' and 'Restart Plus' schemes together with our 'Assist' tariff and WaterSure Plus aim to help customers who are in financial difficulty get back on track and in control of their finances. We have around 9,000 households benefitting from these schemes. Each of these is described below.

207. We intend to do more to promote the tariffs and assistance schemes which we provide, both directly with customers and indirectly via partner organisations such as local Citizens Advice Bureaux (CABs), Age UK, debt advice agencies and debt charities. Our aim is to ensure that all customers who need our help are aware of what we can do for them.

[116] Future Focus Research, Customer Satisfaction Report **('Customer Satisfaction Report')** (SOC278).

Box 1: The Assist Tariff

The Assist tariff

We offer an "Assist" tariff, where customers pay a discounted fixed amount each year. This tariff is offered to customers with severe affordability issues, following a means assessment by a Citizens Advice Bureau. There are six bands of Assist tariff offering various levels of discount ranging from 17% to 88% against the average bill, customers are allocated to a band based on their ability to pay.

We introduced Assist in 2010 as a "win-win" tariff, whereby the discount offered to customers was subsidised by the Company, and offset by a reduction in the bad debt charges.

Following publication of Government guidance on social tariffs in September 2012 we began to use social tariff funding to support the Assist tariff from April 2013. This allows for the discounts to be cross-subsidised by the rest of the customer base, rather than by the Company. We carried out research in the autumn of 2012 to obtain customers' views on willingness to pay to support social tariffs. This research revealed limited support for the principle, but that 76% of customers were willing to pay 50p per year to subsidise social tariffs. All new customers joining Assist from April 1st 2013 have been subsidised through social tariffs.

As at 1st February 2015 there are 5,303 customers on Assist tariffs.

Source: BWBSL commentary

Box 2: WaterSure Plus

WaterSure Plus

All water companies in England and Wales are required to offer the WaterSure tariff. This tariff is available to customers in metered properties receiving one or more of a defined list of state benefits, who have three or more children living at the property, or have a medical condition requiring increased water use. The WaterSure tariff is set at the level of the company average bill.

From 1 April 2013, Bristol Water introduced WaterSure Plus. This applies the same principles as WaterSure, but sets the tariff at the level of the average metered bill, which is lower than the overall average bill and therefore offers a greater discount.

The difference between the average bill and the average measured bill is funded through social tariffs.

As at 1 February 2015 there are 1,672 customers on the WaterSure Plus plus tariff.

Source: BWBSL commentary

Box 3: Restart and Restart Plus

Restart and Restart Plus

Restart and Restart Plus are schemes intended to help customers who are in debt to us, by writing off a portion of their debt in return for entering into a regular payment agreement. Restart is a two-year payment plan intended to clear customer debt and return to normal levels of payment. Restart Plus is offered to customers with greater debt issues, for whom the two-year plan may not be sufficient.

As at 1 February 2015 there are 1,942 customers on Restart and 1,271 customers on Restart Plus.

Source: BWBSL commentary

208. As detailed in **Section 6,** one of our outcomes is 'Affordable Bills'. We will monitor this through measuring the percentage of our customers deemed to be in 'Water Poverty', defined as where the water bill represents more than 2% of a household's disposable income.[117] We intend to reduce the percentage of our customers in water poverty from 2.1% to 1.8% by 2020. The schemes above will be critical to achieving this target (see also **Section 15.5** below).

[117] Disposable income is defined as gross income less income tax.

3.2.3.5 Sustainable business

3.2.3.5.1 Corporate efficiency initiatives

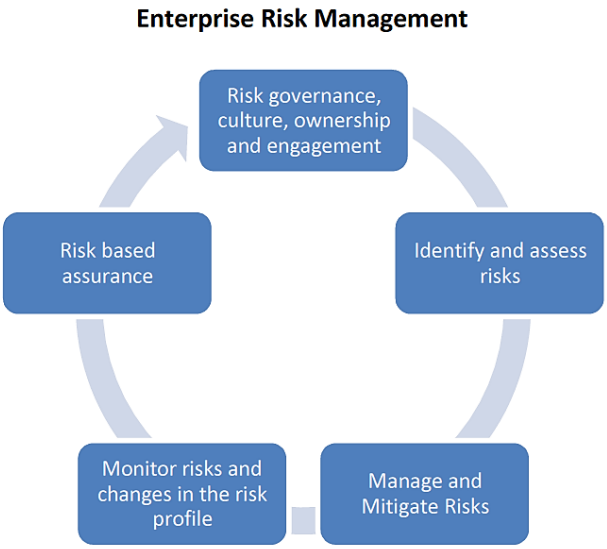
209. Efficiency is continually challenged and improved across the Company through a variety of means ranging from the individual personal objectives to corporate wide initiatives. Our internal Business Improvement function, with the help of external parties as required, facilitates the delivery of projects where they are outside the control of the individual or department. In AMP5 two company wide efficiency programmes were delivered, Avon and Avon+, which delivered a combination of cost reduction and improved capabilities through investment. The delivery phase of both programmes were completed on time and budget and will deliver over £8M Net savings. In support of the efficiency savings required for AMP6 we have designed a new programme, Channel, with the help of industry specialists Baringa which will prepare the business for new challenges, retail competition, but also fundamentally redesign elements of the business to deliver the required savings. Taxation policy

210. Bristol Water endeavours to act as a responsible tax payer. Our Board annually approves a Taxation Policy the way it expects the Company should conduct its overall tax affairs. See **Section 8** below for a discussion of the tax position within the Business Plan and FD14.

3.2.3.5.2 Risk management policy

211. Bristol Water recognises the importance and benefits of timely identification, assessment and management of risks that may impact its ability to achieve its strategic objectives. In this respect, we are committed to prudent risk management practices within the context of an Enterprise Risk Management (**ERM**) framework (see Figure 5 below) that has been designed to ensure that we attain the appropriate level of considered risk taking to assist in balancing the requirements of customers, stakeholders and staff in order to reach our goals.

Figure 5: Enterprise Risk Management framework



Source: Bristol Water

212. Our risk management policy has enabled us to embed risk management into the business' culture. We have assigned risk management staff resources to oversee and co-ordinate the wider risk management process, as shown in the governance structure set out in Figure 6 below.

Figure 6: Bristol Water risk governance structure

Source: Bristol Water

213. Corporate risks are identified through formal risk identification sessions, together with maintaining an awareness of internal and external events with the potential to develop into corporate risks. We require senior management to regularly review the business' top risks recorded in our corporate and operational risk registers.[118]

214. Risk-based assurance is embedded within our Internal Audit process. The internal audit programme is managed by the Risk and Internal Control Manager, but the assignments are executed by an independent professional audit firm to allow us to benefit from its wider experience of similar entities and its technical resource.

215. The internal audit programme is designed to focus on significant corporate risks to provide assurance that risk control measures and mitigations are effective and appropriate. This provides the business and its stakeholders with a level of confidence that our risk taking is acceptable and well controlled.

216. The Risk Management Framework itself is also subject to internal audit review to ensure that it remains effective. A full review of the Risk & Assurance Framework was undertaken by KPMG in July 2013.

[118] For further details see Annual Report 2014 (SOC046), p. 71.

3.2.3.5.3 Risk appetite

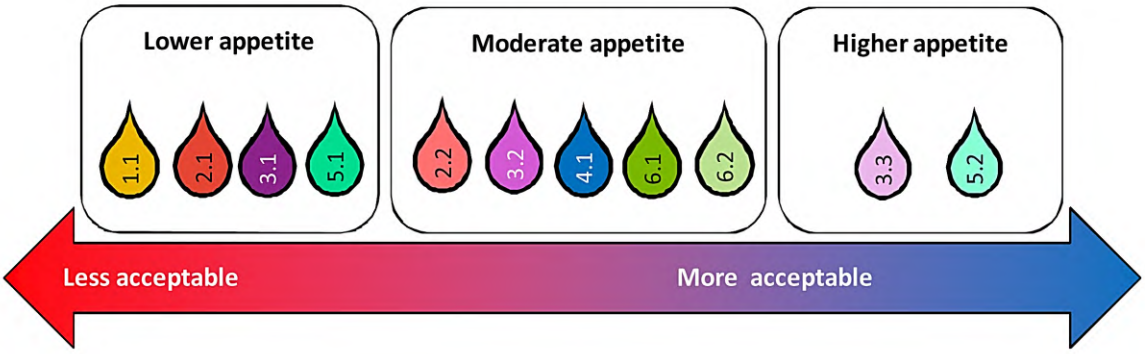
217. Our Risk Appetite statement expresses how willing we are to accept risk in key areas, based on our customers' and wider stakeholder views. How this translates into our aims is set out in Figure 7 below.

Figure 7: Bristol Water risk appetite statement

Risk Appetite Statement

The statement and accompanying graphic below identifies the Company's risk appetite in terms of key elements of the Company's six Corporate Aims based on the definitions to risk appetite outlined in this document.

The Company recognises that it operates within a complex regulatory environment and it is not economically viable to fully mitigate all the risks it faces. Therefore the Company prioritises its risk management strategies by assigning the aims into three risk categories as shown below.



1.0 Excellent quality
- 1.1 Supplying safe water that is good to drink

2.0 Highly reliable
- 2.1 Resilience and extreme life threatening event
- 2.2 Reliable and sufficient supply

3.0 Environmentally sustainable
- 3.1 Regulatory and statutory environmental protection commitments
- 3.2 Leakage and efficient use of resources by the Company
- 3.3 Efficient resources by Customers and improving biodiversity

4.0 Responsive to customers
- 4.1 Maintaining customer satisfaction, affordable bills and appropriate customer communications

5.0 Best people right culture
- 5.1 Health and safety regulation and related operator training
- 5.2 Motivation and general training

6.0 Sustainable business
- 6.1 Highly reputable
- 6.2 Maintaining Investor Confidence, fair return for investors and efficient expenditure

Source: Bristol Water

3.2.3.6 Corporate and social responsibility

218. We have a strong commitment to CSR. We are committed to delivering services responsibly and sustainably to meet our customers' and stakeholders' needs whilst

managing the social, environmental and economic impacts of our business. We pride ourselves on our commitment to supporting and sponsoring community and fund-raising initiatives, and in December 2014 we appointed our first Community Liaison Officer; this has helped increase our profiles amongst the communities we serve.

Table 9: Corporate and social responsibility Initiatives

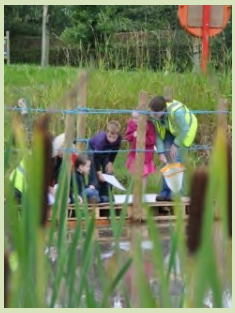
Schools

We currently work with around 50% of local primary schools in our supply area. Our multi-award-winning wildlife engagement projects "Trout and About" and "Spawn to be Wild" bring wild fish into the classroom in inner-city schools. These projects target deprived communities and underrepresented groups, bringing children from these areas to our sites for recreation.

Our eco-schools programme teaches children about their local environment and its links to water, and Bristol Water sits on the board of the new five-school co-operative trust for the area south of Bristol, providing technical support to this new initiative for schools in socially challenging areas. Other education projects include work with Bristol Zoo and Avon Wildlife Trust to protect critically-endangered native crayfish, providing "ark sites" for this endangered species.

Community education and rural education and engagement

We have embarked upon a wider programme of educating community groups on a range of different topics including water treatment processes, the history of Bristol Water, links between water and the natural environment, water efficiency and WaterAid. We also work with local stakeholders on management of our SSSI sites and provide training for Wildlife Trust staff at our sites as part of their own development.



Green Capital and support to urban projects

Bristol Water has been the principal business supporter of the city's success as EU Green Capital 2015 and was involved in every one of the bids for the city to win this award since it was first created. We were part of the bid team in Brussels in 2012 and 2013 to the EU Parliament in support of the bid and now lead the "Water" group of the Green Capital steering group. In 2015, Bristol Water will lead and facilitate specific projects for the local community, ranging from drinking fountains and technical water engagement projects to education programmes and volunteer projects on stream rehabilitation. We support Bristol Civic Society's annual environmental awards; the *Bristol Evening Post*'s Green Business Awards; the Bristol Festival of Nature; local museums; the Local Nature Partnership and many other local organisations. A key characteristic of our involvement is that we do this through partnership and engagement, not just financial donations

3.2.3.7 Investment in innovation

219. As a result of the unique topographical and service demands that Bristol Water is subject to, we recognise the need to be open to innovation in meeting the needs of our customers. Innovation is actively encouraged and a reward-based innovation scheme has been in place for many years. Such an approach generates a collaborative attitude amongst employees where they have a clear understanding of, and are contributing to our objectives.

Table 10: Innovation in practice

Blagdon Lake Eels

We have worked closely with the EA on innovative projects to protect eels. One such project is a solar-powered eel trap and transfer system (the first such partnership project in the UK) developed in collaboration with EA to enable the movement of endangered eels into our reservoir at Blagdon.

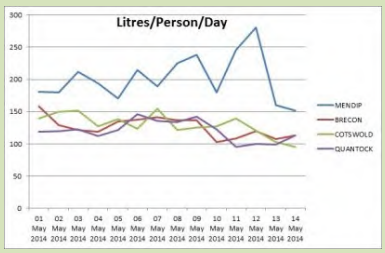
Eel numbers have fallen by over 95% in the past 20 years and we now have statutory obligations under the NEP to implement protection measures. Some of these measures may come at high cost - in order to manage and mitigate these costs, we are working on alternatives such as this 'trap and transfer' project which explores new ways to enable eels to reach their natural habitats.

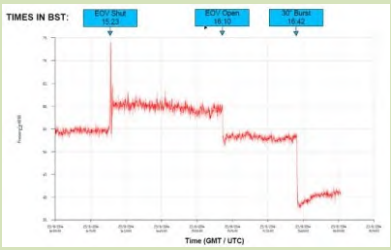
Partnership with academic organisations

We have worked with the University of the West of England (UWE) to create a new test bed for water efficiency measures: the student village. This project provides a constant download of data from multiple identical buildings at the site, to enable monitoring and measurement of the impact of water efficiency projects at the site.

Working with Imperial College London, we are developing ultrafast pressure logging for our network to identify transient pressure events that can cause water mains failures - methods to process and interpret the data are being developed with ICL and this "smart cities" approach will be a key part of our engagement with the population of Bristol during the Green Capital events of 2015.

Work with local universities has also developed an innovative ice-pigging technology that enables water mains to be cleaned with slush ice: an approach now being adopted across the world.





Defra pilot project on payment for ecosystems services

Working in partnership with landholders and key stakeholders such as Defra, lead local flood authorities, Natural England, EA, consultancies and Wessex Water, we have launched a pilot Payment for Ecosystems Services trial in a key catchment area that feeds into Chew Valley Lake. This new approach on catchment management, aimed at identifying the potential beneficiaries of environmental services delivered by good catchment management, seeks to quantify and monetise the benefits of a catchment-based approach, creating new markets for these services.

Zapp: Payment of bills with mobile phones

Bristol Water has partnered with Zapp to allow customers to pay their bills using a mobile device. Zapp enables real-time payments on people's mobile phones through their existing mobile banking application allowing secure payments to happen between consumers and merchants. Through our billing company BWBSL, Zapp will enable us to offer a secure, quick and simple way for our customers to pay their water bill using just their mobile device and their existing bank account. Its launch is planned in the first half of 2015.

Self service paperless HR

We replaced our existing HR & payroll system in 2012/3 moving to a modern web-based platform allowing: a) much greater use of workflows - many tied in with our email system; b) us to use its capabilities to develop it further ourselves; and self service facilities for all our people whether based in the field or on site. We now have better data available to the business on our people (in particular on training and competences), better HR systems and also have achieved higher levels of accuracy on payroll – with most months seeing zero error counts. In addition we have adapted the system to support our health & safety and insurance activities saving the need for having separate systems.

3.3 Bristol Water's region

220. In carrying out the function of supplying water to customers, all water companies have to grapple with the characteristics of their region that impact their ability to deliver those services. This includes the local geology which impacts on the type of raw water sources available, the topography which impacts the ease, or lack thereof, with which water is transported through the network and demography which impacts on demand and dispersement of customers. These challenges are particularly relevant in the context of designing a long-term strategy for the business, and developing the Business Plan. An effective regulatory system should not only reflect the areas of commonality between water companies, but also these areas of difference.

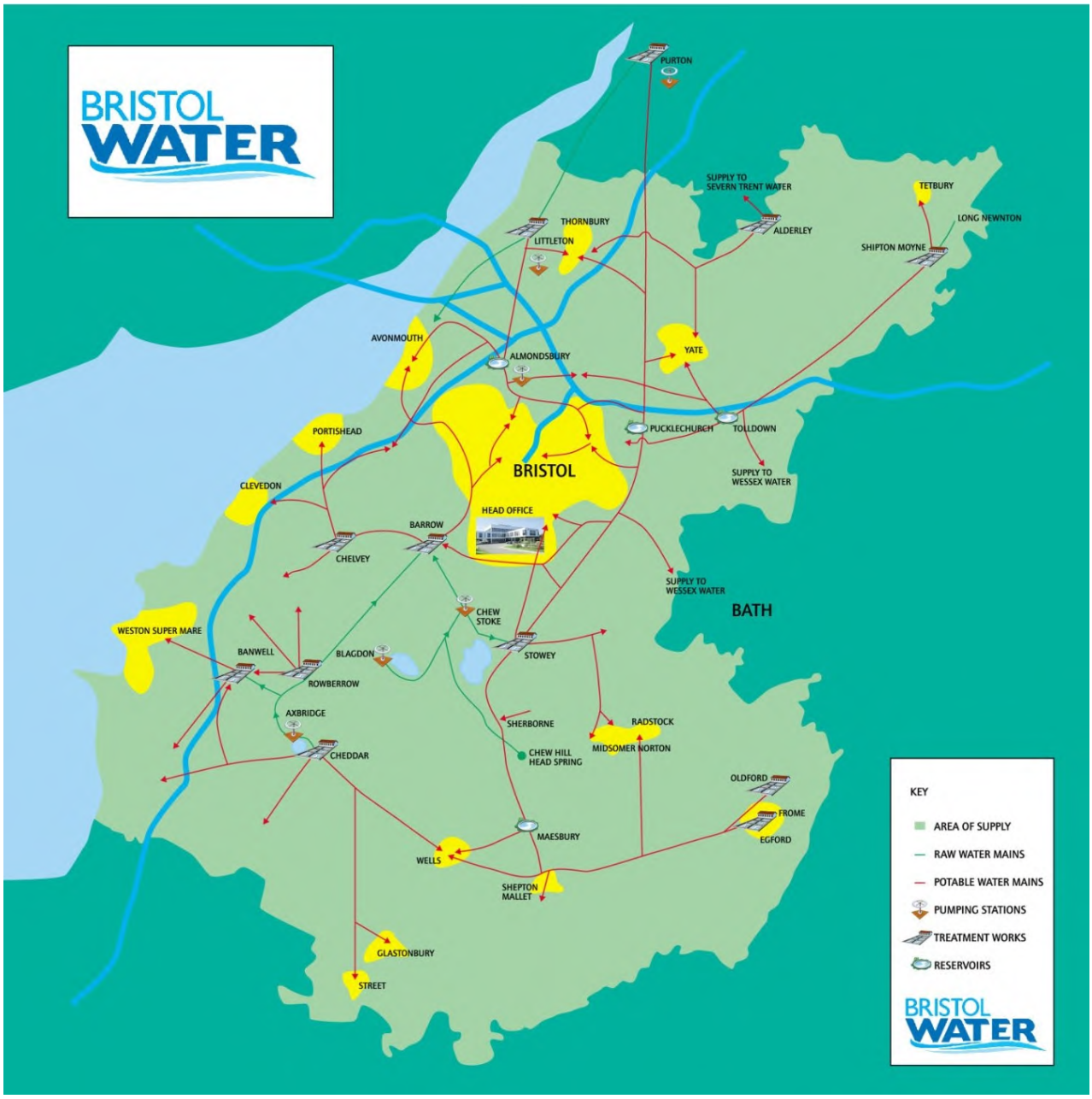
221. The following Section will highlight the features of Bristol Water's region that distinguish it from the 'average' water company, and the challenges this creates for Bristol Water in meeting its responsibilities to consumers. In particular it considers:

- **geography** – an overview of the geographical reach of Bristol Water's Region (see **Section 3.3.1** below);
- **geology and hydrology** – the geological characteristics of the Region and how this impacts on the raw water sources available to Bristol Water (see **Section 3.3.2** below);
- **topography** – details of the landscape of the Region and how this impacts on the requirements of the network to keep water moving from sources to customers (see **Section 3.3.3** below);
- **climate** – comments on the impact of the climate on water supply within the Region (see **Section 3.3.4** below);
- **demographics** – the urban and rural split within the Region, including population density and growth (see **Section 3.3.5** below); and
- **flooding and the risk of other incidents** – a summary of the risks that Bristol Water faces related to the features of its region (see **Section 3.3.6** below).

3.3.1 Geography

222. Bristol Water is the appointed water undertaker for the geographic area shown in the map below (see Image 1), referred to herein as the Bristol Water Region and more precisely defined in the Licence. It ranges from Thornbury and Tetbury in the north, to Street and Glastonbury in the south, and from Weston-super-Mare in the west to Frome in the east, and covers an area of 2,400 square kilometres.

Image 1: Bristol Water Region

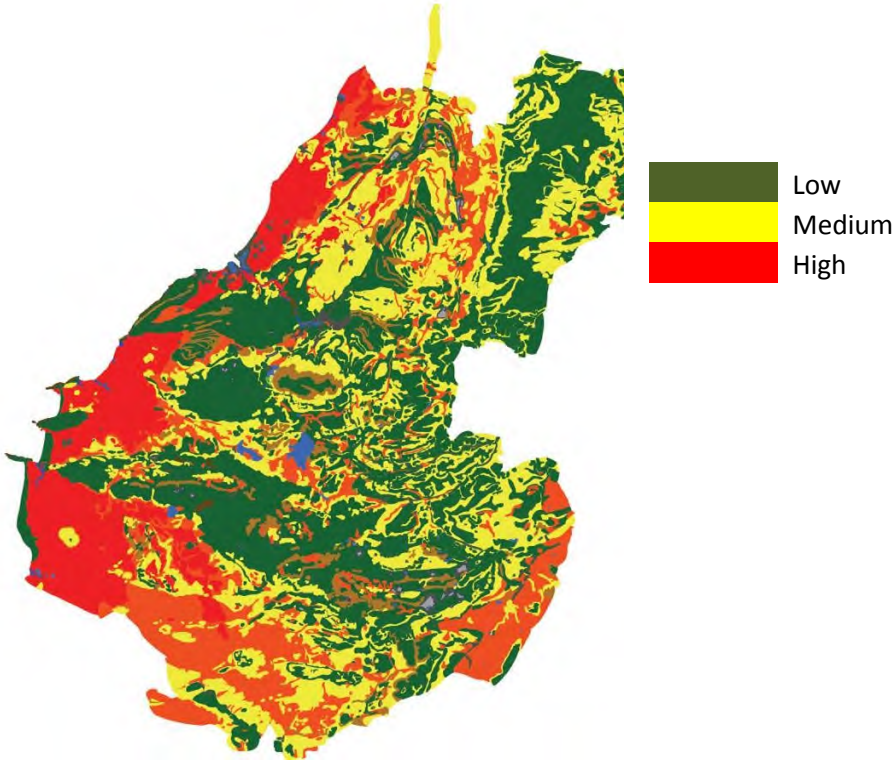


Source: Bristol Water

3.3.2 Geology and hydrology

223. The geology of the Bristol Water Region is highly varied, ranging from hard Devonian limestone to modern peat bogs. This leads to variable ferrous corrosivity in soils around our mains network as shown in the map below of our supply area (see Image 2).

Image 2: Levels of Ferrous Corrosivity in Soils in the Bristol Water Region



Source: Bristol Water

224. Four "blocks" of land are licenced for hydrocarbon exploration (fracking) in the area we supply, covering 40% of this area and including the Mendip lakes. Previous experience with mineral extraction and land management around our water sources indicates that water sources may become contaminated and unusable in the short, medium or long term as a result of activities in the catchment area and managing our resilience to these risks remains an important part of our long term planning.

225. Due to the rapid transit time for groundwater in much of our supply area, the groundwater sources available to us are typically of poor quality when compared with other sources such as boreholes in chalk or sandstone. Our groundwater sources are in limestone which is highly fractured and permeable, resulting in higher treatment requirements for most of our groundwater sites.

226. The southern edge of the Bristol Water Region contains an area known as the Somerset Levels. These were created by reclaiming bogs and wetlands and some areas are six metres below peak tidal sea level. We share responsibility with EA for equipment to maintain water levels at Bleadon Sluice. The nature of this low-lying area can affect our abstraction of water from the River Axe and prevent us from accessing our mains network.

227. During 2014, severe flooding in Somerset meant that we were unable to carry out a repair to a strategic water main supplying the town of Glastonbury. The failure proved to be on

the short section of network where the main was duplicated and it was possible to maintain a supply to the area until a repair could be carried out when the floods subsided several months later, but if this failure had occurred further along the network then no repair would have been possible and the supply to the town would have been lost with no alternative available. Although the supply to Glastonbury was maintained, response to this event included liaison with the armed forces and COBRA committee as the risk to the area was so severe.

Image 3: Flooding on Somerset Levels, February 2014

Source Bristol Water

3.3.3 Topography

228. The Bristol Water Region is a varied mixture of hills up to 325 metres above sea level, valleys and plateaus.[119] The City of Bristol is considered to be one of the hilliest major cities in the UK.

229. As Bristol Water moves raw and treated water around its networks, it must accommodate the changing landscape. This has resulted in water mains either being forced to take indirect routes in order to avoid hill ranges, or additional pumping stations and booster stations being required in order to maintain water pressure and keep the water flowing into service reservoirs. Pressure reduction systems are then needed to reduce pressure at customers' taps.

230. The implication for Bristol Water is that its day-to-day operations are energy intensive due to the power required for pumping. We move over 100 million tonnes of water each year. The topography and location of most sources close to sea level leads to Bristol Water's average pumping head being above average compared to the rest of the industry. Pumping head refers to the height the company has to lift water through in order to keep the system pressurised and keep the water flowing. The impact of topography on our pumping requirements is considered in more detail in **Section 3.4.7.2** below.

[119] The varied topography is demonstrated in a topographic map (**'Topographic map'**) (SOC050).

3.3.4 Climate

231. We work with EA as an executive member of Climate Southwest, one of the principal UK organisations responsible for managing the country's climate change adaptation. Our own adaptation to climate change and management of our long-term resilience to climate change is through our Water Resources Management Plan.

232. Although winters are forecast to be warmer and wetter, current climate change predictions for the area anticipate summers will become warmer and drier. This means that the range of climate variability could also increase, and extreme events become more frequent. This would have the effect of increasing the severity and impact of any drought conditions, as well as sporadic events of heavy rainfall increasing the risk of flooding of key assets.[120] The impact of climate change has been modelled as part of the supply demand forecasts carried out in the context of the WRMP.[121] Whilst this concludes that climate change impacts in isolation do not have the effect of driving specific investment requirements, they do contribute to the overall increase in the supply demand deficit with time, albeit a small contribution compared to the impact of growth in demand caused by the rising population.[122]

3.3.5 Demographics

233. Bristol Water supplies water to 1.2 million customers in the City of Bristol and surrounding areas. The Bristol Water Region is characterised by varied demographics. Over 56% of the properties we supply lie within the built-up area of Bristol, whereas that and other urban areas account for only around 11% of our total Region. Below shows a pictorial representation of the area of supply and highlights the urban areas.

[120] In addition to the flooding in 2014 discussed in **Section 3.3.2** above, Bristol Water experienced sustained heavy rainfall on treated water reserves during a period of high operational activity in November 2012. The resultant flooding and run-off had a major impact on the quality of the Sharpness canal water (see **Section 3.4.3** below). This is discussed in detail in December Wholesale Plan, November 2012 Floods **('December Plan - November 2012 Floods')** (SOC322).

[121] WRMP 2014 (SOC039), Section 4.

[122] WRMP 2014 (SOC039), p.54.

Image 4: Urban areas in the Bristol Water Region

Source: Bristol Water

234. The Region has a mixed economy with two universities, Bristol University and the University of the West of England (**UWE**). Industries include high-tech manufacturing, particularly aerospace and aviation. Bristol is strong in creative arts and media being home to Aardman Animations (creators of *Wallace and Gromit* and *Shaun the Sheep*) and the BBC Natural History Unit. The finance sector is well represented in banking and insurance. There is a strong tourism industry and extensive farming. Bristol Water is responsible for supplying water to major events in the region such as the Bristol International Balloon Fiesta and the Glastonbury Festival, which attracted a combined total of over 600,000 visitors during 2014. Incomes are typically above the national average albeit Bristol has pockets of notable deprivation.

Image 5: Bristol International Balloon Fiesta - Bristol Water representation

Source: Bristol Water

235. Bristol as a city has considerable problems with congestion. The Department of Transport found that Bristol has the third lowest travel speed of all urban areas in England, with only Reading and inner London being lower.[123] This is particularly evident during the morning peak, when Bristol's average speed of 14.9mph is 10mph less than the average in England of 24.9mph, and 1.8mph less than in London.[124] This impacts on Bristol Water as the lower traffic speeds in Bristol, where over half of its customer properties are located, result in greater travel time between jobs compared to other cities and water companies, thereby resulting in additional costs (see also **Section 9.3.2.4** below).

236. Bristol and the surrounding areas are attractive to inward migration from the rest of the UK, both for the employed and retired. As a result, there is continuing population growth and an associated increase in the number of properties within the region. The historic growth rate in domestic household properties has been approximately 1% p.a. and the growth in population has been approximately 0.7%, resulting in a steadily falling household occupancy rate. In the last five years, population growth has increased markedly to 1.3%.[125] Comparative to the rest of the industry, Bristol Water's overall property density[126] and population density[127] is considered average.[128]

3.3.6 Flooding and risk of other incidents

237. The geography, geology and topography of the Bristol Water Region and the location and capacity of operating assets means that Bristol Water's ability to maintain supplies to customers is vulnerable to extreme weather-related events, such as flooding and drought. It is also at risk from fire, contamination and intentional damage. The implications for Bristol Water and its customers can be manifest.

238. Ground conditions have serious implications for both company infrastructure and water quality. For example, water mains across the Somerset Levels are particularly difficult to lay or repair because of the corrosive and unstable ground conditions (see, for example, **Section 3.3.2** above). Similar problems can arise in other areas within the Bristol Water Region, where infrastructure, such as pipes and the proposed new raw water storage reservoir, may need to be routed away from unstable and corrosive environments. This can have significant cost implications, particularly when things go wrong.

239. The complexity and condition of our asset stock continues to create novel issues, all of which must be dealt with promptly. This requires a resilient and trained workforce prepared to work in any conditions at short notice, supported by effective back-up systems.

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[123] Bristol Water Representation on the PR14 Draft Determination Master Appendices October 2014 (**'DDR Appendices Oct 14'**) (SOC020), p. 166, Figure 38.

[124] DDR Appendices Oct 14 (SOC020), p. 166.

[125] WRMP 2014 (SOC039), p. 62.

[126] Thousands per km.

[127] Population per property.

[128] DDR Appendices Oct 14 (SOC020) p. 164-165.

240. Resilience investments enable water companies, such as Bristol Water, to manage the risk of supply outages of the type described above. During the PR09 period we completed the installation of flood protection measures at Purton treatment works and Cook's Corner pumping station. As part of the Resilient Supply outcome for PR14 we have reassessed flood risk at these sites and confirmed the risk has been mitigated. The flood protection was utilised during the early 2014 flooding of the Somerset Levels, but the water did not reach the defences. As such, the support and funding obtained in the CC10 Redetermination to carry out these schemes has proved beneficial for our customers.

3.4 Bristol Water's supply profile

241. The purpose of this Section is to explain how we manage supplies of water to our customers. It describes the key components of our supply network, from obtaining raw water and treating it, to transporting it to our customers. It highlights those features of our operating environment that pose a particular challenge, and how this impacts on our short-, medium- and long-term strategic planning and expenditure.

242. In particular, this Section covers:

- **water supply life cycle** – an overview of the water supply life cycle and how the different components interact (see **Section 3.4.1** below);
- **water resource zone** – introduces the resource zone model used by Bristol Water (see **Section 3.4.2** below);
- **raw water sources** – details the main raw water sources available to Bristol Water (see **Section 3.4.3** below);
- **bulk supply imports** – describes the use Bristol Water makes of imports of raw water from outside its Region (see **Section 3.4.4** below);
- **water quality** – sets out how water quality is assessed and details the quality of the raw water available to Bristol Water (see **Section 3.4.5** below);
- **water treatment** – explains how water is treated and how the complexity of that treatment is assessed, as well as detailing the complexity of the treatment that Bristol Water has to undertake (see **Section 3.4.6** below); and
- **distribution network** – details the components of the distribution network including storage facilities, pumping stations and mains, and considers the characteristics of Bristol Water's network compared to the rest of the industry (see **Section 3.4.7** below); and
- **age of assets** – commentary on the average age of Bristol Water's assets compared to the rest of the industry and how this impacts on the Business Plan (see **Section 3.4.8** below).

3.4.1 Water supply life cycle

243. Before considering the specific supply dynamics that we face, a brief summary of the water supply life cycle is set out in Figure 8 below.

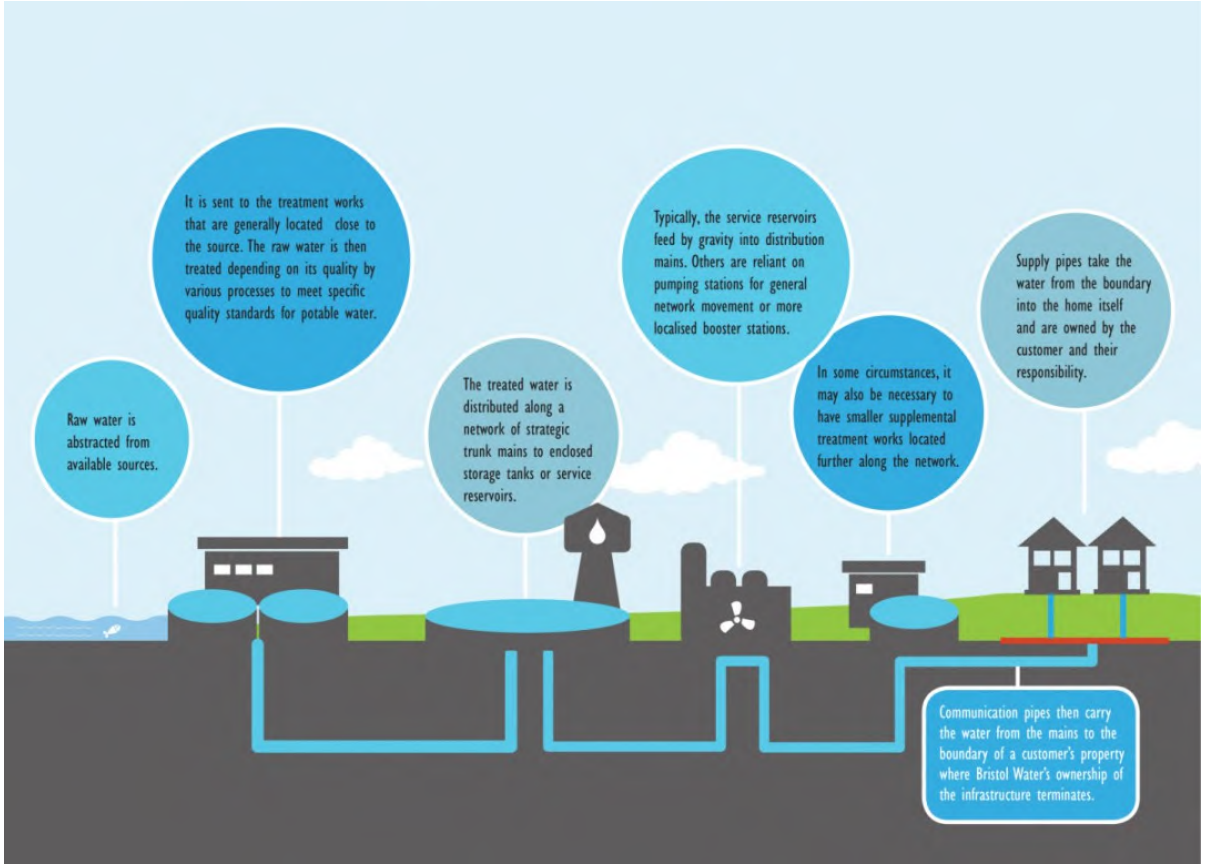
244. The whole process is monitored by computerised data capture and automation systems. Information is transmitted to Bristol Water's main control room from treatment works and pumping stations, 24 hours a day. The system monitors everything from the level of a

reservoir to the chlorine level at a particular treatment works. If a problem occurs that cannot be dealt with from the control room, a member of staff will be sent out to rectify the fault. Bristol Water has a policy requiring attendance at a treatment works before it is restarted to put water into the supply system as a precaution against finding problems other than those identified by telemetry.

3.4.2 Resource zone model

245. The Bristol Water supply area is operated as a single resource zone, as defined by the EA.[129] This means that all water resources are shared, and utilisation can be maximised when the water is most abundant at a particular source. This is the most efficient way of operating and maximises the total yield of the system. The transmission system is designed to facilitate conjunctive use by allowing water transfers between various sources and demand centres.[130] In addition, there is substantial connectivity between the major surface water reservoirs, allowing further flexibility of operation.[131] This is only true, however, if all the assets which form part of the single conjunctive resource zone are operational. Should anything fail, then resilience will become an important issue.

Figure 8 The Water supply process



Source: Bristol Water

[129] This has been confirmed by the EA, see WRMP 2014 (SOC039) p.14.

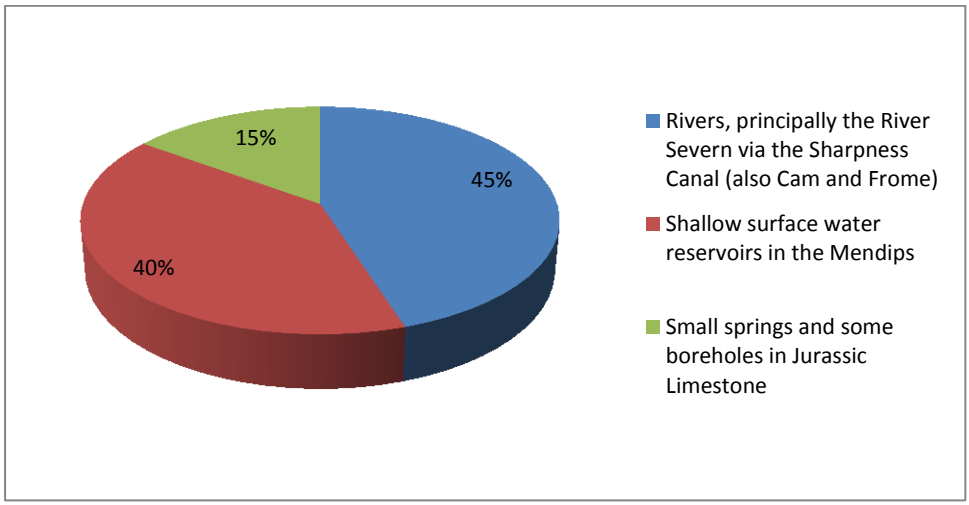
[130] WRMP 2014 (SOC039), p.17.

[131] WRMP 2014 (SOC039), p. 14.

3.4.3 Raw water sources

246. Bristol Water obtains water from a variety of resource categories.[132] At different times of the year, the proportion of water taken from each category will change reflecting the availability of resources over the year. The main categories, and their average contribution to water pumped into supply, are set out in Figure 9 below.

Figure 9: Bristol Water Raw Water Sources



Source: Bristol Water DDR Appendices [133]

247. Bristol Water considers that these resources are sufficient to provide for an average daily demand for water of approximately 300 million litres.[134] This is based on the probability that restrictions to customers' water use during a period of drought will be required once every 15 years on average.[135]

248. The proportion used from each type of source varies on a daily and seasonal basis according to the availability of water, the relative costs and other operational constraints. Abstractions from these sources are regulated according to abstraction licences issued by the EA. Each type of source is considered in more detail in the following Sections.

3.4.3.1 Canal and river abstraction

249. Approximately 44 Ml of water is sourced p.a. from river abstraction. Of this, 99.4% is taken from the Sharpness Canal.[136]

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132 Bristol Water has 68 individual sources of water, including reservoirs, rivers, springs, wells and boreholes.

133 DDR Appendices Oct 14 (SOC020) p. 162.

134 The deployable output of our single zone conjunctive use system has been assessed at 367 Ml/d at our target level of service. The method we have used to determine the amount of water available from our sources follows the UKWIR WR72 '*Water Resources Planning Tools*' 2011 guidance. See WRMP 2014 (SOC039) p. 25 for further details.

135 WRMP 2014 (SOC039), p. 1.

136 DDR Appendices Oct 14 (SOC020), p. 162.

250. The Sharpness Canal is our single largest source of raw water. The Sharpness Canal is itself primarily fed by the River Severn, which is located outside Bristol Water's Region.[137] In addition, the Rivers Frome and Cam flow from the Cotswolds into the Sharpness Canal. Use of canals as such a significant source water is rare in the UK.

251. Water is abstracted from the canal at Purton where the majority of it is treated to potable quality. The remainder is pumped to Littleton where some is pumped directly to Avonmouth as raw water and the remainder is treated for potable supply.

Box 4: The Sharpness Canal and the relationship with the Canal and River Trust

The Sharpness Canal and the Canal and River Trust

The Sharpness Canal was constructed at the end of the 18th century. The Canal and River Trust has a statutory responsibility to maintain the Sharpness Canal. Under a long-term bulk supply agreement, Bristol Water is contractually obliged to pay an annual maintenance fee of £1.67m as a Water Sales Charge to the Canal and River Trust to support the structural maintenance of the Sharpness Canal.[138] This charge is intended to cover: the purchase of water that could otherwise be used in the canal network; necessary works on the canal's system to ensure that abstraction can take place, such as maintenance and dredging; and provisions to deal with emergency situations preventing abstraction.

The licence for abstraction from the Sharpness Canal is owned by the Canals and River Trust. The permitted unrestrained abstraction is for an annual average of 210 Ml/d with a maximum daily abstraction of 245 Ml/d. Bristol Water also pays the relevant abstraction licence costs of £1.72m p.a (2013/14).[139]

Source: Bristol Water

252. See **Section 3.4.5** and Box 6 below for details regarding the quality of water taken from the Sharpness Canal.

3.4.3.2 Surface water resources

253. Bristol Water has raw water storage reservoirs[140] that are supplied from river basins in the Mendip Hills. These reservoirs and their catchments have a large influence on the operation and security of our water supply, including the ability to meet peaks in demand and provide resilience during dry periods, but availability is highly dependent on climatic

[137] The River Severn is a nationally strategic water resource transfer system that supplies many large towns in England and Wales in different water company regions with water. To achieve this, the river is usually supported during dry periods by regulated discharges from reservoirs in Wales and in some cases by support from water pumped from boreholes (Shropshire Groundwater Scheme). This period of regulation occurs in most years from May to September, and may impact on the maximum permitted abstractions from the Sharpness Canal, see WRMP 2014 (SOC039), Section 3.1.1 for further details.

[138] In addition, the Canal and River Trust also receives £0.7m from a power station water user, £0.4m from Thames Water, and between £0.1-£0.4m from Wessex Water, as well as smaller payments from around 200 other entities up to an annual total of £5.2m (2014/15). See DDR Appendices Oct 14 (SOC020), p. 162.

[139] A map demonstrating abstraction from the Sharpness Canal graphically can be found on p. 16 of the WRMP 2014 (SOC039).

[140] Each reservoir has its own unique characteristics in terms of typical refill relative to rainfall patterns reflecting the nature of the supporting catchment area, propensity to develop algal growth and presence of other impurities that must be removed during treatment. Reservoirs can be used in conjunction with one another but the capacity of pumps and raw water mains is a constraint to full flexibility. The normal method of operation is to allow these reservoirs to fill through winter rainfall and let levels fall on a monitored basis during the spring and summer. Source usage is reviewed monthly and adjusted according to demand, inflow and operational needs. Special measures are taken during periods of drought.

conditions.[141] The volume of water stored in the reservoirs is also an important component of our standard daily deployable output.

254. There are five major catchments that provide the inflow to the three reservoirs – Chew, Blagdon and Cheddar.[142] Each reservoir is designated as a Site of Special Scientific Interest (**SSSI**) (see **Section 2.3.5** above) and Chew Reservoir is a Special Protection Area[143] due to the diversity of migratory and indigenous wildfowl.

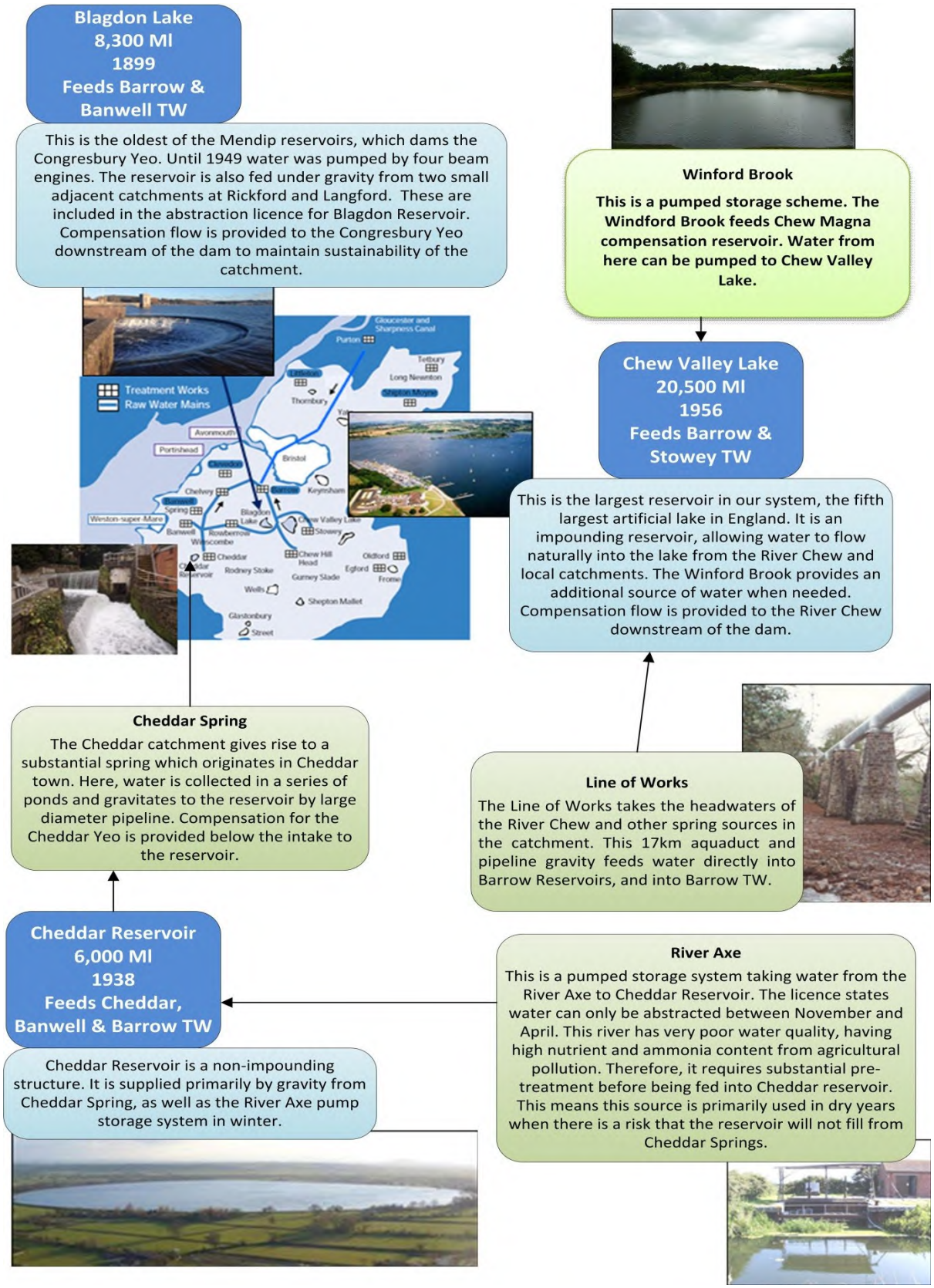
255. The key components of our surface water system are detailed in Figure 10 below.

[141] Use of reservoir water is maximised, subject to drawdown control curves Drawdown control curves are a mechanism for managing demand in circumstances where the water levels of a reservoir dip below pre-determined points during a given year. Taking into account the probabilities of extended drought periods over the months ahead, the aim is to avoid a serious situation, where the reservoir actually empties, by reducing the rate at which water is drawn from the reservoir early enough. Because there are increasing levels of restriction possible, there are usually several control curves applying at a reservoir, each relating to a different level of restriction. Where alternative supplies can be used to make up the shortfall, control curves allow maximum use of the cheapest water available, but in drought years the shortfall in supply from the reservoir may require the introduction of measures such as hosepipe bans or, more seriously, drought orders.

[142] In addition to the main reservoirs, Bristol Water also operates smaller 'compensation reservoirs'. These exist to provide regulatory discharges to maintain minimum flows in rivers and do not typically provide a direct supply to customers. In total, Bristol Water has 12 reservoirs.

[143] Special Protection Areas are strictly protected sites classified in accordance with Article 4 of Council Directive 79/409/EEC on the conservation of wild birds, which came into force in April 1979. They are classified for rare and vulnerable birds (as listed on Annex I of the Directive), and for regularly occurring migratory species.

Figure 10: Bristol Water: Mendip Surface Water System



Source: Bristol Water

256. Over the next years our existing water resources will not be sufficient to meet growing customer demand (see **Section 3.5** below). As such, consideration of the options to increase our capacity has formed an important part of the WRMP.[144] The construction of Cheddar Reservoir Two was identified as one of the technically and financially feasible options to help address the projected deficit in the supply demand balance (see also **Section 10.6** below which sets out details of this scheme, as well as some of the other options that were considered as alternatives).[145]

Box 5: Cheddar Reservoir Two

Cheddar Reservoir Two

The proposal envisages the construction of a 9,000 Ml reservoir adjacent to the existing Cheddar Reservoir.[146] Progress on developing this scheme was undertaken as part of the 2009 WRMP during AMP5, and was funded as part of the CC10 Redetermination.[147] In particular, this included detailed investigations relating to data collection and analysis, appropriate assessments and reports, stakeholder engagement and construction.[148] Planning permission was granted on 12 November 2014.[149] Detailed discussion of the Cheddar Reservoir Two proposals are provided at **Section 10.6** below.

Source: Bristol Water

3.4.3.3 Groundwater sources

257. Water bearing formations or aquifers providing groundwater supplies are relatively insignificant within the Bristol Water Region. What groundwater supplies are available are generally relatively small and shallow. These include boreholes,[150] springs[151] and wells.[152]

258. At present, Bristol Water has 14 groundwater sources with a total dry weather yield of approximately 115 Ml/d.[153]

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144 WRMP 2014 (SOC039), Section 8.6.

145 WRMP 2014 (SOC039), p. 165.

146 Cheddar Reservoir was originally designed as two 6,000 Ml adjoining reservoirs. However, at the time of construction, a decision was made not to store all of the water locally, but to pump some into the reservoirs at Barrow to ensure proximity to the key areas of demand. As a result, only one of the two reservoirs was built.

147 Competition Commission Determination Report August 2010 (**'CC Determination 2010'**) (SOC011), para. 3.85. In particular, the CC allowed funding for the preparatory work to take place, but deferred the purchase of the land to AMP6, dependent on whether updated predictions at that time demonstrate that the new reservoir is still necessary.

148 WRMP 2014 (SOC039), p. 132-133.

149 Sedgemoor Council, Somerset Council and Bristol Water Planning Agreement (**'CR2 Planning Agreement'**) (SOC276) and Cheddar Reservoir Two Planning permission (**'CR2 Planning permission'**) (SOC277).

150 A borehole is a deep mechanical excavation. Bristol Water has some deeper boreholes in the Inferior Oolite of the Cotswold Escarpment and Frome area.

151 A spring is any natural surface discharge of groundwater. Springs are supplied by underground water flows that are replenished by rainwater and melted snow. Some can dry up in periods of drought. Bristol Water has some small springs along the edges of the carboniferous limestone and the associated rocks of the Mendip Hills.

152 A well is a hand-dug excavation, typically shallow, relatively speaking, at least initially. Bristol Water has some small shallow wells in the Keuper Marls recharged by subterranean water flow in the carboniferous limestone.

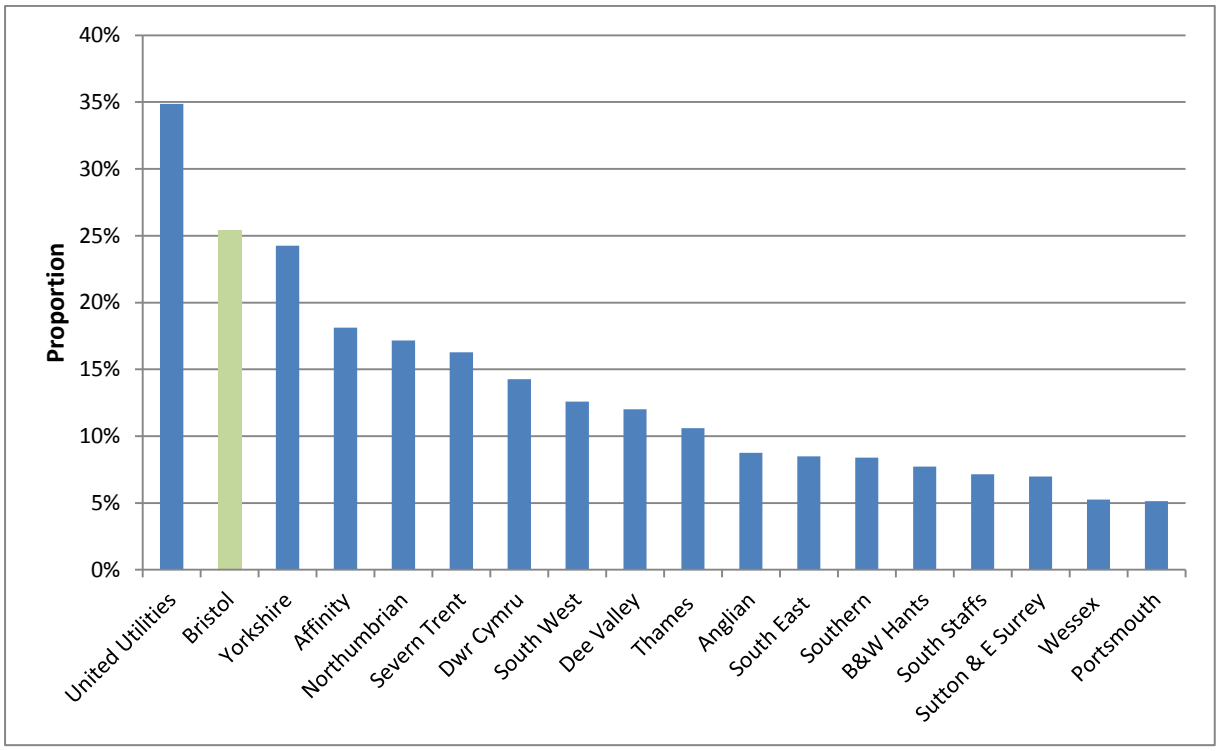
153 In addition, Bristol Water has a number of non-operational sources where the water is either polluted or is of such a poor quality that major plant investment would be required before the water could meet DWI standards for public supply. These sources are retained as they could be returned to service using emergency treatment plant during a drought period. Details of those sources are provided in the WRMP 2014 (SOC039) p. 28-30.

3.4.3.4 Upstream assets

259. 'Upstream assets' encompasses everything involved in the generation of raw water, including source assets, impounding reservoirs, raw water mains and aqueducts.

260. Bristol Water has a proportionally greater amount of upstream assets than other companies. This is demonstrated in Figure 11 below which shows the Modern Equivalent Asset Valuation (**MEAV**)[154] of our upstream assets as a proportion of the MEAV of our total asset base. Using value as expressed by MEAV as a reference, it demonstrates that we have the second highest amount of upstream assets in the industry, and at 25.4% we have a proportion of upstream assets that is almost twice the average of 13.5%. This reflects the atypical construction of these assets, particularly the raw water reservoirs, many of which have a circumferential dam.

Figure 11: Industry wide assessment of comparative amount of upstream assets as a proportion of MEAV



Source: June Return 2011 Data Share[155]

261. As a result, we should be expected to incur proportionally more upstream asset maintenance costs than other companies (see **Section 9.3.3.3.1** below). This factor should be taken into account when carrying out any modelling assessment of anticipated expenditure (see **Section 9.4.4.2.5.1** and **Section 11** below).

3.4.4 Bulk supply imports

262. In addition to the Canal and River Trust bulk supply from the Sharpness Canal, we also import minor quantities from Wessex Water in the Frome area. The supply is provided on

[154] The MEAV is the cost to replace an old asset with a technically up-to-date new asset with the same service capability allowing for any difference both in the quality of output and operating costs.

[155] June Return 2011 Data Share (SOC395), table 25a.

the basis of the domestic tariffs charged by Wessex Water. The supplies are through low capacity mains to small groups of houses and farms at the periphery of Bristol Water's supply system. There is no contracted maximum for these imports. The total volume supplied in the year ending 2014 was under 1Ml/d (i.e. around 0.3% of Bristol Water's needs).

263. As part of the WRMP, Bristol Water has considered the possibility of increasing the volume of water imported from other companies' regions.[156] This included potential supplies from Severn Trent, Dwr Cymru, Thames Water, South West Water, Wessex Water and United Utilities. Of these, the potential supplies from Wessex Water and United Utilities were identified as being the most feasible and likely opportunities, and have been the subject of further investigation.

264. The primary barrier to importing water from other companies is the lack of suitable infrastructure connectivity. In all cases, substantial lengths of large diameter main would be required at considerable capital cost. In addition, long distance pumped transfers result in high operating costs for schemes. The company average pumping head is already one of the highest in the industry (see **Section 3.4.7.2** below). Adding to these already significant costs would not be sustainable (as future power costs are projected to increase above inflation). In addition, we would also have to pay the water management and supply charges to any company providing the transfer.

265. Table 11 below sets out the issues for transfer schemes for the three companies that could commit to supply within the AMP6 or 7 periods.

Table 11: Potential transfer schemes considered in the WRMP

Company	Transfer volume	Issues	AISC p/m3
South West Water	15 Ml/d	200 km pipeline and multiple stage pumping	Considered infeasible
United Utilities	25 Ml/d	Transfer via Severn needs capacity increase at Purton TW and mains	155p
Wessex Water	10 Ml/d	30 km pipeline and 50 m pumping head	103p
Dwr Cymru	15 Ml/d	Severn Estuary pipe crossing – DC not able to commit to supply beyond AMP6	106p

Source: WRMP[157]

266. For comparison, the full life incremental cost of water for our most expensive schemes proposed in the AMP6 and AMP7 periods was 83p/m3 (the Average Incremental Social Costs (**AISC**) for Change of Occupier Metering and Cheddar Reservoir Two calculated to the same value).

3.4.5 Water quality

267. Raw water is split into three quality categories: DW1; DW2; and DW3 (see Table 12 below). These categories determine the amount of treatment needed for the water, although other treatment processes can be added if required.

[156] WRMP 2014 (SOC039), p. 140.

[157] WRMP 2014 (SOC039), p. 167.

Table 12: Raw water quality categories

DW1	DW2	DW3
Very good quality underground sources (typically restricted to wells, boreholes and springs) requiring very little treatment, often only the addition of chlorine as a disinfectant	Good quality surface sources (typically catchment reservoirs) requiring 'normal' physical treatment like sand filtration to remove solids, algae and colour	Poorer quality surface sources (typically rivers, canals). This water might contain pesticides and nitrates as well as having taste and odour issues, and requires a more complex treatment process that is designed to deal with each specific problem

Source: Ofwat

268. Given the prevalence of river and canal water, and reservoirs, among Bristol Water's resources, the majority of raw water abstracted by Bristol Water falls within categories DW2 or DW3 and, therefore, requires intensive treatment. Examples of quality problems managed by Bristol Water include Cryptosporidium Oocysts,[158] nitrates, chlorination by-products, pesticides and general agricultural pollution,[159] zebra mussels,[160] killer shrimp[161] and metaldehyde.[162]

269. Problems (i.e. the presence of contaminants) with the water sources often lead to the need to upgrade both treatment works and, occasionally, the distribution network. Water Companies receive their instructions in this regard from the DWI (see **Section 2.3.2** above) and, less regularly, the EA (see **Section 2.3.3** above). It is important that Ofwat recognise these requirements and allow water companies to finance the required works effectively (see also **Section 2.5.1**).

270. Details of specific raw water quality problems experienced in relation to the Sharpness Canal, and at Cheddar Reservoir, are detailed in Box 6 and Box 7 below.

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158 Cryptosporidium is a protozoan organism that can cause severe diarrheal illness. Ingestion of contaminated drinking water is the major mode of transmission. Cryptosporidium can be introduced into the raw water supply via animal excreta containing oocysts. Water treatment for Cryptosporidium relies on properly designed and operated filtration systems or inactivation through ultra violet radiation. Chlorine disinfection of the organism is ineffective - it has been shown that a single oocyst can withstand pure bleach (50,000 ppm chlorine) for 24 hours and still cause an infection. Filter systems usually consist of several filters.

159 A number of Bristol Water's sources, including the Sharpness Canal and reservoir sites in particular, are at risk from the effects of diffuse pollution from pesticides. As part of Bristol Water's requirement to meet its obligations under the Water Quality Regulations, a risk assessment based on catchment activities is used to identify which pesticides are put on a "watch list". That risk assessment is carried out at the end of each calendar year and will identify the monitoring requirements for the forthcoming year.

160 Zebra mussels are a seasonal issue typically present in the Sharpness Canal raw water between June and September. The dosing of pre-chlorine is required to prevent them from colonising and attaching themselves to hard surfaces, thereby clogging inlet pipes and structures at treatment works and reducing the hydraulic capacity of the system. This process forms chlorination by-products which must be removed from the water through surface aeration.

161 Killer shrimp is a species of amphipod crustacean native to the Ponto-Caspian region of eastern Europe, but which has become invasive across the western part of the continent. In the areas it has invaded, it lives in a wide range of habitats and will kill many other animals, often not eating them.

162 Metaldehyde is primarily used to control slugs and snails on arable crops of potatoes and oil seed rape with the majority being applied during the period September to November. Results of sampling indicate the application of metaldehyde is common practice during the autumn period and is not isolated to one particular area of the catchment. Bristol Water is working with manufacturers and farmers to minimise the impact on raw water quality.

Box 6: Water quality - Sharpness Canal

Sharpness Canal – water quality

The quality of the raw water taken from the Sharpness Canal, which is itself sourced from seven rivers (see Section 3.4.3.1 above), is very variable and often poor quality. The River Severn, River Frome and River Cam in particular are sources of contaminants following rainfall due to run-off from their respective catchments.

The water has intermittent high levels of turbidity and colour and has a strong taste and odour from high concentrations of geosmin. Pesticides are often present, such as metaldehyde. This means that complex water treatment is required in order for the abstracted water to satisfy water quality requirements (see Box 8 below). In addition, zebra mussels are present in appreciable numbers in the raw water abstracted from the Sharpness Canal. During AMP5, work was undertaken in accordance with DWI requirements to introduce and maintain suitable control measures to deal with the impact of these mussels at the Sharpness Canal intakes and on the Purton and Littleton TWs.

Source: Bristol Water

Box 7: Water quality - Cheddar Reservoir

Cheddar Reservoir – water quality

Cheddar Reservoir has been identified as being at risk of failing Article 7.3 of the Water Framework Directive due to the increase in algal blooms in recent years, and has been included in the Bristol Water Interim Phase 3 NEP. The raw water quality deterioration has been recognised by the EA and there is a WFD Safeguard Zone Action Plan in place for the Drinking Water Protected Area Cheddar Reservoir for total algae.

Whilst climate change is undoubtedly having an influence on the raw water deterioration, with warmer temperatures favouring conditions for algal growth, the impact of agricultural practices within the catchment is also a significant factor. Algae are sensitive to even small increases in phosphate concentration. Achieving the significant reduction in nutrients required to achieve algal control by catchment management initiatives is unfeasible within the required timescale to prevent a deleterious impact on the quality and sufficiency of supply from Cheddar TW (see Box 9 below). This has triggered the need to implement a solution at Cheddar TW to manage this issue (see **Section 10.2.2.1.1** below).[163]

Source: Bristol Water

3.4.6 Water treatment

271. As explained above (see **Section 2.4.3.1**), Bristol Water is required to ensure that the water it supplies to customers meets certain quality requirements. To do so, it is required to treat the raw water it abstracts and collects prior to distributing it to customers' premises.

272. Complexity of water treatment requirements is linked to the quality of the raw water: the poorer the quality then generally the more complex the treatment that is required. This impacts both on the sophistication of each treatment stage, and the total number of treatment stages actually required. Companies with greater complexity of treatment works are, therefore, likely to incur higher levels of maintenance spend because the more sophisticated treatments tend to be more costly, and the more process stages there are, the more associated assets there are to maintain.

273. The Ofwat classes W1 to W4 are a useful way of classifying water treatment works by reference to the complexity of the treatment process undertaken. These are detailed in Table 13 below.

[163] See also Cheddar WTW Water Quality Improvement Final Report July 2013 (**'Cheddar WTW Final Report Jul 13'**) (SOC233).

Table 13: Ofwat classification of water treatment works complexity

Class name	Description
W1	Simple disinfection plus simple physical treatment only.
W2	Single stage complex physical or chemical treatment (excluding processes in W4).
W3	More than one stage of complex treatment (excluding processes in W4).
W4	Nitrate or pesticide removal.

Source: Ofwat

274. The range of sources, water quality levels and localised problems means that Bristol Water must use a wide variety of treatment processes, varying from the simple to the highly sophisticated.[164] These processes include slow sand filters, membranes, ozone, granular activated carbon, dissolved air flotation, ultra violet light disinfection and phosphoric dosing.[165]

275. It is believed Bristol Water, despite its relatively small size, uses all treatment methods, other than desalination, now in use in the UK. The complexity and variety of the treatments used entails, in turn, the need for increased levels of training and operator skill.

276. Bristol Water's approach to the provision of treatment facilities is influenced by the use of treatment works supply zone areas. These are a focus for network analysis used to ensure that levels of service are maintained and improved as appropriate, taking into account anticipated growth, etc., and the resultant impact on demand.[166] Bristol Water currently has 16 potable, and one non-potable, operational treatment works. The scale of these works, and an overview of the treatment processes carried out at each, is set out in Figure 12 below.

[164] For instance, the water from Gloucester and Sharpness Canal has always been recognised as very challenging and so requires multi-stage treatment. Historically, the underground sources only needed chlorination as the raw water was of excellent quality. Increasingly these sources now need more complex treatment, particularly for Cryptosporidium removal. Similarly, in the past, the Mendip reservoir sources could be treated with microstrainers, slow sand filtration and chlorination, but increasingly stringent water quality regulations have meant having to add additional treatment processes.

[165] A description of treatment types, and the relevant terminology, is provided at (SOC540).

[166] Models are constructed for each treatment works supply zone area that take into account many parameters including: pipe diameters; pipe lengths; pipe friction factors; topography; reservoir storage volumes; pumping capacity; customer supply connection points; and customer demand profiles (DDR Appendices Oct 14 (SOC020), p. 132).

Figure 12: Bristol Water's treatment sites

SOURCE	TREATMENT WORKS	MAX CAPACITY	AVE 2009 OUTPUT	TW GRADE	ACTIVATED CARBON	AIR STRIPPING (THM removal)	ANTHRACITE / MANGANESE DIOXIDE	BROMATE CONTROL	CHLORINATION	CLARIFICATION (CONVENTIONAL)	CLARIFICATION (HIGH RATE-ACTIFLO-PULSATOR-LAMELLA)	COAGULATION	DESTRATIFICATION (Lakes)	DISSOLVED AIR FLOTATION	HYDROGEN PEROXIDE	HYPOCHLORITE	IRON REMOVAL (RAPID GRAVITY FILTERS)	MICROSTRAINERS (INCLUDING BOWL)	OSEC	pH CONTROL	PHOS ACID	POST OZONE	POTASSIUM PERMANGANATE	POWDER ACTIVATED CARBON	PRE CHLORINATION	PRE OZONE	PRESSURE - ULTRA-FILTRATION MEMBRANES	RAPID GRAVITY FILTRATION	SCREENS - FIXED AND ROTATING	SLOW SAND FILTRATION	SLUDGE - BELT PRESS	SLUDGE - FRAME PRESS	SLUDGE - THICKENERS	SUBMERGED MEMBRANES - ULTRA-FILTRATION	SULPHONATION	UV
RIVER SEVERN	Littleton TW (Sharpness)	60	22	W4	■	■		■	▥	■		■			■				▨	■	■	■			■	■		■	■				■			■
	Purton TW (Sharpness)	165	91	W4	■	■		■	■	■	■	■			■				■	■		■		■	■	■		■	■				■			■
RIVER AXE	Axe raw water - Actiflo		3	W3							■	■								■									■			■				
MENDIP RESERVOIRS (Lakes)	Banwell TW (minus WB & BS)	30	11	W4					▥			■	■					■	▨	■			■						■	■			■			■
	Barrow TW	120	69	W4			■		▥			■	■	■					▨	■	■			■				■	■		■		■		▥	▨
	Cheddar TW (minus R Axe)	60	23	W3					▥			▨	■	▨				▥	▨	▨	■			▨		▨		▨	■	▥					▥	■
	Stowey TW	27	18	W4					▥				■					■	▨	▨	■					■		■	■	■					▥	■
GROUNDWATER (Borehole, Well & Spring)	Alderley SP	5	4	W3					▥									■	▨								■		■							
	Charterhouse SP	2	0	W3					▥									■	▨		■						■		■							
	Chelvey BH	18	9	W3					▥									■	▨		■						■		■							
	Clevedon Well	4	0	W3					▥										▨		■															
	Egford Sub & Main Wells (Frome TW)	5	4	W3					▥									■	▨		■						■		■							
	Shipton Moyne/Long Newnton b.h.	12	6	W3					▥								■		▨		■											■				■
	Oldford BH	15	13	W3					▥									■	▨		■						■		■							
	Sherborne SP	9	3	W3					▥			■						■	▨								■		■							
	Tetbury BH	3	2	SIMPLE					▥										▨																	
	Shepton Mallet (Forum)	2	0	W3					▥									■	▨								■		■							
BOOSTER CHLORINATION	Victoria																		■																	
	Avonmouth																		■																	
	Dry Hill															■																				
	Maesbury															■																				
	Kingswood															■																				
	Brent Knoll															■																				
	Cooks Corner															■																				
	Lockleaze																		■																	
	Almondsbury								■																											
	Rowberrow								■																											

Advance treatment

To be abandoned during AMP6

New process to be installed during AMP6

Source: Bristol Water

277. In addition to having a higher proportion of W3/W4 treatment works compared to other water companies, some of Bristol Water's treatment works are even more complex than a typical W3/W4 treatment works. This is particularly true of the Purton and Littleton TW, as described in Box 8 below.

Box 8: Purton and Littleton TW - complexity of the treatment processes

Purton and Littleton TW – complexity of the treatment processes

The Purton TW and Littleton TW share many characteristics and water treatment issues. They were built in the early 1970s and 1960s respectively. Both plants are fed from the Sharpness Canal. The Purton TW site includes a raw water pumping station to feed Littleton TW.

The nature of the raw water extracted from the Sharpness Canal is of such a poor and variable quality (see Box 6 above) that the complexity and costs of treating it at Purton and Littleton are much higher than the costs of treating water from a more typical river abstraction that would require a W3 or W4 level of treatment complexity.

There is a historic legacy of assets at Purton which derive from past contaminants in the catchment, such as atrazine, but we still need to retain these given the variability of the water quality. Recent additions include UV treatment processes installed during AMP5 to address Cryptosporidium oocysts that had been detected in treated waters at both Purton and Littleton, and the use of pre-chlorine dosing and surface aeration to reduce the numbers of zebra mussels.[167]

It is also essential to retain complex processes to deal with transient deteriorations in the raw water as we do not have the interconnectivity to source/blend other water. There is currently no technology to detect exotic contaminants (such as pesticides) with real-time monitoring and then respond by ramping up/down treatment or avoiding contamination by turning off intakes at these works during times of very poor quality raw water. The lack of adequate bankside storage to use as a back-up also contributes to the need for continued asset based treatment management that can deal with the spikes in water quality.[168]

The need to maintain compliance with water quality standards means, therefore, that we must retain and operate intensive and expensive processes at these sites such as ozonation, Granular Activated Carbon adsorption (including regeneration) and UV disinfection.[169] The variability of the quality also means that the quantity of treatment inputs, such as coagulants, also varies resulting in a notable increase in the cost of treatment. Whilst there are ongoing programmes for plant and process optimisation, the need for extra treatment stages means that there is only limited opportunity to mitigate these costs.[170]

Hampton Loade TW[171] has been identified as a raw water site that is comparable to Purton and Littleton TW.[172] Water is abstracted from the same underlying source (the River Severn) and Ofwat's models predict that it should have similar costs to Purton TW (i.e. both are non-ground water treatment works classed as W4. There are, however, differences in the quality and variability of the water quality faced by the plants, which reflects in the number of additional processes carried out at Purton and Littleton TW compared to Hampton Loade TW.[173] This results in increased costs for chemicals and operational maintenance at Purton and Littleton TW of £1.67m p.a. compared to the costs incurred at Hampton Loade.[174]

Source: Bristol Water

[167] DDR Appendices Oct 14 (SOC020), Section 4.10.4.2 – Zebra mussels and chlorination by-products

[168] By contrast, Severn Trent, which also makes use of water from the River Severn, does have access to suitable bankside storage to use as a back-up. It is, therefore, able to 'turn-off' Strensham when high suspended solids loads are detected in the River Severn.

[169] The UV systems that came into service during 2012 have led to a significant increase in power costs at both sites.

[170] DDR Appendices Oct 14 (SOC020), p. 155

[171] Hampton Loade TW is a large treatment works, owned and operated by South Staffs Water, capable of treating up to 215 Ml/d and classed as W4. At the point of abstraction, the River Severn has the characteristics of a lowland river with all the difficulties of treatment this entails.

[172] DDR Appendices Oct 14 (SOC020), Section 4.10.4.4

[173] DDR Appendices Oct 14 (SOC020), Table 47.

[174] DDR Appendices Oct 14 (SOC020), p. 157 – Direct costs resulting from process differences.

3.4.6.1 Current water treatment issues

278. We aim to achieve 100% compliance with all drinking water quality standards. Plant breakdowns or elevated levels of impurities in raw water, however, can cause problems in treatment works leading to exceedances of standards. We report these as a matter of course to the DWI and the need for improved processes are considered if there is a reasonable likelihood of reoccurrence. In nearly every case, exceedances are short-lived and only modestly above the precautionary limits set. As such there is unlikely to be any risk to public health. Should more serious problems arise then there are well-practised procedures for warning customers and relevant authorities that either the water should not be used at all or should be boiled before use. These situations are rare but can be caused by the direct or indirect action of third parties.

279. In other situations, the cause for the quality issues is more complex, and requires specific action to rectify the issue. An example of this in relation to Cheddar TW, resulting from underlying problems with the quality of the raw water the site treats, is provided in Box 9 below.

Box 9: Cheddar TW - quality issues

Cheddar TW – quality issues

As explained above (see Box 7) the algal bloom problem at Cheddar Reservoir has created a water quality issue that necessitates a solution at Cheddar TW in order to protect the quality and sufficiency of supply.

The Cheddar TW is normally fed from Cheddar Reservoir. However, if Axbridge Pumping Station is out of service, Cheddar TW can be supplied directly from Cheddar Springs, but at a higher risk of contamination due to Cryptosporidium oocysts.[175]

Cheddar TW is a relatively basic treatment works comprising of micro-strainers and slow sand filters which was designed to treat the previously very good quality surface water taken from the Cheddar Reservoir. With the quality of the raw water deteriorating, as demonstrated by the increased frequency and severity of algal blooms, the existing treatment processes are rapidly becoming no longer 'fit-for-purpose'. Indeed, it has already led to serious operational issues, including a DWI notifiable incident[176] and throughput being severely limited.

The occurrence of algal blooms results in an increased incidence of filter blinding. Investigations have shown that if the slow sand filter media becomes anaerobic, appreciable concentrations of Mn, Fe, As, Pb and Al will be released into the filtered water compromising the final water quality. On a number of occasions this has significantly restricted the throughput of Cheddar TW and has led to a DWI notifiable incident when the major strategic service reservoir supplied from Cheddar TW went empty impacting on the supplies to around 20,000 people. Throughput has been severely limited at times.

A solution is required to ensure that final water quality and full treatment design flows (60 Ml/d) can be maintained at times of algal blooms in the raw water (see **Section 10.2.2.1.1** below for further details of the proposed solution).

The DWI has issued two letters which 'Commend for Support' the scheme we have proposed (see **Section 2.4.3.1** above).[177]

Source: Bristol Water

3.4.6.2 Bristol Water's treatment complexity profile comparative to the industry

280. As Figure 12 above indicates, all but one of Bristol Water's treatment works are classified W3 or W4. This means that since 2001/02, over 98% of our deployable input of water

[175] An upgrade to Cheddar TW to install ultraviolet disinfection to address the problem of Cryptosporidium oocysts was completed during AMP5.

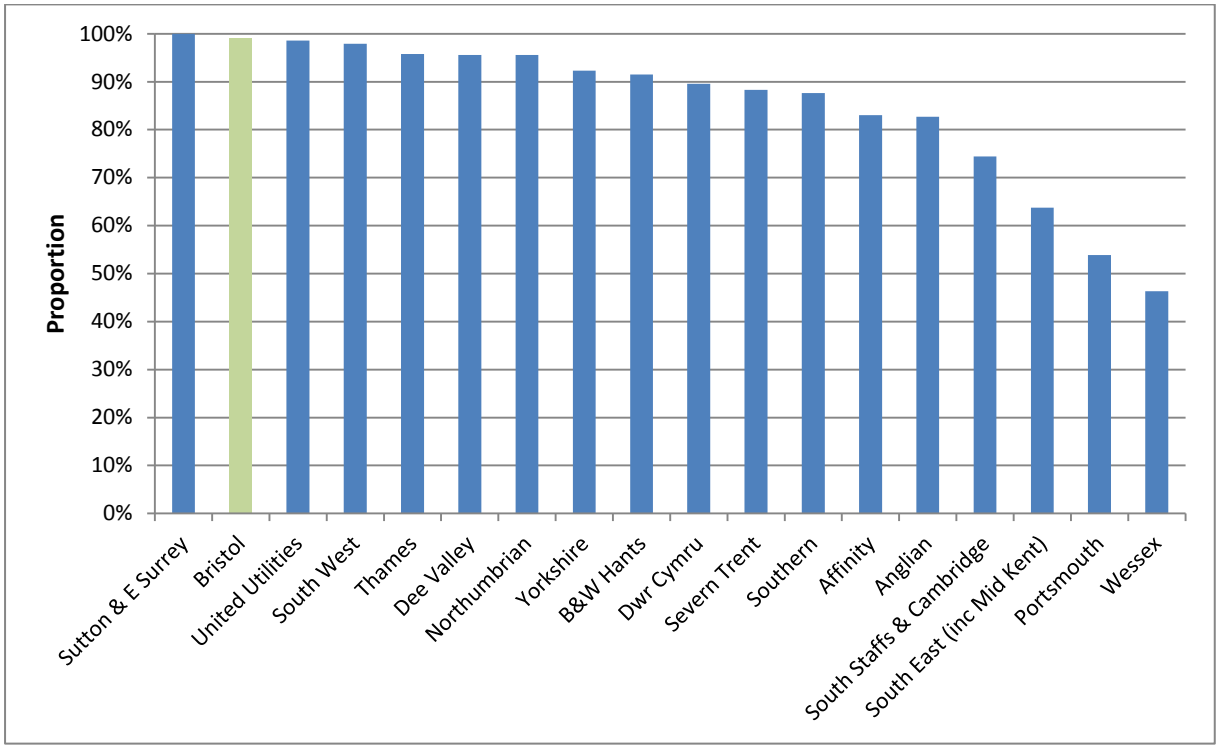
[176] Cheddar WTW Final Report Jul 13 (SOC233).

[177] DWI further support letter Cheddar TW RW deterioration (SOC234) and Cheddar TW DWI Commendation for support (SOC316).

resources has been supplied from a W3 or W4 classification treatment works, with very little between year variations.

281. Figure 13 below shows the proportion treatment works for all companies that are classed as W3 and W4. It demonstrates that Bristol Water has the second highest proportion of W3 and W4 treatment works in the industry.

Figure 13: Treatment complexity – industry-wide proportion of treatments works classed as W3 or W4

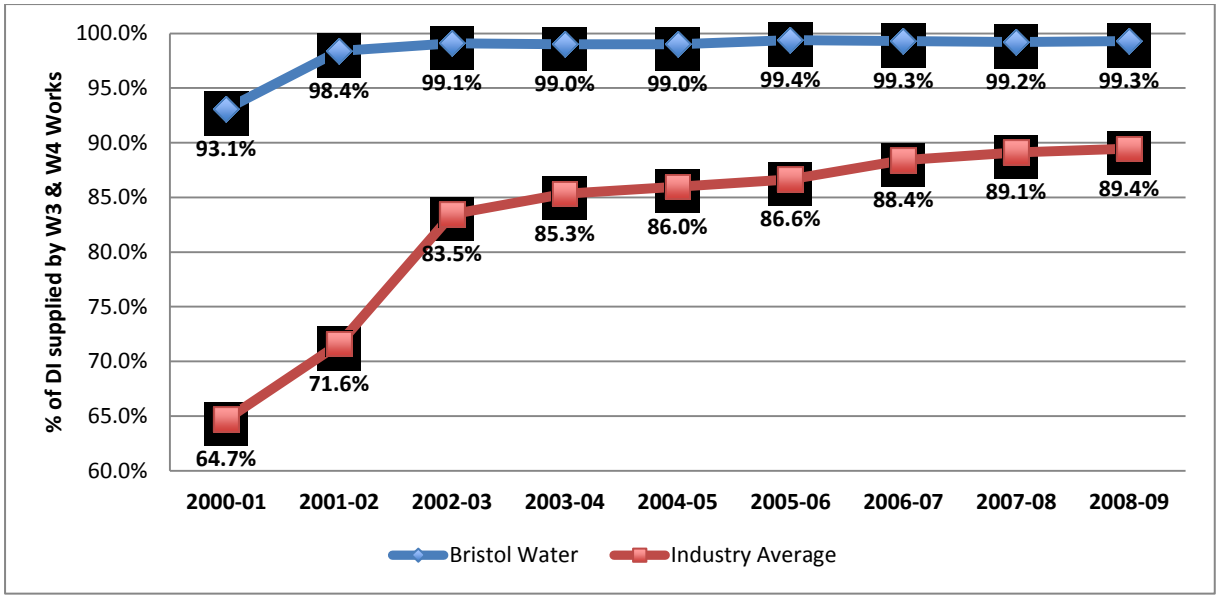


Source: Bristol Water analysis of Inter-company data provisions – June Returns 2009[178]

282. In all years since 2000/01, the percentage of our distribution input supplied through a W3 or W4 treatment works has substantially exceeded the weighted industry average, with evidence of a stable relative difference since 2002/03. This is demonstrated in Figure 14 below.

[178] Information regarding treatment work complexity is not contained in the Annual Return which replaced the June Returns from 2012.

Figure 14: Trend in Bristol Water treatment complexity relative to industry average



Source: Annual June Returns 2000/01 to 2008/09, DDR Appendices[179]

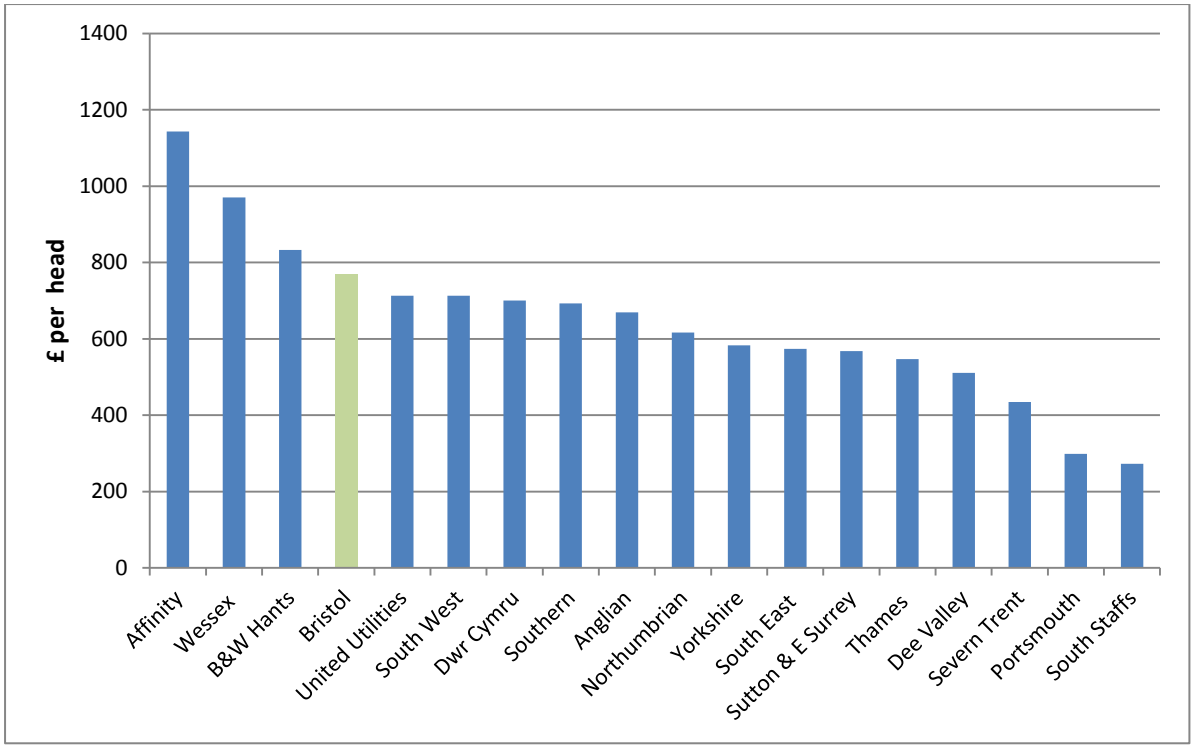
283. The tightening of water quality standards has meant that the top end of the range (W4) no longer represents a particularly complex treatment works. For example, many of Bristol Water's works, and in particular the largest ones, have complexity significantly in excess of the minimum for W4 (see Figure 12 above). In addition, additional treatment processes such as ultraviolet treatment, have been added to a number of our works since this data was produced.[180] Purton and Littleton TW are good examples of this, as demonstrated in Box 8 above. As such, Figure 13 may actually understate the relative complexity.

284. An alternative measure of treatment works complexity would be MEAV of treatment works per head. This data is not available to Bristol Water, but total non-infrastructure MEAV per head is an available proxy. This is because the MEAV of treatment works is the largest of the different non-infrastructure asset classes and, therefore, companies with more complex treatment works will tend to have higher non-infrastructure MEAVs compared to the population served. This is shown for all companies in Figure 15 below.

[179] DDR Appendices Oct 14 (SOC020).

[180] This may be the case for other companies with complex works if they are subject to the similar environmental issues.

Figure 15: Non-Infrastructure MEAV £ per head



Source: Bristol Water[181]

285. This shows a similar picture to the treatment works complexity graph, with Bristol Water having a relatively higher asset intensity than average.

286. Based on this information, and given the relative complexity of Bristol Water's treatment works, and the processes utilised, this would be expected to result in Bristol Water's cost for maintenance of treatment works to be higher than the industry average (see **Section 9.3.3.4.2** below).

3.4.7 Distribution network

287. Bristol Water's treatment works feed into a network of storage facilities and pumping stations. Raw water and treated water is moved about this network through a series of trunk mains, connection pipes and service pipes. Important elements of this distribution network are described in more detail in the following Sections. In performing these services Bristol Water not only has to contend with supplying water across a hilly region (see **Section 3.3.3** above), it has to do so with the second oldest mains network in the UK (see **Section 3.4.8** below).

3.4.7.1 Treated water storage facilities

288. Once water has been treated, it is typically moved into our treated water storage facilities which comprise a mixture of service reservoirs and water towers. Storage facilities help balance the desired stable throughput from treatment works with the highly variable

[181] Model differences graphs (SOC392); 'charts' tab; from June return data, adjusted by inflation (SOC394), 'mea_other' tab.

diurnal demand from customers. Adequate "turnover" of the water in service reservoirs is essential to maintain its quality otherwise the chlorine disinfectant evaporates away.

289. In total, we own and operate 136 covered storage service reservoirs and 10 water towers, with total storage capacities of 537 Ml and 4.2 Ml respectively. The largest of Bristol Water's service reservoirs, Pucklechurch, can hold 116 Ml.

290. Service reservoirs are enclosed tanks that store potable water within the distribution system. Service reservoirs are normally built on ground higher than the area they supply to allow gravity to aid supply to customers whilst still ensuring pressure standards at the tap. Where this is not possible we utilise water towers to raise the water higher or keep the zone under pumped pressure.

291. It remains important to protect security of supply for the densely populated area in the centre, north and west of Bristol. At present, this is made particularly difficult by the continued problems at Bedminster reservoir, as described in Box 10 below, which has the effect of reducing current storage capacity.

Box 10: Bedminster Reservoir - summary of status

Bedminster Reservoir

Bedminster Reservoir, one of our largest treated water storage reservoirs, serving over 30,000 customers, was constructed in 1907 and is situated in a strategic position above Bristol. It has been out of service since June 2013 as a result of a serious structural failure. Investigations have identified that the inability to operate Bedminster Reservoir results in a greater risk of interruptions in the area of the city it supplies affecting over 30,000 customers. Proposals to address this issue were contained in the Business Plan and are described in more detail in **Section 9.3.3.4.1** below.[182]

Source: Bristol Water

3.4.7.2 Pumping stations

292. The topography of the Bristol Water Region means that Bristol Water must contend with supplying water in a hilly region (see **Section 3.3.3** above). This has a direct impact on the amount of pumping plant required, with an associated impact on expenditure.

293. Another factor influencing pumping requirements is the nature of the sources. Sources in upland areas are likely to reduce pumping requirements whereas deep borehole sources are likely to increase pumping requirements. As noted in **Section 3.3.3** above, most of our sources are located close to sea level, which increases our pumping requirements.

[182] June Cost Exclusion Cases (SOC006).

294. A key piece of pumping plant is the pumping station (see Box 11 below).

Box 11: Pumping Stations

What is a pumping station?

Main pumping stations, which supply water to the distribution system, are located near the water treatment facility or a potable water storage facility, and pump directly into the piping system. Pumps that pump directly into transmission lines and distribution systems are sometimes called high lift pumps.

Booster pumps are additional pumps used to increase pressure locally or temporarily. Booster pumping stations are usually remotely located from the main pumping station, as in hilly topography where high-pressure zones are required, or to handle peak flows in a distribution system that can otherwise handle the normal flow requirements.

Source: Bristol Water

295. We have 173 remotely controlled pumping stations as detailed in Table 14 below.

Table 14: Pumping Stations

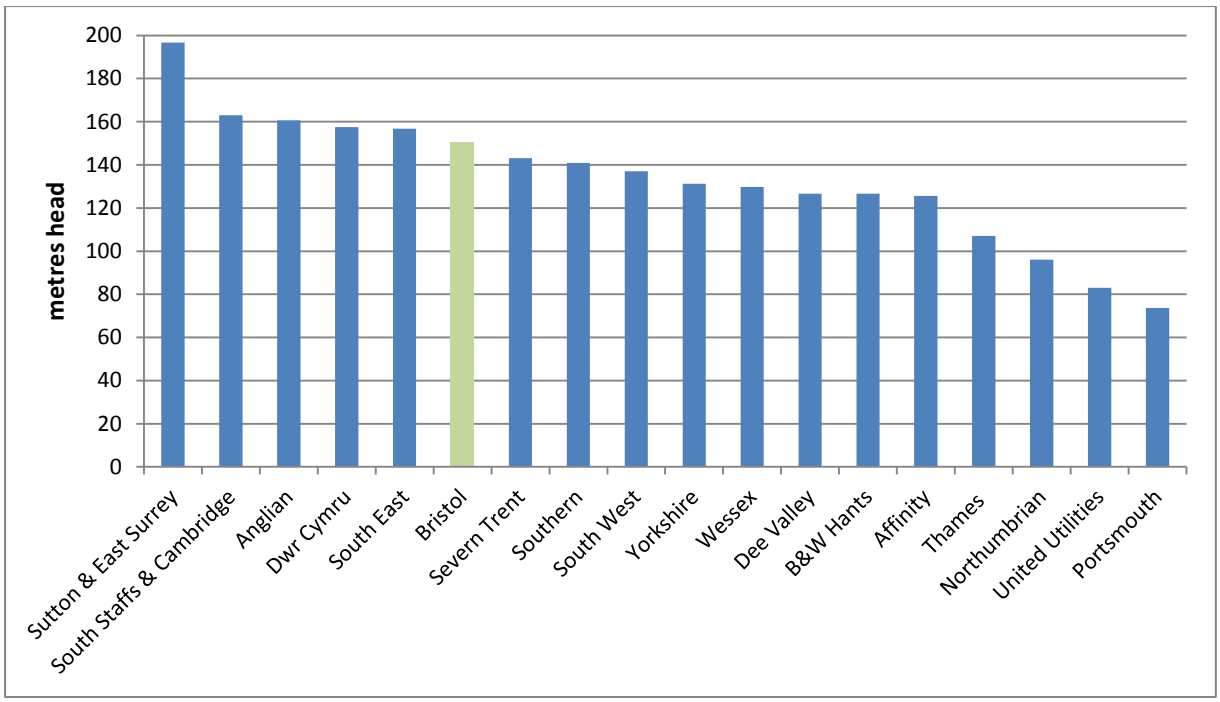
Pumping stations	Number
Water resources - intake and source	33
Raw water distribution - booster	1
Water treatment - forwarding	27
Treated water distribution - booster	112

Source: Bristol Water

3.4.7.2.1 Bristol Water's pumping requirements comparative to the industry

296. One comparative measure of pumping collected by Ofwat is average pumping head. This measures the average height the water has to be pumped in each network. The greater the pumping head, the more pumping plant is typically required. Figure 16 sets out the average pumping head by reference to metres pumped for each company. It shows that Bristol Water has a slightly higher pumping head than average.

Figure 16: Average pumping head – industry comparison



Source: Bristol Water[183]

297. Bristol Water would, therefore, be expected to incur slightly higher maintenance costs on pumping stations (see **Section 9.3.3.4.2** below)**.**

3.4.7.3 Mains

298. As mentioned above, the mains network splits into two parts – one which provides for the transportation of raw water between sources, reservoirs and treatment works, and the other which allows for distribution of treated water to customers' properties.

3.4.7.3.1 Raw water mains

299. Bristol Water has 133 km of raw water mains and aqueducts. The two most important of these are the Line of Works (see Box 12 and Image 6 below) and the Axbridge to Barrow 33" including the spur from Blagdon to Says Lane near Churchill (see Box 13 below).

Box 12: Line of Works - key features

Line of Works

As explained above (see Figure 10), the Line of Works transports raw water from the River Chew to Chew Reservoir, and on to Barrow TW. The Line of Works was built in the 1840s and was designed to use gravity. This influenced the route taken and the variety of ways in which the water is carried. It is over 17 km in length comprising 10 km of culvert with some considerable lengths over 20 m underground, together with 7 km of large diameter cast iron mains and 0.3 km of wrought iron aqueducts above ground on piers. The raw water aqueduct's lower section is the sole means of getting Chew Reservoir water to Barrow for treatment.

Source: Bristol Water

[183] Model differences graphs (SOC392); from June Return Data 2007/8-2010/11 – average over four years (SOC396).

Image 6: Bristol Water's Line of Works

Source Bristol Water

Box 13: Axbridge to Barrow Main - key features

Axbridge to Barrow Main

The Axbridge to Barrow 33" raw water main is a cast iron, lead-jointed main laid in the 1920s. It is 27 km long and transfers raw water from Cheddar Reservoir to Banwell or Barrow TW. Water can also be transferred from Blagdon Reservoir to Banwell via the spur to Says Lane.

Source: Bristol Water

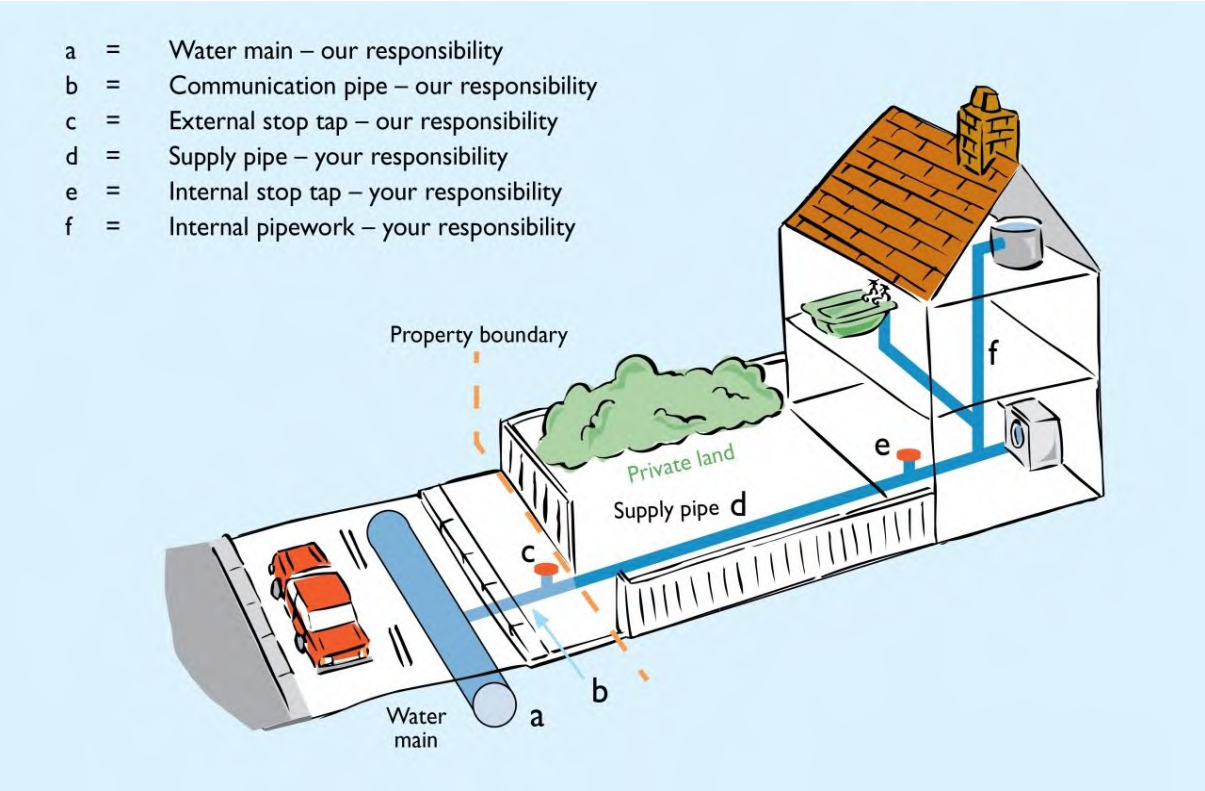
3.4.7.3.2 Treated water distribution

300. Our distribution system has approximately 6,750 km of networked potable water mains, ranging from 50 mm to 1200 mm in diameter. 688 km of mains are classed as trunk mains. Our network also includes 478,000 communication pipes connecting mains in the street to customer properties.

301. The older sections of mains within our network are generally designed to permit the movement of water solely by gravity. The newer mains have been laid in more difficult terrain in order to cope with growing demand, and tend to operate at higher pressures as a result. This impacts both on materials used and the need for increased numbers of pumping and booster stations.

302. The relationship between the different type of pipes is explained by Figure 17 and Table 15 below.

Figure 17 Treated water supply network



Source: Bristol Water Website[184]

Table 15: Types of treated water pipes

Type	Description
Service Pipe	The whole of the water pipe from the main to the first internal water fitting. The pipe is divided into two sections: the communication pipe and the customer supply pipe.
Communication Pipe	This is normally the length of pipe from the connection with the water main, to a point where the pipe crosses the boundary between the street and someone's garden. This part of the pipe is normally maintained by Bristol Water. Of our communication pipes, the material type for 241,000 m (50.4%) is lead, and for 12,000 m (2.6%) is galvanised iron.[185] Bristol Water has one of the industry's highest proportions of lead communication pipes in its supply system. Although Bristol Water stopped installing lead pipes in the 1970s on health grounds, it has only had limited funding to replace small numbers of lead pipes for water quality compliance purposes.[186] The remaining lead pipes, which are a minimum of 40 years old and with many

[184] Bristol Water Website - 'useful definitions' (**'Bristol Water Useful Definitions'**) (SOC293).

[185] The historical reason for this variety stems from the different types of ground conditions and operating pressure requirements throughout the region, the fact that the company has grown in a piecemeal way through the acquisition of several smaller water undertakings with separate infrastructure), and technological developments in materials. More than 20%, by length of mains, is over 100 years old. A sustainable programme of future maintenance and replacement is essential to provide appropriate customer service at the lowest cost and to avoid storing up problems for future periods.

[186] We undertake compliance monitoring for lead at the frequency stated in the Water Quality Regulations and a more extensive operational random sampling programme when it takes any sample for bacteriological compliance monitoring. The dataset in each year is about 3,500 samples. The effectiveness of ongoing optimisation of the plumbosolvency control at treatment works using phosphate dosing is well demonstrated with a reducing rate of non-compliance against the 10µg/l standard. However, the rate of improvement is likely to be asymptotic and will level out at a relatively steady annual failure rate. Bristol Water estimates this value to be about 40 (i.e. just over 1% of the

	over 100 years old, are increasingly prone to leaks. Deterioration of these pipes will continue until they are replaced.
Supply Pipe	This is normally the length of pipe from the boundary between the street and the garden up to the first internal water fitting. In exceptional cases the supply pipe can extend right up to the connection to the main. This section of pipe is owned and maintained by the owners of the property(ies) supplied by that pipe.
Distribution Main	Distribution mains are generally medium diameter pipes that distribute water to a number of buildings in an area. Distribution mains are the responsibility of Bristol Water and are normally laid along public highways – sometimes in the carriageway and sometimes in the footpath. They can also be installed in privately owned streets or lanes and across fields or public open spaces. Occasionally they can be found in other locations. Communication pipes are connected directly onto distribution mains. Our mains comprise a variety of pipe materials including cast iron, ductile steel, asbestos cement lined and four types of high density plastic.
Trunk Main	Trunk mains are generally large diameter mains that transfer water from one area to another.[187] We have no legal duty to make service connections to trunk mains, and due to their strategic importance we do not normally do so. This is so that their integrity can be maintained. An activity output required from the CC Redetermination was the rehabilitation of 58.6 km of trunk mains to improve discolouration contacts to 1.23/1000 population. The scheme is due for competition by 31 March 2015.

Source: Bristol Water analysis

3.4.8 Age of assets

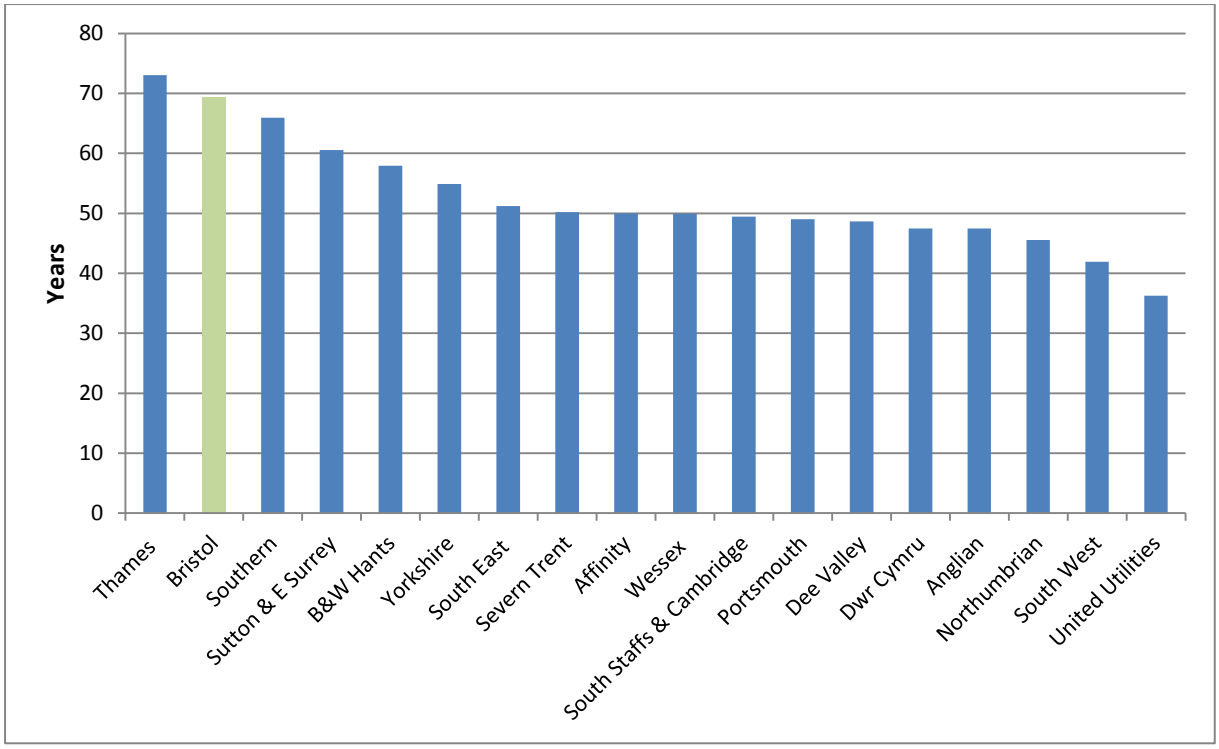
303. As might be expected for a company with such a long history, many of Bristol Water's assets are very old. Over 21% of Bristol Water's mains are over 100 years old.

304. Figure 18 sets out the average age of company networks based on the 2009 asset inventory. More recent data is not available.

Figure 18: Average Mains Age

3,500 annual samples) and that this will continue during the AMP6. These failures require replacement of pipes. It should be noted that the sampling regime is only checking a small proportion of the extensive number of lead pipes each year.

187 In 2008, Bristol Water installed a major new main as part of the Northern Strategic Support Scheme that involved the construction of a new service reservoir, 13.5 km of new large diameter mains, relining 10.5 km of existing 21" main and two new pumping stations. This, together with some of the existing treated water distribution network, enables treated water to flow around Bristol via an integrated network, the "Ring Main". The Northern Strategic Support Scheme can provide water to almost 200,000 people in the north and eastern parts of Bristol and surrounding areas in an emergency. The Northern Strategic Support Scheme has already been used to protect some customers against the risk of water outages.



Bristol Water analysis; 2009 Asset Inventory [188]

305. Bristol Water has the second oldest mains network in the UK.

306. More than 30% of Bristol Water's pumping plant is over 25 years old, and many of the largest and most strategic pumps are over 40 years old.

307. Bristol Water's level of investment during AMP4 was restricted so that the average distribution mains replacement rate has been 0.4% per annum, equivalent to a 250-year replacement cycle for the network. During AMP5 the replacement rate has been 0.7% per annum equivalent to a 140-year replacement cycle. This is in line with CCFD10 rate set at 0.7% per annum equivalent to a 140-year replacement cycle.

308. As is explained in more detail in **Section 9.3.3.3.1** below, the age of assets can impact on the associated capital maintenance costs. The expectation is that for a company with relatively old assets, the cost of maintenance might be higher than for a company with relatively younger assets. This is in part because an older network has a higher rate of degradation and therefore needs more maintenance to maintain its performance.

3.5 Bristol Water's demand profile

309. The purpose of this Section is to set out the characteristics of Bristol Water's customers' demand for water now and in the future. This has a direct impact on Bristol Water's strategic planning, particularly for the long term, and the resultant supply demand balance is a key component of the WRMP (see **Section 2.4.4.1** above). A number of the schemes

[188] This was based on data obtained through the June Returns. Equivalent information is not available in the Annual Returns that have replaced the June Return, hence why this information is linked to 2009 and has not been updated.

proposed in our Business Plan are linked to the need to ensure that future demand will be met (see **Section 10.2.2.3** below).

310. In particular, it considers:

- **average consumption** – Bristol Water's supply statistics for 2013/4 (see **Section 3.5.1** below);
- **distribution input** – details of our water input, and how it is used (see **Section 3.5.2** below);
- **bulk supplies** – details of bulk supplies of water made to other companies (see **Section 3.5.3** below); and
- **changing demand** – a discussion of some of the factors that impact future demand and Bristol Water's expectations for future household and non-household consumption (see **Section 3.5.4** below).

3.5.1 Bristol Water's customer consumption statistics

311. Bristol Water's customers and their current levels of consumption are described in outline in the following table:

Table 16: Bristol Water supply statistics 2013/14

	Metered Households (000)	Unmetered Households (000)	Total Households (000)	Metered Non-households (000)	Unmetered Non-households (000)	Total Non-households (000)	Total (000)
Billed properties[189]	200	273	473	30	3	33	506
Connected properties[190]	-	-	483	-	-	35	518
Population[191]	421	679	1,100	59	1	60	1,160
Occupancy rate[192]	2.1	2.5	2.3 (average household)	N/a	N/a	N/a	N/a
Water delivered (Ml/d)[193]	55.1	114.6	169.7	58.0	1.5	59.5	230.1
Per Capita Consumption (l/head/d)[194]	**120.5**	**158.6**	**142.5 (average household)**	**n/a**	**n/a**	**n/a**	**n/a**

Source: As per footnotes.

312. Self-evidently demand can have a direct impact upon the supply-side issues. Any increase in demand will spotlight capacity constraints in distribution, etc., leading to the need to accelerate investments to ensure the ability to supply. As is shown in **Section 3.5.4** below,

189 Bristol Water June Return Annual Performance Report 2013-2014 **('June Return 2014 Master Data')** (SOC312), Table 5 Lines 1-10.

190 June Return 2014 Master Data (SOC312), Table 5 Lines 6 and 10.

191 June Return 2014 Master Data (SOC312), Table 5 Lines 18-22.

192 Calculated as population divided by billed properties, only relevant for households.

193 June Return 2014 Master Data (SOC312), Table 6 Lines 1-6, 20.

194 June Return 2014 Master Data (SOC312), Table 6 Lines 8-9.

demand, both household and commercial, is set to increase in the Bristol Water Region during AMP6.

3.5.2 Distribution input

313. During 2013/14 an average 264 Ml/d of treated potable water was put into supply. This distribution input is utilised as follows:

Table 17: Bristol Water's distribution input 2013/14

Input	Volume (Ml/d)	Percentage
Household use including customer leakage	170	**64%**
Non-household use including customer leakage	59	**22%**
Illegal and other legal use but unbillable	4	**2%**
Leakage from Company mains	31	**12%**
Total	**264**	**100%**

Source: Computed from BW Regulatory Performance Report 2014[195]

3.5.3 Bulk supplies

314. We have a large bulk supply contract providing a transfer of up to 11.37 Ml/d treated water to Wessex Water, via Newton Meadows at Bath. This export of water is regarded by both Wessex Water and Bristol Water as a secure supply available under all conditions except during periods when the EA have imposed drought restrictions on the River Severn. Under these conditions, the bulk transfer will be reduced by the same percentage as the overall percentage reduction in Sharpness abstraction. We have agreed in principle with Wessex Water the possibility of reducing the contracted supply volume in order to retain water for our existing customers as we move into a period of supply demand deficit. We will conclude these agreements during the AMP6 period as part of the formal changes to abstraction regimes in the Malmesbury area.

3.5.4 Changing demand

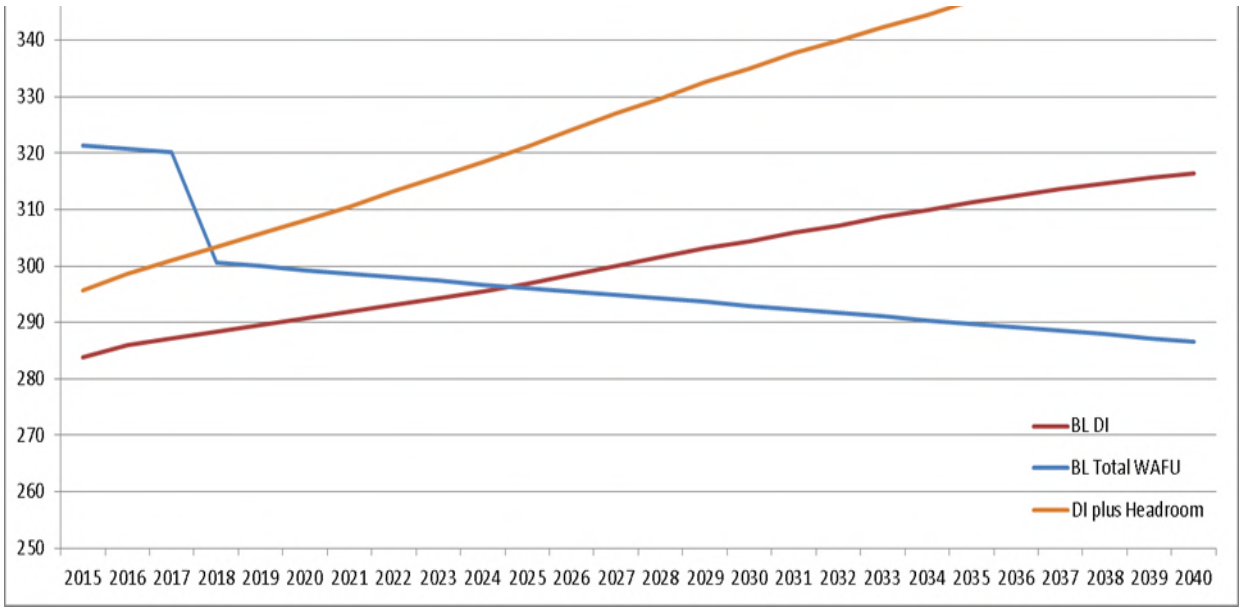
315. Current projections for regional population and housing growth suggest an increase in the demand for water of 15% by 2045. This increase will mean that future demand for water will exceed the water available from our existing sources. This may be exacerbated by the impact of climate change on water availability.[196] It is anticipated that this shortfall will arise at some point in the 2020s. Our Business Plan proposals to address this shortfall are detailed in **Sections 10.2.2.3** and **10.6** below.

316. Figure 19 below illustrates the overall projection of future demand for water against a background of declining water availability.

[195] Computed from Bristol Water Regulatory Performance Report 2013/14 (**'Regulatory Performance Report 2013/14'**) (SOC052)

[196] WRMP 2014 (SOC039), p.1.

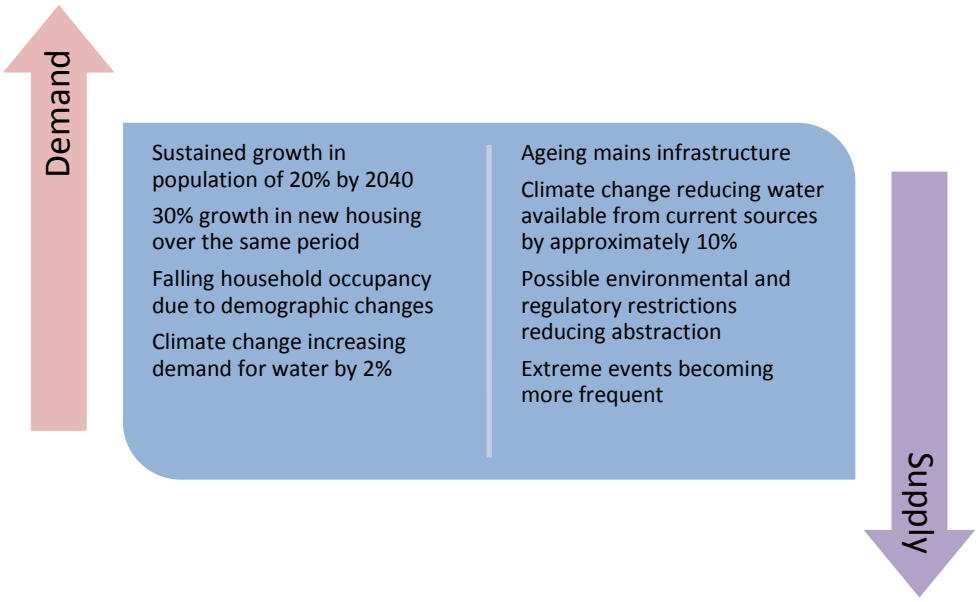
Figure 19: Baseline supply/demand balance before any planned interventions



Source: WRMP[197]

317. The main drivers behind the future deficits in the supply demand balance are shown in Figure 20 below.

Figure 20: Supply Demand Drivers



Source: WRMP[198]

[197] WRMP 2014 (SOC039), p2 Legend descriptors:

- BL DI = Baseline Distribution Input;
- BL Total WAFU = Baseline total water available for use;
- DI plus Headroom = Distribution Input plus headroom.

Definitions of these terms are provided in **Section 10.6**.

3.5.4.1 Household water consumption

318. The projected increase in population and properties over the next 30 years is higher than at any time in the past and could result in an increased demand for water similar to that witnessed between the 1950s and 1970s. The trends for household water consumption are explored in detail in Section 5 of the WRMP.[199]

319. According to our ONS-based estimate of growth, the number of households is projected to increase by an additional 15% by 2026 and by 30% by 2040, while population is projected to increase by 20% over the same period. Despite this, our baseline household demand for water is predicted to increase by approximately 10% over the same period. This is due to the efficiency assumptions already made in the baseline forecast reflecting the level of market- and customer-driven water efficiency outcomes anticipated.[200]

3.5.4.2 Non-household water consumption

320. Non-household demand for water comprises the industrial and commercial sectors of the customer base. Practically all of the demand is for potable supplies of water.[201] Due to the large numbers of smaller customers in our non household category, the overall number of non-household customers has remained relatively constant over the past 10 years, although the demand for water has decreased. Non-household water demand now accounts for only 23% of the total amount of water put into the distribution system, compared to over 30% 10 years ago. This has been largely due to de-industrialisation and the closure of some larger commercial and industrial customers.

321. Between 1960 and 2010, Bristol Water has had non-potable water supply contracts for up to 26 Ml/d for customers in the Avonmouth industrial zone. At present we have only one minor non-potable supply of less than 0.2 Ml/d. We consider that it is quite likely we will need to provide supplies of non-potable water to customers in Avonmouth at some point in future. For planning purposes we have assumed a 19 Ml/d supply between 2015 and 2020 (2018).[202] This was based on discussions that took place between Scottish & Southern EnergySSE and Bristol Water for supply to a new power station, Seabank 3. We were advised in November 2014 that SSE have paused its planning application. However, we have also been approached by Scottish Power for water supply to a similar power station development on an adjacent site. As Scottish Power is at an early stage in its planning application, we have not made a formal offer of supply.

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198 WRMP 2014 (SOC039).

199 WRMP 2014 (SOC039).

200 WRMP 2014 (SOC039), p. 87.

201 Included in this component is a small element of domestic household consumption in the instances where the commercial premises have an associated dwelling, as may be the case on some small farms. The domestic component is not disaggregated in our plan as it so small and non-material when compared to the overall quantity of non-household component.

202 WRMP 2014 (SOC039), p. 89.

3.6 CC10 Redetermination – its impact and Bristol Water's comparative performance

3.6.1 Executive summary

3.6.1.1 Introduction

322. The purpose of this Section is to outline the scope of the CC10 redetermination, explain its impact on Bristol Water and compare what it has delivered during AMP5 against the CC10 assumptions. This provides useful context to understand Bristol Water's proposals for PR14, particularly in relation to its historical levels of efficiency, and ability to deliver against its business plan proposals and meet cost expectations.

3.6.1.2 Key themes

323. We have performed well in 2010-15 and have met all of our performance targets. In particular, we have delivered what we said we would in FBP09 and what was allowed for in CC10, such as the North Bristol Resilience scheme and have actually gone beyond that where it made sense to do so for customers. For instance, during AMP5 we have provided solutions for Tetbury and Oldford, even though these schemes were not funded in CC10.

324. We have maintained our assets successfully and delivered stable serviceability (see **Section 12**). We have also achieved high SIM rankings throughout the period.

325. 2013/14 is used as the base year for Bristol Water's PR14 Business Plan estimation of opex (see **Section 9.3.2.2.1** above). This sub-section demonstrates that 2013/14 expenditure was in line with the CC10 assumptions for that year, thereby supporting the position taken on historic efficiency in our Business Plan.

3.6.1.3 Structure of sub-section

326. In particular, this sub-section sets out:

- **overview of CC10** – an outline of the conclusions reached by the CC in CC10 (see **Section 3.7.2**);
- **Bristol Water performance compared to CC10 assumptions –** details of Bristol Water's performance during AMP5, including financial performance, revenues, expenditure and delivery record, compared to the assumptions contained in the CC10 redetermination (see **Section 3.7.3**); and
- **CC10 lessons learnt** – details of the lessons learnt by Bristol Water following PR09, and the CC experience in particular, and how this has informed Bristol Water's approach to PR14 (see **Section 3.7.4**).

3.6.2 Overview of CC10 redetermination – key findings and conclusions

327. In 2010 Bristol Water rejected Ofwat's determination of K for PR09. Ofwat's FD09 was referred to the CC, which carried out a full redetermination.

328. In reaching its redetermination, referred to as CC10, the CC used the best data available at the time and focused on areas of disagreement between Bristol Water and Ofwat. It

assessed and built upon the work undertaken by the parties, including by appointing engineering consultants, Halcrow, to assist with that process.[203]

329. The CC estimated Bristol Water's capex, opex and likely cost of capital. It addressed, in particular, the dispute between Bristol Water and Ofwat regarding proposals for capital maintenance, ultimately concluding that most of the work Bristol Water proposed in its capital maintenance programme was required and should be funded.[204]

330. In reaching that conclusion, the CC criticised the application of Ofwat's asset management assessment to Bristol Water on the basis, amongst other things, that it failed to take into account Bristol Water's "*naturally 'lumpy' investment profile*" and penalised us for using a model to predict burst rates that the CC found to be reliable, thereby resulting in an excessive challenge. The CC resolved this partially by assessing several schemes outside the scope of the AMA.[205]

331. The CC also looked at enhancement capex to improve supply demand balance and, whilst the Honeyhurst scheme was not approved as necessary for that period, our plans for preparatory work at Cheddar Reservoir Two were approved and funded.[206]

332. With regards to resilience, the CC expressed concerns about the data and methodology used in the cost benefit analysis carried out by Bristol Water. Taking into account the length of time that water supplies could reasonably be expected to last should particular assets fail, how many people might be affected as a result, and the cost of putting mitigation system in place, the CC approved and funded our plans for Victoria pumping station and Durdham Down, but rejected the proposals for the Oldford, Tetbury and Southern resilience schemes.[207]

333. The CC considered the potential for capex efficiency to improve, and found that the 0.4% target set by Ofwat was the appropriate rate.[208]

334. The CC adjusted opex allowance for the period where it was satisfied that costs would increase and reasonable management action could not mitigate the effects, and recommended Notified Items (albeit sparingly) where costs might increase but there was uncertainty about amount, timing or mitigation.[209] In particular, the CC increased the allowance for pensions, bad debt and abstraction charges, and retained Ofwat's allowance for energy costs, training costs, Highways Agency inspection costs and changes to water efficiency targets.

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[203] CC Determination 2010 (SOC011), Summary Section para. 5.

[204] CC Determination 2010 (SOC011), Summary Section para. 8.

[205] CC Determination 2010 (SOC011), Summary Section para. 9.

[206] CC Determination 2010 (SOC011), Summary Section para. 10.

[207] CC Determination 2010 (SOC011), Summary Section para. 11.

[208] CC Determination 2010 (SOC011), Summary Section para. 12.

[209] CC Determination 2010 (SOC011), Summary Section para. 14.

335. The CC reviewed Ofwat's opex efficiency target for Bristol Water, the supporting modelling and considered alternative approaches as suggested by Bristol Water and used by Ofgem. The CC concluded that Ofwat's targets of continuing efficiency improvement of 0.25% a year and relative efficiency improvement of 0.92% a year were reasonable.[210]

336. The CC's price cap was based on the revenue required by Bristol Water to cover its efficiently-incurred costs, including a return on its RCV, which was set as equal to the expected cost of capital. The CC considered that a return below the cost of capital would not be consistent with the Finance Duty, whilst a return above it would not be consistent with the Consumer Duty.[211]

337. To estimate the WACC, the CC directly estimated Bristol Water's cost of existing debt and utilised benchmark data to estimate the cost of new debt. It used CAPM to assess the cost of equity on the premise that it is the best way to measure returns required by shareholders. This resulted in a cost of capital of 5%.[212]

338. The CC considered that by this approach it had satisfied the Finance Duty. In recognition, however, of our Licence obligation to retain investment grade issuer status, it assessed whether its findings on capex, opex and the cost of capital would prevent us from retaining such status. It carried out this assessment by considering financial projections against target credit ratios first by reference to our existing gearing (70% in 2010), and also by reference to the assumed level of gearing of 60% used in the calculation of the cost of capital which the CC believed that we could reasonably attain. On that basis, the CC concluded that its assessment of opex, capex and the cost of capital was reasonable and that we could comply with our Licence obligations.[213]

339. Table 18 below sets out the K contained in FD09, that proposed by Bristol Water, and the ultimate outcome of the CC10 Redetermination. CC10 reflects the fact that 2010-11 was set in accordance with the FD09, and the K was smoothed over the remaining four years to assist customers in avoiding sharp increases.[214]

Table 18: Comparison of PR09 K: Bristol Water/FD09/CC10

	2010-11	2011-12	2012-13	2013-14	2014-15
Bristol Water	15.3	7.1	5.2	1.8	0.7
FD09	0.6	4.2	4.0	0.3	-0.2
CC	0.6	3.9	3.9	3.9	3.8

Source: Bristol Water

[210] CC Determination 2010 (SOC011), Summary Section para. 16.

[211] CC Determination 2010 (SOC011), Summary Section para. 19.

[212] CC Determination 2010 (SOC011), Summary Section para. 21.

[213] CC Determination 2010 (SOC011), Summary Section para. 22.

[214] CC Determination 2010 (SOC011), Summary Section para. 23.

3.6.3 Bristol Water performance comparative to CC Redetermination

340. The purpose of this Section is to demonstrate how we have performed against our regulatory targets in AMP5, and by comparison to the CC10 assumptions.[215] In particular, it considers details of:

- Bristol Water's AMP5 performance against its regulatory targets and KPIs (see **Section 3.6.4.1** below);
- our revenue during AMP5 (see **Section 3.6.4.2** below);
- our opex during AMP5 (see **Section 3.6.4.3** below);
- our capex during AMP5 (see **Section 3.6.4.4** below);
- our delivery of capital schemes during AMP5 (see **Section 3.6.4.5** below); and
- our performance against water resources output targets (see **Section 3.6.4.6** below).

3.6.3.1 Bristol Water's AMP5 performance against regulatory targets and KPIs

341. Water companies are required to report on an annual basis to Ofwat on their performance against certain service standards, particularly service to customers, in respect of their obligations as water undertakers and, where relevant, wastewater undertakers. These are generally referred to as the "DG" Service Standards and allow comparisons across the industry.

342. We use a comprehensive system of Key Performance Indicators (**KPIs**) to monitor non-financial performance.[216] These are widely distributed within the business and reviewed carefully at each Board meeting. Bristol Water measures an extensive range of performance against service standards in addition to the KPIs. Performance is measured against targets set in the CC10 Redetermination, and tracked in our Monitoring Plan. The key areas for assessment are:

- customer experience, as measured by reference to SIM and water supply interruptions;
- reliability and availability as measured by reference to serviceability, leakage and security of supply;
- environmental impact as measured by reference to greenhouse gas emissions and pollution incidents; and
- finance as measured by reference to post tax return on capital, credit rating and compliance with covenants.

343. Since identification of our outcomes during 2012, we have monitored and reported performance against these through our annual Regulatory Performance Report.[217] Our performance against our outcomes in 2013/14 and forecast for 2014/15 is shown in Table 19 below.

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[215] This is based on December 2013 Company Wide Overview **('December Company Wide Plan')** (SOC053), 2010-2015 Performance, p. 20-28.

[216] The KPIs are set internally by Bristol Water. Some reflect regulatory outputs and Ofwat's service measures to help Bristol Water ensure that it manages any issues arising in a timely manner.

[217] Regulatory Performance Report 2013/14 (SOC052).

Table 19: Performance against outcomes 2013/14 and 2014/15

Aim	Outcome	Performance Measure/KPI	Units	2014/15 Forecast	2013/14
Highly reliable	Reliable supply	Unplanned customer minutes lost	Minutes	151	13.95
		Asset reliability (below ground assets)	Improving/ Stable/ Marginal/ Deteriorating	Stable	Stable
		Asset reliability (above ground assets)	Improving/ Stable/ Marginal/ Deteriorating	Stable	Stable
	Resilient supply	Population at risk from asset failure due to an extreme event	Population	312,000	311,629
	Sufficient supply	Security of supply index	No.	100	100
		Hosepipe ban frequency	Return period (1 in 'X' years)	15	15
Excellent quality	Safe drinking water	DWI standards	%	99.93	99.97
	Water is good to drink	Negative water quality contacts	No.	2,576	2,561
Environmentally sustainable	Efficient use of resources by company	Leakage	Ml/day	47	44
		Pumping efficiency	%	55	55
	Efficient use of water by customers	Per capita consumption	litre/head/day		144
		Meter penetration (household)	%	45	42
	Sustainable environmental impact	Total carbon emissions			
			Kg/person	38	36.2
		Raw water quality of sources	Improving/ Stable/ Marginal/ Deteriorating	Deteriorating	Deteriorating
		Biodiversity Index	Improving/ Stable/ Marginal/ Deteriorating	Stable	Not assessed
		Waste disposal compliance	%	97	99
Responsive to customers	Affordable Bills	Percentage customers in water poverty	%	2.1	2.1
	Satisfied customers	Ofwat measurement of customer service (SIM)	Score/100	80.8	85
		General satisfaction survey	%	Data available March 2015	93
		Value for money rating	%	72	70
	Easy to contact	Ease of contact from surveys	%	87	96.2
	Bills are accurate and easy to understand	Negative billing contacts	No.	2,616	2,686

Aim	Outcome	Performance Measure/KPI	Units	2014/15 Forecast	2013/14
Best people right culture	Safe working practices	No. of accidents reportable to Health & Safety Executive ("HSE")	No.	1	4
	Skilled and motivated workforce	Training matrix compliance	%	TBC	N/A
		Staff satisfaction survey	% of respondents who like their job	No survey	No survey
Sustainable business	Investor confidence	Credit rating	Moody's rating	Baa1	Baa1
	Fair return to investors	Post tax return on capital	%	[✂]	3.9
	Highly reputable	Customer survey	%		83
		Stakeholder survey	%		53

Source: Bristol Water[218]

3.6.3.2 Revenue during AMP5

344. Table 20 below sets out our actual revenue during AMP5 compared to the expectations contained in CC10.

[218] 2013/14 data from Bristol Water Annual Report 2014 (SOC046), 2014/15 data is management forecasts.

Table 20: Actual revenue for AMP5 compared to CC10 expectations

Reported tariff basket revenue (£m 07/08 prices)	2010/11 Actual	2011/12 Actual	2012/13 Actual	2013/14 Actual	2014/15 Forecast	2015-20 p.a.
Revenue Expectation	84.66	87.74	90.97	95.28	[✂]	
Reported Tariff Basket Revenue	83.49	86.56	90.42	95.73	[✂]	
Correction Required	-0.99	-0.99	-0.46	0.36	[✂]	
Annualised adjustment to PR14						0.57

Source: Bristol Water[219]

345. Tariffs have been increased in line with the K factors allowed in CC10, but our outturn revenue has been slightly lower than the CC10 expectations due to lower demand than anticipated. Ofwat included an annualised adjustment of £0.51m to our AMP6 revenues in its Final Determination in respect of this. Updating this calculation to reflect our latest forecasts on 2014/15 revenue, inflation and AMP6 discount rate shows that this revenue correction mechanism should adjust our AMP6 revenue by £0.57m per annum.

3.6.3.3 Opex during AMP5

346. Bristol Water's operating costs during AMP5 are expected to be marginally below the allowance contained in CC10. This is demonstrated in Table 21 below.

Table 21: AMP5 operating costs compared to CC10 Redetermination (2012/13 prices)

	AMP5
CC10 Redetermination	£276.8m
Bristol Water's actual operating costs (includes forecast for 2014/15)	£271.5m
Difference	(£5.3m)

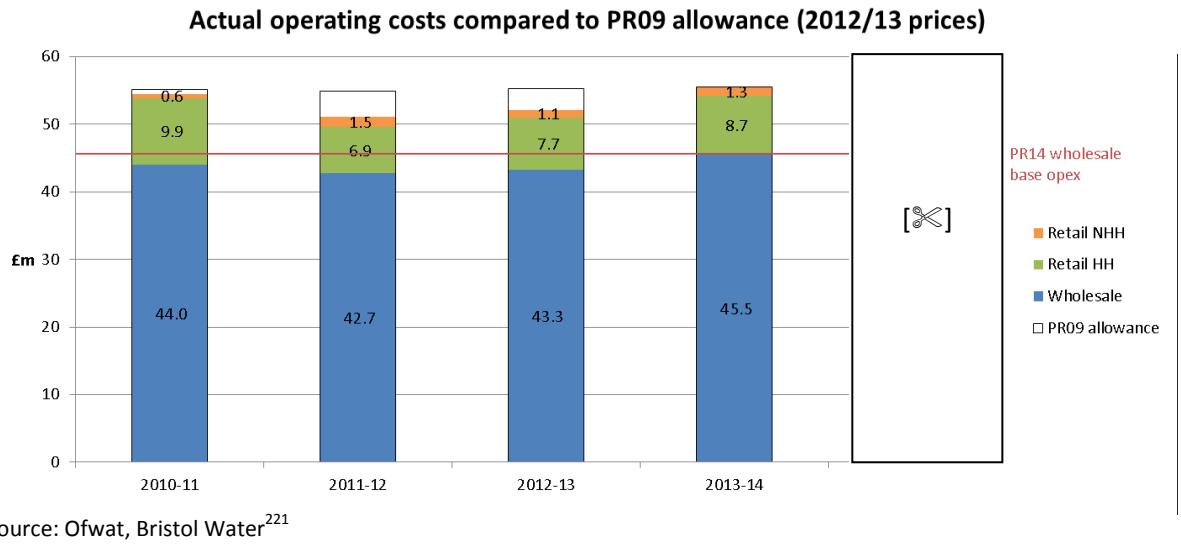
Source: Ofwat; Bristol Water[220]

347. A yearly comparison of our AMP5 opex with the relevant CC10 assumptions is provided in Figure 21 below.

[219] Update to Ofwat RCM Feeder model Bristol Update (SOC340) to include Bristol Water latest revenue forecast, inflation assumption and discount rate for AMP6.

[220] Ofwat Final CC Model (SOC473) (rebased to 2012/13 prices).

Figure 21: Actual AMP5 operating costs compared to PR09 allowance in CC10 redetermination



Source: Ofwat, Bristol Water[221]

348. Figure 21 shows that for the first three years of AMP5, actual operating costs were slightly below the CC10 allowance.

349. 2013/14 operating costs were in line with the allowance and included costs of £0.4m relating to an Ofwat investigation under the Competition Act 1998 regarding activities in the market for development services. This one-off cost was allocated 100% to Retail NHH and was removed from base opex for PR14 submissions (see **Section 9.4.3.2.1** below).

350. 2014/15 operating costs are forecast to be above the CC10 allowance and include the increased impact of additional operating expenditure related to capital investments allowed at PR09 in addition to some one-off costs that we would expect to reverse (e.g. increased rechargeable work, external input into our business efficiency project, an enforced change of banking supplier due to the RBS downgrade, set-up costs to prepare for the opening of the retail market).

351. Table 22 sets out a comparison of the change in operating costs between 2008/09 and 2013/14 with that assumed in the CC10 Redetermination.

Table 22: Operating costs movement 2008/09 to 2013/14 compared to CC10 assumptions

(£m 2007/08 prices)	CC10	Actual	Difference
Operating costs in 2008/09	43.04	43.04	-
Increase in power costs	0.82	1.15	0.33
Increase in bad debt costs	0.70	0.74	0.04
Change in pension contributions	-0.14	0.08	0.22
New opex from growth and quality	2.70	2.70	0.00
Other offset by efficiencies	0.22	-0.33	-0.55
Operating costs in 2013/14	47.35	47.38	0.03

Source: Bristol Water, Business Plan June 2014[222]

[221] Ofwat Final CC Model (SOC473) (rebased to 2012/13 prices).

[222] June Company Wide Plan (SOC005), Table 55, P.129.

352. The table shows that overall Bristol Water operating costs are similar to those assumed in CC10, with slightly higher growth in power costs offset by delivering greater efficiency than expected. Overall, the additional efficiency delivered over five years represents a cumulative improvement of 0.1% per annum relative to CC10.

3.6.3.4 Capex during AMP5

353. Our largest ever capital programme is nearing completion, and we are on track to deliver all material schemes assumed in CC10. Table 23 below details our actual expenditure against the profiled expenditure in CC10 based on the approach used in the Ofwat CIS adjustment spreadsheet.

Table 23: Expenditure profile – forecast vs. actual

	(£m 07/08 prices)					
	2010/11 Actual	**2011/12 Actual**	**2012/13 Actual**	**2013/14 Actual**	**2014/15 Forecast**	**TOTAL**
Final Determination post CIS adjustment	45.21	59.27	50.97	42.43	[✂]	[✂]
AMP5 expenditure	18.47	49.50	72.08	59.67	[✂]	[✂]
Total Cumulative variance to FD	-26.74	-36.51	- 15.40	1.83	[✂]	[✂]

Source: Bristol Water[223]

354. Overall, our actual capex is expected to exceed the CC10 allowance of £227.9m (07/08 prices) by £16.97m. The expenditure is further analysed in Table 24 below.

Table 24: Expenditure profile – detail

AMP5 total (£m, 07/08 prices)	FD09	Outturn	Diff
Infrastructure maintenance	92.4	109.3	16.9
Non infrastructure maintenance	53.9	64.4	10.5
Enhancements	81.6	71.1	-10.5
Total	227.9	244.9	17.0

Source: Bristol Water[224]

355. This increased level of expenditure is the result of our approach of putting customers first as we decided to spend more than the allowance to give customers additional benefits. This increase in spend was notified to Ofwat in our August 2013 Data Submission.

356. Examples of this additional work include:

- extending a mains replacement scheme to combine with a growth main laying scheme to allow us to deliver the improvements to supply resilience to Tetbury (as proposed in our PR09 Final Business Plan); and
- following instances of critical asset failure, investing more than originally assumed in maintenance expenditure, including increased spend on mains networks and replacement of critical assets at Purton.

[223] CIS feeder model Bristol Update (SOC339) to provide Bristol Water latest forecast on inflation and 2014/15 capex.

[224] Summarised from CIS feeder model Bristol Update (SOC339).

357. Efficiencies in delivering the enhancement programme have partially offset the cost of additional work.

358. The final methodology provides for transition investment, allowing companies to bring forward 2015-20 schemes where it is efficient to do so. To limit critical asset failures in the future, we believe it is advantageous for certain AMP6 schemes to be completed in 2014/15. In addition, other schemes would benefit from commencing design work in advance, to assist with delivering projects on time. We have assumed £1.32m of transition investment.

359. During AMP5, our RCV was capped by £1.805m (07/08 prices) due to expenditure exceeding the investment ceiling. A calculation performed using the actual COPI rates at the end of AMP4, shows that expenditure did not exceed allowances and therefore the capping should not apply. Table 25 below uses a calculation provided by Ofwat to show the impact of the revised COPI and actual 2009/10 capex.

Table 25: Correction of AMP5 RCV Capping

£m 07/08 prices	PR09	Revised for actual COPI
Total capex subject ceiling on investment	101.861	101.861
Total ceiling on investment	100.056	102.755
Amount to be capped	1.805	0

Source: Bristol Water[225]

360. Using Ofwat's spreadsheet we have calculated that a "midnight adjustment" of £2.639m to our RCV at 31st March 2015 as shown in Table 26 below.[226]

Table 26: Calculation of AMP6 Midnight Adjustment

Reversal of capping	**07/08 prices**	**£1.805m**
PR09 Cost of Capital		4.5%
Reversal of capping x PR09 WACC for 5 years	07/08 prices	£2.249m
Inflate to 2012/13 prices		(244.7/208.6)
Midnight adjustment	12/13 prices	£2.639m

Source: Bristol Water[227]

361. In its FD14 Ofwat made a negative midnight adjustment of £0.9m in respect of 2009/10 expenditure.[228] We consider that this adjustment has been incorrectly calculated as our expenditure did not exceed the allowed amount. The discrepancy arises because Ofwat has continued to use the original PR09 ceiling on investment of £100.056m rather than the updated value of £102.755m shown above.[229] This issue is particular to Bristol Water as

[225] Bristol Water RCV at 1009-10 updated for COPI March 2014 ('**RCV/CPOI March 2014 Update**') (SOC554).

[226] RCV/CPOI March 2014 Update (SOC554). This adjustment is calculated using the PR09 post-tax cost of capital set at CC10 and is stated in 12/13 prices.

[227] RCV/CPOI March 2014 Update (SOC554).

[228] Final Price Control Determination Notice: Company Specific Appendix - Bristol Water (**'Bristol Water Final Determination'**) (SOC229), p. 30, Table A2.8.

[229] Ofwat confirms that this is the approach it has taken in Bristol Water Final Determination (SOC229), p. 96.

the COPI rates assumed in the CC10 determination were updated from those used by Ofwat in its FD09 for all other companies.

3.6.3.5 Delivery of capital schemes during AMP5

362. To date we have delivered all major required outputs in line with required dates. We anticipate delivery of all remaining required outputs by the required date apart from lead removal at Sherborne. This scheme was due to be complete by July 2013. A revised completion date of 31 March 2015 was agreed with DWI due to contractual and site issues. The scheme went into operation on 23 October 2014. The slight delay in this scheme has not lead to any detriment or additional risk to customers. Table 27 below sets out the non-quality and exceptional schemes required and their current progress:

Table 27: Progress non-quality and exceptional schemes

Scheme Name	Required Completion Date	Current Status	Delivery Risk
Flood protection amalgamated • **Purton TW** • **Cook's Corner PS**	March 2011	Complete Complete	Complete 2011
Shipton Moyne Submerged Membrane Plant	December 2012	Complete	Complete 2012
Durdham Down resilience scheme	March 2013	Complete	Complete 2013
Brent Knoll reservoir.	March 2015	Complete	Complete 2013
Banwell Spring to Hutton	March 2015	Complete	Complete 2013
North Bristol trunk main	March 2015	SD2 Complete SD3 Complete	Complete 2013
Purton raw water reservoir inlet mains	March 2015	Complete	Complete 2013
Chew Stoke PS	March 2015	Complete	Complete 2013
Communication Pipe Replacement	March 2015	Construction/In Progress	On schedule
SEMD Security	March 2020	Construction/In Progress	On schedule
SEMD Security Prop All Amalgamated	March 2015	Construction/In Progress	On schedule
Withywood/Dundry reservoir	March 2015	In progress and partially complete	Emergency storage to meet current demand is available now. Storage to meet future requirements will be complete by July 2015
South east trunk main reinforcement	March 2015	Complete	Complete 2014
Blagdon PS	March 2015	Construction/In Progress	On schedule
Victoria PS	March 2015	Construction/In Progress	On schedule
Meter replacement scheme	March 2015	Ongoing	On schedule
Preparatory work for Cheddar No 2	March 2015	Complete	Complete 2014

Scheme Name	Required Completion Date	Current Status	Delivery Risk
Banwell TW SR Extension[230]	March 2016	Superseded by Southern Strategic Support Scheme	On schedule
Line of works aqueduct	March 2020	Construction/In Progress	On schedule

Source: Bristol Water and Ofwat[231]

363. Table 28 below details our progress in delivering schemes associated with Service Standard Outputs.

Table 28: Delivery of schemes with associated Standard Service Outputs

Risk	Works	Solution	Target Delivery	Current Status	Delivery Risk
Cryptosporidium	Purton	Install UV treatment	31/12/2011	Complete	Complete
	Littleton		31/12/2012	Complete	Complete
	Shipton Moyne		31/12/2012	Complete	Complete
	Stowey		31/12/2013	Complete	Complete
	Cheddar		30/06/2014[232]	Complete[233]	Complete
Zebra Mussels/THM Formation	Purton and Littleton	Surface Aeration	31/12/2011	Complete	Complete
Metaldehyde	Purton	Catchment Management[234]	31/03/2015	In Progress	On schedule
	Littleton		31/03/2015	In Progress	On schedule
	Banwell		31/03/2015	In Progress	On schedule
Iron failures and discolouration	Distribution	Relining of 58.6km trunk mains	31/03/2015	In Progress	On schedule
Nitrate	Egford	Blending	04/09/2014	Complete	Complete 2014
Lead	Sherborne	Submerged Membrane and Coagulant Dosing	31/07/2013 Extended by DWI to 31/3/2015	In Progress	On schedule for completion by extended date

Source: Bristol Water and Ofwat[235]

364. We have legally binding programmes of work for water quality reasons during the AMP5 period.

365. Stowey UV was delivered on target, Cheddar TW was completed in June 2014, ahead of the extended deadline of 30/06/2014. Sherborne Lead Removal plant was delayed due to

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230 The construction of the Southern Strategic Support Scheme will meet the outcome originally planned to be met by this scheme.

231 Final Determination: Setting price limits for 2010-2015 supplementary report Bristol Water Plc (**'FD09 Bristol Water report'**) (SOC371).

232 Post DWI agreed extension. Original target delivery 31/12/2013.

233 The output for Cheddar TW was met in the 2014/15 report year.

234 Interim reports submitted to DWI by 31/03/2013 as required.

235 FD09 Bristol Water report (SOC371).

poor contractor performance. Commissioning was completed in December 2014 and the works is now undergoing performance trials.

366. Our strategy for delivery involved a step change in our capital delivery approach. Detailed framework arrangements with expert contractors and consultants - and a conventional tendering approach where appropriate - have allowed us to benefit from contractors' early involvement in complex schemes while retaining a competitive cost benefit for more routine schemes. This has been supported by the enhancement of our in-house project and programme management skills and has allowed long-term relationships to be established, alongside individually tendered schemes.

367. We have overcome challenging construction locations and difficult weather conditions during this programme, allowing us to meet all deadlines to date. For example, we completed the Durdham Down project, one of our largest ever main-laying schemes, on time and within budget even though this scheme in the city of Bristol faced major challenges associated with traffic, village greens and unusual ecological constraints. Due to the high quality of project management throughout, the project won a CEEQUAL "Excellent" rating and a UK Green Apple award.

368. This collaborative approach with specialists showed particular strength on our Trunk Mains Renovation programme, where the original contractor went into administration. The impact of this event was minimised, the contract recovered, and the programme remains on target to meet the original completion date with no additional costs.

369. We also drove efficiencies through tendering our service reservoir programme on an individual scheme basis following internal design. This led to tender prices and outturn costs for completed schemes being below that expected.

3.6.3.6 Water resources, water efficiency and metering output targets during AMP5

370. Table 29 shows performance against Water Resources output targets set at PR09.

Table 29: Security of supply and supply demand enhancements

		2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15 forecast	Totals
Security of supply							
SoSI – dry year annual average	Target	100	100	100	100	100	-
	Performance	100	100	100	100	100	-
Supply demand enhancements (annual increments)							
Supply side management projects (Ml/d) [236]	Target	0.00	0.00	0.33	0.48	0.49	1.30
	Performance	0.00	0.00	0.00	0.00	1.30	1.30
Demand side management projects (Ml/d)[237]	Target	2.53	1.53	1.53	1.53	0.53	7.65
	Performance	2.80	7.94	1.49	1.62	-3.04	10.81
Total (Ml/d)	Target	2.53	1.53	1.86	2.01	1.02	8.95
	Performance	2.80	7.94	1.49	1.62	-1.74	12.11

[236] Schemes to deliver the supply side increase of 1.3 Ml/d (from Sherborne and Frome TW) have been delivered in 14/15.

[237] =Sum of yield from leakage reduction (increase), SELWE and Selective Metering savings

Source: Bristol Water and FD09 Bristol Water report (SOC145).

371. Schemes to deliver the supply side increase of 1.3 Ml/d (from Sherborne and Frome TW) are on track for completion by 2015, but have been delayed during 2013/14. Both are now expected in 2014/15.

372. Table 30 below shows progress against water efficiency targets and metering targets set at PR09. As we have met our total SELWE water efficiency target for AMP5 (through a different profile of performance), efforts during 2014/15 will focus on providing extra support for businesses that have already been through our water efficiency audit process.

Table 30: Water efficiency

		2010/11	2011/12	2012/13	2013/14	2014/15 forecast	Totals
Water efficiency							
Base service water efficiency target (Ml/d)	Target	0.48	0.48	0.48	0.48	0.48	2.40
	Performance	0.58	0.53	0.59	0.56	0.59	2.85
SELWE (Ml/d)	Target	0.32	0.32	0.32	0.32	0.32	1.60
	Performance	0.32	0.69	0.36	0.33	0.18	1.88
New properties							
Properties connected to the water main	Target	4,760	4,760	4,760	4,760	6,920	25,960
	Performance	3,453	3,657	3,154	3,254	3,950	17,468
Metering							
Optional household and non-household meters	Target	10,980	9,746	8,628	6,369	5,484	41,207
	Performance	6,980	6,868	8,903	9,020	7,500	39,271
Selective and compulsory household and non-household meters	Target	3,360	3,480	3,400	3,320	3,260	16,820
	Performance	200	1,033	1,798	2,117	2,850	7,998
Meters Installed	Target Total						58,027
	Performance						47,259

Source: Bristol Water and Ofwat[238]

373. The number of selective meters installed has been lower than target because:

- the expected uptake of meter optants as part of the zonal maintenance programme has been lower than anticipated. A programme to engage customers in areas where 100% zonal mains and service rehabilitation took place is planned for 2014/15 to increase the uptake of metering. These meters were included in the 'selective meters' total in the determination; and
- there has been less activity in the housing market than expected in our AMP5 forecast, so 'change of occupier - large garden' metering has been lower.

374. The current AMP5 project outcome for the Meter Options and Selective metering projects is forecast to be 47,259 meters installed against a Final Determination target of 58,027; a difference of 10,768 (19%). The difference is not financially significant.

[238] FD09 Bristol Water report (SOC371).

3.6.4 Lessons learnt from the PR09 process

375. The PR09 process, and the CC10 Redetermination in particular, provided additional insight into, and understanding of, the best regulatory approach to setting price controls in the water sector.

> *"Similarly, we considered that Bristol Water had not been sufficiently responsive to the regime that Ofwat had established (which may have contributed, for example, to its treatment under the CIS)". CC Redetermination Findings, para. 13.6.*

376. We have taken on board the message that we need to ensure that we can be responsive to Ofwat's chosen approach to PR14. As is demonstrated in **Section 5**, we consider that our Business Plan process fully embraced Ofwat's vision, particularly in relation to the early development of customer challenge group, customer engagement and outcomes (see **Section 5** and **Section 6** below). In this respect, we were an early adopter of these initiatives, demonstrating that we have been very responsive to the new elements introduced by Ofwat in PR14.

377. We have developed our approach to cost assessment and models in light of the challenges we received, including the adoption of SEAMS WiLCO models, as well as a proprietary optimiser for totex (see **Section 7** below).

378. LEF oversight of all customer research has ensured that it is robust and reliable (see **Section 6** below).

379. We have embraced a wider range of views through the growth of our regulatory team, particularly bringing in members of staff with experience of working within Ofwat.

380. We have taken on the best practice industry approach to resilience, as developed through UKWIR by CH2M Hill, and engaged CH2M Hill to go through the process of applying that best practice to our business (see **Section 7** below).

381. We have ensured that our process has been subject to strong and effective governance from the Board, as well as effective challenge and assurance from external third-party specialists and experts (see **Section 5** below).

4 The PR14 methodology and process

4.1 Executive summary

4.1.1 Introduction

382. This Section builds on the introduction to PR14 provided in **Section 2.6** above, and details the methodology developed by Ofwat for PR14. It also outlines the process followed by Ofwat in managing the price review, assessing Bristol Water's Business Plan, and reaching FD14.

383. It is intended to provide background information on the PR14 methodology and process, in order to place Bristol Water's Business Plan in its proper context, and inform the CMA's approach to its redetermination, in particular by signalling those aspects of the methodology where Bristol Water considers that the CMA should differ in its approach from Ofwat.

4.1.2 Key themes

384. The PR14 process and underlying methodology represents a considerable change from prior price reviews. This has instigated a fundamental revision to the way in which business planning takes place, and how those business plans are to be assessed by Ofwat.

385. Bristol Water broadly supports the PR14 methodology, strategy and underlying principles. Being mindful of the lessons learnt at PR09, and particularly during the experience of the CC10 redetermination, Bristol Water has worked hard to understand what has been required by Ofwat, and has consequently embraced Ofwat's PR14 vision within its approach (see **Section 5** below). Bristol Water welcomes the shift in strategic direction, and considers that over the long term it will ensure that customer interests are protected whilst companies retain an appropriate level of flexibility to manage future challenges.

386. There are, however, certain fundamental elements of Ofwat's approach to cost assessment which contribute to the substantial gap between the totex proposed in Bristol Water's Business Plan and that allowed for in FD14. In particular, Bristol Water has concerns about the models used by Ofwat, even when combined with a 'cost exclusion' process, and their overall robustness and reliability. Whilst this is dealt with in more detail in **Section 11** below, this Section flags those aspects of the methodology where Bristol Water would like the CMA to take a different approach to that taken by Ofwat.

4.1.3 Structure of the Section

387. In particular, this Section provides:

- **PR14 framework** - an overview of the framework for assessing PR14 including its key features, and how that framework was developed (see **Section 4.2**);
- **PR14 process** - a summary of Ofwat's approach to assessment of business plans submitted for PR14 (see **Section 4.3**);

- **Bristol Water's FD14** - comments on why Bristol Water considers a CMA redetermination is necessary by reference to the outcome of FD14 (see **Section 4.4**);
- **methodology of CMA redetermination** - Bristol Water's preferred approach for the methodology to be utilised in the context of the CMA's redetermination (see **Section 4.5**); and
- **conclusions -** conclusions on the PR14 process and methodology (see **Section 4.6**).

4.2 Development of PR14 methodology

388. The purpose of this Section is to provide an overview of the framework for assessing PR14, and how the framework and the underlying methodology were developed.

389. As noted in **Section 2.6** above, Ofwat's approach to PR14 began with the Future Price Limits project which saw a number of key consultations, discussion papers and consultants' reports published which collectively set out the framework for Ofwat's developing vision for future price controls.[239] Following completion of that project in spring 2012, Ofwat began the process of consulting on the specific features of its approach to PR14.[240] Bristol Water was an active participant in these consultations, and provided written consultation and discussion paper responses, attended workshops and contributed to industry thinking.[241]

390. For ease of reference, we have summarised which we believe to be the main drivers behind the PR14 methodology and the key messages to come out of that process:

- the aim was to create a more targeted, proportionate and appropriate regulatory framework that would focus the sector on the most important outcomes, incentivise companies to deliver those outcomes and, in doing so, drive better and more efficient results;
- a move to a more outcomes-focused approach would help to achieve this, and would give companies greater ownership of their plans, with Ofwat holding companies to account for the outcomes they deliver, rather than the means by which they choose to deliver them (see **Section 6** below);
- customers to be placed at the heart of the regulatory process, through enhanced engagement and the role of the Customer Challenge Group (**CCG**) to challenge the planning process, and the resulting plan, and provide assurance of the quality of the engagement (see **Section 6** below for a more detailed description of the role of the CCG);
- encourage innovative and efficient solutions to long-term delivery through the application of meaningful incentives (see **Section 14** below);

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239 These materials can be found at http://www.ofwat.gov.uk/future/monopolies/fpl

240 'The Future Price Limits - statement of principles' project concluded with the publication of a 'Statement of Principles' in May 2012, which set out the high-level principles that Ofwat intended to use to guide it in how it sets price limits in the future: Ofwat, Future price limits - statement of principles May 2012 **('FPL - Statement of Principles May 2012')** (SOC062)

241 See Table 31: Key stages in the development of the PR14 methodology and Bristol Water involvement below

- move to a totex approach to allow companies to chose the right investment solutions to drive benefits for their customers (see **Section 7** below); and
- greater ownership of, and accountability for, business plans given to companies' Boards, with an increased focus on governance and assurance to the Board rather than to Ofwat (see **Section 5** below).

391. Key milestones in that process, and details of our involvement, are referenced in Table 31 below.

Table 31: Key stages in the development of the PR14 methodology and Bristol Water involvement

Title	Date	Comments
Consultation on *'Involving customers in decisions about water and sewerage services'*	April 2011	Bristol Water provided a response to this consultation.[242]
Involving customers in price setting – Ofwat's customer engagement policy statement	August 2011	This document sets out Ofwat's approach to customer engagement during the price-setting process.
Consultation on Future Price Limits Autumn 2011	November 2011	Consultation on proposals for the high-level principles which will guide the continued development of the price-setting approach for PR14. Bristol Water provided a response to this consultation.[243]
Future price limits – a statement of principles	May 2012	This publication concluded the Future Price Limits project and set out the high-level principles that Ofwat intended to use to guide it in how it sets price limits in the future.
Consultation on retail price controls for the 2014 price review	10 July 2012	Consultation exploring key issues relating to retail price controls. Bristol Water provided a response to this consultation.[244]
Consultation on wholesale incentives for the 2014 price review.	28 August 2012	Consultation exploring key issues relating to wholesale control incentives. Bristol Water provided a response to this consultation.[245]
Setting price limits for 2015-20 – framework and approach: A consultation.	28 January 2013	Consultation on the methodology for PR14. Bristol Water provided a response to this consultation.[246]
Setting price controls for 2015-20 – business planning expectations: A consultation.	11 April 2013	Consultation on the information required in business plans and how they will be assessed. Bristol Water provided a response to this consultation.[247]
Setting price controls for 2015-20 – final methodology and expectations for companies' business plans.	25 July 2013	Sets out Ofwat's final approach to PR14, including business plan information requirements and Ofwat's approach to review and assessment of those plans.

[242] Bristol Water Response to Involving Customers in decisions about water and sewerage services **('BW Response to Involving Customers')** (SOC295).

[243] Bristol Water response to Future Price Limits consultation February 2012 **('BW response to FPL consultation February 2012')** (SOC189).

[244] Bristol Water Retail controls consultation response August 2012 **('BW Response to retail controls consultation August 2012')** (SOC190).

[245] Bristol Water Wholesale consultation response October 2012 **('BW response to wholesale consultation October 2012')** (SOC191).

[246] Bristol Water Ofwat Setting Price controls for 2015 framework and approach consultation response April 2012 **('BW response to price controls consultation April 2012')** (SOC192).

[247] Bristol Water response to business Planning Expectations Consultation May 2013 **('BW response to business planning consultation May 2013')** (SOC193).

Title	Date	Comments
Service incentive mechanism (SIM) for 2015 onwards – a consultation	14 October 2013	Consultation on proposed changes to SIM. Bristol Water provided a response to this consultation.[248]
PR14 Financial Model v.1	17 October 2013	Initial release of Ofwat's financial model used to: determine the wholesale price controls; calculate the revenues arising from the retail price controls; and help assess financeability.
Submission of Business Plans to Ofwat	2 December 2013[249]	Business Plans and Customer Challenge Group reports submitted to Ofwat.
Presentation to Ofwat Board	9 December 2013	Bristol Water Management Team presented key areas of its Business plan to members of the Ofwat Board.
PR14 Financial Model v.2	13 December 2013	Release of version 2 of the financial model.
IB 28/13: Change to Ofwat's price review process	19 December 2013	Outline of Ofwat's proposed changes to the PR14 process including the forthcoming risk and reward guidance.
Setting price controls for 2015-20 – risk and reward guidance	27 January 2014	Sets out guidance on risk and reward, including Ofwat's view on the cost of capital and other key financial parameters given the risks that companies should be taking and those which customers will be bearing.
Setting price controls for 2015-20 – risk assessment tool (RAT) supporting documentation	February 2014	Description of the principles, logic and functionality adopted in the RAT used in Ofwat's Risk Based Review to test the impact of various scenarios on companies' return metrics and customer bill impacts.
Setting price controls for 2015-20 – pre-qualification decisions	10 March 2014	Sets out: the approach to the Risk Based Review; announcement of which companies received enhanced status and why; the benefits of being enhanced; proposals for SIM; and changes to the delivery timetable for PR14 (opportunity for an early draft determination).
Service incentive mechanism (SIM) for 2015 onwards – conclusions	3 April 2014	Sets out the SIM measures for all companies and the plan for their testing during 2014-15.
2014 price review Risk Based Review – internal methodology	3 April 2014	Builds on the final methodology statement and sets out Ofwat's approach to implementing the RBR tests.
Setting price controls for 2015-20 – decisions on enhanced companies and next steps	3 April 2014	Confirmation of South West Water & Affinity Water as enhanced status companies
Outcomes of the Risk Based Review	3 April 2014	Outcomes of the RBR for each company comprising • a **company recommendation document** containing the key points from the Risk Based Review assessment and Ofwat's overall assessment for the company. • **company dashboards** summarising Ofwat's assessment for each company against each test • **element scorecards** setting out the detailed reasons for Ofwat's assessment against each test
Setting price controls for 2015-20 – policy and information update	4 April 2014	Update on PR14 policy and requirements for resubmission of business plans.
Setting price controls for 2015-20 – guidance for companies on producing default tariffs	4 April 2014	Further guidance to companies for developing their default tariff proposals for submission by 27 June 2014.

[248] Bristol Water Response to SIM Consultation **('BW SIM Response')** (SOC294).

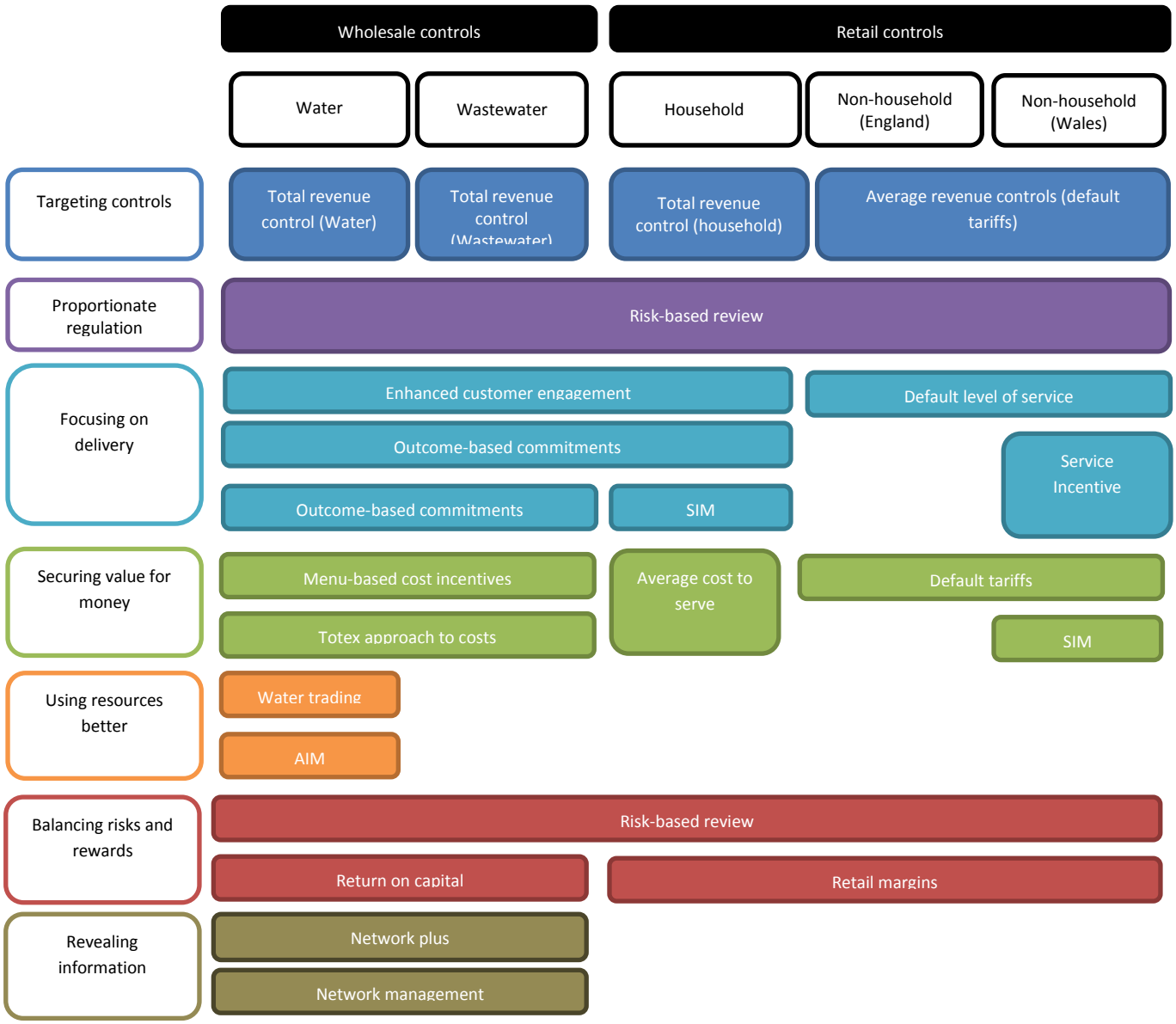
[249] The original deadline for the submission of Business Plans was intended to be Q.1 2014 (Future price limits – a consultation on the framework, Ofwat, November 2011). The move to an earlier submission date was raised in the business planning expectations consultation in April 2013.

Title	Date	Comments
PR14 Financial Model v.3	7 April 2014	Release of version 3 of the financial model.
Setting price controls for 2015-20 – further information on reconciling 2010-15 performance	9 April 2014	Further information on how 2015-20 price controls will reflect companies' actual performance during 2010-15.
PR14 Financial Model v.4	23 April 2014	Release of version 4 of the financial model.
Draft Determinations	30 April 2014	Draft Determinations for South West Water and Affinity Water.
Draft Determinations	30 May 2014	Draft Determinations for Northumbrian Water and Dwr Cymru.
PR14 Financial Model v.5	6 June 2014	Release of version 5 of the financial model.
Gap Analysis submission	13 June 2013	Gap analysis submitted to Ofwat
Business Plan Submissions	27 June 2014	Revised Business Plans submitted to Ofwat.
Bristol Water – water special cost claims	6 August 2014	Advance notice of size of gap for Bristol Water regarding cost exclusion claims.
PR14 Financial Model v.6	21 August 2014	Release of version 6 of the financial model.
Setting price controls for 2015-20 – draft price control determination notice August 2014	29 August 2014	Draft Determination for Bristol Water and 13 other companies published.
Draft Determination Representations	3 October 2014	Submission of representations on Draft Determination to Ofwat.
Meeting with Ofwat	5 November 2014	Bristol Water's meeting with the Ofwat PR14 team, including Board representatives.
Final Determination	12 December 2014	Final Determination published for Bristol Water and 17 other companies.
Menu Choice	16 January 2015	Bristol Water published its menu choice.

Source: Ofwat website and Bristol Water analysis

392. Ofwat's methodology framework for price controls, demonstrating how the component parts fit together, is set out in Figure 22 below.

Figure 22: Overall framework for setting price controls for 2015-20



Source: Ofwat: Setting Price Controls for 2015-2020[250]

393. As noted above, PR14 is an evolution of the approach to price controls taken at PR04 and PR09. Some of the tools that have been tried, tested and found to be effective have been retained, whilst new approaches to outcomes, incentives, performance commitments and cost assessment have been introduced to drive efficiency, innovation and an effective response to the long-term challenges facing the industry.[251] We understand the drivers

[250] Setting Price Controls for 2015-2020 final methodology and expectations for company business plans July 2013 **('Setting Price Controls - final methodology and expectations July 2013')** (SOC063), p. 4.

[251] For instance, these changes included: retirement of the PR09 CIS mechanism and Opex Incentive mechanism; replacement of Revenue Correction Mechanism with Wholesale Revenue Forecasting Incentive Mechanism; discontinued use of the COPI for cost recovery; incorporation of a simplified tax approach; regulatory depreciation – depreciation of totex additions (totex multiplied by 1 minus the PAYG ratio) to the regulatory capital value (RCV) and 2015 RCV run-off; UK GAAP harmonisation with IFRS; removal of the June Return reporting requirement from 2011

for these changes and agree that they are important. We also recognise that it is appropriate for regulators to adapt and change their processes to try and find new ways to drive improvements and efficiency within an industry.

394. In particular, we strongly support:

- putting customers at the heart of the review;
- the move to a focus on outcomes;
- the introduction of Pay As You Go (PAYG); and
- the introduction of wholesale tariffs and a separate price control for non-household retail to support the introduction of non-household retail competition.

395. Each of the key phases within the framework set out in Figure 22 above is considered in more detail in the following Sections.

4.2.1 Targeted controls

396. A key feature of PR14 is the setting of separate price controls for:

- retail services to household customers;[252]
- retail services to non-household (business) customers;[253]
- wholesale water services; and
- wholesale sewerage services.[254]

397. In order to achieve this, it was essential to define what constitutes 'retail services', with wholesale services defined by exception.[255] Costs were then allocated to either the wholesale or retail part of the business.

398. We understand why Ofwat has introduced separate controls for retail household, retail non-household, and wholesale, and consider that it will help to improve incentives and performance within each of these parts of the business.

4.2.1.1 Wholesale form of control

399. In accordance with Licence Condition B8.4 and B8.6 (see **Section 2.8** above) the wholesale controls have been set for five years, and have been calculated using an RPI+K approach.[256]

400. All of the existing Regulatory Capital Value (**RCV**) has been allocated to the wholesale business.

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and replacement with annual KPI reporting; removal of 'Reservoir' database and replacement with Excel spreadsheets for collection of Table data; and new requirements for companies to develop their own Ofwat-facing financial models (Ofwat provided one later in the process) rather than Ofwat's financial model being a central part as at PR09.

[252] 'Households' are properties used as single domestic dwellings (normally occupied), receiving water for domestic purposes which are not factories, offices or commercial premises.

[253] 'Non-households' are properties receiving water for domestic purposes but which are not occupied as domestic premises, or where domestic dwellings are combined with other properties.

[254] Given that Bristol Water is a Water Only Company, this Statement of Case focuses only on the controls for water.

[255] Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.1.3.

[256] Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.1.1.

401. The wholesale controls are total revenue controls that cover all revenues from wholesale activities. The control is expressed as annual changes to a revenue limit, rather than a price limit. As such, companies have some flexibility to adjust charges within the period to manage unexpected changes in demand and smooth price changes.

4.2.1.2 Retail form of control - household

402. The household controls are total revenue controls with an annual revenue adjustment factor to reflect the cost differences arising from differences between actual and expected customer numbers and levels of metering.[257]

4.2.1.3 Retail form of control – non-household

403. The non-household controls are average revenue controls per customer type, referred to as default tariffs. These are set using a gross margin approach, per customer.[258]

4.2.2 Proportionate regulation

404. In response to feedback, including the Gray Review, which indicated that Ofwat should reduce the burden of regulation and be less prescriptive regarding companies' business plans (see also **Section 2.6** above), for PR14 Ofwat adopted a new approach focused on incentivising companies to submit high-quality plans, and for Boards to ensure appropriate governance and ownership of those plans (see **Section 4.2.10** below).[259]

405. Ofwat intended the delivery of such high-quality plans to be incentivised by its use of the Risk Based Review (**RBR**) which would contain reputational, procedural and financial incentives (see **Section 4.3.1** below).[260]

4.2.3 Focusing on delivery

406. To achieve these aims, the companies were asked, as the initial step in their planning, to agree outcomes and associated performance commitments and delivery incentives with customers through a process of customer engagement. The quality of this engagement was challenged and assured through the CCG.[261]

407. Ofwat's methodology envisaged incentives which reflect the value of outcomes to consumers and which utilised both penalties and rewards for under- and out-performance. Ofwat provided some guidance on calculating the incentives using incremental Willingness to Pay (**WTP**) and incremental costs.[262]

4.2.4 Securing value for money - wholesale

408. Ofwat considers that the following three elements will secure value for money in the wholesale control:

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[257] Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.1.2

[258] Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.1.2

[259] Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.2

[260] Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.2.2.

[261] Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.3.

[262] Setting Price Controls - final methodology and expectations July 2013 (SOC063), Appendix 1.

- **cost assessment** - a totex approach to determining the efficient level of expenditure;[263]
- **cost performance incentives** – use of menus to encourage efficient delivery and expenditure reductions;[264] and
- **cost recovery** – a company can choose the proportion of expenditure to be recovered through its RCV, and that to be recovered as revenue from current customers through the 'Pay as You Go' (**PAYG**) ratio.[265]

409. All expenditure proposals should be necessary for delivery of one or more of a company's outcomes.

410. We welcome the decision to adopt cost incentivisation of totex, rather than separate incentives for opex and capex, and consider that our historical use of whole life costing of possible options to meet our network requirements embodies the totex philosophy. Our detailed comments in relation to totex and its role within a planning context are set out in **Section 7** below. The impact of totex on incentives is considered in **Section 14** below, whilst the interaction between totex, cost recovery and PAYG from a financeability perspective is addressed in **Section 17** below.

411. We do, however, have some concerns about the tools used by Ofwat to carry out its wholesale cost assessment. In particular, we are concerned that is has taken a narrow approach, and that its models have inherent weaknesses such that, even when supplemented by a 'cost exclusion' process (see **Section 4.3.2** below), they do not provide a reliable assessment of costs for Bristol Water. These issues are considered in more detail in **Section 11** below.

4.2.5 Securing value for money - retail

4.2.5.1 Household retail – average cost to serve

412. Retail controls for household customers are set on an average cost-to-serve basis. The Final Methodology confirmed that Ofwat's assessment would have certain key elements:

- use of a measure of unique customers adjusted for economies of scale;
- use of actual costs rather than forecast costs to derive average costs;
- adjustment to account for levels of metering;
- evidential criteria for other proposed adjustments;
- three-year glide path for companies with actual costs above the average;
- use of actual costs for companies with costs below the average;
- inclusion of a net margin; and

[263] Ofwat noted that despite company requests to make its cost assessment models available during 2013, it felt that companies should concentrate on formulating plans which met the delivery objectives, rather than being driven by regulatory models of cost assessment. As such, it was not until April 2014 that companies began to have transparency regarding the models and the baseline data. See Setting Price Controls - final methodology and expectations (SOC063), Section 1.4.1, and Setting Price Controls - policy and information update **('RBR policy update')** (SOC368).

[264] Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.4.2.

[265] Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.4.3.

- no automatic indexation to RPI.[266]

4.2.5.2 Non-household retail – default tariffs

413. Ofwat took a default tariff approach to retail controls for non-household customers. The customer types for which default tariffs are set is based on each company's proposed tariff structure. A 'tariff corridor' approach would be used to determine a range of allowed average revenue for each customer type, and a net margin would be included.[267]

414. Whilst a five-year control was originally set out in the methodology, when issuing draft determinations in August 2014 Ofwat invited companies to suggest alternate durations in their draft determination representations to take account of the uncertainty posed by market opening in 2017. In its FD14 Ofwat confirmed that there would be a reallocation of costs and margins between tariff bands in 2016, to take effect from April 2017.

4.2.6 Using resources better

415. In addition to the move to a totex approach, Ofwat hoped to incentivise better use of water resources through the use of the following incentives at PR14:

- **water trading incentives** – incentives for new exports and imports (including the retention of 50% of lifetime economic profits for exporters and 5% of costs of imports, subject to a total annual cap) and trading and procurement codes;[268] and
- **AIM** – reward or penalise companies on a reputational basis depending on levels of abstraction at low flows from environmentally sensitive sites.[269]

4.2.7 Balancing risks and rewards

416. Ofwat adopted a scenario-modelling approach to analyse risk and explore the balance of risks to return on regulatory equity (**RORE**).[270]

417. Under the wholesale controls, companies continue to earn a regulated return on RCV by reference to a weighted average cost of capital (**WACC**). The WACC would be calculated by reference to a notional capital structure, a forward-looking fixed cost of debt, and a cost of equity based on the capital asset pricing model (**CAPM**).[271]

418. Decisions on retail margins would also have to take into account payment terms which would affect the cash flow balance between the retail and wholesale parts of the business.

419. Another method for managing risk and reward is the menu approach, which Ofwat considered would provide incentives for companies to reveal information and allow for

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266 Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.5.1.

267 Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.5.2.

268 Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.6.1.

269 Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.6.2.

270 Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.7.

271 Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.7. Ofwat noted that whilst it still did not intend to prescribe the right structure for companies, it would introduce a new financial structure monitoring regime to review and assess the risks to customers posed by companies' financial structures, with particular reference to untested models such as highly-geared securitised structures.

some extra flexibility in setting totex and cost-sharing factors. Within a menu, companies can choose a level of expenditure they expect to incur. The rewards or penalties that they incur then depend upon how this expenditure compares to Ofwat's baseline and how expenditure eventually outturns compared to the level initially chosen. The impact of the menu choice on Bristol Water is considered in more detail in **Section 17.5.2.1** below.

4.2.8 Business plan information requirements

420. In its Final Methodology, Ofwat gave the following indications of its approach to information requirements for business plans:

> *"…we are not issuing any detailed guidance on what companies should include in their business plan narratives …"*[272]

421. Instead Ofwat stated that its "new approach to reviewing business plans … gives companies greater freedom to innovate and to find the best way to present their plans".[273]

4.2.9 Customer engagement and the role of the CCG

422. A key aim for Ofwat for PR14 was to place customers at the heart of the process in order for customers to know that the bills they pay are fair and legitimate. The intention was that this should be achieved, in part, through effective customer engagement in the development of companies' business plans.[274] Ofwat envisaged that this engagement would take three main forms:

- direct local engagement between each company and its customers to understand customer views and inform development and test acceptability of the plan;
- CCGs which assess the nature of the direct customer engagement and whether the plan reflects a sound understanding and reasonable balance of customers views, and ensure that the work required to deliver the outcomes in the plan is socially, economically and environmentally sustainable; and
- a sector-wide customer advisory panel that will influence Ofwat's thinking on issues where it will apply consistent policies or assumptions across the water sector.[275]

423. Following consultation, Ofwat set out seven principles for customer engagement as expressed in Table 32 below:

Table 32: Principles for customer engagement

Principle	Definition
Principle 1	Water companies should deliver outcomes that customers and society value at a price they are willing to pay.
Principle 2	Customer engagement is essential to achieve the right outcomes at the right time and at the right price.

[272] Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.9.

[273] Setting Price Controls - final methodology and expectations July 2013 (SOC063), p. 1.

[274] Setting Price Controls - final methodology and expectations July 2013 (SOC063), p. 2.

[275] Setting Price Controls - final methodology and expectations July 2013 (SOC063), p. 3-4.

Principle 3	Engagement should not simply take place at price reviews. Engagement means understanding what customers want and responding to that in plans and ongoing delivery.
Principle 4	It is the companies' responsibility to engage with customers and to demonstrate that they have done it well.
Principle 5	Customers and their representatives must be able to challenge the companies throughout the process. The engagement process should ensure this challenge happens. If this is not done effectively, we must be able to challenge on customers' behalf. In doing so, we will fulfil our duty to protect customers.
Principle 6	Engagement is not a 'one-size fits all' process, but should reflect the particular circumstances of each company and its various household and non-household customers.
Principle 7	The final decision on price limits is entrusted to Ofwat. We will use a risk-based approach to challenge company plans if this is necessary to protect customers' interests.

Source: Customer Engagement Policy Statement[276]

424. Ofwat did not want to be prescriptive about how direct engagement should take place, but set out what it considered to be the key characteristics of good customer engagement.[277] Ofwat emphasised that companies should not seek simply to establish customer support for business plans they have already designed, but should genuinely seek to shape their plans to reflect the desires and needs of current and future customers.[278] By ensuring this level of customer engagement, and allowing CCGs to act as arbitors[279] to ensure an effective process and a plan that adequately reflects customer views, Ofwat was essentially creating a process that would ensure consumer interests were reflected in company business plans in satisfaction of the Consumer Duty (see **Section 2.5.1.1** above).

425. The way in which we embraced this challenge is set out in **Section 6** below, including the creation of our own CCG, the LEF. As we demonstrate, our LEF's role went beyond that envisaged by Ofwat in that it acted as a valuable contributor to the PR14 process in its own right.

426. The CCG was intended to have a broad range of participants from regulators, consumer representatives, customer and community stakeholders and customer segment representatives. Details of the entities that participated in Bristol Water's LEF are set out in **Section 6.2** below.[280]

427. In terms of how the output of the customer engagement and CCG process would inform Ofwat's determinations, Ofwat stated in 2011 at the outset of the process that:

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[276] Involving customers in price setting - Ofwat's customer engagement policy statement August 2011 **('Ofwat's customer engagement policy statement August 2011')** (SOC065) p. 9.

[277] Ofwat's customer engagement policy statement August 2011 (SOC065), p. 14.

[278] Ofwat's customer engagement policy statement August 2011 (SOC065), p. 15.

[279] In terms of the role of the CCG, Ofwat stated: "*We will take account of the group's advice when we consider the companies' business plans. … When the companies submit their final business plans to us, we will expect the challenge group to tell us how effective a company's engagement has been and how it has taken account of customers' priorities. We will ask for the group's views on the company's plan and for it to highlight any contentious areas.*" Ofwat's customer engagement policy statement August 2011 (SOC065), p. 5).

[280] Ofwat's customer engagement policy statement August 2011 (SOC065), p. 4.

"Broadly, we intend to follow an approach that is proportionate and that focuses on the material issues. Overall, if the company demonstrates that its customers support its plan, that it can comply with its obligations and meet cost assumptions, and we are confident of its track record of effective planning and delivery, we should be able to accept that plan with minimal scrutiny. In these circumstances, less extensive assurance may be needed as long as we have sufficient and quantitative evidence that customers accept the company's business plan. And we will need to know that the company has considered and tested innovative solutions where these are appropriate."[281]

"On the other hand, if a company's proposals would have significant impact on service levels or customers' bills, then there is more onus on that company to demonstrate that it has engaged effectively and that customers understand and support its plans. In such cases, the company will need more robust evidence and may also wish to have a more independent and comprehensive assurance process in place. In turn, we will put more weight on the need for effective assurance by company and customer challenge group so that we can have confidence in the views attributed to customers."[282]

428. We consider that our Business Plan achieved the criteria set out in in the former category. Overall, we proposed a reduction in customer bills in line with the accepted industry average, whilst maintaining service levels and building in enhancement at a rate and cost consistent with customer priorities and accepted by customers as a package. This was evidenced through extensive and repeated customer research, with the approach we adopted supported by the LEF and accepted by Ofwat (see **Section 6** below). We have a track record which supports our planning approach, cost assumptions and ability to deliver (see **Section 3.6** above). Our approach to planning for PR14 demonstrates that a broad range of potential solutions was considered (see **Section 7** below). As such, we are disappointed to be in a position where Ofwat has not accepted our Business Plan.

4.2.10 Governance and assurance

429. A high premium was placed on the role of Board assurance for business plans. In particular, Boards were challenged to provide a statement setting out the assurance process followed, and why the business plan is considered to be of high quality. In addition the statement would need to explain the Board's governance processes and demonstrate how it has provided strategic leadership, a transparent process and compliance with the relevant legal and licence obligations as well as the UK Corporate Governance Code (the '**Code**').[283]

430. Ofwat made it clear that for PR14 the onus would be on company Boards to own and be accountable for their business plans. This would be encouraged by developing

[281] Ofwat's customer engagement policy statement August 2011 (SOC065), p. 6.

[282] Ofwat's customer engagement policy statement August 2011 (SOC065), p. 6.

[283] Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 3.7.

reputational, procedural and financial incentives to encourage companies to submit high-quality plans.[284]

431. Whilst Ofwat did not want to be overly prescriptive on how this should be achieved, at a minimum it expected Boards to:

- determine the appropriate internal processes and assurances needed for the business plans and supporting data tables to be assured that they are high quality;
- sign off business plans; and
- provide a statement, in their own words, of why they consider that all the elements of the plan and its supporting data add up to an overall plan that is high quality.

432. Ofwat stated that it considered a plan might be 'high quality' if it:

- "*is designed to deliver good outcomes for current and future customers and the environment;*
- *has a coherent narrative based on sound reasoning and contains proportionate evidence;*
- *will ensure that a company meets its statutory obligations and enables the relevant regulators to confirm this in the CCG report;*
- *is based on good-quality engagement with customers and consumers, and the results of this engagement are reflected in the proposed outcome commitments, and the plan more generally;*
- *is cost efficient, containing accurate projections and estimates;*
- *proposes a reasonable balance of risk and reward between customers, investors, and other stakeholders, with efficient proposals to share 'pain and gain' with customers;*
- *is both affordable and financeable;*
- *comes with a high level of assurance – in the form of a statement from the company's whole Board that the plan is of high quality, will ensure that it meets its statutory obligations, and that estimates and data have been arrived at appropriately, and independently of other companies and competitors; and*
- *does not seek to game the regulatory process in any way."*[285]

433. In setting out its methodology for PR14 Ofwat produced its Final Methodology and two Information Notices[286] in order to guide companies as to what assurances it expected to see within their business plans. Bristol Water turned that guidance into a series of

[284] Setting Price Controls - final methodology and expectations July 2013 (SOC063), para 3.1.

[285] Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.2.1.

[286] Setting Price Controls - final methodology and expectations July 2013 (SOC063), IN13/13 - board assurance for the 2014 price review - board leadership, transparency and governance **('IN13/13 Board Assurance PR14')** (SOC130) and IN13/20 - 2014 price review - companies' compliance with statutory obligations **('IN13/20 Company Compliance')** (SOC0131).

challenges to which the Board was required to respond. Bristol Water's formulation of Ofwat's challenges is set out in Table 33 below.

Table 33: Ofwat challenges to Bristol Water in respect of Board Assurances

Section	Ofwat's challenge to Boards	Bristol Water's Board reply
1	Does the Board own and is it accountable for the business plan?	Yes to all these challenges
2	Has the Board given assurance that this is a high quality Plan? Has the Board shown why all the elements (and supporting data) add up to a business plan that is of high quality?	
3	Has the Board explained its governance processes?	
4	Has the Board demonstrated it has provided strategic leadership?	
5	Has the Board demonstrated it has provided a transparent process?	
6	Has the Board demonstrated it has complied with the Licence?	
7	Has the Board demonstrated it has complied with the Code?	
8	Has the Board demonstrated it has put in place processes to deliver assurance?	
9	Has the Board signed off on the business plan?	

Source: Board Assurance Statement[287]

434. Bristol Water's Board believes it has successfully met all of the challenges posed by Ofwat. To this end the Board provided an Assurance Statement with its December Submission[288] and with its revised June Submission.[289] The DDR and SoC and any changes to the Business Plan which result from it, do not have any material impact on the assurance provided with respect to the Business Plan, which remains valid and effective. The approach that Bristol Water took is developed in more detail in the **Section 5** below.

4.3 PR14 assessment process

435. The purpose of this Section is to provide a summary of Ofwat's approach to assessment of business plans submitted for PR14.

436. The process for assessing business plans for PR14 has had three key stages - Risk-based Review (**RBR**), Draft Determination (**DD**) and Final Determination (**FD**), each of which is described in the following Sections. During the process, Ofwat has added an additional stage for some companies involving early feedback (see **Section 4.3.2** below).

437. From a procedural perspective, one of the major changes between PR09 and PR14 has been the move from the submission of a draft and final version of the business plan, to submission of the final business plan only, with resubmission of the same in light of the outcome of the RBR. The publication of the Risk and Reward Guidance after submission of business plans also represented a change in the usual order of a price control process. The

[287] Board Assurance Statement December 2013 PR14 Business Plan **('Board Assurance PR14 December')** (SOC142).

[288] Bristol Water PR14 Business Plan Overview December 2013 **('December Business Plan Overview')** (SOC114).

[289] Board Assurance Statement June 2014 PR14 Business Plan **('Board Assurance PR14 June')** (SOC140).

introduction of the CCG, and its role in the formulation and assessment of the business plan has also been a big development.

4.3.1 Risk-Based Review (RBR)

438. The intention behind the RBR as set out in Ofwat's methodology document was that the quality of companies' business plans would be assessed and each element of the plan, and the company overall, categorised as either: 'enhanced'; 'standard'; or resubmission.

439. On 19 December 2013, following receipt of companies' business plans, Ofwat announced a change to the process to include the publication of risk and reward guidance[290] in January 2014. The risk and reward guidance set out Ofwat's views on the cost of capital and other key financial parameters (see **Section 12** below). Companies responded to the risk and reward guidance at different times in the process, depending on the outcome of the RBR; we responded in our June Submission

440. The RBR assessment focused on the quality of the business plans in relation to:

- "***outcomes*** *– the company's key proposed deliverables for consumers, including current and future customers and the environment, and the incentives associated with delivering them.*
- ***costs***[291] *– the costs, for both wholesale and retail businesses, associated with delivering the company's proposed outcomes.*
- ***risk and reward*** *– how the company's proposals balance risk and the rewards for bearing those risks between consumers, including current and future customers and the environment, and the company and its investors.*
- ***affordability and financeability*** *– the impact of the company's proposals on customers' bills, and its ability to finance its functions*."[292]

441. Board assurance and assessment of 2010-15 performance were also key considerations for the RBR.[293] Each of these tests and considerations were supported by assessment criteria,[294] and were scored on a four-point scale as either A, B, C or D.[295] The score awarded depended on the quality of the evidence submitted, application of some tests with a more mechanistic nature, and the exercise of regulatory judgment.[296]

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290 IB28/13 Change to ofwats price review process August 2011 **('IB28/13 Changes to Price Review Process August 2011')** (SOC066); Ofwat, Setting Price Controls for 2015-2020 - risk and reward guidance Jan 2014 **('Ofwat Risk and Reward Guidance Jan 2014')** (SOC079).

291 Setting price controls for 2015-20 - decisions on enhanced companies and next steps April 2014 **(Setting Price Controls - decisions on enhanced companies April 2014')** (SOC194), p. 27.

292 Setting Price Controls - final methodology and expectations July 2013 (SOC063), Section 1.2.3.

293 Ofwat Risk Based Review Internal Methodology April 2014 **('Ofwat RBR internal methodology April 2014')** (SOC199), p. 3.

294 (SOC199), Appendix 1.

295 Ofwat RBR internal methodology April 2014 (SOC199), p. 3.

296 Ofwat RBR internal methodology April 2014 (SOC199), p. 8-9, Appendices 2 and 3. One example of a mechanistic test was the comparison of costs to Ofwat's efficient cost benchmarks.

442. Ultimately, two companies were awarded enhanced status – Affinity Water and South West Water.[297] The standard and resubmission categories were effectively merged, and all other companies were required to resubmit their business plans – either in early May 2014 for an early draft determination in late June 2014, or in late June 2014 for a draft determination in late August 2014.[298]

443. The RBR provided a mixed picture for Bristol Water.[299] Ofwat rated our Board Assurance process as good (see **Section 5.5** below), along with some aspects of our retail cost allocation and outcome development, but the difference between our wholesale totex and Ofwat's model caused significantly more evidence to be required on wholesale costs and other tests linked to the cost assessment. This was the first occasion on which the potential difference between our position and Ofwat's was signalled (see **Section 11** below).

444. Given the extent of challenge to our plan by Ofwat we elected to resubmit our plan on 27 June 2014, to allow an extended period of time to review and refine the evidence supporting our plan, and the impact of Ofwat's cost modelling.

445. Following publication of Ofwat's RBR feedback we undertook a detailed gap analysis to identify each area of criticism by Ofwat and necessary steps to improve our plan.

446. A summarised version of the gap analysis was provided to Ofwat on 10 June 2014.[300] On receipt of our gap analysis, Ofwat requested further detail on wholesale costs regarding the type of evidence that Bristol would be submitting and what it was expected to demonstrate.[301] An updated version of the gap analysis was provided to Ofwat on 11 June 2014.[302] This document was discussed at a meeting between Ofwat and Bristol Water on 16 June 2014.

447. Our revised plan, submitted on 27 June 2014[303], included a further £8m efficiency challenge to our proposed totex investment programme, along with revisions to our

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297 Pre-Qualification Decisions (SOC176); Enhanced Decision (SOC194).

298 Setting Price controls for 2015-20 - Pre-Qualification Decisions March 2014 **('Setting Price Controls, Pre-qualification decisions March 2014')** (SOC176), p. 7. Ofwat considered that all non-enhanced companies needed to work further with their CCGs and that there was no objective basis on which to distinguish them further. Northumbrian Water and Dwr Cymru chose to resubmit their plans in early May to receive a Draft Determination on 30th May, all other companies chose to resubmit their plans on 27th June.

299 2014 price review risk-based review - reccommendation to Ofwat's Board on Bristol Water's Business plan categorisation April 2014 **('Risk Based Review - Reccommendation to Ofwat on BW Business Plan April 2014')** (SOC007).

300 Bristol Water Gap Analysis as supplied to Ofwat 10 June **('10 June Gap Analysis')** (SOC359).

301 Email from [✂] to Mike King on GAP analysis 11th June 2014 **('Ofwat email on GAP analysis June 14')** (SOC477).

302 Bristol Water Gap Analysis Detail, 11 June **('Gap Analysis Detail')** (SOC360).

303 Our submission comprised:

- PR14 June submission covering letter from Luis Garcia to Sonia Brown Ofwat 270614 ('June submission covering letter') (SOC522)
- Bristol Water PR14 Business Plan overview June 2014 **('June Business Plan')** (SOC001);
- Bristol Water PR14 Business Plan, Wholesale Plan June 2014 **('June Wholesale Plan')** (SOC002);

proposed WACC and Non-Household Retail Margin to align to Ofwat's published guidance on Risk & Reward.[304] We also made minor adjustments to our proposed performance commitments and the associated incentives to include rewards as well as penalties, as suggested by the guidance.

448. Details of the steps taken by Bristol Water between the December Submission and FD14 are provided in Figure 23 below.

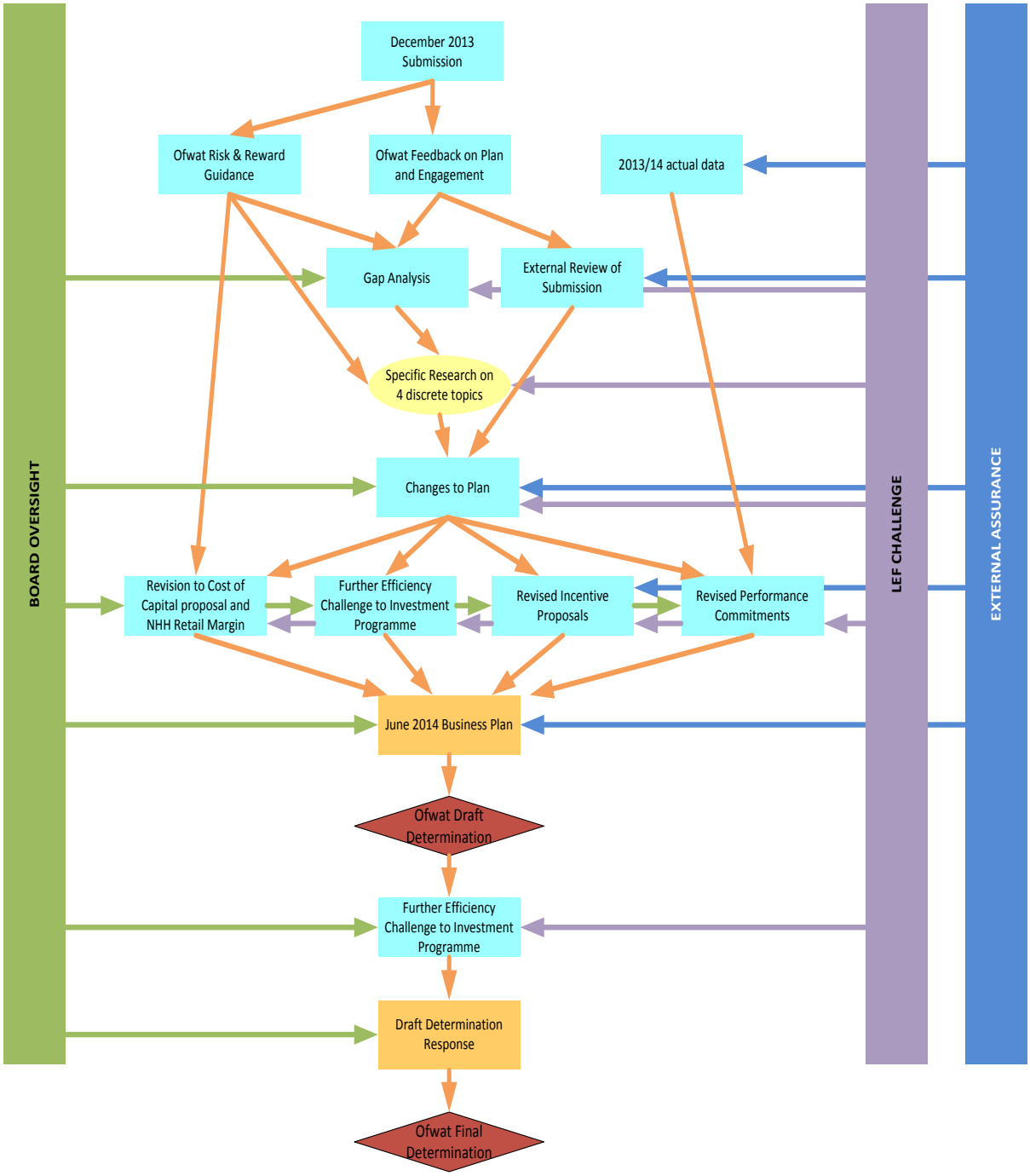
- Bristol Water PR14 Business Plan, Retail Household Plan June 2014 **('June Retail Household Plan')** (SOC003);
- Bristol Water PR14 Business Plan, Retail non-household plan June 2014 **('June Retail Non-Household Plan')** (SOC004);
- Bristol Water PR14 Business Plan, Company Wide Plan, June 2014 **('June Company Wide Plan')** (SOC005)
- Bristol Water PR14 Business Plan, Cost Exclusion Cases June 2014 **('June Cost Exclusion Cases')** (SOC006)

An overview of the documents submitted is provided in the two visuals we submitted along with the plan:

- June submission visual showing supporting document structure from Level 1 to Level 2 **(June submission document structure pt 1)** (SOC523)
- June submission visual showing supporting document structure from Level 0 to Level 2 **(June submission document structure pt 2)**(SOC524)

[304] Ofwat Risk & Reward Guidance (SOC079).

Figure 23: Process from December 2013 Submission to December 2014 Final Determination



Source: Bristol Water

4.3.2 Early feedback on wholesale costs

449. Following the RBR, Ofwat published its wholesale cost models and decisions regarding enhanced status on 4 April 2014. In so doing Ofwat stated:

> *"We are providing detailed information on the way we have modelled wholesale costs at this time: to provide transparency of our approach and decisions, to facilitate the preparation by non-enhanced companies for the 2 May and 27 June submissions, and to support constructive engagement on our approach to estimating the efficient level of costs. We want to encourage companies to engage with how*

the wholesale cost thresholds have been calculated. ***It is in the interests of both consumers and the companies that our assessment of efficient costs is robust****."*[305]

450. As a response to the comments in the RBR, our June Business Plan contained a number of Cost Exclusion Cases (**CEC**).[306] As part of that submission, we also provided general feedback on the modelling and methodology utilised by Ofwat.[307] Similar commentary was provided by other water companies. As set out in **Section 11** below, this feedback raised concerns about Ofwat's approach to cost assessment.

451. On 6 August 2014, Ofwat provided early feedback arising from the application of its models on wholesale water costs for Bristol Water, wholesale wastewater costs for United Utilities and the costs of the Thames Water Tideway Tunnel.[308] This feedback set out Ofwat's assessment of the proposed CECs in the context of need, whether it represents the most cost-beneficial solution, robustness of the estimates and customer protection. Ofwat also provided commentary on the amount of any implicit allowances relating to each of the claims. Ofwat concluded that:

- eight of our 13 proposed CECs failed the "need" test, four passed, and one was not assessed as Ofwat did not consider the costs to be material;
- eight schemes were assessed for cost benefit, of which four passed, four were given a partial pass, and two failed; and
- ten schemes were assessed for robustness of cost estimates, of which five were given a partial pass and five failed.[309]

452. The nature of the feedback varied for the different claims, however the following themes were common to a number of them:

- there is no evidence provided to demonstrate that the cost estimates are robust or reflect upper quartile efficiency; and
- there is no evidence provided to support the difference between our costs and ChandlerKBS (**CKBS**) cost estimates.

453. The net result of Ofwat's assessment of our proposed CECs was to increase the wholesale cost baseline by £14.1m. This amount was net of the values which Ofwat considered were already implicitly allowed by its model, totalling £62.7m.[310]

454. In providing this information three weeks ahead of the draft determination, Ofwat stated its intention to allow Bristol Water and the other two companies additional time to provide further evidence supporting the relevant cost proposals. We responded

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305 Setting Price Controls - decisions on enhanced companies April 2014 (SOC194), p. 26.

306 June Cost Exclusion Cases (SOC006).

307 June Cost Exclusion Cases (SOC006), p. 274.

308 Ofwat, Protecting Customers where there are very material differences between companies' re-submitted plans and Ofwat's wholesale assessment 6 Aug 2014 **('Ofwat, Protecting Customers Aug 14')** (SOC366).

309 Ofwat - Aug 2014 Bristol special costs and claims (SOC008).

310 Ofwat - Aug 2014 Bristol special costs and claims (SOC008).

accordingly by arranging for a further external review of our intervention costs and providing additional evidence and commentary in respect of the CECs.

455. We undertook a gap analysis of the comments, suggestions and criticisms made by Ofwat and met with its Wholesale Cost team on 2 September 2014. We took the results of this into account in our review. Where appropriate, we also sought advice from third-party consultants (see **Sections 9** and **10** below). This review considered both the scope of the Business Plan, as well as the associated costs.

456. Our intervention costs had been subject to review and assurance throughout the PR14 process (see **Sections 7, 9** and **10** below). However, in view of Ofwat's feedback, we undertook further detailed external review of our costs involving:

- CKBS review of the cost of Cheddar Reservoir Two;[311]
- a further review of intervention costs by Mott MacDonald building on the assurance work it had already completed;[312] and
- an update of the outturn costs of the specifically priced schemes during AMP5 compared with the estimates included in our PR09 Business Plan.[313]

457. As a result of this review, and also reflecting the fact that the design had progressed in some areas, we made a number of adjustments to our costs. In addition, the Board reflected on the third-party review process and decided to reduce costs further for customers through the application of higher efficiency challenges by accepting a higher level of risk (see **Sections 9** and **10** below).

458. We provided a detailed response and supporting evidence for the CECs in our DDR.[314]

4.3.3 Draft Determination

459. Ofwat published its draft determination for 14 companies, including Bristol Water, on 29 August 2014.[315]

460. The draft determination provided Ofwat's provisional assessment on wholesale and retail revenue allowances, along with interventions on outcome performance measures and associated targets. Overall, the draft determinations proposed an average 5% reduction in bills across the industry.[316]

461. For Bristol Water, Ofwat's key interventions were as follows:

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311 CKBS assessment of PR14 cost for Cheddar Reservoir 2 - elemental level review October 201 **('CKBS CR2 cost review Oct 14')** (SOC474).

312 Mott MacDonald PR14 Technical Assurance Report October 2014 ('**MM Assurance Report 2014**') (SOC136)

313 CKBS Independent Assessment of PR14 AMP5 Project Costs Process and Elemental Level Review Bristol Water May 2014 ('**CKBS assessment PR14 AMP5 costs elemental and process**') (SOC533).

314 Bristol Water Representation on the PR14 Draft Determination Master Appendices **('DDR Appendices Oct 14')** (SOC020), Section 3 Wholesale Costs and Section 4 CEC response – specific challenges.

315 PR14 Ofwat Draft Determination Overview **(PR14 'Draft Determination')** (SOC298). This does not include the enhanced companies, or those which had submitted revised plans in May 2014 and received their draft determinations at an earlier date.

316 PR14 Draft Determination (SOC298).

- reduction of wholesale costs to £409m, compared with £562m in our June Submission;
- set wholesale WACC at 3.7%, with no allowance for a small company premium;
- applied a £12m shortfall penalty on water infrastructure;
- rejected an adjustment to retail costs for input price pressure; and
- amended outcome performance commitments for mean zonal compliance and negative water quality contacts. [317]

4.3.4 Post-Draft Determination Engagement

462. Following publication of the draft determination, Bristol Water and Ofwat held a series of meetings in an attempt to resolve the difference on wholesale costs.[318]

463. We provided our formal representation on the draft determination on 3 October 2014 (**DDR**).[319] Following this further meetings were held between Ofwat and Bristol Water.[320] A letter from Sonia Brown to Luis García on 13 October 2014 confirmed that Bristol Water had a limited period in which to provide additional evidence to Ofwat to support its wholesale costs submission.[321]

464. Following receipt of our DDR, Ofwat issued a series of queries to Bristol Water, normally requiring a response within 48 hours. Through this query process, Ofwat informed us on 3 November 2014 of its intention to adjust the performance target for unplanned supply interruptions, to reflect what it considered to be industry upper quartile performance.[322] We responded to this query explaining that such an adjustment is not appropriate due to differences between our measure and that used to calculate the industry upper quartile, and provided an alternative calculation for upper quartile performance for this measure (see **Section 14** below for further details).[323]

465. Prior to publication of the final determinations we made a request to Ofwat to use a three-year glide path towards its intended bill level, to mitigate the damaging effects of the reduction in allowed costs on the Company, its customers, staff, suppliers, shareholders and other stakeholders.[324]

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317 Additional detail on the reasoning for the interventions were provided to Ofwat's Board in: August 2014 price review –recommendations to Ofwat's Board on Bristol Water's revised business plan (**'August recommendation to Ofwat board on BW plan**') (SOC526)

318 Bristol Water Meetings with Ofwat **('Ofwat meeting list')** (SOC370).

319 Bristol Water Representation on the PR14 Draft Determination October 2014 **('Bristol Draft Determination Representation October 2014')** (SOC048).

320 Ofwat meeting list (SOC370).

321 Letter Brown to Garcia on further engagement over wholesale water costs 10 October 2014 **('Letter from Ofwat on further engagement October 14')** (SOC297).

322 rFBP-BRL-Outcomes Query 217 - unplanned customer minutes lost **('Ofwat query unplanned minutes lost')** (SOC369).

323 Our query response, based on Ofwat's DD calculation of upper quartile performance, suggested a target of 11.25 minutes may be appropriate. An update to this calculation following Ofwat's revised FD calculation suggests that the upper quartile level is higher than our proposed target. Further details are provided in **Section 13**.

324 Bill Profiling and PAYG (SOC393).

4.3.5 Final Determination (FD14)

466. Ofwat published its Final Determination (**FD14**) on 12 December 2014 for all 18 companies. The FD14 set out allowed wholesale and retail revenues for all companies for the five years from 1 April 2015 to 31 March 2020. As at the DD14, at an overall level FD14 reduced bills across the industry by 5% on average.

467. For Bristol Water, key movements from DD14 to FD14 were:

- wholesale totex allowance increased to £437.8m (increase of £54.1m);
- wholesale WACC reduced to 3.6% (reduction of 0.1%);
- retail household costs adjusted to allow for input price pressure (increase of £4.9m);
- adjustment to bill profile to allow one-year glide path to final reduced bill level; and
- minor positive adjustments to some outcome incentives.[325]

468. Details of the specific elements of FD14, how it impacts on different aspects of the business and how it relates to our Business Plan are provided in the following Sections. In particular, these cover Ofwat's position on:

- our overall approach to developing our Business Plan, including governance (see **Section 5**)
- outcomes and performance measures, as derived through customer engagement (see **Section 6**);
- totex assessment (see **Section 7**)
- regulatory depreciation and taxation (see **Section 8**);
- details of the base totex components within our wholesale price control, including maintenance opex and capex (see **Section 9**);
- details of the enhancement components within our wholesale price control (see **Section 10**);
- cost assessment and modelling (see **Section 11**);
- the appropriate cost of capital (see **Section 12**);
- serviceability penalties (see **Section 13**);
- performance commitments and incentives (see **Section 14**);
- the components that form our retail household price control, including associated costs and the retail margin (see **Section 15**);
- the components that form our retail non-household price control, including associated costs and the retail margin (see **Section 16**); and
- financeability of FD14 (see **Section 17**).

469. Clearly, the scale of change introduced at PR14 has been appreciable. Whilst Ofwat has, ultimately, delivered its final determinations within the intended timescale, it is

[325] Additional comments on the FD were provided to Ofwat's Board in: December 2014 price review –recommendations to Ofwat's Board on Bristol Water's final determination (**'December recommendation to Ofwat board on BW plan'**) (SOC525)

undoubtedly the case that the size and complexity of the tasks involved to get to this stage were underestimated at the outset, meaning that the timing has been very tight. This has been exacerbated by the frequent changes and adaptations that have occurred during the process, and by the delays causing key pieces of information, such as the cost assessment, being made available to companies relatively late in the process.[326] Ultimately, this has meant that Ofwat has had insufficient time available to respond to any criticisms of its underlying methodologies during the process and to react accordingly in time to impact the final determinations. This has particularly been of consequence to Bristol Water in relation to Ofwat's approach to cost assessment, as described in more detail in **Section 11** below.[327]

4.4 Why is a CMA redetermination necessary?

470. The purpose of this Section is to provide an assessment of why we believe that a CMA redetermination is necessary for Bristol Water.

471. As the following Sections set out, our Business Plan envisaged reducing bills and increasing service levels, and was supported by customers and the LEF. As demonstrated above, however, the gap between what has been allowed in FD14 and what we sought in our Business Plan is significant.

472. We consider that our Business Plan was robustly developed, in accordance with the principles and requirements of the PR14 methodology, and represents the best value solution for our customers, the environment and society whilst ensuring that we fulfil our statutory and regulatory obligations (see **Section 5** below). It is disappointing, therefore, to be in a position where FD14 has such substantial differences from our Business Plan.

473. A reference of Ofwat's FD14 to the CMA is not our preferred outcome from the PR14 process and is one that we have sought to avoid throughout. We have embraced Ofwat's approach to PR14 and produced a plan that reflects and incorporates the interests of our customers. Our reference is predominantly the result of Ofwat's approach to cost modelling producing unacceptable results for a company with the specific characteristics of Bristol Water that has left us in a position where FD14 does not allow sufficient revenue to deliver the programme that customers want and support (see **Sections 9**, **10** and **11** below)**.**

4.5 Methodology to be applied in the Redetermination

474. As was acknowledged in the CC10 Redetermination, the CMA has discretion regarding the methodology it adopts for a redetermination:

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[326] For instance, the changes to the timetable meant that Ofwat's final methodology and business planning expectations were not published until 25 July 2013, just four months prior to the 2 December 2013 deadline for submission of Business Plans.

[327] As an example, the lack of visibility of Ofwat's cost assessment model prior to submission of the Business Plans meant that many issues could not be identified and addressed until after the publication of the RBR in April 2014. This contrasts with the approach taken by Ofgem to the development of its equivalent model, which it did as an iterative process involving companies in a constructive way throughout.

"While we had discretion to choose another framework in determining the price cap, we found no reason to depart from Ofwat's framework (which is similar to those of other utilities and to those recommended by the CC for Heathrow and Gatwick). There are also significant benefits associated with regulatory certainty. Bristol Water accepted the Ofwat framework in principle (although it challenged many aspects in detail). Accordingly, in this determination we adopted that framework. We assessed Bristol Water's objections to its application as part of our redetermination."[328]

475. The CMA also acknowledges, however, the value in consistency with previous regulatory decisions which, although not binding precedents, provide important guidance to regulated companies:

"We consider that consistency with previous decisions is relevant and any significant changes should be satisfactorily explained and well justified."[329]

476. In rejecting the Wholesale Price Control contained in FD14, Bristol Water is not rejecting the general approach taken by Ofwat to PR14. On the contrary, the increased emphasis on customer engagement, outcomes rather than outputs, and the need for governance has been welcomed and embraced as part of our planning process, company culture and operational behaviour (see **Section 5** below).

477. As was noted above (see **Section 4.2.4**), and is explained in more detail below (see **Section 11**), the costs assessment approach used by Ofwat has simply failed Bristol Water and placed it in a position where the Board was unable to accept the Wholesale Price Control. As such, whilst we consider that the CMA should generally follow Ofwat's approach except where it has concerns that it leads to a suboptimal outcome, it is in relation to costs assessment that we explicitly ask the CMA to take a different approach to Ofwat.

478. In particular, we would like the CMA to:

- incorporate a separate assessment of operating costs and efficiency as a component of the overall totex approach;
- assess capital maintenance expenditure using a bottom up approach supported by appropriate benchmarking;
- assess capital enhancement expenditure using a bottom up approach supported by appropriate benchmarking; and
- fund schemes with clear customer support.

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328 Competition Commission Determination Report August 2010 **(CC Determination from 2010)** (SOC011), para. 2.16. The CC has more recently taken a similar approach in the NIE Determination, in which it noted that "*the requirement to have regard to the duties of the Utility Regulator did not mean that we would be required to follow the same approach that the UR adopted or adopt the same methodologies"* (NIE Determination, para. 1.13 – SOC116). Indeed, when designing the new price control for NIE, the CC noted that some of its own proposals that it ultimately adopted "*represent alternative options that we consider more appropriate than those submitted by the parties"* (NIE Determination, para. 5.32 – SOC116).

329 Competition Commission Northern Ireland Electricity Limited Price Determination March 2014 **('NIE CC Final Determination 2014')** (SOC116), para. 13.191.

479. Our preferred approach in this regard is considered in more detail in **Sections 7, 9, 10** and **11** below.

4.6 Conclusions on the PR14 process and methodology

480. The PR14 methodology developed by Ofwat responds to the challenges set by Defra (see **Section 2.6** above) to apply a more targeted, proportionate and appropriate regulatory framework to the price control process, whilst ensuring an enhanced role for customers.

481. Bristol Water broadly supports the PR14 methodology and principles, and welcomes the strategic shift it has introduced with regards to the role of customer engagement, and outcomes-focus, and the use of totex. How Ofwat's framework has impacted Bristol Water's approach to developing its Business Plan is described in detail from **Section 5** onwards.

482. Bristol Water has serious concerns about the cost assessment tools used by Ofwat, and how they have been applied in practice. For Bristol Water, Ofwat's cost assessment model and methodology has resulted in the significant gap between our Business Plan and FD14. As such, and as is described in more detail in **Section 11** below, Bristol Water would like the CMA to exercise its discretion and adopt a different approach to cost assessment to that used by Ofwat.

5 Bristol Water's approach to PR14

5.1 Executive summary

5.1.1 Introduction

483. The purpose of this Section is to provide an overview of Bristol Water's approach to PR14, including the development of the Business Plan.[330] This Section is intended to demonstrate that Bristol Water's process has been robust, effective and reflective of the PR14 framework, taking into account the best possible outcomes for customers, the environment and society. It acts as an overview of the approach taken and is supported by the more detailed Sections dealing with specific aspects of the Business Plan and process that follow.

484. This Section demonstrates the measures Bristol Water's Board has taken to ensure that the Business Plan that was submitted for PR14 met all the requirements set by statute, Ofwat and the expectations of Bristol Water's customers.[331] Ofwat has raised the profile of standards of corporate governance in the sector and has linked this to the Board assurance and governance sought in respect of PR14. Bristol Water believes it has been following best practice in corporate governance and has supported Ofwat's approach.

5.1.2 Key themes

485. Bristol Water has fully embraced the principles, spirit and letter of PR14. This is reflected not only in its approach to the development of the Business Plan and the underlying totex driven intervention plan, but also by the way in which key aspects of PR14 have become embedded in the Company's strategy, operations and culture.

486. As early adopters of many key concepts, such as the Customer Challenge Group (**CCG**), Bristol Water has demonstrated its acceptance, and responsiveness, to the changing regulatory landscape. Fundamental aspects of its approach include:

- engaging with customers to identify the outcomes, performance measures and package of interventions that underpin the Business Plan;
- ensuring that the Business Plan has evolved as a result of customer input, so that customers have played a proactive role in its creation and shaping;
- the interventions proposed are the result of detailed analysis of need and timing, and represent the selection of the most cost-beneficial solution using an asset risk-based whole life costing totex approach;
- significant levels of independent challenge from third-party specialists and experts on all revenue building blocks;
- cost benchmarking of individual cost components and top-down modelling to validate the proposed capital programme and associated costs;

[330] This section sets out information provided to Ofwat in the following submissions regarding our planning process: Bristol Water Company Wide Overview December 2013 ('**December Company Wide Plan**') (SOC053); PR14 June Business Plan, Business Plan Evolution ('**June 2014 Business Plan Evolution**') (SOC021).

[331] See **Section 3.2.2.1** above for a description of the composition of Bristol Water's Board.

- engaging with Ofwat, other regulators and other stakeholders; and
- ensuring that its duties are met, including those specifically relating to financeability.

487. This has been demonstrated in a Business Plan that reflects the priorities and requirements of customers and other key stakeholders, and enables Bristol Water to supply its services at the levels expected in a sustainable and efficient way.

488. Ofwat required all companies to own their plans and meet high standards of governance and assurance in the PR14 process. In particular, Ofwat asked that all Boards confirm that their business plan does not seek to game the regulatory process in any way. Bristol Water's Board confirmed this in its Board Assurance Statement. [332]

489. Bristol Water believes it met Ofwat's objectives. In the Risk Based Review (**RBR**) Ofwat assessed some elements of Bristol Water's approach as exceptional with an overall score of 'acceptable'.[333] For instance:

- Bristol Water has met all of the challenges posed by Ofwat for Board assurance with openness and honesty;
- Bristol Water's Board put in place a comprehensive system for developing the Business Plan and to verify the information contained therein;
- the Technical Assurance provided by Mott MacDonald confirmed that the data provided was derived from appropriate sources and key issues related to the data had been adequately explained;
- PwC confirmed the validity of the financial data contained within the Business Plan;
- Bristol Water has engaged with all relevant stakeholders to ensure that its Business Plan has the approval and can meet the needs of its customers; and
- the Board has shown why all the elements (and supporting data) result in a business plan that is of 'high quality' as defined by Ofwat.

5.1.3 Structure of Section

490. This Section is structured as follows:

- **development of the Business Plan -** an overview of the approach taken by Bristol Water to the creation of its Business Plan, including links to the Sections which address the various aspects of the Business Plan in more detail (see **Section 5.2**);
- **incorporating PR14 principles into the broader business** - an overview of the way in which Bristol Water has embraced the PR14 methodology more broadly in other aspects of its operations and strategy (see **Section 5.3**);
- **Business Plan risk -** a brief summary of the approach taken to the issue of risk within the Business Plan (see **Section 5.4**);

[332] See Table 35 on page 176 for details of what Ofwat's expectation of a high quality plan, and Bristol Water's response on regulatory gaming.

[333] Risk Based Review: Element Categorisation Scorecard - Bristol Water, April 2014 (**'RBR Bristol Scorecard'**) (SOC527).

- **Bristol Water's PR14 goverance and assurance approach** - a summary of Bristol Water's approach to governance and assurance for PR14 (see **Section 5.5**);
- **High quality Business Plan** - details of how Bristol Water believes it has demonstrated that its Business Plan is of 'high quality' (see **Section 5.6**); and
- **Ofwat's view of Bristol Water's approach** - Ofwat's assessment of Bristol Water's governance and assurance process for PR14 (see **Section 5.7** and **5.8**).

5.2 Development of our Business Plan

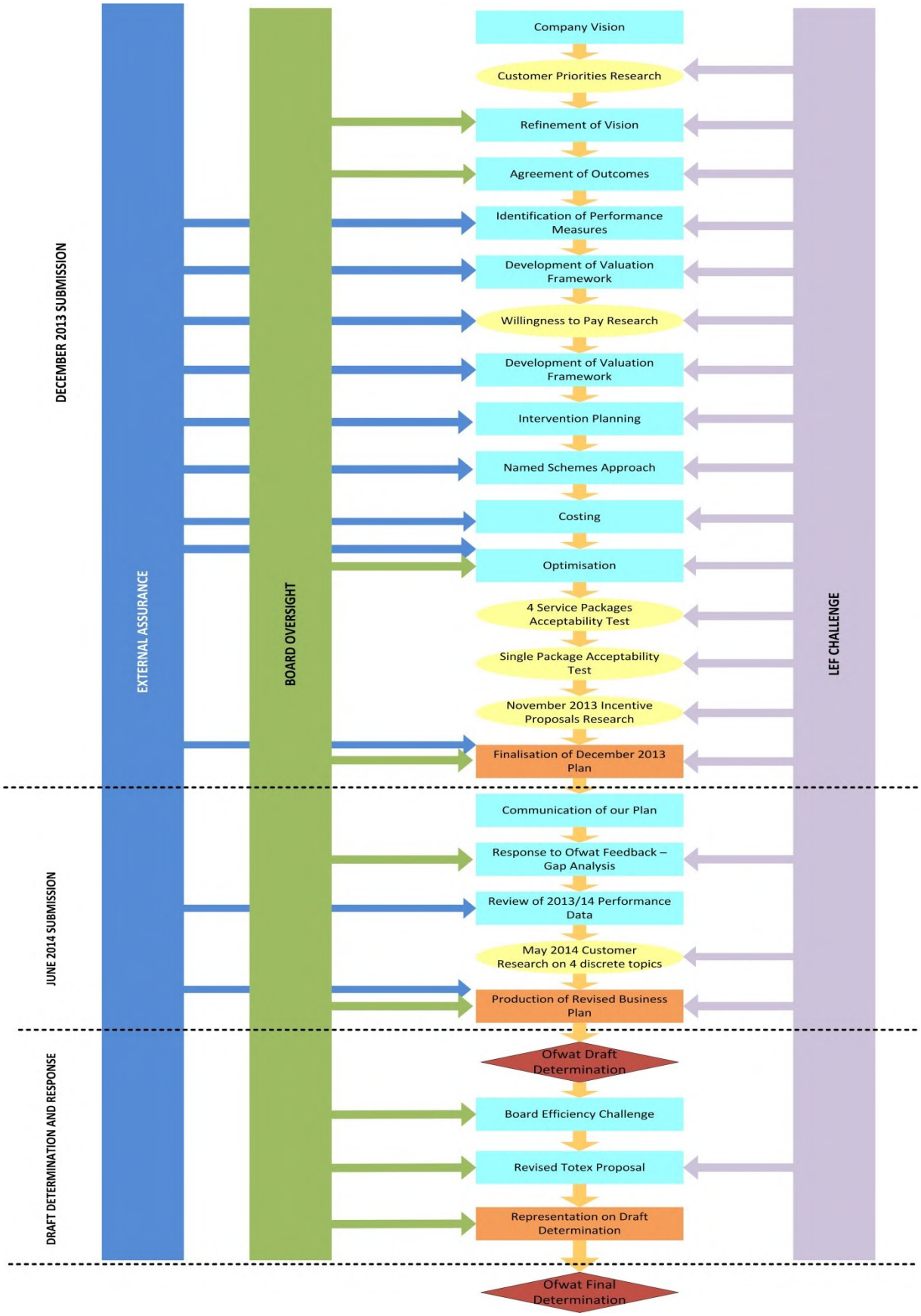
We embarked on the formal process of developing our PR14 Business Plan in early 2012 with the creation of our Local Engagement Forum (**LEF**). Each of the key elements in the evolution of our Business Plan are identified in the following Sections.

491. Figure 23 below demonstrates the structure of the overall process.

- **how customers and stakeholders shaped our plan - Section 6** sets out the various ways in which we engaged with our customers, the LEF, and other stakeholders at various stages through the business planning process – in particular through the customer priorities, willingness to pay and acceptability research. It explains how customers participated in the identification of our outcomes, the associated performance measures and commitments, and ultimately the package of interventions we put forward as components of our Business Plan. It demonstrates that we sought to put customers at the heart of our approach and to ensure that we worked alongside them to develop a plan that appropriately reflects customers' priorities and preferences;
- **translating customer led outcomes into our plan and the approach to assessment of totex - Section 7** details the process we underwent to translate the outcomes into a series of potential interventions intended to deliver them. It summarises the approach we took to assessment of need, identification of the range of interventions available, optioneering to assess the most cost-beneficial schemes, and the timing of each intervention. It also outlines the benchmarking tools used to ensure both our approach, and the associated costs, represent the right level of efficiency.
- **determining the level of revenue for Bristol Water - Section 8** outlines the revenue building blocks that go toward the setting of the price controls;
- **wholesale base totex - Section 9** sets out the elements comprised within the base totex component of the wholesale price control. In particular it breaks down the anticipated maintenance opex and capex envisaged by our Business Plan by reference to the activities that we intend to carry out;
- **wholesale enhancement - Section 10** describes the enhancement component of the wholesale price control. It looks at the schemes and activities we propose to deliver, along with next best options. In particular, it sets out in detail the case for Cheddar Reservoir Two;
- **cost of capital - Section 12** provides details of Bristol Water's cost of debt and equity, and considers the WACC that is required in order for us to be able to finance the activities included within the wholesale programme; and

- **performance commitments and incentives - Section 14** details the process we followed to identify and agree with customers the right incentives to have in place associated with our performance commitments to ensure that we deliver in accordance with their expectations during AMP6.

Figure 24: Overall evolution of our Business Plan



Source: Bristol Water

492. The development of the PR14 Business Plan also sat alongside other strategy planning processes, including the 25-year strategy and the Water Resources Management Plan (**WRMP**) (see **Section 2.4.4.1** above).

493. Bristol Water's latest WRMP 2014-2040 was consulted on in 2013,[334] and the final version published in June 2014.[335] The WRMP highlighted a potential deficit in the supply/demand balance in 2017/18 if we were to do nothing, and sets out how we plan to manage the challenges of climate change and population growth in our area whilst continuing to provide affordable, secure and safe water supplies.[336] In particular, it provides details of the 150+ schemes we considered as possible solutions, as well as the 30+ schemes that made the 'short' list for detailed cost-benefit assessment (see also **Section 7.6.2** below).[337] As a result, we were able to identify a long-term strategy comprised of the most effective combination and timing of those options that can deliver the required outcomes at the least cost.

5.3 Incorporating PR14 principles into broader aspects of the business

494. Bristol Water has fully embraced Ofwat's vision for PR14 - from separate wholesale and retail price controls to placing customers at the heart of both the plan and the planning process (see **Section 6** below), as well as taking a whole life cost totex approach to our intervention planning (see **Section 7** below). Our Business Plan has been developed in line with Ofwat's methodology as set out above (see **Section 4**) and incorporates the new incentive-based regulatory principles. In particular it has been led by the preferences and priorities of our customers, with more than 3,000 household customers and 400 business customers contributing their views, and contains proposals representing the most beneficial options at a cost that our customers view as good value (see **Section 6** below).

495. In terms of framing our approach, we have been early adopters of many of the elements featured in the PR14 methodology. We were, for instance, one of the first companies to set up our Customer Challenge Group (**CCG**). Details of the composition of our CCG, known as the Local Engagement Forum (**LEF**), and the role that it played throughout the PR14 process, are set out in **Section 6.2** below. In particular, all of our customer research related to our Business Plan was carried out with oversight from the LEF.

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[334] Water Resources Management Plan 2014 ('**WRMP 2014**') (SOC039). In addition to engaging with the statutory consultees, we engaged with a wide variety of stakeholders when preparing our WRMP, including our customers and the LEF. We initially held an optioneering meeting with the EA to get the most cost-beneficial approach to maintaining supply over demand. We also took the Water Resources Sub Committee of the LEF through our proposals at three separate meetings; one on forecasting demand (10 October 2012), one on forecasting supply (16 October 2012) and headroom and one on the supply/demand scheme options appraisal (21 February 2013). We informed customers of our approach to managing water resources in the spring 2013 edition of our customer magazine *WaterTalk* and invited them to respond on the draft WRMP. No customers responded directly on our plan but we did receive responses from the EA, Ofwat, NE, CCWater and the Canal and River Trust. We responded to the consultation in a 'Statement of Response to Stakeholder Representations'. This explains how we updated our draft WRMP to reflect the consultees' views.

[335] Both our draft WRMP and final WRMP, including the Statement of Response to Stakeholder Representations, were subject to independent assurance by our third-party auditors Atkins.

[336] WRMP 2014 (SOC039), Sections 2-7.

[337] WRMP 2014 (SOC039), Sections 8-11.

496. We recognise that the move to outcomes-focused regulation grants us a greater degree of flexibility to develop long- and short-term plans that will deliver for our customers and other stakeholders. Our approach to the identification of outcomes, and how we engaged customers and other stakeholders in that process, is set out in detail in **Section 6** below. It is important to stress that we have embraced the outcomes culture in a more fundamental way within the business. For instance, we based our 25-year strategy plan, 'Water in the Future', on the outcomes being developed for PR14 and were the first company to publish its proposed outcomes when we put that strategy out to consultation.[338]

497. Our outcomes have also become embedded within the business at an operational and management level. For instance, we changed our internal reporting structure in order to reflect outcomes in our annual reports from 2012/13, and our investment forecasting has been based on delivery of outcomes from the outset. As of 2013/14, staff bonus targets have also been changed to reflect the outcome targets.[339] Indeed, our Reporter commented that Bristol Water had become truly "*outcome-centric*" in our approach.[340]

5.4 Approach to risk in the Business Plan

Our approach to risk assessment in the context of the Business Plan has also been structured with outcomes in mind. This meant that our Business Plan was developed to meet the level of service our customers want and to address the areas of corporate risk with the highest 'appetite adjusted' exposure, as illustrated in **Error! Reference source not found.** below.

[338] Bristol Water, Water in the Future 25 year strategy, December 2012 (**'Bristol Water - Water in the Future 2012'**) (SOC143).

[339] Details are given in the Bristol Water Annual Report 2014 (SOC046), at p77-79.

[340] PR14 Business Plan Assurance - update to Bristol Water Board, Andrew Heather **('PR14 Assurance - update to Board November 2013')** (SOC367).

Figure 25: Corporate risk appetite

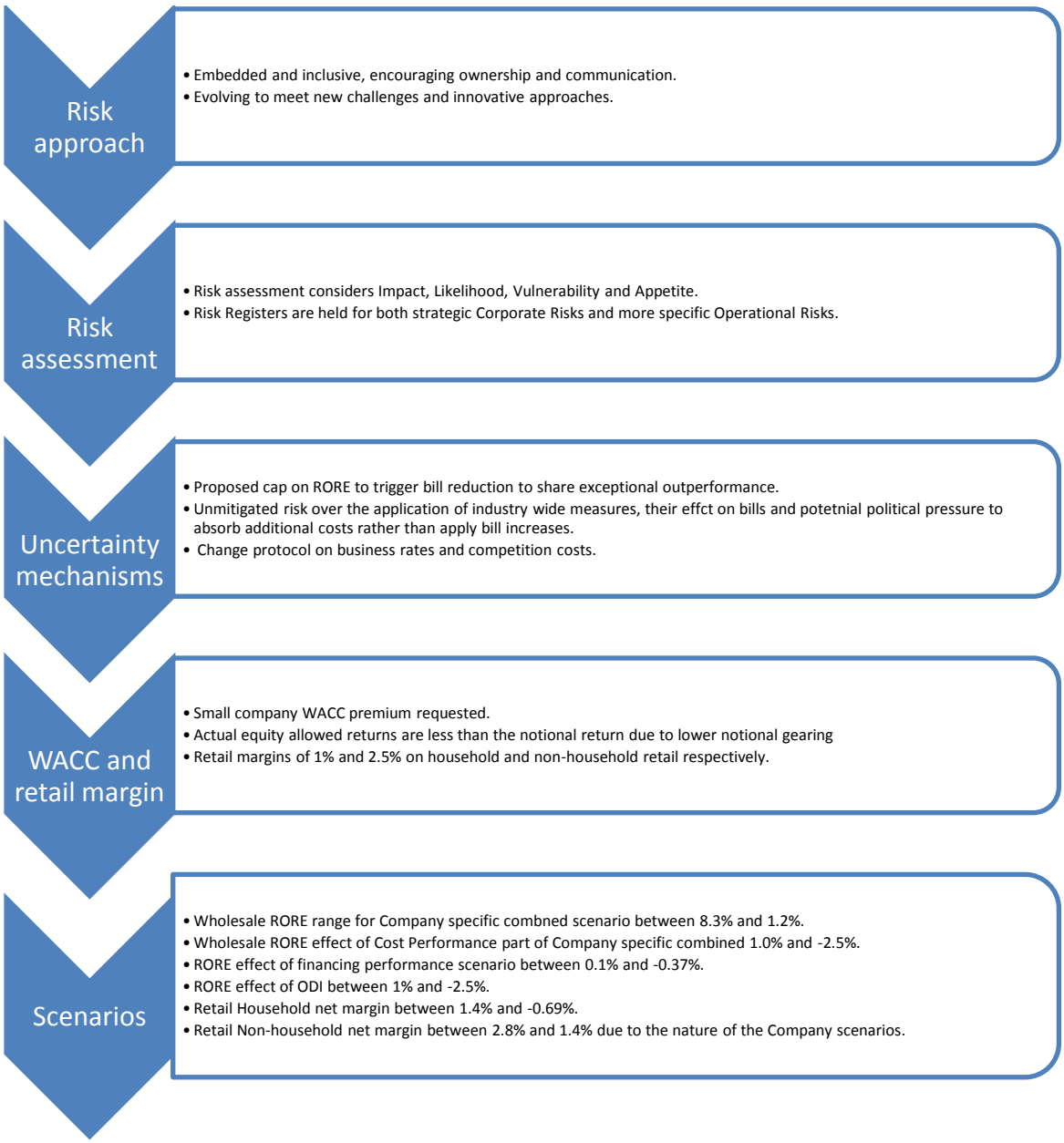
Appetite adjusted Risk exposure ranking	Corporate Risk	Outcome based appetite groups	Risk Appetite group	Vulnerability/ Effectiveness of current risk control
1	Major Event	2.1	Lower	2
2	Environmental damage	3.1	Lower	2
3	Asset serviceability	2.2, 3.2	Moderate	2
4	Water Quality	1.1	Lower	1
5	Water Resources & climate Change	2.2	Moderate	2
6	Investment Programme and Outcome Delivery	All	Moderate	2
7	Increasing Costs	6.2	Moderate	2
8	Supply Chain	3.2, 6.2	Moderate	2
9	Regulatory Change	6.2	Moderate	2
10	Funding/Investor Confidence	6.2	Moderate	2
11	Health & Safety	5.1	Lower	1
12	Human Resources	5.2	Higher	2
13	Customer Satisfaction	4.1	Moderate	2
14	Regulatory Data Compliance	6.1, 6.2	Lower	1

Source: June Company Wide Plan[341]

498. More generally, our approach to assessing risk within our Business Plan is summarised in Figure 26 below.

[341] Bristol Water PR14 Business Plan, Company Wide Plan, June 2014 (**'June Company Wide Plan'**) (SOC005), p. 142.

Figure 26: Risk in the Business Plan



Source: Bristol Water

5.5 Bristol Water's approach to governance and assurance

5.5.1 Board Leadership

499. Providing strategic leadership is one of the main functions of our Board and with respect to the Business Plan the Board has defined all of the key strategies that are embedded within it. The Business Plan therefore reflects the strategies considered and agreed by the Board.

500. Key examples of the strategies defined by the Board and featured in the Business Plan include:

- 'Water in the Future' - our long-term strategy document sets out the outcomes and long-term aspirations for our customers;
- determining the acceptable price impact on customers by:
  - defining the right cost of capital (WACC); and
  - ensuring the plan is acceptable to customers in the current climate.
- planning the capital investment necessary to:
  - deliver Bristol Water's vision by delivering the outcomes; and
  - meet customers' expectations in a sustainable and affordable way.
- having a financeable plan;
- ensuring the right balance of risk between customers and Bristol Water; and
- responding to customer research that showed our customers did not support certain initiatives by deciding that the Business Plan would not incorporate any rewards to incentivise service delivery.[342]

501. From the outset of the PR14 planning process the Board recognised it had to own the Business Plan. This lead to the development of the independent challenge and assurance processes which were produced as part of a package of work to enable it to reach its own view on the plan and to determine if it met the Ofwat test of high quality (see Table 35 and comments at **Section 5.6** below).

5.5.2 Board Assurance

502. Our approach to governance was set out in our December and June Business Plan submissions, in the Company-wide plan documents.[343]

503. Our Board fully appreciates the expectation that it should be able to evidence the ownership and governance of the Business Plan. To this end, it developed a multi-tiered assurance approach and defined governance structure, in order to demonstrate the clear lines of challenge, reporting and approval which were needed for it to be able to sign the required assurance statement.

504. Throughout the process we have ensured that our Independent Non-Executive Directors had full access to materials and advisors to enable them to provide effective challenge and oversight.

5.5.3 Board Assurance Governance Structure

505. Early in the development of the Business Plan, our Board appointed KPMG to assess the governance of our approach to PR14.[344] KPMG commenced its review by carrying out interviews with the Executive, the Regulatory team and a number of key Business Plan contributors.

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[342] These incentives were re-introduced following publication of Ofwat, Setting Price Controls for 2015-2020 - risk and reward guidance Jan 2014 (**'Ofwat Risk and Reward Guidance Jan 2014'**) (SOC079),

[343] December Company Wide Plan (SOC053) p. 113; June Company Wide Plan (SOC005), p. 171.

[344] KPMG PR14 Working Group Roles and Responsibilities 2014 (**'KPMG Governance Report 2013'**) (SOC133).

506. This approach identified the key challenges we faced around the governance of the PR14 process and resulted in the development of a governance structure and plan to respond to them.

507. The governance approach adopted for the development of our Business Plan submission contained the following elements:

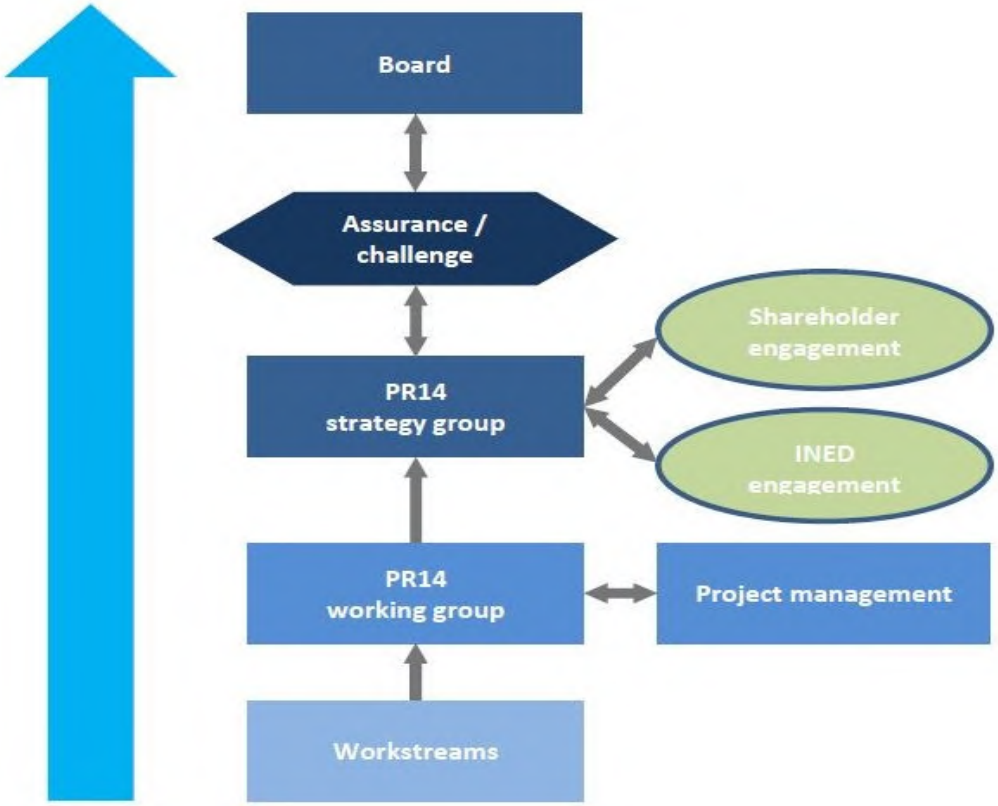
- description of the governance structure, showing the relationship between the Board and the key committees responsible for the programme. This included the Board's expectations in terms of approvals for the plan and when the Board was to be informed and consulted during the Business Plan development;
- identification of specific working groups to address key subject matter areas for the Business Plan;
- terms of reference for each of the governance committees and workstream groups and their role in our PR14 process;
- appropriate programme governance tools including:
  - programme plan and key milestone analysis;
  - risk register;
  - critical path analysis; and
  - identification of key dependencies between workstreams and with our other programmes of work; and
- appropriate programme management to ensure the governance approach is adhered to and to monitor progress.

5.5.4 PR14 Process Governance Structure

508. The governance structure shown in Figure 27 was developed to:

- identify the key points in the process at which Board direction, Board decisions, Board approval or consultation with the Board was required;
- specify interactions with shareholders to understand their views on some of the key regulatory parameters;
- ensure clear specification of programme milestones for the PR14 business planning project and ownership for the delivery of those milestones; and
- identify how challenges from the LEF and the findings from our customer research were to be integrated within the Business Plan process.

Figure 27: PR14 governance structure



Source: June Company Wide Plan[345]

5.5.5 Regulatory stakeholder engagement

509. It has been important for the Board to engage with external stakeholders involved with the process, to which end a number of members of our Board, including our Chairman, have met with Jonson Cox (Chairman of Ofwat). In addition, members of our Executive Team have met with the Ofwat Executive team. Additionally, the full Board has met the Chief Scientist of the DWI, and members of the Executive have met with the EA to ensure that both regulators have had full visibility of our plans so that they can make their own assessment of our compliance with our statutory obligations. This engagement was additional to both regulators' representation on our LEF.

510. At a working level we have held several meetings with Ofwat staff during the PR14 process, in particular with Ofwat's Portfolio Leads, the Chief Engineer, Chief Economist and Director of Strategy. We have also attended Ofwat industry workshops related to the development of the PR14 methdology.

5.5.6 Compliance with Licence and Water Industry Act

511. Our Licence sets out the obligations we have as a company (see **Section 2.4** above). To provide independent confirmation of our understanding of our licence obligations to the Board, we commissioned an external legal firm, Greenberg Traurig Maher LLP, to prepare

[345] June Company Wide Plan (SOC005), p. 173.

a detailed briefing paper on our licence obligations. Furthermore we asked Burges Salmon LLP, to carry out an assessment of the WIA'91 so that the Board had the benefit of independent advice as to its duties under that legislation.

512. Using these independent briefings the Board has reviewed the licence obligations and WIA'91 duties relevant to the Business Plan, and then assessed the Business Plan's ability to continue to allow us to meet our obligations under the Licence and WIA'91. On the basis of this assessment, the Board is confident that the Business Plan as submitted will allow Bristol Water to continue to comply with its obligations.

5.5.7 Compliance with the Code on Corporate Governance

513. The Board has continued to adopt and ensure that Bristol Water complies with the Code on Corporate Governance (the '**Code'**). Bristol Water's compliance with the Code was confirmed in the Annual Report for 2013/14. Ahead of the Business Plan submission, the Board commissioned Osborne Clarke LLP to review its compliance against all relevant aspects of the Code and compliance was confirmed in a report disclosed with the Board Assurance Statement.[346]

5.5.8 Internal Quality Assurance

514. We used our established protocol for internal checking and quality assurance of regulatory data for the production of the Business Plan. All written sections were assigned to a designated owner to produce. Each of these sections was then passed to a designated reviewer. All sections were then reviewed by the Executive directors. We used an internal document management system, SharePoint, to control all documents. This system allowed individuals to assign reviewers and approvers for each document.

515. All data tables were assigned to a table owner, with separate line owners identified where appropriate. Data owners were required to submit internal quality assurance forms to confirm that the data was compiled in accordance with the stated methodology, and that the data provided a true representation of the facts. Data tables were subject to internal review prior to the external assurance review. All data tables were reviewed by the Executive directors before submission of the Business Plan.

5.5.9 PR14 external assurance

516. As detailed in **Section 4** above the approach to PR14 adopts a risk-based approach and the focus of assurance has resulted in a change in emphasis from the audit process used for previous business plans. Previous processes concentrated upon following a set of reporting requirements and detailed audit trails to determine whether companies had addressed and achieved specific outputs. The assurance approach for PR14 has been based on activities that help us to ensure that we understand our risks and that we have appropriate mechanisms in place to deliver the outcomes valued by our customers.

517. To continue with the robust practices developed for previous price reviews, as the emphasis had changed from an 'audit' process to an 'assurance' process, we used external consultants as assurers with the main focus of assisting us with identifying where

[346] Board Assurance Statement December 2013 PR14 Business Plan (**'Board Assurance PR14 December'**) (SOC142).

improvements could be made to ensure the best achievable Business Plan, which would deliver the outcomes supported by our customers.

518. Mott MacDonald provided technical assurance and audit services to us under our Reporter contract for AMP5 and was asked to provide our Board with assurance of our PR14 Business Plan.[347] As part of this role, the Reporter himself also provided updates on his work to the LEF and ensured that his assurance procedures addressed any technical queries on our plans that the LEF raised.

519. Additionally, the WRMP and the supply demand balance components of the Business Plan were audited by Atkins.[348] [349] The role played by independent experts in our assurance process is summarised in Table 34 and is considered in more detail in the following sub-sections.

Table 34:External assurance and expert review

Independent View From Keith Harris	Totex	Base Totex Costing	Opex	Oxera
				CH2M HILL
			Capital Maintenance	Oxera
				Mott MacDonald
				CH2MHILL
		Enhancement Costing	Capex	Mott MacDonald
				Atkins
				ChandlerKBS
	Plan Challenges	Efficiency	Totex	ChandlerKBS
				Mott MacDonald
				Baringa
				ICS
				First Economics
	Viability of Business Plan	Financial Assessment	Modelling	KPMG
			Cost of Capital	KPMG
				Oxera
			Financeability	KPMG
	Consideration of Various Techniques	Modelling Approaches	Totex	BW Models
				Ofwat Models
				Oxera Models
				Industry Benchmarking

Source: Bristol Water

5.5.9.1 Technical Assurance

520. The PR14 assurance objectives assigned to Mott MacDonald were to:

[347] Mott MacDonald PR14 Technical Assurance Report October 2014 ('**MM Assurance Report 2014**') (SOC136).

[348] Atkins review of Bristol Water dWRMP ('Atkins dWRMP review') (SOC283).

[349] Atkins, Water dWRMP Assurance Report 27 September 2013 ('Atkins dWRMP assurance Sept 2013') (SOC336)

- support our Board in providing independent assurance that our PR14 business plan is a high-quality plan;
- help to provide the LEF with assurance on our planning process and the quality of our work; and
- to assess whether our plan was likely to meet Ofwat's tests for a 'high-quality plan'.

521. An initial, high level scope of work was developed by Mott MacDonald as the basis for the assurance work. It identified potential areas of challenge and recommended where strengthening of our investment case was required.[350]

5.5.9.2 Process assurance

522. The assurance approach took the form of a focused review of our investment plans including:

- the strategy that underpins proposed activities;
- the processes involved in categorising interventions; and
- the systems used to estimate costs.

523. Checks and balances were put in place to ensure consistency and confidence through strength of evidence.

5.5.9.3 Data table assurance

524. In developing our assurance process, we assessed the individual business plan data tables and identified whether they would be best assured through our technical assurer (Mott MacDonald) or our financial assurer (PwC). Where historic financial data was required, we used PwC to provide assurance. Where such financial assurance was not required, we have used Mott MacDonald to provide assurance.

525. Mott MacDonald's review of the data tables included confirmation that:

- historic data had been derived from appropriate sources;
- methodologies used to calculate and extract data are appropriate to the table and line guidance, and, if relevant, consistent with those used previously;
- forecasts had been appropriately developed using sound methodologies and assumptions; and
- key issues related to the data table had been adequately explained in the supporting commentary.[351]

526. Mott MacDonald's report of its findings confirmed that assurance could be given to the Business Plan. It presented its findings to our Board on 21 November 2013 and the Local Engagement Forum on 25 November 2013. Mott MacDonald's report concluded that "*the processes behind Bristol Water's PR14 Business Plan are reasonable*".[352]

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350 MM Assurance Report 2014 (SOC136).

351 MM Assurance Report 2014 (SOC136).

352 MM Assurance Report 2014 (SOC136).

527. Following Ofwat's assessment of our December 2013 Business Plan we further instructed Mott MacDonald to review the technical aspects and data contained within our revised Business Plan submitted in June 2014. Further, we arranged for Mott MacDonald to engage with the LEF to provide assurance on the high quality of the revised plan.

5.5.9.4 PwC Financial Assurance

528. PwC is our Financial Auditor, responsible for the audit of our Statutory and Regulatory Accounts, and has carried out agreed upon procedures in respect of certain financial tables for the PR14 submission as part of the Board's assurance programme.

529. The agreed upon procedures were to confirm that the financial data used can be reconciled with the underlying accounting records or other supporting documentation. PwC was tasked with a review of the financial data tables included in our Business Plan submission.

530. PwC provided a report to our Board and presented the results of the agreed upon procedures to our Board on 21 November 2013. As part of the preparation of the submission of our revised Business Plan in June 2014 we instructed PwC to review the plan and present on the factual findings to the Board on 18 June 2014.

5.5.9.5 Technical Assurance – Atkins

531. The PR14 assurance objectives assigned to Atkins were to review the overall Water Resources Management Plan with particular emphasis on the main components of:

- demand and supply forecasting;
- outage and headroom;
- climate change;
- resources/options appraisal;
- water efficiency/leakage/metering; and
- investment modelling.[353]

532. The specific objectives of the individual assurance elements were detailed within individual Notification of Audit forms. Atkins identified potential areas of challenge, particularly around compliance with the WRMP methodology and guidance, and recommended where strengthening of our investment case was required.[354]

533. Atkins' report of its findings confirmed that assurance could be given to the Business Plan.[355] Atkins' report concluded that:

> *"Overall we consider that the dWRMP as presented by Bristol Water represents a balanced, reasonable plan that has reasonably considered likely stakeholder requirements, and is generally suitable for consultation purposes".*[356]

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[353] Atkins dWRMP review (SOC283), p.1.

[354] Atkins dWRMP review (SOC283).

[355] Atkins dWRMP review (SOC283), p.8-9.

[356] Atkins, Water dWRMP Assurance Report 27 September 2013 **('Atkins dWRMP assurance Sept 2013')** (SOC336), p. 2.

5.5.9.6 Specific Peer Reviews

534. In addition to the technical assurance carried out by Mott MacDonald and Atkins, specific parts of our business planning processes were subject to external expert peer review. Details are provided in the following sub-sections.

5.5.9.6.1 Review of willingness to pay research

535. In the context of customer research into willingness to pay, our approach was favourably peer reviewed by Professor Susana Mourato of the London School of Economics (see **Section 6.5.5** below).[357]

5.5.9.6.2 Atkins review of SEAMS WiLCO model

536. At each stage of the development of the SEAMS WiLCO models[358] used to determine our investment plan a peer review was carried out by Atkins (see **Section 7.9** below). Ultimately, three reviews were provided, with the final review confirming that Atkins was satisfied with our approach and that any identified issues had been addressed.[359]

5.5.9.6.3 ICS review of business plan development approach

537. ICS provided further independent review ahead of the June Submission when it examined and challenged the entire approach to business planning at Bristol Water.

538. In its letter to our Board, ICS concluded:

> *"We believe that June 2014 business plan makes visible the well-structured, analytical framework and provides the clear evidence trail back to customers.*
>
> *The process of cost benefit analysis and development of the performance commitments is now transparent; and clearly shows how the plan aligns with what customers want."*[360]

539. ICS also carried out a review of Ofwat's serviceability assessment in DD14.[361]

5.5.10 Risk review

540. As detailed at **Section 3.2.3.5.2** above our corporate risk management framework has been developed to ensure effective identification of our top risks, facilitate regular reviews of our risks and provide a mechanism for regular risk reporting to our Board.

541. KPMG was engaged to review the effectiveness of the framework and make recommendations to align our approach with best practice, where this was beneficial to do so.

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[357] Professor Mourato is a recognised expert in the field of economic valuation and 'willingness to pay' methodologies, and her water industry experience includes PR09 peer review work.

[358] See December Company Wide Plan (SOC053) – Governance section p. 113-124; and June Company Wide Plan (SOC005) – Governance section p. 171-183 for details.

[359] Atkins Review of Bristol Water PR14 Model, Third Review (**'Atkins Wilco 3rd Review 2013'**) (SOC137).

[360] ICS letter to the board of Bristol Water on business plan advice and challenge **('ICS letter to Board 2014')** (SOC337), p. 1.

[361] ICS review of Bristol Water's Approach to Assessing Serviceability Status (**'ICS Report on Serviceability'**) (SOC268).

542. A key output from KPMG's work was to review the process for linking corporate risk with the internal control assurance programme. The review confirmed significant levels of sound practice, and also identified areas where the effectiveness of the framework to support business outcomes could be enhanced to add further value.

543. Following KPMG's review we instigated a work programme to facilitate KPMG's recommendations. The main areas of focus in the programme were:

- reviewing corporate risk exposure to ensure all major risks relevant to the business are considered;
- strengthening the link between risk and assurance to ensure the process focuses on key risk areas to achieve effective control of risk;
- building on our current level of risk appetite understanding to support decision making and planning. Links have been established between our corporate risks and our business outcomes; and
- developing risk understanding from the perspective of different stakeholders to achieve a balanced approach to mitigating risk.

5.5.11 Shareholder and Independent Non-Executive engagement

544. To ensure full oversight from our Board in the development of our Business Plan, as well as the regular PR14 updates provided at Board meetings and the formal board papers, we have held a number of Shareholder committee and Independent Non-Executive briefings. These took the form of formal presentations, detailed one-to-one meetings and technical explanations ahead of decision-making Board meetings.

545. These meetings covered:

- application of Willingness To Pay studies;
- customer research;
- cost data;
- capital Programme;
- wholesale/retail;
- financial modelling;
- incentives;
- WACC;
- totex; and
- cashflows.

546. Such meetings allowed the Board to challenge the thinking of the Executive team and served to provide assurance to the Board that the plan was being developed with customers' interests at its heart, and that the financial implications of the plan were acceptable to them. Additionally we had Independent Non-Executive representation at some full meetings of the LEF and at customer research sessions where it was possible for the process to be viewed.

5.6 Demonstrating that the business plan is high quality

547. At the meeting on 28 November 2013 the Board determined that in its opinion the Business Plan satisfied the test for high quality.[362] Following feedback from Ofwat in respect of our December 2013 Business Plan the Board revisited Ofwat's guidance to assess how each element of our submission could be strengthened. At the 18 June 2014 meeting the Board concluded that the revised Business Plan met the high-quality standard.[363]

548. Set out below in Table 35 is a summary of how the Board believes it has successfully demonstrated that the plan is of high quality and meets each element of Ofwat's guidance. Responses detailed in our December 2013 Assurance Statement are provided in black font and those from the June 2014 statement in blue font. This is reproduced from the Board Assurance Statement (June 2014).[364]

Table 35: Meeting Ofwat's high quality Plan definition

Ofwat guidance on a high quality business plan:	The Bristol Water Board responds saying: why these elements are present in the business plan
Is designed to deliver good outcomes for current and future customers and the environment	The Outcomes were the key output of the strategic direction given by the Board to produce the 25-year plan – "Water in the Future". Outcomes were developed internally and with our customer challenge group, the LEF. Outcomes were confirmed by customer research as the outcomes that customers want. Outcomes are the same in the revised plan but some are evidenced by internal KPIs - not performance commitments. This change occurred after taking external independent advice as the KPIs are a better fit for an internal style target e.g. the Best People Right Culture aims – Motivated and Skilled Workforce. This has been confirmed as consistent with the approach Ofwat expects in its early draft determinations.
Has a coherent narrative based on sound reasoning and contains proportionate evidence	The Board firmly believes this is the case. The Level one overview provides the overall narrative. Four individual Level two business plans provide further details on each key area: • Company wide • Wholesale • Retail Household • Retail Non-household Detailed supporting evidence is then provided in Level three appendices. More of the evidence from these documents has been introduced directly into level two documents. A new document has been produced and reviewed by the Board – the Business Plan Evolution - to ensure our narrative explains about the plan's evolution, its rationale and the golden thread running between

[362] For further details see Board Assurance PR14 December (SOC142).

[363] For further details see Board Assurance Statement June 2014 PR14 Business Plan (**'Board Assurance PR14 June'**) (SOC140).

[364] Board Assurance PR14 June (SOC140).

	the components in one accessible document.
Will ensure that a company meets its statutory obligations and enables the relevant regulators to confirm this in the CCG report	The regulators, the Environment Agency (EA) and the DWI, were part of the CCG/LEF process. Their views have been heard and taken into account as follows: EA • Assessment included within the LEF Report • EA has attended LEF sessions • BW has responded to direct questions from EA. • The EA's view on incentives has been made clear in the LEF report with the revised plan. DWI • Assessment included within the LEF Report • DWI has attended LEF sessions • DWI has provided letters of support and commendation for proposed Quality Programme. To address our statutory obligations, we commissioned an external analysis of the Water Industry Act 1991 from Burges Salmon solicitors, to confirm our obligations and we have assessed the plan's ability to allow us to meet our obligations. With the Water Act 2014 in force we obtained from Burges Salmon further advice on our obligations under that Act. We annex a note assessing the revised plan's ability to address these.
Is based on good-quality engagement with customers and consumers, and the results of this engagement are reflected in the proposed outcome commitments, and the plan more generally	The LEF report will cover oversight of and support for the engagement process. The Board has had regular updates throughout this process and Board members (including Independent non-executives) have attended LEF meetings and also customer research sub-committees. The outcome commitments were adjusted following stage 1 of the acceptability research. This will, we understand, be discussed within the LEF report. The outcomes in the business plan reflect the challenges from the LEF when they were developed. The Board notes that the final stage of acceptability research found that 92% of household and 97% of non-household customers found the plan to be acceptable. The changes with some outcomes becoming KPIs have all been discussed with and accepted by the LEF. Changes on performance commitments, bill profile and outcome delivery incentives have been researched with LEF oversight and are now reflected in our proposed outcomes.
Is cost efficient, containing accurate projections and estimates	The Board considers this test is met having reviewed the key building blocks for the business plan including, inter alia, the Capital Programme, WACC , Retail Margins, totex, incentives and cash flows. – Early engagement with our supply chain has enabled us to develop robust central Capital Programme cost estimates. – Cost effectiveness of programme has been driven by whole life costs using best industry practice with the Cross Asset Optimiser (SEAMS). – Efficiency of business plan will be enhanced in delivery and procurement – relationships developed in AMP5 will help to realise further efficiencies and innovation in AMP6. – Our AMP6 procurement and delivery plan is discussed in business plan (Wholesale cost interventions section). – Peer review process internally has challenged cost projections and estimates as part of the optioneering process. The Board has engaged the Reporter to provide an assurance process

	to assess the accuracy of projections and estimates for engineering schemes (The Reporter has briefed the Board and LEF). The Reporter was engaged to review the revised submission for the Board and to report to the LEF again. The Board has agreed to set more challenging efficiency targets in the revised plan now (at P^{33} rather than P^{50}). The Board has overseen the development of the cost exclusion cases following the review of the Ofwat cost model and its results. The modelling critique has been provided to both Ofwat and the Board.
Proposes a reasonable balance of risk and reward between customers, investors and other stakeholders, with efficient proposals to share 'pain and gain' with customers	The Board has had specific debates on Sharing and Incentives to allow this issue to be considered. The Risk and Reward section of the Company Wide Overview addresses the balance and these individual components: • WACC • Outcome Delivery Incentives • Pain/gain sharing 50-50 • Revenue Correction Mechanism. No Notified Items are being proposed. Revisions to the plan in light of Ofwat's guidance on risk and reward have resulted in revised ODIs with pain and gain sharing being proposed after consultation with our customers. These were reviewed at the June 18 board meeting. Board debates on WACC were held in earlier board meetings and again on 18 June 2014.
Is both affordable and financeable	Proposed increases in average bills are to be below inflation over the AMP and this, taken with our plan to increase the adoption of the support and social tariffs, will decrease the number of our customers in water poverty from 2.1% to 1.8%. Financeable – the Board has been through a detailed review of the Financial Modelling having been briefed on and determined all the key assumptions which are now the basis of the business plan. Affordability is expected to be further improved with the lower average bills in the revised plan. The Board has been briefed on the testing conducted with customers over bill profiles in AMP6 and AMP7. The Board has reviewed the financial scenarios based on the revised plan.
Comes with a high level of assurance – in the form of a statement from the company's whole Board that the plan is of high quality, will ensure that it meets its statutory obligations, and that estimates and data have been arrived at appropriately, and independently of other companies and competitors	Please see paragraph 8.2 of this statement. Some data relating to retail costs has been provided by BWBSL, our joint billing venture. BWBSL is jointly owned by Wessex Water and data may also have been supplied to them. However, our retail plans have been produced independently from those of Wessex Water. This document contains a new assurance statement supporting the revised plan.
Does not seek to game the regulatory process in any way	There is no clear definition of gaming but the Board believes it to refer to actions taken to take advantage of the regulatory structure in a way that could not be justified if specifically identified and challenged, a meaning supported by our Reporter. The Board confirms that there is no gaming of this nature in this plan. The LEF will report to Ofwat on this point and it has had detailed oversight on the customer research and scrutiny of the overall business plan. The Board has sought independent advice on WACC and efficiency, and has disclosed that material with its submission.

	The Board has had limited visibility of the Ofwat PR14 models, which ensures that the totex forecasts have been independently derived[365]. The Board can confirm that the changes to the plan in the revised plan are based on up-to-date evidence and risk assessment.

Source: Board Assurance Statement PR14[366]

5.7 Ofwat's assessment of Bristol Water's governance

549. Ofwat's assessment of our corporate governance resulted in the following classification against its criteria:

- Board assurance that the business plan is of a high quality: **Exceptional**;
- Board assurance statement supported by data and evidence from elsewhere in the plan – **More evidence required**; and
- extent to which the Board has given adequate assurance that its outcomes are consistent with relevant statutory requirements and licence obligations – **Exceptional**.

550. This resulted in Bristol Water being given an overall score of **Acceptable**. Each criteria and Ofwat's assessment will be discussed further below.

5.7.1 Board assurance that the business plan is of a high quality

551. In designating that we had achieved an Exceptional rating for this category Ofwat highlighted the following evidence:

- the Board Assurance Statement signed by all Board members. Further, the evidence provided which demonstrated that strategies had been agreed by the Board through engagement with a range of parties and stakeholders;
- the Board's statement that the plan is high quality, and evidence provided on how that view was reached;
- the Board's statement that it complies with the Code and that it engaged with external solicitors to review its compliance.[367]

5.7.2 Board assurance statement supported by data and evidence from elsewhere in the plan

552. Ofwat determined that the assurance provided about the quality of our plan was not fully supported by evidence from elsewhere in our plan. Ofwat concluded that a lack of persuasive evidence had been provided in relation to wholesale costs, specifically Cheddar Reservoir Two.[368]

553. We are not persuaded that this assessment is appropriate since we consider that the assessment of wholesale costs has been unduly impacted by the results of Ofwat's totex modelling, our concerns with which are set out in **Section 11** below.

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[365] Original text has been left for ease of reference but it is noted that the model was shared in 2014.

[366] Board Assurance PR14 June (SOC140).

[367] RBR Bristol Scorecard (SOC527).

[368] RBR Bristol Scorecard (SOC527).

5.7.3 Extent to which the Board has given adequate assurance that its outcomes are consistent with relevant statutory requirements and licence obligations

554. In designating Bristol Water as Exceptional for this category, Ofwat complimented the "*comprehensive and exceptional evidence*" that our Board was satisfied the Business Plan will meet our relevant obligations.[369] In particular Ofwat highlighted the following evidence:

- the Board explicitly stating that it has taken account of all relevant obligations;
- the Board Assurance Statement tabulates key WIA'91 duties and how outcomes meet these;
- the Board had commissioned a legal firm to confirm Bristol Water's obligations, specifically assessing the ability of the outcomes to allow the Board to meet its obligations; and
- the Board had commissioned another legal firm who concluded that Bristol Water had met all its licence obligations.

5.8 Ofwat's assessment of Bristol Water's assurance

555. On 30 July 2014 Ofwat sent letters[370] to nine companies expressing concerns regarding the level of assurance around their June Business Plans submissions. We did not receive one of those letters and therefore assumed that Ofwat had no concerns regarding the assurance of our business plan.

556. On 12 February 2015 Ofwat published IN15/01 setting out its assurance requirements for regulatory reporting during AMP6. Bristol Water was assigned to the 'targeted' category, along with all other companies with the exception of the two companies awarded 'enhanced' status at PR14, which were assigned as 'self-assurance' and Dee Valley Water, which was assigned as 'prescribed'.[371]

5.9 Conclusions on our approach to PR14

557. Bristol Water considers that it has fully embraced the letter and spirit of PR14 and Ofwat's associated principles and methodology. This has become properly embedded in the Company's culture, operations and strategy.

558. This allowed Bristol Water to follow a robust approach to the development of its Business Plan, that reflects the views and priorities of its customers and stakeholders, meets expectations regarding service levels and delivery, whilst challenging it to be evermore efficient. This is a view shared by the LEF:

> *"Bristol Water's plan is reasonable, begins from a position of strong performance, and clearly responds to customer opinion. It is relatively well supported by the detailed planning. Bristol Water has taken an exemplary approach to developing*

[369] RBR Bristol Scorecard (SOC527)

[370] Letter from S. Brown to Chief Executives - Concerns regarding quality of data and assurance (**'S. Brown letter - data and assurance'**) (SOC232).

[371] IN15/01 Future Company performance reporting and assurance February 2015 (**'IN15/01 Feb 15'**) (SOC401).

outcomes and integrating them into its high-level planning. It has achieved very high customer acceptability for its plan."[372]

559. Bristol Water has sought to meet the challenges from Ofwat to ensure that its plan has the right level of corporate governance and assurance to ensure it meets its customers' expectations. Ofwat's assessment that the plan is of high quality is proof that Ofwat believes Bristol Water has met this particular test.

560. Bristol Water's Business Plan was several years in its development, and its Board has overseen it carefully through every stage of the process. The Board has fully understood that Ofwat required it to be able to evidence its ownership and governance of the Business Plan. To this end, the Board developed a multi-tiered assurance approach and defined governance structure, in order to demonstrate the clear lines of challenges, reporting and sign-off to Ofwat. Bristol Water believes that Ofwat recognised the lengths its Board had gone to and accordingly awarded Exceptional status in respect of the two categories in its Risk-based Review - a status which no other company achieved.

[372] Andrew Heather, Technical Assurer, Mott MacDonald (advisor to the LEF on assurance): LEF Report to Ofwat on Bristol Water's 2015-2020 Business Plan, December 2013 (**'LEF Report to Ofwat Dec 2013'**) (SOC022).

6 How customers and stakeholders have shaped our plan

6.1 Executive Summary

6.1.1 Introduction

561. As explained in **Section 5** above, an important aspect of Bristol Water's approach to developing its Business Plan for PR14, as well as its longer-term strategies, was to engage with its customers and other stakeholders in order to develop outcomes to ensure that Britsol Water's Business Plan best reflects their preferences.

562. This Section explains in more detail Bristol Water's approach to customer engagement in the development of its PR14 Business Plan, and how it has embraced an outcomes-focused approach. It demonstrates how the development of Bristol Water's strategy and proposed outcomes have been driven by customer preferences and challenged by stakeholders to deliver the best possible package for customers, the environment and society. It also explains how performance against these outcomes will be assessed by reference to pre-defined measures.

6.1.2 Key Themes

563. This Section explains how Bristol Water enthusiastically adopted Ofwat's form of enhanced customer engagement for the PR14 Business Plan process, being the first company to set up its Customer Challenge Group (CCG), known as the Local Engagement Forum (LEF). The LEF proved to be an effective body in the challenge and oversight it provided to Bristol Water's customer research and how it incorporated the findings into the Business Plan.

564. Customer and stakeholder input was not limited to commenting on the acceptability of the plan, but was also used to guide its development through the identification of customer priorities which translated into Business Plan outcomes. With the LEF's oversight, customer engagement took place repeatedly throughout the planning process, meaning that the plan developed on an iterative basis, taking into account all the feedback received.

565. The following factors have contributed to a successful customer engagement process:

- Bristol Water engaged effectively with customers and other stakeholders to identify their service priorities, which were translated into outcomes and then into performance measures;
- Bristol Water carried out customer research to identify the areas where customers want it to improve service and by how much;
- the LEF played an active role in the process, both challenging and validating Bristol Water's approach to customer research and how it reflected customer priorities in the Business Plan, as well as helping to ensure that customer and stakeholder feedback played a meaningful role in shaping the Business Plan;

- Bristol Water took steps at an early stage to develop the service valuation framework as part of the process to assess willingness to pay (**WTP**), in order to understand what bill level and profile is acceptable to customers, and for this to inform the identification of the right interventions to deliver the outcomes;
- recognised industry experts were used to peer review the approach to WTP research and the use of the data;
- customer research was carried out in line with the standards contained in the Market Research Society Code of Conduct and was carried out with the oversight of the LEF;
- quantitative research was utilised to ensure that views obtained were robust and from a representative sample of the customer base;
- a two-stage approach to assessing acceptability of the Business Plan was taken to ensure it properly reflected customer feedback, and
- further efficiencies were included in the final version of the Business Plan to offer the same service levels required by customers for a below inflation price rise.

566. This comprehensive process of customer engagement was deemed acceptable by Ofwat in its Risk-based review (RBR).

567. Customers showed through the research that they do not want Bristol Water to take increased risks with the availability and quality of their water supply, and whilst they want our bills to remain affordable they have no desire for significant price reductions at the expense of reduced levels of service. Bristol Water's Business Plan has been crafted to deliver this level of safety and quality at an affordable price.

568. Consequently, with 92% acceptability, Bristol Water's Business Plan can be seen to have the overwhelming support of its customers. Bristol Water would like the final outcome of the PR14 process to remain faithful to those wishes wherever possible, particularly in respect of the level of bills and associated levels of service.

6.1.3 Structure of the Section

569. In particular, this Section provides:

- **LEF** - an introduction to the LEF, its members and its role (see **Section 6.2**);
- **overview of engagement** - an overview of the stages at which we sought customer and stakeholder views (see **Section 6.3**);
- **outcomes approach** - an introduction to the concept of an outcomes-focused approach (see **Section 6.4**);
- **developing outcomes and performance measures** - details of the approach Bristol Water took to the development of its proposed outcomes and the associated performance measures (see **Section 6.5**), including:
    - reflecting regulatory and statutory requirements (see **Section 6.5.1**);
    - customer research to understand priorities (see **Section 6.5.2**);
    - translating those priorities into outcomes and performance measures (see **Section 6.5.3**);
    - the interaction between the Business Plan and other long-term planning measures (see **Section 6.5.4**);

- the WTP research to inform the shaping of the plan (see **Section 6.5.5**);
- how customers were kept informed throughout the process (see **Section 6.5.6**); and
- the different phases of acceptability testing carried out with customers (see **Section 6.5.7**);

- **Ofwat's assessment** - Ofwat's views on Bristol Water's customer engagement and development of its outcomes (see **Section 6.6**); and
- **Conclusions** - conclusions on engagement, outcomes and performance measures (see **Section 6.7**).

6.2 Introducing the LEF

570. As explained in **Section 4.2.9** above, PR14 was intended to be a customer-focused price review.[373] As such, PR14 has seen a step change in companies' approach to customer engagement as part of the business planning cycle, including the introduction of the role of Customer Challenge Groups (**CCGs**).

571. We set up our CCG, known as the Local Engagement Forum or **LEF**, in January 2012. This enabled the LEF to play a full role in the development of our strategy throughout the process.

572. The overall purpose of the LEF was to aid and challenge us during the development of our Business Plan by ascertaining whether:

- our proposed outcomes reflect a sound understanding and reasonable balance of customer priorities;
- the phasing, scope and scale of activities articulated in the Business Plan is socially, economically and environmentally sustainable; and
- the plans constitute a good deal for customers.[374]

573. The LEF comprised members representing customers, local authorities, business representatives and environmental groups.[375] The Consumer Council for Water (**CCWater**), the Drinking Water Inspectorate (**DWI**), the Environment Agency (**EA**) and Natural England (**NE**) were also represented, providing expert opinion and oversight to key areas of our plan (see **Section 2.3** above).[376] A full list of participants is provided in Figure 28 below.

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[373] This was clearly signalled by Ofwat through its policy statements issued early in the process. See, for example: Involving customers in price setting - Ofwat's customer engagement policy statement August 2011 **('Ofwat's customer engagement policy statement August 2011')** (SOC065).

[374] Further details about the LEF and its role are set out in its terms of reference: Local Eengagement Forum Terms of Reference **('LEF Terms of Reference')** (SOC211). See also http://www.bristolwater.co.uk/about-us/strategic-objectives/planning-for-the-future-2015-20/local-engagement-forum/

[375] The LEF was required to ensure that Bristol Water had taken due account of the interests of all customers, including those who struggle to pay or are vulnerable or disadvantaged in some way, as well as those of the wider stakeholder base and the environment.

[376] In addition to discussion through the LEF, we also had a programme of direct engagement with the DWI in relation to our water quality scheme proposals, the EA in relation to our WRMP, and the EA and the NE in relation to the NEP.

Figure 28: List of organisations represented on the LEF

Organisations represented on the LEF			
Consumer Council for Water		Bath & North East Somerset Council	
Drinking Water Inspectorate		Bristol City Council	
Environment Agency		Mendip District Council	
Natural England		North Somerset Council	
Age UK		Sedgemoor Council	
Royal Society for the Protection of Birds		Federation of Small Businesses	
South West National Farmers Union		Business West	
Horticultural Trades Association		University of the West of England	
Bristol Citizens Advice Bureau			

Source: Bristol Water PR14 Business Plan Evolution[377]

574. The LEF is chaired by Charles Howeson, who was also the chair of CCWater's western region until 31 January 2015. John Savage, a prominent local businessman, served as Deputy Chair.

575. In order to review different aspects of our proposed business plan, three Sub-Committees of LEF members were formed:

- **Customer Survey Sub-Committee (CSSC)** - chaired by CCWater, this scrutinised the customer research material;
- **Water Resources Sub-Committee (WRSC)** - chaired by the EA, this scrutinised the supply and demand options in our WRMP; and

[377] PR14 June Business Plan, Business Plan Evolution **('June 2014 Business Plan Evolution')** (SOC021), p. 13.

- **Investment Programme Sub-Committee (IPSC)** - chaired by CCWater, this scrutinised the investment scheme proposals and cost estimates in our business plan.

576. We had regular meetings with our LEF throughout the PR14 process. The LEF and its sub-committees were given opportunities to review, discuss and challenge us on:

- our 25-year strategy as set out in our paper '*Water in the Future*'[378];
- customer research, including:
  - research identifying customers' priorities;
  - preferences for services and cost (also known as WTP);
  - acceptability of our proposed plans and incentives; and
  - issues identified by Ofwat's Risk-Based Review on bill profiles, performance targets and outcome delivery incentives (**ODIs**); [379]
- the framework of our plan, including:
  - our outcomes and measures of success;[380]
  - our proposals on penalties and rewards;[381] and
  - our approach to the non-household retail control in response to Ofwat's information note (IN14/14);[382]
- the technical details of our plan, including:
  - development and finalisation of our 2015-2020 investment programme;[383]
  - key schemes included in our plan, and the alternative solutions;[384]
  - the development of our Water Resources Management Plan;[385]and
  - our proposed cost of capital;[386]and
- the proposed level of customer bills in our plan and the associated drivers.[387]

577. A detailed overview of these meetings and what was discussed is provided in Table 36 below.

Table 36: Summary of LEF meetings

Date	Meeting	Key Agenda Items
24 January 2012	LEF	Introduction to Bristol Water[388]

[378] Bristol Water, Water in the Future 25 year strategy, December 2012 **('Bristol Water - Water in the Future 2012')** (SOC143).

[379] See **Section 6.5**.

[380] See **Section 6.5.3**.

[381] See **Section 14**.

[382] Ofwat IN14/14 2014 Price Review - non-household customer engagement ahead of draft determination representation August 2014 **('IN14/14 Non Household Customer Engagement Aug 14')** (SOC013).

[383] See **Sections 7**, **9** and **10.**

[384] See **Sections 9** and **10**.

[385] Water Resources Management Plan 2014 **('WRMP 2014')** (SOC039).

[386] See **Section 12**.

[387] See **Section 15.5.1**.

Date	Meeting	Key Agenda Items
8 February 2012	LEF	Overview of previous Bristol Water customer research[389]
23 February 2012	CSSC	Introduction to Blue Marble and research proposal on customer priorities research[390]
4 April 2012	CSSC	Qualitative results from Blue Marble on customer priorities[391] Discussion of draft questionnaire for quantitative research on customer priorities[392]
15 May 2012	LEF	Presentation by Blue Marble of results from Customer Priorities research[393] Customer preference for services and cost (WTP) research proposal[394] Overview of supply/demand balance[395] Introduction to Outcomes[396]
14 June 2012	CSSC	Development of questionnaire[397] and showcards[398] for Stage 1 WTP research
17 July 2012	LEF Outcomes Workshop	Development of Outcomes and Performance Measures[399]
4 September 2012	CSSC	Draft WTP results by NERA on stage 1 research[400]
11 September 2012	LEF	Presentation of Water in the Future – 25-year strategy[401] Draft WTP results by NERA on stage 1 research [402] Discussion on Measures of Success[403]
10 and 16 October 2012	WRSC	Presentation of Demand forecast[404], Supply forecast and headroom. [405]
23 October 2012	LEF	Update on Outcomes and Measures of Success[406] Summary of supply/demand balance[407] Water in the Future performance targets [408]

388 Local Engagement Forum First Meeting 24th Jan 2012 (SOC564).

389 Local Engagement Forum 8th February 2012 (SOC565).

390 PR14 Customer Engagement Foundation Stage: needs & expectations research Jan 2012 (SOC566).

391 Blue Marble qualitative report April 2012 (SOC403).

392 Bristol Water PR14 Customer Engagement domestic customer telephone survey questionnaire (SOC567).

393 Blue Marble quantitative report May 2012 (SOC404).

394 Local Engagement Forum Meeting 3 May 2012 **('LEF meeting May 2012')** (SOC568).

395 LEF Meeting May 2012 (SOC568).

396 LEF Meeting May 2012 (SOC568).

397 Bristol Water WTP draft domestic questionnaire (SOC569).

398 LEF draft Show Cards (SOC570).

399 LEF Outcomes workshop July 2012 (SOC571).

400 Insight, Bristol Water: Valuing Aspects of Service, Sept 2012 (SOC572).

401 Local Engagement Forum Meeting 3 May 2012 September 2012 **('LEF Meeting Sept 2012')** (SOC574).

402 Insight, Bristol Water: Valuing Aspects of Service – results, Sept 2012 (SOC573).

403 LEF Meeting Sept 2012 (SOC574).

404 Water resources sub committee demand forecast Oct 2012 (SOC618).

405 Water resources sub committee supply forecast Oct 2012 (SOC575).

406 Local Engagement Forum Meeting 3 Oct 2012 **('LEF Meeting Oct 2012')** (SOC576).

407 LEF Meeting Oct 2012 (SOC576).

408 LEF Meeting Oct 2012 (SOC576).

Date	Meeting	Key Agenda Items
26 October 2012	Teleconference EA, NE, RSPB	Sustainable Environmental Impact Performance Measures [409]
26 November 2012	CSSC	Final WTP results by NERA on stage 1 research[410] Stage 2 WTP research proposal[411]
8 January 2013	LEF	Update on Outcomes and Measures of Success [412] Presentation of final results from stage 1 WTP research[413] Feedback from Water in the Future consultation[414] Water quality investment schemes presented[415]
24 January 2013	CSSC	Approach to quantitative questionnaire for Stage 2 leakage WTP research[416] Review of health valuations performed by NERA[417] Review of Accent report on qualitative leakage focus groups [418]
21 February 2013	WRSC	Supply Demand scheme options appraisal for draft WRMP[419]
12 March 2013	LEF	Water in the Future update[420] Presentation of draft WRMP[421] Investment Programme development process[422]
30 April 2013	IPSC	Presentation and discussion on approach to the development of the PR14 investment programme [423]
7 May 2013	LEF	Update on Ofwat PR14 requirements[424] Introduction to Outcome Delivery Incentives[425] Acceptability Research proposal[426] Draft Business Plan Scenarios
16 May 2013	CSSC	Presentation by Blue Marble on approach to Acceptability Testing[427]
11 June 2013	CSSC	Presentation by NERA on stage 2 WTP research[428] Presentation by Blue Marble of stage 1 qualitative results of the Acceptability Research[429] Development of quantitative questionnaire[430] and showcards[431] for Stage 1 acceptability research

409 LEF conference call on sustainable environmental impact measure of success Oct 2012 (SOC577).

410 Insight economics, Bristol Water Willingness to Pay research Nov 2012 (SOC578).

411 Nera, memo to Mike King and [✂] – further WTP research requirements, Nov 2012 (SOC579).

412 Local Engagement Forum Meeting Jan 2013 **('LEF Meeting Jan 2013')** (SOC580)

413 LEF Meeting Jan 2013 (SOC580)

414 LEF Meeting Jan 2013 (SOC580)

415 LEF Meeting Jan 2013 (SOC580)

416 Nera, approach to quantitative stage 2 survey Jan 2013 (SOC581)

417 Nera, memo on health attribute valuations Jan 2013 (SOC582)

418 Water resource options qualitative research draft Jan 2013 (SOC583)

419 Water resources sub committee scheme options Feb 2013 (SOC584)

420 Local Engagement Forum Meeting March 2013 **('LEF Meeting March 2013')** (SOC585)

421 LEF Meeting March 2013 (SOC585)

422 LEF Meeting March 2013 (SOC585)

423 Investment Programme Sub-Committee April 2013 (SOC586)

424 Local Engagement Forum Meeting May 2013 **('LEF Meeting May 2013')** (SOC587)

425 LEF Meeting May 2013 (SOC587)

426 LEF Meeting May 2013 (SOC587)

427 Acceptability research – summary of decision (SOC589)

Date	Meeting	Key Agenda Items
18 June 2013	EA, RSPB, NE	Biodiversity performance measure meeting[432]
25 June 2013	LEF Committee Interim Report	Review of draft LEF Interim Report and agreement of next steps[433]
9 July 2013	IPSC	Presentation and discussion on PR14 Investment Programme development process[434]
18 July 2013	LEF	Final results of stage 2 WTP Research[435] Phase 1 Acceptability Research[436] Investment Programme Update[437] Biodiversity performance measure[438]
25 July 2013	IPSC	Presentation of the PR14 Preferred Investment Plan and changes due to customer engagement and research[439]
30 July 2013	CSSC	Development of quantitative questionnaire[440] and showcards[441] for stage 2 of the acceptability research
23 September 2013	LEF/Reporter	Review of Reporter's assurance brief for Bristol Water[442] Discussion and agreement of LEF's technical assurance requirements
8 October 2013	LEF	Cost of Capital[443] Response to consultation on dWRMP[444] Presentation by Blue Marble of topline stage 2 acceptability research results[445]
8 October 2013	LEF Incentives Workshop	Assignment of Incentives to performance measures[446] Financial incentives proposals[447]
22 October 2013	CSSC	Discussion on stimulus material for incentives customer research[448] Final stage 2 acceptability results[449]

428 Results from WTP research June 2013 (SOC590)

429 Blue marble business plan customer research June 2013 (SOC591)

430 Business Plan acceptability phase 1 final questionnaire June 2013 (SOC592)

431 LEF show cards final (SOC593)

432 Biodiversity measure of success July 2013 (SOC594)

433 LEF interim report to Ofwat (SOC595)

434 Investment programme sub committee July 2013 issued September (SOC596)

435 Local Engagement Forum Meeting July 2013 **('LEF Meeting July 2013')** (SOC598)

436 Blue Marble Acceptability Research Phase 1 July 2013 (SOC109)

437 LEF Meeting July 2013 (SOC598)

438 LEF Meeting July 2013 (SOC598)

439 LEF IPSC presentation 25th July 2013 (SOC311)

440 Phase 2 CAPI interviews final questionnaire (SOC601)

441 Phase 2 CAPI showcards (SOC602)

442 Bristol Water response to CCWater's questions on investment (SOC603)

443 Local Engagement Forum Meeting Oct 2013 **('LEF Meeting Oct 2013')** (SOC604)

444 LEF Meeting Oct 2013 (SOC604)

445 Business Plan Acceptability 2 Blue Marble Oct 2013 (SOC017)

446 Local Engagement Forum incentives workshop Oct 2013 **('LEF incentives Oct 2013')** (SOC606)

447 LEF incentives Oct 2013 (SOC606)

448 Blue marble, incentives and performance Nov 2013 (SOC607)

449 Blue Marble - Business Plan acceptability Phase 2 report final (SOC195)

Date	Meeting	Key Agenda Items
4 November 2013	LEF	Overview of business plan[450] Outstanding issues on investment areas[451] Update on incentives customer research[452] Peer reviews[453]
25 November 2013	LEF	Presentation of Board-approved business plan[454] Results of incentives customer research[455]
25 February 2014	LEF	Ofwat Risk and Reward Guidance[456] Revised incentives proposals[457]
13 May 2014	CSSC	Stimulus material to be used in customer research[458]
13 June 2014	LEF	Presentation on response to the Ofwat Risk-Based Review[459] Results of the customer research[460] Changes to the Plan incl WACC & Efficiency[461] Gap Analysis[462]
11 September 2014	LEF	Presentation on Ofwat's Draft Determination[463]
25 September 2014	CSSC	Bristol Water response to Ofwat's Draft Determination[464] Non-household customer engagement[465]
6 February 2015	LEF	Presentation of Ofwat's Final Determination [466] Update on Bristol Water Board meeting (held on 5 February 2015)[467]

Source: Bristol Water

578. The LEF was thorough in its challenge to our proposals at every step. This is demonstrated by a challenge log maintained by the LEF that documented all the challenges raised by the members, our response and whether the LEF considered this sufficient.[468] A total of 470 challenges were raised prior to the submission of the Business Plan in December 2013 and a further 55 between February and June 2014.

450 Local Engagement Forum Meeting Nov 2013 **('LEF Meeting Nov 2013')** (SOC608)

451 LEF Meeting Nov 2013 (SOC608)

452 LEF Meeting Nov 2013 (SOC608)

453 LEF Meeting Nov 2013 (SOC608)

454 LEF Meeting Nov 2013 (SOC608)

455 Blue Marble Rewards and Penalties research Nov 2013 (SOC186)

456 Local Engagement Forum Meeting Feb 2014 **('LEF meeting Feb 2014')** (SOC611)

457 LEF Meeting Feb 2014 (SOC611)

458 Blue marble, Business Plan workshop May 2014 (SOC612)

459 Local Engagement Forum Meeting June 2014 **('LEF Meeting June 2014')** (SOC613)

460 LEF Meeting June 2014 (SOC613)

461 LEF Meeting June 2014 (SOC613)

462 LEF Meeting June 2014 (SOC613)

463 Local Engagement Forum Meeting 11 Sept 2014 **('LEF meeting 2014')** (SOC614)

464 LEF Meeting 11 Sept 2014 (SOC614)

465 Local Engagement Forum Meeting 25 Sept 2014 (SOC615)

466 Local Engagement Forum Meeting Feb 2015 **('LEF Meeting Feb 2014')** (SOC616)

467 LEF Meeting Feb 2015 (SOC616)

468 LEF master challenge log 18/10/13, (SOC216), LEF challenge log Feb-June 2014 (SOC217).

579. Technical assurance of the scope and costs included within our plan was provided to the LEF by Mott MacDonald, who had carried out detailed audits of our plan (see **Section 5.5.10** above). The Reporter attended LEF meetings when invited by the LEF. He was asked to investigate and report back to the LEF on specific aspects of our plan that the LEF either wished to challenge or wanted to confirm through the assurance process. This provided the LEF with assurance that our proposals represented efficient levels of expenditure, and the most appropriate technical solutions.

580. The LEF produced an independent report,[469] providing assurance and opinion to Ofwat on its review and challenge of our Business Plan and 25-year strategy.[470] The LEF has subsequently produced supplementary reports on our business plan resubmission in June 2014[471] and on Ofwat's DD14.[472] Both of these indicated LEF's ongoing support for the business plan in terms of both performance commitments and bill impacts.

581. The LEF report on our December Submission concluded:

> *"The LEF considers that an appropriate balance has been achieved that meets the needs of customers and the environment over the next five years and in the longer term. From its reviews and challenges and the Company's response to these, the LEF unanimously supports Bristol Water's Business Plan and considers it represents a fair deal for customers."*[473]

582. The LEF report on our revised June Submission concluded:

> *"The LEF is pleased to note that the overall Plan continues to reflect an appropriate balance of the needs of customers and other stakeholders and now includes the potential for even lower bills."* [474]

6.3 Seeking out customer and stakeholder views

583. We have developed our Business Plan to deliver the outcomes chosen by our customers and we have carried out extensive engagement to understand these preferred outcomes and the most appropriate types of incentives. More than 3,000 household customers and 400 business (non-household) customers have directly contributed their views during this process.

584. To ensure this was robust and representative, at the outset of the process we identified the areas where we needed to engage and the timeline for engagement. Our approach was to obtain input from customers and stakeholders on our proposals at key stages in the

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469 LEF Report to Ofwat on Bristol Water's 2015-2020 Business Plan, December 2013 **('LEF Report to Ofwat Dec 2013')** (SOC022).

470 This was supplied to Ofwat on 2 December 2013 alongside the Business Plan.

471 LEF Report to Ofwat on Bristol Water's 2015-2020 Business Plan, June 2014 **('LEF Report to Ofwat June 2014')** (SOC023).

472 Bristol Water's Local Engagement Forum- Report on the Ofwat Draft Determination on Bristol Water's 2015-2020 Business Plan (October 2014) **('LEF Report to Ofwat Oct 14')** (SOC198).

473 LEF Report to OFwat Dec 13 (SOC022), p. 34.

474 LEF Report to OFwat June 14 (SOC023), p. 14.

process, as well as commissioning specific pieces of market research. These stages are demonstrated in Figure 29 below.

Figure 29: How Customer Engagement Shaped Our Plan

Source: Bristol Water June Business Plan Overview[475]

585. Customer views informed not only the Business Plan, but also our longer-term strategy as expressed in our 25-year plan 'Water in the Future'.[476]

586. We considered what the best approach was for conducting the market research to gather information about customer views. This could be qualitative, through discussion, or quantitative, where customers' views are captured in a survey. We also considered whether the research should be conducted online, by telephone or face-to-face.

587. Having liaised closely with the LEF, and in particular the CSSC, we concluded that where possible, the best approach would be quantitative surveys that are conducted face-to-face with the customer. Although there is an increased cost to this approach, we believe this provides the most rigorous results that can be used with confidence. We also used qualitative research to help develop the quantitative surveys.

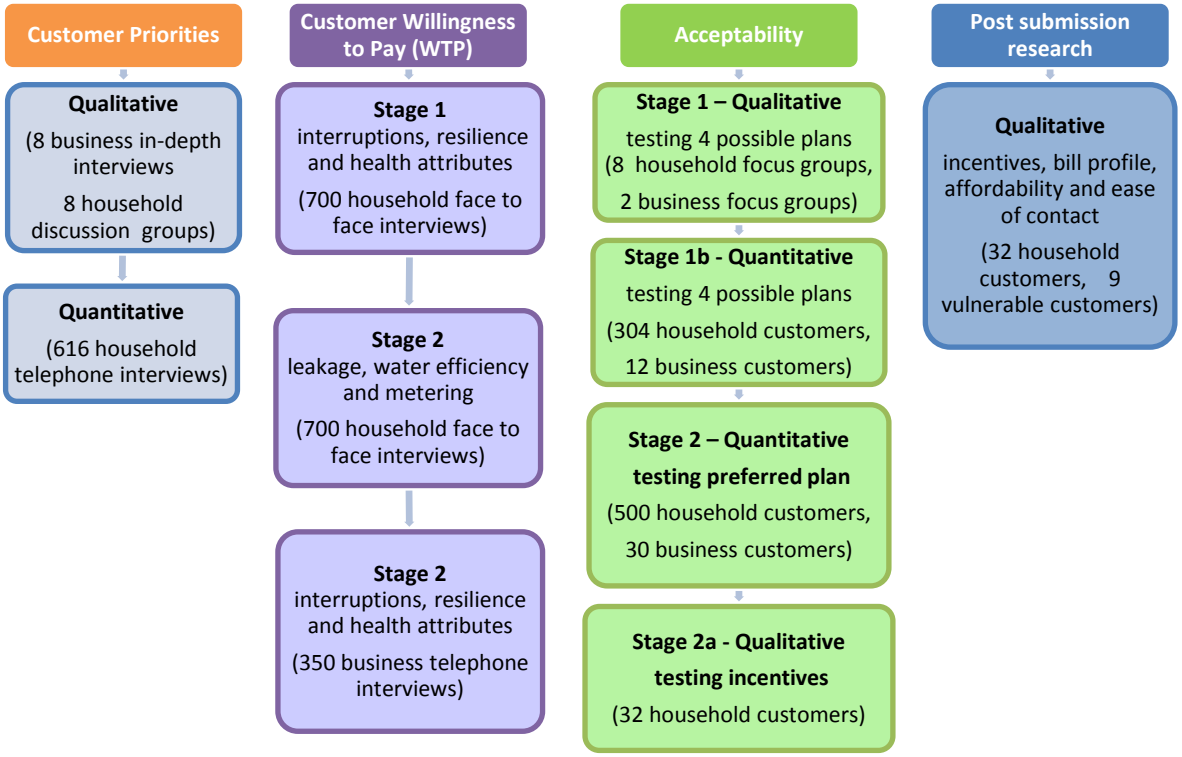
588. Overall we feel our approach to the market research has provided robust and representative views from quotas of customers that reflect our customer base. It has also allowed us to drill down into why customers have said what they've said, giving us valuable additional evidence in developing our plans.

[475] Bristol Water PR14 Business Plan overview June 2014 **('June Business Plan')** (SOC001), p. 11.

[476] Water in the Future 2012 (SOC 143).

589. Further details of the type of engagement carried out at each stage, including what it covered and the scale of the research, is set out in Figure 30 below.

Figure 30: Summary of PR14 Customer Research



Source: June Company Wide Plan[477]

6.4 An outcomes approach

590. Ofwat's move to outcome regulation was first signalled in 2011.[478] Ofwat produced a discussion paper which defined 'outcomes' as "the higher-level objectives that company actions, activities and achievements are intended to help deliver. They represent what customers and society really value".[479] Ofwat acknowledged in its paper that outcomes are "generally continuous, long-term requirements that do not necessarily fit into one price control period".[480]

591. The concept of the outcomes-based approach was developed further through the various consultations issued by Ofwat in relation to PR14 (see **Section 4.2** above).[481] Ofwat further developed and explained its approach to outcomes following the receipt of company

[477] Bristol Water PR14 Business Plan, Company Wide Plan, June 2014 **('June Company Wide Plan')** (SOC005), p. 39.

[478] Ofwat, Water Today, Water Tomorrow - Inputs, Outputs and Outcomes - what should price limits deliver? March 2011 **('Inputs, Outputs and Outcomes March 2011')** (SOC083). A form of outcomes-based regulation is also used in the electricity and gas industries, as part of the RIIO approach used by Ofgem. In those industries, the term 'outputs' is used to mean the same as Ofwat's 'outcomes'.

[479] Inputs, Outputs and Outcomes March 2011 (SOC083), p. 8.

[480] Inputs, Outputs and Outcomes March 2011 (SOC083), p. 8.

[481] See, in particular: Consultation on the Future Price Limits Framework Appendix 2 **('Future Price Limits Consultation, A2')** (SOC389).

Business Plans. Its Risk and Reward Guidance,[482] and draft determinations,[483] for instance, set out requirements for standardisation of certain outcome measures and incentives.

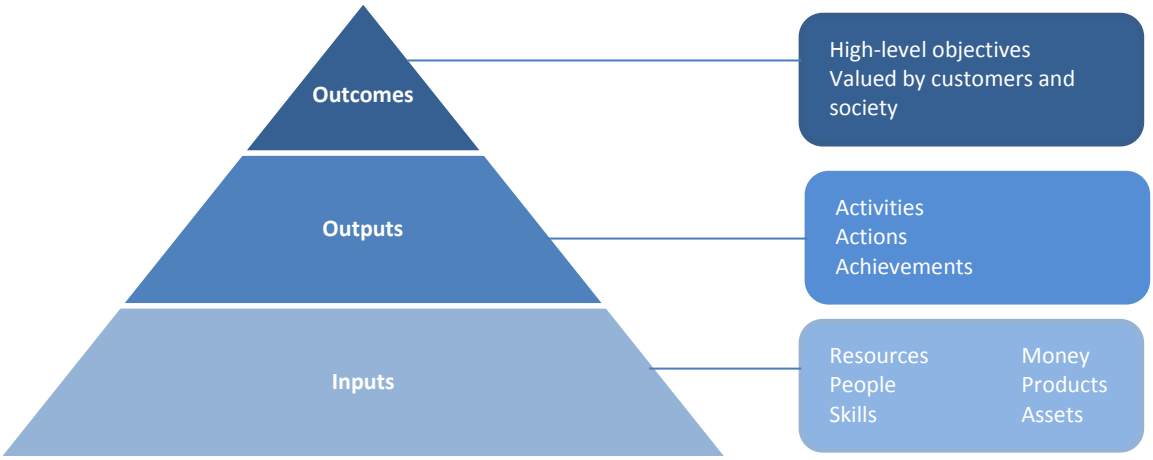
6.5 Development of Bristol Water's proposed outcomes

592. The regulatory framework for PR14 has given us the freedom to identify the outcomes our customers want, to decide how we should measure our performance against these outcomes, and to determine the delivery incentives we place upon ourselves.

593. As noted above, outcomes are achieved as a consequence of the expenditure of resources and effort, which can be identified through specific activities and actions, but not necessarily the delivery of specific schemes or projects.

594. Figure 4 below shows how we aim to make effective use of our available resources to deliver outputs which will enable us to achieve our outcomes.

Figure 31: Inputs, outputs and outcomes



Source: Bristol Water analysis

595. To inform this process, we began by encapsulating our vision,[484] which we then translated into six key aims, equivalent to Ofwat's 'sector objectives'.[485] For each of these aims, we developed a number of associated outcomes, delivery of which we considered would help us to meet our aims (see Figure 32 below).

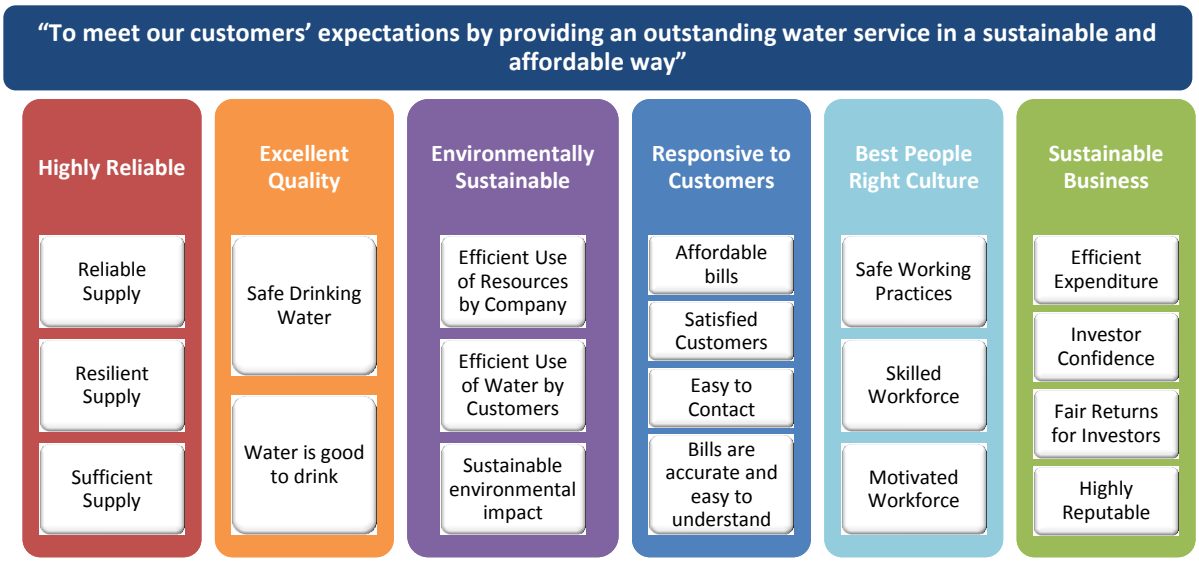
[482] Ofwat, Setting Price Controls for 2015-2020 - risk and reward guidance Jan 2014 **('Ofwat Risk and Reward Guidance Jan 2014')** (SOC079).

[483] Draft Determination chapter A2 - Outcomes **('DD - Outcomes')** (SOC330).

[484] Our vision was informed by the Customer Priorities research (see **Section 6.5.2** below). We also tested our original vision statement with customers: "*to **exceed** our customers' expectations by providing an outstanding water service in a sustainable and affordable way*". Customers told us we should be meeting their expectations but not aiming to exceed them. We therefore amended our Vision statement accordingly: "*to **meet** our customers' expectations by providing an outstanding water service in a sustainable and affordable way*".

[485] Ofwat, Future price limits - a consultation on the framework 2011 **('FPL - consultation on framework 2011')** (SOC059), p. 23 Table 1.

Figure 32: Bristol Water's Vision, Aims and Outcomes



Source: June Business Plan[486]

596. The outcomes we selected are driven by regulatory and statutory requirements, the results of our customer research and the needs of the Company or other stakeholders. Overall, outcomes must be consistent with government policy as well as legislation. Each of these factors, and how we have taken them into account, is considered in the following Sections.

6.5.1 Reflecting regulatory and statutory requirements

597. Defra's Strategic Policy Statement, published in November 2012 (see **Section 2.6** above) sets out the priorities for regulation of the water industry which the Government expects Ofwat to reflect in its decision making.

598. We consider that our plan is consistent with these strategic priorities. We embraced the spirit and letter of these priorities, as evidenced for example by our approach to outcome regulation and customer engagement.

599. The need to contribute to sustainability, both environmental and financial, and to develop resilience in accordance with the Resilience Duty and Sustainability Duty (see **Section 2.5** above), has been taken into account in the development of our outcomes, for example those on Sustainable Environmental Impact, Efficient Expenditure and Resilient Supply.

6.5.2 Understanding our customers' priorities

600. The first step in our customer engagement process (see Figure 29 in **Section 6.3** above) was the Customer Priorities research which took place in spring 2012.[487] This aim for this research was to identify the services customers want us to deliver and understand their relative importance.

[486] June Business Plan (SOC001), p. 13.

[487] Full details of this research are set out in our document: Customer Engagement - Approach and Methodology **('Customer Engagement Approach and Methodology')** (SOC077).

601. The research proposal was presented to the LEF on 23rd February 2012, and comprised two stages. The first was a qualitative stage of discussions with both household and non-household customers.[488] Results of the qualitative stage were presented to the CSSC on 4th April 2012. A quantitative stage followed, where household customers were asked to complete a questionnaire over the phone.[489] Results of all the Customer Priorities research were presented to the LEF on 15 May 2012[490] and highlights are included in Figure 33 below.

Figure 33: Customer Priorities qualitative research highlights

Household customer – priority highlights:

- their top priority is for us to ensure that **water is always 'on tap'** with no interruptions;
- they want us to **fix leaks now;**
- we should ensure bills do not rise above inflation, while **helping those who are struggling to pay**;
- we should **maintain water quality** and customer service and encourage metering/water efficiency; and
- we should also invest now to **maintain the supply** for the future.

Business customers – priority highlights:

- their priorities were similar to households with **leakage** identified as an area for improvement now;
- they also wanted improved **customer service** with a named contact, real-time billing and **tariff choices** (for large users); and
- that in the long-term, they were keen for advice on **water efficiency**, water recycling and on water scarcity/drought issues.

Source: Blue Marble qualitative research (SOC403) (emphasis added).

6.5.3 Translating priorities and aims into outcomes and performance measures

602. As part of the Customer Priorities research, household customers were asked to rank, in order of priority on a scale of 1 (not at all important) to 10 (very important) the 16 different areas of water service. We translated these priorites into outcomes as shown in Table 37 below.

Table 37: Mapping customer priorities to outcomes for customers

Level of importance	Mean Score (out of 10)	Service provided by Bristol Water	Outcomes for customers
1=	9.7	Making sure water is always 'on tap' with no interruptions	Reliable supply
			Resilient supply
			Satisfied customers
		Clear and clean appearance of water supplied	Safe drinking water

488 Blue Marble, PR14 Customer Engagement: Customer Needs and expectations research April **2012 ('Blue Marble qualitative research')** (SOC403).

489 Blue Marble, PR14 Customer Engagement: Customer Needs and expectations research May 2012 **('Blue Marble quantitative')** (SOC404).

490 LEF Briefing Paper – Outcomes (SOC405).

Level of importance	Mean Score (out of 10)	Service provided by Bristol Water	Outcomes for customers
			Water is good to drink
			Satisfied customers
3=	9.5	Reducing the amount of water that leaks from pipes	Efficient use of resources by company
		Taste of water supplied	Water is good to drink
			Satisfied customers
		Resolving problems quickly with no quibbles	Easy to contact
			Satisfied customers
6	9.4	Investing to ensure a reliable water supply in the future	Resilient supply
			Sufficient supply
7=	9.3	Trained and knowledgeable staff	Skilled workforce
			Safe working practices
		Bills that are clear and easy to understand	Bills are accurate and easy to understand
9	9.0	The Company is environmentally friendly	Sustainable environmental impact
10	8.8	Keeping disruption on roads to a minimum	Reliable supply
11	8.1	Helping me to use less water	Efficient use of resources by customers
12	8.0	Having a range of tariffs suitable for customers in different circumstances	Affordable bills
			Bills are accurate and easy to understand
13	7.2	Tell me about the benefits of metering	Efficient use of resources by customers
14	6.9	Avoiding hosepipe bans	Sufficient supply
15	6.7	Encouraging customers to have water meters	Efficient use of resources by customers
16	5.2	Paperless or online billing	Bills are accurate and easy to understand

Source: Bristol Water[491]

603. In addition to outcomes which reflect customer priorities, we have also included two aims, and associated outcomes, which are important to us as a company and to our non-customer stakeholders as key building blocks which we need to have in place in order to deliver levels of service consistent with our customers' expectations:

- Best People, Right Culture (staff, shareholders, regulators); and

[491] June Submission, Company Wide Plan, page 42 (SOC005)

- Sustainable Business (regulators, shareholders, other stakeholders).

604. The development of these non-customer facing outcomes and their associated performance measures have been owned by our Executive Team, supported by the Board (see **Section 5.5** above). The LEF agreed that for us to be a successful company, such outcomes were imperative to enable the delivery of the customer-facing outcomes.[492] Whilst these are additional to our customer-facing outcomes, we have opted to include them in our approach to outcomes, so that the development of our plan is as transparent as possible.

605. Having identified outcomes at a conceptual level, our next task was to develop that concept in more detail. To do this, we prepared fuller descriptions of what each high level outcome might look like in practice. This was discussed with the LEF in detail, including at an outcomes workshop in July 2012[493] with the LEF's feedback informing the agreed outcomes and terminology set out in Table 38 below. The LEF challenged us regarding these proposed performance measures, particularly around their definition.[494]

606. In order for us to monitor whether we are achieving our desired outcomes we need to have clearly identified performance measures for each outcome, against which our performance can be assessed.

607. We held a series of internal workshops with senior staff responsible for delivering each outcome, to discuss potential performance measures. These workshops identified a long list of potential performance measures and, for each outcome, a suite of internal KPIs that give a more rounded picture of our performance.

608. During this outcome development process, we participated in an industry-wide (**UKWIR**) research project for defining and incentivising outcomes and performance measures.[495] This project identified six criteria for testing proposed performance measures:

i. as closely related to the outcome as possible;
ii. measurable and verifiable;
iii. covering a large proportion of the outcome;
iv. easy to understand by stakeholders;
v. degree of water company controllability; and
vi. future-proof.

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492 LEF Briefing Paper (SOC405), Appendix B – LEF feedback.

493 LEF Outcomes Workshop 17th July 2012 (SOC200).

494 We held a workshop on the development of outcomes and performance measures with the LEF members on 17 July 2012. Further discussion on performance measures took place at the LEF meetings on 11 September 2012 and 23 October 2012. As an example, the LEF challenged us to reassess our performance measure of 'Meeting river basin objectives', which related to the sustainable environmental impact objective, with three separate measures: (1) Raw water quality of sources; (2) waste disposal compliance; and (3) Biodiversity Index. The environmental specialists within the LEF played an important role in influencing this particular change. The '% of customers in water poverty' performance measure was also developed with strong cooperation from the CAB member on the LEF.

495 UKWIR Defining and Incentivising Outcomes (SOC084).

609. We assessed the extent to which our potential performance measures met each of the six criteria.[496] Details of the performance measures proposed in our Business Plan are shown in Table 38 below.

Table 38: Aims, outcomes and performance measures

Aim	Outcome	Description	Performance Measure
Highly Reliable	Reliable supply	Ensuring the water supply is always available for our customers when they turn on the tap	Unplanned customer minutes lost (UCML)
			Asset reliability
	Resilient supply	Ensuring the water supply is able to cope with extreme events, for example as a result of flooding or malicious damage	Population at risk of asset failure
	Sufficient supply	Ensuring our customers can continue to use the water supply without restrictions such as hosepipe bans	Security of supply index
			Hosepipe ban frequency
Excellent Quality	Safe drinking water	Ensuring water is always safe to drink for our customers and complies with regulatory standards	Mean zonal compliance
	Water is good to drink	Ensuring the water is always good to drink for our customers	Negative water-quality contacts
Environmentally Sustainable	Efficient use of resources by company	Reducing the amount of power used in our water treatment and distribution processes, and reducing our level of leakage	Leakage
			Pumping efficiency
	Efficient use of water by customers	Supporting our customers to save water, through education, water efficiency devices and audits	Per capita consumption
			Meter penetration (household)
	Sustainable environmental impact	Managing our environmental impact more effectively	Total carbon emissions
			Raw water quality of sources
			Biodiversity index
			Waste disposal compliance
Responsive to customers	Affordable bills	Keeping bills as low as possible and price rises to a minimum for our customers	% customers in 'water poverty'
	Satisfied customers	Improving levels of customer satisfaction, ensuring any problems are resolved quickly and providing a value-for-money service for our customers	SIM
			General satisfaction from surveys
			Value for money
	Easy to contact	Ensuring our customers find it easy to contact and communicate with us	Ease of contact from surveys
	Bills are accurate and easy to understand (BW)	Producing bills that avoid any confusion for our customers	Negative billing contact
Best People Right Culture	Safe working practice	Making the safest working environment possible	No. accidents per 1,000 employees
	Skilled workforce	Ensuring our staff are trained to deliver the highest level of service possible for our customers	Training matrix compliance
	Motivated workforce	Ensuring our staff are motivated to deliver outstanding service to our customers	Staff satisfaction survey
Sustainable Business	Efficient expenditure	Managing efficiently the way we spend our customers' and our investors' money	Expenditure vs targets
	Investor confidence	Ensuring our investors believe we run a financially efficient company	Credit rating
	Fair returns to investors	Demonstrating that investing in our company provides a fair return on investment	Post-tax return on capital
	Highly reputable	Ensuring our customers and all of our other stakeholders recognise that we are a good company	Stakeholder survey

Source: Bristol Water[497]

[496] Bristol Water PR14 Business Plan, Company Wide Plan, June 2014 (SOC005), p. 28.

[497] June Company Wide Plan (SOC005), Table 21 p.71-72 and Table 22 p.73-74.

6.5.4 Interaction with other long-term planning initiatives

610. These aims and outcomes informed our draft 25-year strategy, as set out in our '*Water in the Future*' paper that was published for consultation on 10 December 2012. Details of that consultation are provided in Box 14 below.

Box 14: Water in the Future - consultation summary

'Water in the Future' set out the outcomes and performance measures developed from the Customer Priorities research with our aspirational targets for 2040. The full version of the strategy was distributed to stakeholders, including our LEF members, during December 2012 and January 2013. It was open for consultation until 31 January 2013.

We informed customers of the consultation through an article in the winter 2012 edition of our customer magazine *WaterTalk*. A four-page customer summary of the strategy was published which prompted 12 customers to request the full document. In addition we ran newspaper advertisements in mid-late January 2013 reminding customers of the opportunity to comment.

The formal responses from customers were largely positive on the aims and priorities of the 25-year strategy and the importance of safe, reliable drinking water. Customers had certain reservations around whether some of the proposed improvements are really needed, whether the balance is right between service to customers and environmental considerations, whether the focus should be on supply rather than demand, whether reducing leakage has environmental consequences, what impact metering may have on customers' bills in the long-run and what impact 'external' influences, i.e. European Union, Ofwat, Wessex Water and shareholders may have on this long-term strategy. Verbatim responses are contained in the Water in the Future feedback document.[498]

We also received positive endorsement from the EA. We discussed the consultation responses with the LEF on 8 January 2013. After considering all consultation responses, we felt there was no need to alter the long-term direction set out in the Water in the Future strategy.

Source: Bristol Water

611. The targets for performance in 2040 contained in Water in the Future are summarised in Table 43 in **Section 6.5.7** below.

6.5.5 Willingness to Pay research[499]

612. The second step in our PR14 customer engagement was designed to ensure we developed a business plan that aligns with customers' preferences on service levels and cost. To do this, we carried out WTP research in relation to both household and business customers.[500]

613. In order to assess WTP, we took the performance measures identified through the customer priorities research, and translated these into our valuation framework. The intention behind the WTP research is to identify customer values to populate that framework and enable the right package of interventions to be identified for customers.

614. This WTP research carried out between July 2012 and July 2013 established the value customers place on different levels of service for different aspects of their water service.[501] In particular, we obtained WTP values from both household and business

[498] Water in the Future feedback (SOC166).

[499] Further details on our approach to WTP research are provided in: Customer Engagement - Approach and Methodology Dec 2014 **('Customer Engagement Approach and Methogology Dec 2014')** (SOC077), p. 10-34.

[500] June Company Wide Plan (SOC005), p. 43-49; Customer Engagement Approach and Methogology Dec 2014 (SOC077) p. 10-34.

[501] Our WTP research, including our valuation plan and questionnaires, was developed taking into account industry guidelines and best practice, particularly as expressed in UKWIR 2011 WTP study (SOC181). This was published

customers on a number of different durations of unplanned interruptions and stoppages, as well as hosepipe bans, taste and odour issues, discolouration and low pressure.[502] We also asked household customers to value reducing leakage as an aim in its own right, over and above any other benefits that may be associated with leakage reduction such as the benefit to the environment from reduced requirements for abstraction. The results allowed us to calculate the best combination of interventions in an overall plan based on customers' preferred areas for investment.

615. Our WTP customer research was undertaken by the leading economic consultancy, NERA, with Accent as the field agents. There were two distinct stages to obtaining valuations as shown in Table 39.

Table 39: Stages of the customer preferences for services and cost (WTP) research

Survey	Audience Type	Completes	Method	Interview length	Fieldwork period
Water supply (Stage 1)[503]	Household	700	Quantitative: Face-to-Face[504]	30 mins	June – August 2012[505]
Water supply (Stage 2)[506]	Non-Household	350	Quantitative: Online	20 mins	Feb – Apr 2013[507]

following PR09 to build on lessons learnt during that process. We used the UKWIR study to inform the development of our WTP questionnaire to ensure that it met industry best practice.

502 We specifically asked customers to value different durations of unplanned interruptions in order to obtain actual valuations and avoid the need for extrapolating data.

503 NERA, PR14 Domestic Customer Stated Preference Survey A Report for Bristol Water (Dec 2012) (SOC182). Stage 1 covered household customers' WTP for seven attributes relating to interruptions (3-6 hours, 2-3 days, hosepipe/temporary use bans), resilience (2-3 week stoppage) and aesthetics (taste and odour, discolouration and low pressure). The LEF reviewed the Stage 1 research proposal on 15 May 2012.

504 The LEF CSSC helped to develop the questionnaire by providing comments on a draft version at a meeting on 14 June 2012. The final version was circulated by email for approval prior to cognitive testing. The CSSC were also updated with minor textual changes to the questionnaire as a result of the cognitive testing and updated on how the survey instrument was working after 100 pilot interviews.

505 Results from stage 1 were reviewed in detail by the CSSC on 4 September 2012 with a summary of the results being presented to the LEF on 11 September 2012. The CSSC met to discuss their comments on the draft report on 26 November 2012. The CSSC also reviewed the stage 2 research proposal and agreed with the methods for obtaining valuations on supply options (leakage and metering), health (lead, cryptosporidium and coliforms) and interruptions and resilience attributes.

506 NERA, PR14 Non-Domestic Customer Stated Preference Survey A Report for Bristol Water (June 2013) (SOC183). Stage 2 covered the same seven attributes but obtained valuations from non household customers. Stage 2 also obtained valuations from household customers for leakage, metering and water efficiency part of which involved holding four focus groups in order to aid designing a quantitative questionnaire that could be used to value leakage, metering and water efficiency. For Stage 2, an initial qualitative stage with focus groups would be used to establish customers' perceptions on water resource options (supply and demand). NERA used these views to develop two possible survey approaches. The CSSC reviewed the two options on 25th January 2013 and agreed option 2 should be used to develop the stage 2 quantitative survey.

507 As for the stage 1 research, the CSSC was kept informed with email updates on the questionnaires, cognitive interviews and pilots. As there were no major problems the group did not need to reconvene until the dissemination of results. The CSSC reviewed the results in detail on 11 June 2013 and a summary of the results was presented to the LEF on 18 July 2013.

Survey	Audience Type	Completes	Method	Interview length	Fieldwork period
Leakage, metering and water efficiency (Stage 2)[508]	Household	4 Focus groups 700	Qualitative: Focus groups Quantitative: Face-to-Face	1.5 hrs 20 mins	11-12 Dec 2012 May 2013

Source: Customer Engagement – Approach and Methodology[509]

616. The values obtained in the WTP research allowed us to identify which outcomes and performance measures are most important to customers, thus enabling us to prioritise our investment proposals by using customer WTP values in our optimisation modelling.[510]

617. Our optimisation modelling identifies a plan which delivers the most benefit for a given investment level, by assessing the value of customer benefit (in terms of their willingness to pay for a change in performance) against costs. There are a large number of interventions we can make, each of which can have a different impact on different aspects of service. For example, replacing old pipes may make interruptions less likely, whereas building a new reservoir may make restrictions in drought less likely. We use customer WTP values to calculate the least cost combination of interventions that deliver customers' preferences.

618. All values were aggregated across households and businesses to provide the value per event to customers.[511] We also used some publicly available valuations and took part in a cross industry study[512] to complete all the WTP values used to populate our service valuation framework which is set out in Table 40 below.

Table 40: Service Valuation Framework based on WTP research results

Service Area	Description	Value per event
Interruption < 3hours	Per property	£249
Interruption 3-6 hours	Per property	£263
Interruption 6-12 hours	Per property	£337
Interruption 12-24 hours	Per property	£359
Interruption 24-48 hours	Per property	£403
Interruptions for 48 hours to 1 week	Per property	£524
Interruption for > 1 week	Per property - per day affected	£80
Hosepipe ban	Per property - per day affected	£1
Taste and odour	Per incident at a property	£2,480
Discolouration	Per incident at a property	£1,425
Low pressure	Per incident at a property	£295
Leakage	Per Ml/d	£268,622
Metering	Per % meter penetration	£21,808

508 PR14 Stage 2 Domestic Customer stated preference survey. Regarding Leakage, Metering and Water Conservation Devices **('NERA domestic survey stage 2')** (SOC184).

509 Customer Engagement Approach and Methogology Dec 2014 (SOC077), p. 10.

510 Bristol Water PR14 Business Plan, Wholesale Plan June 2014 **('June Wholesale Plan')** (SOC002), cross asset optimisation, p. 67.

511 Appendix C of the PR14 Non-domestic customer-stated preference survey report by NERA (SOC183).

512 Accent Comparative Willingness To Pay report June 2014 **('Accent WTP report June 14')** (SOC406).

Service Area	Description	Value per event
Lead	Per property	£80
River quality - improved status by 1 category	Per km	£20,362
Freshwater habitats	Per hectare	£1,862
Forest habitats	Per hectare	£1,906
Natural and semi-natural grassland formations	Per hectare	£1,567
Biodiversity impacts (used to value biodiversity index)	Walking/informal recreation benefit per visit	£1.22
	Value of birdwatching/wildlife viewing per visit	£2.17
	Value of angling	£16.01
Pollution - Category 1 incident	Per incident	£2.935m
Pollution - Category 2 incident	Per incident	£0.425m
Health & Safety risk	Per incident	£0.696m

Source: Bristol Water

619. As part of NERA's process, two NERA experts, Dr Kenneth Train and Sarah Butler, who were not part of the project team provided internal peer review of the work.[513] Their focus was on approach and methodology. The internal peer review concluded:

- **stage 1 household survey:** the report uses state-of-the-art methods in an insightful way, and its conclusions are reasonable;[514]
- **stage 2 non-household survey**, the range created by the Choice Experiments and Contingent Valuation estimated was a useful way of characterising the sensitivity in the estimates and producing reliable ranges of WTP;[515] and
- **stage 2 household survey**, the closeness between the stage 1 and stage 2 results for the common attributes added extra credibility to the results.[516]

620. In addition we sought independent verification that our approach to obtaining WTP valuations, and the way in which we use them, was robust through an academic peer review. Professor Susana Mourato of the London School of Economics provided an independent peer review of our WTP research and the way we have applied it in the investment modelling. Overall, her conclusion was that:

> *"the research team has done a great job in designing well-structured, thought out and detailed choice experiment (CE) questionnaires, particularly in the light of the complexity of the multi-attribute valuation tasks in hand, and in analysing the data using appropriate econometric models. This is overall a very good study."*[517]

[513] Dr Kenneth Train, who is also Professor of Economics at the University of California in Berkeley (USA), provided feedback on the econometric modelling which NERA accounted for in its final models.

[514] NERA PR14 Domestic Customer Stated preference survey. A report for Bristol Water **('NERA domestic survey stage 1')** (SOC182), Appendix E.

[515] NERA PR14 Non-domestic customer stated preference survey. A report for Bristol Water **('NERA non-domestic survey')** (SOC183), Appendix D.

[516] PR14 Stage 2 Domestic Customer stated preference survey. Regarding Leakage, Metering and Water Conservation **Devices ('NERA domestic survey stage 2')** (SOC184), Appendix A.

[517] Prof Susana Mourato: Bristol Water Willingness to Pay Peer Review **('WTP peer review 2013')** (SOC138).

6.5.6 Keeping customers informed

621. We published our PR14 business plan on our website in December 2013.[518] As well as a two-page customer summary and a 36-page overview of the business plan, we produced two video animations summarising the key elements of the proposals with one focusing on the environmental improvements the business plan will deliver.[519]

622. As the PR14 process evolved, we have updated the website with our June Submission and our DDR. More recently the website has been updated with information relating to the referral to the CMA. We have also provided customers with updates on the business plan in the winter 2013, spring and winter 2014 issues of our customer magazine *WaterTalk*.[520]

6.5.7 Acceptability research

623. The third step in our PR14 engagement with customers focused on finding the right balance between service levels and bills. To make sure our business plan proposals would be acceptable to our customers we undertook a two-stage approach to acceptability research (June to November 2013) that evaluated how acceptable four different service and bill level packages were to customers. The results of stage 1 shaped what we included in our 'preferred plan'. Our preferred plan of service improvements with an inflation-only average bill rise underwent further testing with customers for acceptability. The results of that stage 2 testing was a plan that was acceptable to 92% of household customers.

624. Stage 1 of the acceptability testing involved both a qualitative and quantitative phase.[521] Eight focus group discussions with eight household customers in each were conducted in May 2013 and two group discussions and 12 in-depth interviews were held with non-household customers in June 2013. 304 household customers were then surveyed in June 2013 by face-to-face interviews in a hall test environment.

625. The four packages with different levels of service and progress towards our 'Water in the Future' targets which we developed for the stage 1 research are shown in Table 41. The package with the lowest level of investment delivered all statutory requirements plus a reduction in leakage while allowing service to deteriorate in other areas. This package resulted in a £12 reduction in average bills relative to inflation by 2020. Each subsequent plan included additional cost-beneficial interventions that delivered better service but also resulted in higher bills, with the highest level of investment leading to a bill increase of £12.

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518 www.bristolwater.co.uk/about-us/strategic-objectives/business-plan-2015-2020. On our website, we invite customers to send us their views on the business plan.

519 Videos available at www.youtube.com/watch?v=SxpmMYfGJOA, www.youtube.com/watch?v=Yb5843c97kI and via the Bristol Water website.

520 Winter 2013 (SOC172), spring 2014 (SOC173), winter 2014 (SOC174).

521 The research proposal was presented to the LEF on 7 May 2013.The CSSC reviewed the stimulus material for the qualitative research on 16 of May 2013 and for the quantitative research on 11 June 2013. The full results of the stage 1 acceptability research were presented to the LEF on 18 July 2013. The research also met CCWater's expectations for companies' acceptability testing of business plans (SOC185).

Table 41: Package Plans used in Acceptability Testing

SHOWBOARD 'C' – Plan Options				
	Purple	Brown	Blue	Orange
Impact on bill: average change by 2020	-£12 per year	£0	+£6 per year	+£12 per year
Protecting water supply sources (canals, rivers, reservoirs) from pollution	Minimal action quality of water sources could get worse ▼	Investment so quality of water sources does not get worse =	Investment so quality of water source does not get worse =	Investment so quality of water source does not get worse =
Maintenance: investment to ensure reliability of the system	Maintenance reduces by 45% ▼▼	Maintenance reduces by 16% ▼	Maintenance same as now =	Maintenance increases by 5% ▲
Balancing growing demand with supply: ensuring sufficient water available	Minimal Investment: increased risk of hosepipe bans & standpipes. Leaks: reduce by 6% ▼	Level of investment means risk of hosepipe bans & standpipes same as now Leaks: reduce by 12% =	Level of Investment means risk of hosepipe bans & standpipes same as now. Leaks: reduce by 13% =	Greater investment means reduced risk of hosepipe bans & standpipes. Leaks: reduce by 17% ▲
Improving 'back up' system: so households don't lose water supply during extreme events e.g. drought or flood	No action =	Reduce the number of households at risk ▲	Reduce the number of households at risk ▲	Reduce the number of households at risk ▲
Carbon dioxide emissions (from energy use)	Increase by 2% ▼	Reduce by 10% ▲	Reduce by 15% ▲	Reduce by 15% ▲

Source: Bristol Water PR14 Business Plan Evolution[522]

626. The first stage of the acceptability testing involved asking customers to tell us how acceptable four service packages with different investment and bill impacts were, and to identify which of the four they preferred - and why.[523]

627. The results of the research as shown in Figure 34 Summary of household customers acceptability – Four package showed that household customers liked the idea of a plan where bills remained in line with inflation (the Brown plan), but that they also wanted to see some improvements in service if the cost was not too high (the Blue plan).

628. It also showed that household customers were not looking for a reduction in their bills at the expense of poorer service or inadequate maintenance (the Purple plan) and that the Brown plan was more consistently acceptable to all groups of household customers

[522] June Business Plan Evolution (SOC021), p. 32-33.

[523] Details of the research are set out in: Customer Engagement Approach and Methogology Dec 2014 (SOC077) p. 35- 41.

including those who currently cannot afford their bill; those who are not satisfied with current service; and those who think water is currently poor value for money.

Figure 34 Summary of household customers acceptability – Four package

Package	Purple	Brown	Blue	Orange
Service improvements	Reduced service	Maintaining service	Slight increase in service	Increase in service
Bill impact by 2020 (excluding inflation)	-£12	£0	+£6	+£12
Acceptability	31%	74%	72%	57%
Preferred plan	12%	32%	34%	15%

Source: Blue Marble[524]

629. Business customers' views were similar to household customers with a majority accepting and also preferring the blue plan (see Figure 35)

Figure 35 Results of stage 1 acceptability research – business customers

	PURPLE -£12	BROWN £0	BLUE +£6	ORANGE +£12
Acceptability	✗	Most reject – but sig. minority accept ?	✓	Most accept – but minority reject ✓
Preference	✗	Most reject – but sig. minority prefer ?	✓	Significant minority prefer ?

Businesses selecting the brown plan:
- Are finding it more difficult economically
- Are unable to pass these costs on to their customers
- View Bristol Water as being more expensive in comparison to other suppliers (other business sites)
- Cannot see any direct benefit for the business from the blue or orange plan

Businesses selecting the blue plan:
- Are more likely to use water in a domestic setting
- Don't view the cost increases as being considerable

Businesses selecting the orange plan:
- Water is more likely to be **crucial** for the business
- Respondents have a better understanding of the importance of maintenance and investment

Source: Blue Marble[525]

630. Stage 2 of the acceptability research asked customers' views on the preferred plan.[526] The preferred plan was developed from the stage 1 acceptability results to reflect that the

[524] Blue Marble Research, Acceptability Research Phase 1, July 2013 **('Blue Marble Acceptability Research Phase 1 July 13')** (SOC109), slide 41.

[525] Blue Marble Acceptability Research Phase 1 July 13, (SOC109) slide 40.

Brown plan was consistently more acceptable across the entire customer base and to take account of customers' views on the importance of each investment area.

631. We included the following levels of service in our preferred plan to reflect customers' views on the importance of each investment area, obtained from the first stage of acceptability testing. The changes made are summarised in Table 42:

Table 42: Changes to Service Levels

Outcome	Customer Priority	Change to Service Level
Sufficient Supply	1st	We kept Brown/Blue plan timing for Cheddar Reservoir Two. We did not bring forward timing of Cheddar Reservoir Two as the improvement in the level of service (frequency of hosepipe ban restrictions) was not supported by customers.
Sustainable environmental impact	2nd	We kept Blue plan level of investment in protecting water sources and CO_2 reductions.
Efficient use of water by the Company	3rd	We kept Brown/Blue plan level of investment in leakage reduction.
Reliable Supply	4th	We kept Blue plan level of maintenance investment but sought lower cost through optimisation of schemes.
Resilient Supply	5th	We kept the Southern Resilience Scheme in plan but did not include additional resilience schemes.
Water is good to drink	9th	We reduced the level of trunk mains relining proposed for 2015 - 2020 to reflect lower priority of reducing the number of complaints about discoloured water.

Source: Bristol Water

632. The preferred plan included most of the Blue plan service levels with specific guidance coming from customers on the rate of construction of Cheddar Reservoir Two, the acceptable level of discoloured water complaints and maintenance. However, the preferred plan ensured that average bills did not increase above inflation (see Table 43).

633. This preferred plan used constraints within the investment modelling on affordability (bill level) and service identified from the stage 1 acceptability research findings. The preferred plan was £80m totex lower than an unconstrained plan that simply maintained cost benefit. A fully cost-beneficial plan would have contributed to the sufficient supply outcome and fewer discoloured water complaints, in addition to improvements in accordance with the resilient supply outcome.

[526] The CSSC reviewed the stimulus material for the stage 2 acceptability research on 30 July 2013. The high level results of the stage 2 acceptability research were presented to the LEF on 8 October 2013, with a detailed review by the CSSC on 22 October 2013 - Blue Marble, Bristol Water Phase 2 report final v2 (SOC195). The research also met CCWater's expectations for companies' acceptability testing of business plans including obtaining an uninformed response to the proposals: CC Water's expectations for companies' acceptability testing of Business Plans 2013 **('CCWater expectations for acceptability testing 2013')** (SOC185).

634. We also considered that the impact of inflation had not been well understood in the stage 1 acceptability research so specifically asked customers acceptability without and with the impact of inflation shown.

Table 43: Preferred plan used in stage 2 acceptability research

AIM	OUTCOMES	PERFORMANCE MEASURES	TARGET BY 2020	TARGET BY 2040
Highly Reliable	Reliable Supply	Unplanned interruptions – minutes per customer p.a.	12.2	<5 mins/property
		Asset Reliability	Stable	Maintain - Stable
	Resilient Supply	Population at risk from asset failure	9,000	Zero
	Sufficient Supply	Security of Supply Index	100	Maintain - 100
		Hosepipe ban frequency	1 in 15 years	1 in 25 years
Excellent Quality	Safe Drinking Water	Drinking Water Inspectorate Standards	99.96%	>99.99%
	Water is Good to Drink	Negative Water Quality contacts	2,221	<1,000 per year
Environmentally Sustainable	Efficient Use of Resources by Company	Leakage	16%	10%
		Pumping Efficiency	60%	65%
	Efficient Use of Resources by Customers	Average Per Capita Consumption	142 l/h/d	130 l/h/d
		Household Meter Penetration	66%	95%
	Sustainable Environmental Impact	Total Carbon Emissions	20kg per customer	5kg per customer
		Raw Water Quality of sources	Stable	Improve - stable
		Biodiversity Index	Improve	Improve
		Water Disposal Compliance	98%	>99%
Responsive to Customers	Affordable Bills	% Customers in Water Poverty	1.8%	1%
	Satisfied Customers	Ofwat's measure of customer service	Top 5	Top 5
		General satisfaction from surveys	>93%	>95%
		Value for Money	72%	>80%
	Easy to Contact	Ease of contact from surveys	>96.5%	>95%
	Bills are Accurate and Easy to Understand	Negative billing contacts	2,240	<1,300
Sustainable Business	Efficient Expenditure	Expenditure against targets	Continually improve efficiency	Continually improve efficiency
	Investor Confidence	Credit Rating	Baa1	Maintain
	Fair Returns to Investors	Post-tax return on capital	4.4%	Maintain
	Highly Reputable	Stakeholder survey	70%	Maintain

Source: Bristol Water June Business Plan[527]

[527] June Business Plan (SOC001), p. 34, as used in Acceptability Research Phase 2 Stimulus Materials.

635. We sought customers' views on the acceptability of the preferred plan at three points in stage 2 of our acceptability research:

- the first was to get an 'uninformed' acceptability rating after customers heard only a brief outline of our plan;
- the second was to get an 'informed' acceptability rating after customers heard more detail about how the plan would improve services; and
- the third was to get an 'overall' acceptability rating after customers heard how inflation, assumed to be 3.3% on average per year, would impact on their bills over the five years.

636. The findings of this research [528] showed that the level of acceptability was very high at all three points. For household customers, the level of uninformed acceptability was 93% and the level of informed acceptability was 98% with no customers saying the plan was unacceptable. The overall level of acceptability, after they had considered the impact of inflation, was 92%, with only 5% of customers saying the plan wasn't acceptable.

637. Of the 5% of households surveyed which didn't find the plan acceptable overall, the majority indicated that they didn't find it difficult to pay their bill and didn't worry about paying their bill currently. They were, however, concerned that prices would rise because of inflation.[529]

638. The results for business customers were similarly very high, with all of the businesses surveyed finding the plan acceptable when informed about the detail of the proposed plan and 28 out of 29 of them finding it acceptable after considering the impact of inflation.[530]

639. As part of the acceptability research on our business plan, we also conducted a deliberative workshop with customers on the incentives (rewards and penalties) we had developed around our Outcome Performance Commitments (see **Section 14** below).[531] We wanted our plan to include incentive proposals around the targets we set, to incentivise us to outperform and deliver improvements earlier to customers.

640. Generally customers rejected the idea that rewards should be funded through an increase in customer bills. Therefore, we considered the best approach was to submit a business plan in December 2013 that only proposed penalties and no rewards. This was strongly supported by our LEF.[532]

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528 Business Plan Acceptability research phase 2, Blue Marble Research, Oct 2013 **('Business Plan Acceptability 2 Blue Marble Oct 2013')** (SOC017), slide 10.

529 Business Plan Acceptability 2 Blue Marble Oct 2013 (SOC017), slide 42.

530 Business Plan Acceptability 2 Blue Marble Oct 2013 (SOC017), slide 10.

531 The LEF reviewed the research proposal on 8 October 2013. The CSSC helped to develop the stimulus material by providing comments on a draft at a meeting on 22 October 2013. A final version of the stimulus material was circulated to the CSSC prior to the workshop. The deliberative workshop was facilitated by Blue Marble Research Agency on 6 November 2013 with a member of the LEF observing. The results of the research were presented to the LEF on 25 November 2013: Blue Marble - Incentives and Performance Full Report November 2013 **('Blue Marble Rewards and Penalties research Nov 13')** (SOC186).

532 LEF Report to OFwat Dec 13 (SOC022), p. 18-19.

641. In January 2014, Ofwat issued further guidance to all companies on the level of risk and reward it wanted to see in companies' business plans.[533] In this Ofwat stated that companies should include Outcome Delivery Incentives within their proposals that reflected a return on regulated equity (RORE) of between +/-1% and +/-2%.

642. Following Ofwat's further guidance, we undertook a second phase of research on incentives in May 2014. The research was qualitative research based on two workshops (one for vulnerable customers, the other for a larger sample of 32 customers).[534] We used the results to inform the details of the business plan we resubmitted to Ofwat in June 2014. The issues considered are summarised in Table 44 below.

Table 44: Summary of Customer Research on Performance Commitments

Issue	Finding
How reasonable is Bristol Water's target for being easy to contact?	Customers identified that whilst the target was high they did not consider it to be appropriate to have a performance target below recent performance,[535] so we have increased the target for AMP6 to be above recent best performance. In addition, we applied this principle to the performance measure general satisfaction.
How do customers want to see their water charges (bill profiles) change over the longer term?	Customers preferred a flat bill profile[536] and we have reflected this within our plan by having a flat bill profile through AMP6 and AMP7.
How should Bristol Water apply rewards and penalties to its performance targets?	Although the principle of rewards was not supported by customers, there was lukewarm acceptance of the performance areas and the absolute bill impacts proposed.[537] Customers did think penalties should be larger than rewards and we have modified our incentives proposals to reflect this.[538]
How reasonable is Bristol Water's long-term target for reducing water poverty?	Whilst customers felt a challenging affordability target was appropriate, they were not prepared for the level to change from that included in our plan if it meant greater subsidies[539]. As we would need to carry out research in accordance with Defra's guidelines (July 2012) to increase the level of cross subsidy, we retained the target as in the original plan and will carry out additional research during AMP6.

Source: Bristol Water/Blue Marble Research

533 Ofwat Risk and Reward Guidance Jan 2014 (SOC079), p. 51.

534 Blue Marble, PR14 Customer Engagement: Customer Needs and expectations research May 2012 **('Blue Marble quantitative report May 12')** (SOC404), slide 2.

535 Blue Marble quantitative report May 12 (SOC404), slide 4.

536 Blue Marble quantitative report May 12 (SOC404), slide 6.

537 Blue Marble quantitative report May 12 (SOC404), slide 9.

538 Bristol Water PR14 Business Plan, Company Wide Plan, June 2014 **('June Company Wide Plan')** (SOC005), Incentives section, June 2014.

539 Blue Marble quantitative report May 12 (SOC404), slide 11.

6.6 Ofwat's views on Bristol Water's engagement, outcomes and performance measures

643. In April 2014, Ofwat published the results of its Risk-Based Review of our Business Plan (see **Section 4.3.1** above).[540] In the area of outcomes, Ofwat's tests on customer engagement and WTP evidence considered:

- to what extent has the company demonstrated an effective customer engagement process;
- to what extent has the company demonstrated effective engagement with wider consumer interests, including environmental interests, generally and through its CCG; and
- how far has the company demonstrated a robust approach to gathering WTP information and in mapping this to its outcomes, performance commitments, and Outcome Delivery Incentives.

644. Ofwat scored our business plan as 'acceptable' (grade B) for each of these three tests on customer engagement and WTP evidence. In its recommendation to Ofwat's Board on our business plan categorisation, Ofwat states:

> *"Bristol provided sufficient and convincing evidence of an effective customer engagement process, including the use of an extensive range of techniques to consult a comprehensive sample of customers and adherence to UKWIR best practice. The CCG demonstrated that it challenged the company and it was supportive of the company's overall engagement process.*
>
> *There is also sufficient and convincing evidence that Bristol used a robust approach to gathering WTP information and mapping this to its proposed outcomes performance commitment and outcome delivery incentives (ODIs), including significant use of its CCG and the completion of a number of independent peer reviews."*[541]

645. Ofwat's feedback[542] stated that our approach to outcomes was 'exceptional' (grade A) in relation to allocation of commitments to separate controls and consistency of assurance on statutory and licence obligations, and 'acceptable' (grade B) for consistency with methodology requirements and reasonable assumptions in relation to future obligations. Evidence of track record in relation to future delivery was marked as 'exceptional' (grade A) for retail outcomes but 'more evidence required' (grade C) for wholesale, and consistency with long-term customer interests was also marked as 'more evidence required'. Value for money, and measuring, recording and governance were marked as 'significantly more evidence required' (grade D).

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[540] 2014 price review risk-based review - recommendation to Ofwat's Board on Bristol Water's Business plan categorisation **('Risk-Based Review - Reccommendation to Ofwat on BW Business Plan')** (SOC007).

[541] Risk-Based Review - Reccommendation to Ofwat on BW Business Plan (SOC007).

[542] Element A Scorecard Wholesale Water, Bristol **('Element A Scorecard WSW')** (SOC324).

646. We addressed Ofwat's feedback on these measures through our gap analysis and amended our June 2014 Business Plan to provide further details and evidence of our proposals where necessary. [543]

647. In August 2014, Ofwat issued an information note on non-household customer engagement ahead of draft determination representations. [544] In this information note, Ofwat set out its expectations that:

- each company has engaged with its customer challenge group and ideally local non-household customer groups as well, on potential options to change the length or form of control;
- there is customer support for the structure of its proposed average revenue controls and associated default tariffs; and
- revenue levels appear acceptable to those customers.

648. We asked the LEF to respond to Ofwat's questions on behalf of non-household customers. The LEF took advice from its business representative and confirmed its support for a two-year Retail Price Control followed by a three-year Retail Price Control, on the basis of the retail market for non-household customers opening in April 2017. Additionally, the LEF indicated that it had no objections to our default tariff structure and that as we had already obtained the views of non-household customers on our Business Plan proposals,[545] it considered that no further testing in relation to bill levels was necessary.[546]

649. In FD14, Ofwat accepted all the outcomes and associated performance measures in our Business Plan. It did, however, amend the performance targets for two measures to align with what it considers to be industry upper quartile performance. Our concerns with this approach are discussed in more detail in **Section 14** above.

6.6.1 Comments on Ofwat's approach

650. We consider that Ofwat's acceptance of our proposed outcomes and performance measures confirms that we have created a framework for our Business Plan which properly reflects the expectations and priorities of our customers, as well as reflecting our statutory and regulatory requirements.

651. Given Ofwat's support for the customer engagement process we have followed, we find it disappointing that Ofwat has then chosen to be selective in the exent that it has taken account of our customers' preferences in reaching FD14. Customers have expressed a preference for the continuation of a safe and reliable supply of water at an affordable price, Ofwat's FD14 does not allow for that.

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543 Bristol Water June Business Plan Gap Analysis **('Gap Analysis')** (SOC327).

544 Ofwat IN14/14 2014 Price Review - non-household customer engagement ahead of draft determination representation August 2014 **('IN14/14 Non Household Customer Engagement Aug 14')** (SOC013).

545 Blue Marble Acceptability Research Phase 2 Oct 2013 (SOC017).

546 See LEF Report to Ofwat Oct 14 (SOC198).

6.7 Conclusions on engagement, outcomes and performance measures

652. Bristol Water strongly believes that the process it has followed has been a success for the following reasons:

- effective engagement was carried out with customers and other stakeholders to identify their service priorities, which were translated into outcomes and then into performance measures;
- customer research identified the areas where customers want Bristol Water to improve service and by how much;
- steps were taken at an early stage to develop the service valuation framework as part of the process to assess WTP, in order to understand what bill level and profile is acceptable to customers, and for this to inform the identification of the right interventions to deliver the outcomes;
- the approach to WTP research and the use of the data was positively peer reviewed by recognised industry experts;
- the LEF played an active role in the process, both challenging and validating Bristol Water's approach to customer research and how it reflected customer priorities in the Business Plan, as well as helping to ensure that customer and stakeholder feedback played a meaningful role in shaping the Business Plan;
- all research met the standards contained in the Market Research Society Code of Conduct and was carried out with the oversight of the LEF;
- quantitative research was used to ensure that views obtained were robust and from a representative sample of the customer base;
- Ofwat concluded that Bristol Water's approach to customer and stakeholder engagement was acceptable and accepted the proposed outcomes;
- there was a two-stage approach to assessing acceptability of the Business Plan to ensure it properly reflected customer feedback, and it was ultimately considered acceptable by 92% of household customers questioned and 28 out of 29 of non-household customers surveyed; and
- the further efficiencies included in the DDR offer the same service levels required by customers for a below inflation price rise and therefore would be expected to result in even greater acceptability.

653. As a result, Bristol Water's Business Plan is based on outcomes and performance measures that are consistent with:

- the guidance provided by Ofwat;
- the guidance from UKWIR;[547]
- the findings of customer research; and
- the needs of the business.

654. Working with the LEF has meant Bristol Water's customer research has been as robust as possible and the results have driven its proposals. The LEF provided a report to Ofwat in

[547] UKWIR Willingness To Pay Customer surveys Practioners Guide 2011 **('UKWIR practitioners guide 2011')** (SOC181).

December 2013[548] in which it confirmed that the Business Plan reflected a sound understanding and reasonable balance of different customer and stakeholder views and priorities as evidenced by its research.

655. The LEF supported Bristol Water's approach as shown by its representations to Ofwat on the Business Plan and DD14.

656. Implementing Ofwat's FD14 means customers will receive a lower bill at the expense of poorer service or inadequate maintenance. This is contrary to customers' views obtained through extensive engagement - engagement that Ofwat has acknowledged is acceptable. Ofwat's FD14 will, therefore, deliver a poorer outcome for customers.

657. The Consumer Duty (see **Section 2.5.1.1** above) requires Ofwat and the CMA to protect the interests of consumers. The comprehensive approach to customer engagement for PR14, and the role of the LEF, was intended to ensure that consumer interests are not just protected but are actually embedded within the fabric of Business Plans. Indeed, as explained above (see **Section 4.2.9**), Ofwat indicated at the outset of the process that it would apply less scrutiny to plans with strong customer support and effective CCG challenge. As such, Bristol Water considers that its Business Plan does protect consumer interests. By negating that protection through an FD14 that does not facilitate delivery of the plan supported by customers, Ofwat has acted inconsistently with the Consumer Duty.

658. For the reasons set out above, Bristol Water would like the CMA's redetermination to be based upon the outcomes and performance measures set out in the Business Plan and as accepted by Ofwat.

659. Bristol Water hopes that the CMA will take into account customers' views that a safe and reliable supply of water should not be put at undue risk through a significant reduction in bills leading to reduced levels of service, and will satisfy the Consumer Duty by ensuring that consumers' interests, as expressed through their support for the Business Plan, are protected in the CMA's redetermination.

[548] LEF Report to Ofwat Dec 2013 (SOC022).

7 Translating customer-led outcomes into our plan and our approach to assessment of totex

7.1 Executive Summary

7.1.1 Introduction

660. This Section explains Bristol Water's approach to intervention planning in the context of PR14, and demonstrates how it has embraced Ofwat's totex focus. In this context, the term 'intervention' is used to refer to any activity Bristol Water may undertake to maintain service to its customers, be it classified as operating or capital expenditure. This Section also sets out Bristol Water's approach to the identification of costs, and the application of an efficiency challenge.

661. By detailing the methodology and approach used by Bristol Water to translate the outcomes identified through customer and stakeholder engagement (see **Section 6**) into its PR14 Business Plan, this Section will demonstrate that the process followed by Bristol Water in assessing the scope of the proposed plan, identifying the associated costs, and applying an efficiency challenge is robust and consistent with good industry practice.

662. Details of how this approach was applied in practice, and the wholesale programme that was developed as a result, are provided in **Sections 9** and **10** below, dealing with the base totex and enhancement programmes in turn.

7.1.2 Key themes

663. A key feature of the PR14 methodology was the move to a totex approach to cost assessment, cost recovery and performance incentives to encourage companies to choose the right investment solutions to drive benefits for their customers (see **Section 4** above). It was considered that this would help to address the perceived capex bias, allow for more targeted incentives, and encourage greater flexibility in business planning. This Section is focused on the impact of a totex approach to schemes and intervention planning, and how this has been embraced by Bristol Water.

664. Bristol Water's approach to translating outcomes into a package of interventions, which is described in detail in this Section, is consistent with both Ofwat's PR14 methodology and industry good practice. Bristol Water considers that a totex approach to schemes and intervention planning, in order to develop an intervention programme that will deliver the outcomes identified in line with customer priorities, requires the consideration of multiple options with both a capex and opex focus that are assessed on a whole life cost basis. Bristol Water's overall approach to the development of the Business Plan has been reviewed by ICS.[549] CH2M Hill's review of Bristol Water's approach to capital maintenance identification covered all aspects of its intervention planning approach.[550]

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[549] ICS letter to the board of Bristol Water on business plan advice and challenge 2014 ('**ICS letter to Board 2014**') (SOC337).

[550] CH2M Hill - Capital Maintenance Review 29 August 2014 ('**CH2M Hill CM Review Aug 2014**') (SOC096).

665. Interventions have been selected using an asset-driven risk-based response to delivering the outcomes as reflected in the performance commitments.

666. These interventions have been identified with input from the design consultants and contractors in Bristol Water's supply chain, and tested through optioneering to identify the optimum solutions. This includes benchmarking by reference to solutions used by other companies and cost-benefit analysis.

667. Optimisation techniques have been used to determine the optimal combination of interventions to deliver the outcomes at the lowest possible cost. This included the development of SEAMS WiLCO[551] models, and the use of a 'Cross Asset Optimiser' (**CAO**) tool utilising customers' willingness to pay assessments. The approach to optimisation has been peer reviewed by Atkins.[552] Atkins also peer reviewed the deterioration modelling that informed Bristol Water's maintenance need case[553] and the development of the WRMP.[554]

668. Customer testing of different service packages identified customers' preferences for particular aspects of service, enabling Bristol Water to adapt its plan in response, resulting in a Business Plan shaped by customers. This was deemed acceptable by 92% of households surveyed.

669. Bristol Water's costs have been calculated by reference to historic data as well as input from supply chain consultants and contractors, and benefit from the 'business as usual' benchmarking carried out by Bristol Water as a matter of course. Solutions have been costed on a 'Whole-Life Cost' (**WLC**) basis to enable effective and realistic comparison of all options, whether opex or capex focused. Bristol Water has utilised scheme specific benchmarking and independent assessment by Mott MacDonald and ChandlerKBS (**CKBS**) of its cost estimating procedures to inform relative efficiency and efficiency challenges have been applied accordingly. The level of efficiency challenge has also been sense checked by Oxera (opex efficiency catch-up rate)[555] and First Economics (opex continuing efficiency),[556] as well as through comparison with historic levels of expenditure.

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551 WiLCO is the modelling platform developed by SEAMS Ltd to provide software solutions for intelligent asset planning. WiLCO powers a family of software products that organise, inform, and communicate decision-making for infrastructure company, and infrastructure project, stakeholders. Bristol Water was familiar with SEAMS through its involvement in national projects, and had spoken to other companies who are successfully using the WiLCO suite prior to deciding to use it.

552 Atkins SEAMS model reviews (Atkins Review of Bristol Water PR14 Model, Initial Review March 2013 ('**Atkins Wilco 1st Review March 13**') (SOC344); Atkins Review of Bristol Water PR14 Model, Second Review May 2013 ('**Atkins Wilco 2nd Review May 13**') (SOC345); Atkins Review of Bristol Water PR14 Model, Third Review August 2013 ('**Atkins Wilco 3rd Review August 2013**') (SOC137).

553 See **Section 9.4.**

554 Atkins review of Bristol Water dWRMP **('Atkins dWRMP review')** (SOC283), Atkins FWRMP/SEAMS assurance report Oct 2014 ('Atkins FWRMP/SEAMS review Oct 2014') (SDB model) (SOC202).

555 Oxera, Bristol Water's Relative Operating expenditure efficiency for wholesale water services, ('**Oxera Opex efficiency wholesale Report November 2013**') (SOC015).

556 First Economics, Water Input Price Inflation and Frontier Productivity Growth, A report for Bristol Water August 2013 ('**First Economics Report August 2013**') SOC014.

670. The overall approach to intervention planning has been assured by Mott MacDonald.[557]

671. This Section demonstrates that Bristol Water's approach to determining the scope and cost of the activities contained in the Business Plan is appropriately robust, subject to a sufficient level of external scrutiny and challenge, and is consistent with good industry practice. As such, we would like the CMA to be confident that Bristol Water's wholesale programme, as detailed in **Sections 9** and **10**, represents the most appropriate and lowest whole life cost solutions to deliver the outcomes customers require.

7.1.3 Structure of the Section

672. This Section is structured as follows:

- **what is totex** - what is meant by the term 'totex' (see **Section 7.2**);
- **role of totex in PR14** - how totex was intended by Ofwat to be used in the context of PR14, with a particular focus on its impact on intervention planning (see **Section 7.3**);
- **Bristol Water's approach to planning** - Bristol Water's general approach to intervention planning and how it incorporates a totex approach (see **Section 7.4**);
- **identifying need** - how Bristol Water identifies the need for an intervention (see **Section 7.5**);
- **identifying solutions** - how Bristol Water identifies the most effective solutions to meet those needs (see **Section 7.6**);
- **optimisation** - how Bristol Water identifies the optimal package of interventions using cost benefit analysis and optimisation tools (see **Section 7.7**);
- **costing** - how Bristol Water approaches the costing of potential interventions to ensure estimates are relevant and based on efficient base costs, including the use of benchmarking (see **Section 7.8**);
- **benchmarking and assurance** - an overview of benchmarking and assurance of our approach to planning (see **Section 7.9**)
- **comparison of approaches** - a brief comparison of Bristol Water's approach to totex assessment with that used by Ofwat (see **Section 7.10**); and
- **conclusions** - conclusions on why Bristol Water's approach can be accepted as consistent with industry good practice and Ofwat methodology (see **Section 7.11**).

7.2 What is totex?

673. 'Totex', or total expenditure, is the sum of all costs associated with a company or a range of its activities, regardless of how those costs are treated in financial terms. As such it is a combination of operating expenditure (**opex**) and capital expenditure (**capex**). A focus on

[557] Mott MacDonald provides technical assurance to Bristol Water under a Reporter contract. As part of those activities, it looked at the means by which we identified need, our approach to optioneering in order to identify the most appropriate options to include within the optimisation of our plan, our approach to deterioration modelling, the optimisation of our plan, and specific schemes and their cost (Mott MacDonald PR14 Technical Assurance Report October 2014 ('**MM Assurance Report 2014**') (SOC136)).

totex, rather than its individual components, provides a balanced view of expenditure that helps focus on delivering service to customers in the most cost-effective way.

674. A totex approach views all expenditure equally over a period and allows companies to recover costs in more flexible ways. The totex approach is often described as one which encourages a wider choice of solutions to problems, with operational remedies being given full consideration. It requires early opex interventions to be considered as part of the evaluation of options in a coherent and systematic way. Indeed, one of the drivers behind the move towards totex was to address the perceived capex bias that some considered inherent within past regulatory mechanisms and price controls.[558]

675. One way in which a totex approach can be reflected in intervention planning is to assess 'Whole-Life Cost' (**WLC**) as a method to determine the most appropriate option from a range of potential solutions.[559] This approach compares the overall costs of each alternative in terms of cash flow, normally using net present values of each future cost for a defined planning horizon (e.g. 25 or 40 years). In this way interventions with immediate expenditure requirements, such as capex projects, can be compared with those that spread costs over a longer period, such as operational solutions that are recurrent in nature, as well as provide a comparison between assets with different useful lives. This type of analysis is not particularly concerned with when expenditure occurs, but rather with what is the most effective cost solution to a service issue considered over the whole life of the solution. This means that WLC is consistent with a longer-term strategic approach to the sustainable and cost-effective delivery of outcomes.[560]

7.3 Ofwat's approach to totex for PR14

676. As explained in **Section 4.2.4** above, Ofwat has utilised totex in three main ways for PR14:

- **cost assessment** – the approach to the identification of the right schemes and interventions and the associated costs;

[558] Capex schemes increase the regulatory capital value (**RCV**). The approach at PR09, which had an emphasis on the role of the RCV, is considered to have had the potential to encourage capex solutions at the expense of alternative opex solutions, an effect increased by the drive for opex efficiency. A capex bias can be an issue given that capex solutions are sometimes perceived to address the symptoms of problems rather than the causes. For instance, a polluted raw water source might commonly be tackled through introducing extra stages of treatment but could be controlled through better catchment management and cooperation with landowners and others discharging to the source water. At the same time, however, it must be remembered that some operational interventions will be ongoing in nature, and may need to be repeated beyond the five-year price control period being considered. Stopping the activity at any point may lead to the problem recurring. Associated costs should not, therefore, be overlooked and the relevant risks must be taken into account. This can be achieved through the use of whole life costing.

[559] 'Whole-Life Cost' (**WLC**) refers to the total cost of owning an asset over its entire life. WLC includes all costs such as design and build costs, operating costs, associated financing costs, depreciation and disposal costs. WLC also takes into account other costs that are usually overlooked, including environmental impact and social costs. WLC aims to identify the lowest-cost long-term solutions with no capex or opex bias and full reference to intergenerational bias.

[560] There is, therefore, a potential conflict between an approach based on WLC which looks at the long-term picture, and the setting of totex limits over a shorter five-year price control period.

- **cost recovery** – the split between expenditure that is recovered through revenue, and that which is attributed to the Regulatory Capital Value (**RCV**), as achieved through the setting of a 'Pay as you go' (**PAYG**) ratio; and
- **cost incentivisation** – looking at the incentives to outperform during the period from a totex perspective.

677. Cost recovery and the use of PAYG are considered in more detail in **Section 17.5** below. Cost incentivisation is considered in **Section 14** below. This Section is focused on the impact of totex on cost assessment, primarily in the context of intervention planning. As the remainder of this Section sets out, Bristol Water has adopted an intervention planning approach that reflects the totex focus through our use of whole life costing and is, therefore, consistent with Ofwat's methodology and expectations for PR14.

678. Other important aspects of Ofwat's totex approach to cost assessment, and in particular its use of econometric models to assess the appropriate level of totex for Bristol Water within AMP6, are considered in **Section 11** below.

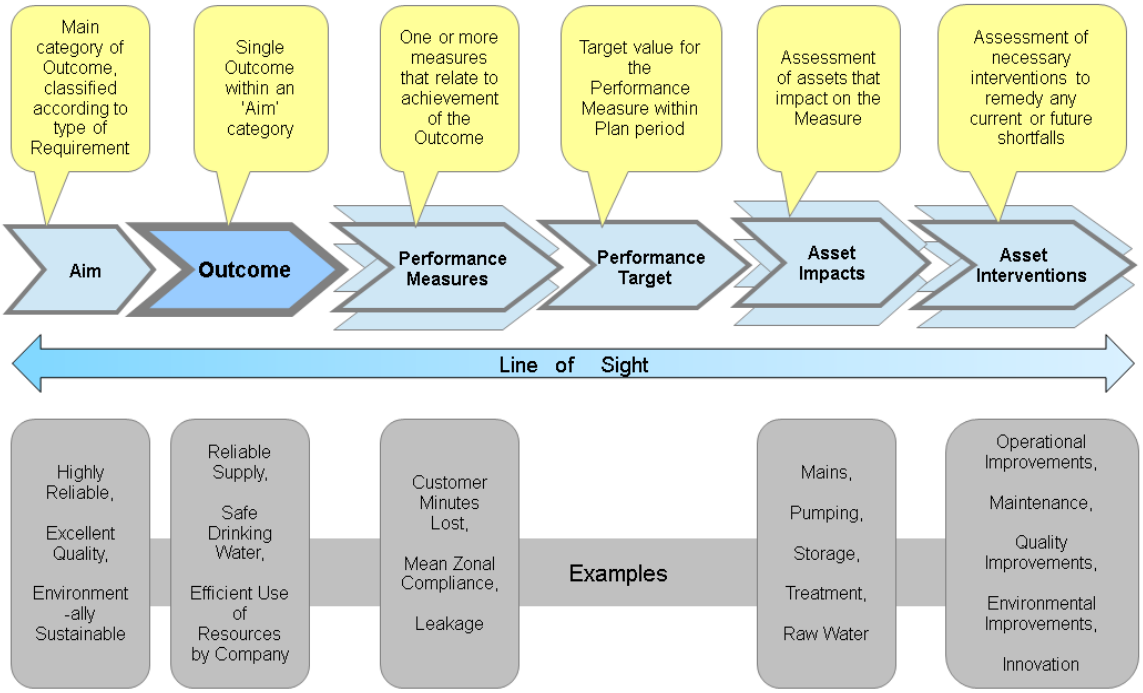
7.4 Bristol Water's approach to totex-focused intervention planning

679. The way in which Bristol Water has adapted to the new totex environment is to look at interventions on their merits regardless of accounting treatment. We have aimed to reconcile operational and capital expenditure into a more holistic approach. Therefore, moving to a totex approach has not been just about combining the operating and capital costs more effectively in our analyses but has required us to review the way we identify, forecast, control and implement all interventions. It will impact how we deliver economic levels of service to customers from AMP6 onwards. Our overall approach to totex-focused intervention planning was outlined in the June Wholesale Plan.[561]

680. For Bristol Water, anticipated totex is driven by the interventions proposed by our Business Plan as a means to deliver the outcomes and performance commitments required to satisfy our regulatory and statutory responsibilities and meet our customers' service expectations and priorities. Details of the outcomes and performance measures, and how they were developed through customer engagement, are described in detail in **Section 6** above. The link between outcomes and performance measures and how they are translated into interventions is demonstrated in Figure 36 below.

[561] Bristol Water PR14 Business Plan, Wholesale Plan June 2014 ('**June Wholesale Plan**') (SOC002) , p. 62.

Figure 36: Line of Sight from Outcomes to Interventions



Source: Bristol Water[562]

681. In order to translate those outcomes into interventions, we have carried out a detailed asset risk-driven bottom-up assessment of a wide range of potential solutions.[563] This has incorporated a number of key stages:

- the assessment of need and risk, taking into account system performance, customer preferences and the future operating environment, including through the use of deterioration modelling and operational input (see **Section 7.5** below);
- initial optioneering of the potential interventions, including the brainstorming of potential schemes, operational workarounds and possible mitigations (see **Section 7.6** below);
- costing of interventions on a WLC basis over an extended time period and assessment of those costs through the use of benchmarking at a scheme and programme level to identify the most cost-effective and efficient solutions (see **Section 7.8** below);
- undertaking cost-benefit analysis of the potential interventions, including the use of the service valuation framework and results of the willingness to pay research carried out with customers (see **Section 7.7.1** below);

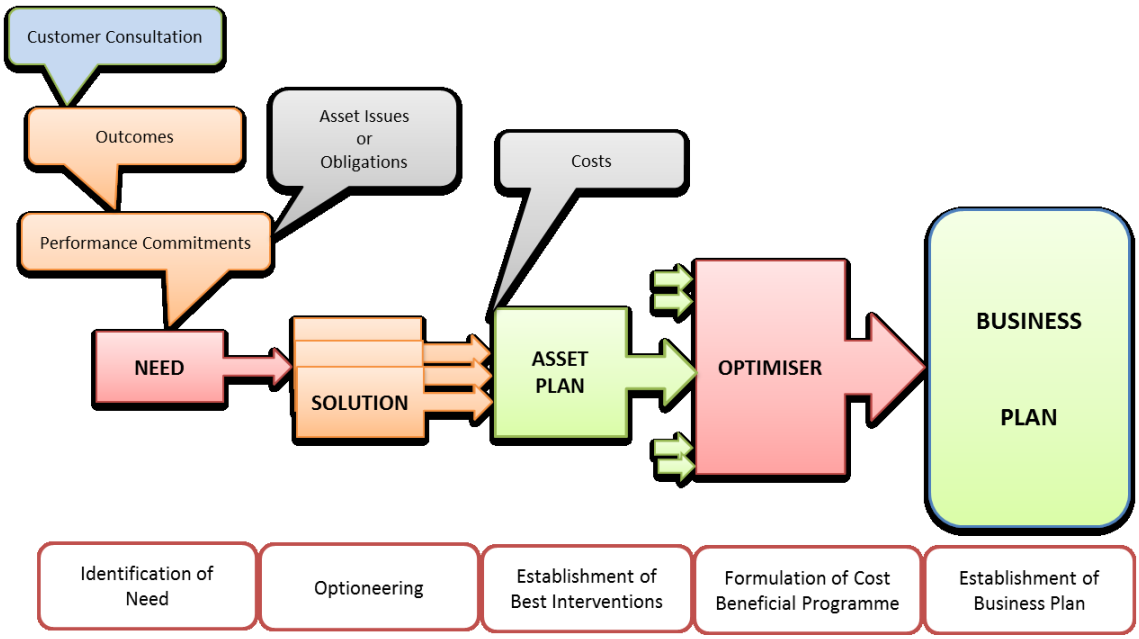
562 June Wholesale Plan (SOC002), Figure 5 p. 46.

563 A full description of our overall planning process is provided in the Wholesale Costs section of the June Submission of our Business Plan (June Wholesale Plan (SOC002)).

- using optimisation techniques to identify the optimal combination of interventions against the constraints of performance commitments and costs, including bill impacts (see **Section 7.7.3** below);
- testing four alternative service packages developed through engagement with customers to determine acceptability (see **Section 6.5** above); and
- refining the intervention programme in light of customer acceptance feedback regarding priorities, preferences and bill levels and carrying out further customer acceptability testing to confirm that we had arrived at the most appropriate programme (see **Section 6.5.7** above).

682. Our approach to translating outcomes into interventions is demonstrated in Figure 37 below. Implementing this bottom up approach provides the most realistic assessment of future expenditure requirements and is the approach historically used by the water sector.[564]

Figure 37: Steps in Formulating Business Plan Elements



Source: Bristol Water

683. We have had our approach to intervention planning and the assessment of totex scrutinised by independent assurers (Mott MacDonald[565] and Atkins[566]) and independent reviewers (Atkins,[567] ICS,[568] and CH2M Hill[569]) who all commented favourably on the

[564] In its assurance, Mott MacDonald noted that we had "*taken an exemplary approach to developing outcomes and integrating them into [our] high level planning*". (MM Assurance Report 2014 (SOC136), Section 3.3.6).

[565] MM Assurance Report 2014 (SOC136).

[566] Atkins dWRMP review (SOC283); Atkins FWRMP/SEAMS review (SOC202).

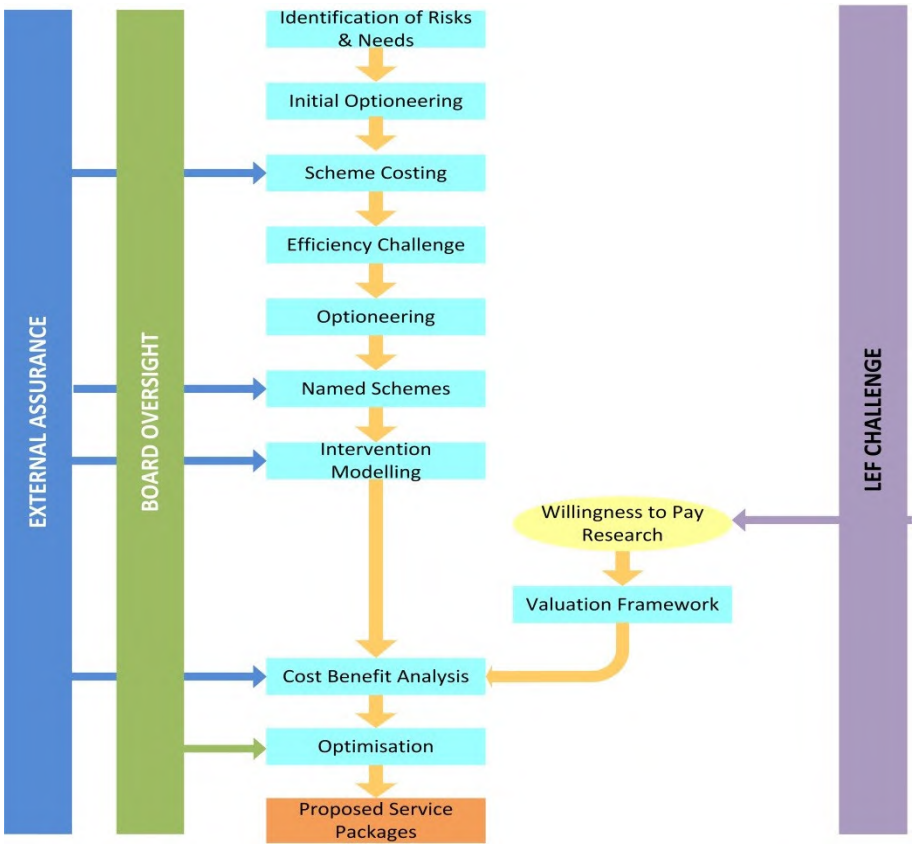
[567] Atkins Wilco 1st Review March 13 (SOC344); Atkins Wilco 2nd Review May 13 (SOC345); Atkins Wilco 3rd Review August 2013 (SOC137).

[568] ICS letter to Board 2014 (SOC337).

[569] CH2M Hill CM Review Aug 2014 (SOC096).

approaches adopted (see also **Section 7.9** below). Our assessment of costs through benchmarking, which is described in more detail in **Section 7.8.4** below, led us to propose a challenging level of efficiency at the greatest level of risk the Bristol Water Board is prepared to accept.[570] The interaction between the stages of the process we followed, the external review from third parties, and the oversight and involvement of the LEF and the Board is represented in Figure 38 below.

Figure 38: Overview of approach to intervention planning



Source: Bristol Water[571]

684. This approach has ensured that our proposed interventions, and the associated cost elements of base operating expenditure, capital maintenance and capital enhancement as detailed in **Sections 9** and **10** below, have been derived using a robust and reliable process, and represent the most cost-beneficial and efficient solutions for our customers at an affordable level of totex.[572]

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570 Extract from minutes of Bristol Water board of directors meeting 30 September 2014 ('**Board Meeting Sept 2014 minute extract**') (SOC397).

571 PR14 June Business Plan, Business Plan Evolution ('**June 2014 Business Plan Evolution**') (SOC021), p. 25.

572 More generally, we understand that the move to totex can deliver efficiencies by encouraging companies to consider options that might not have been on the table before. With the support of external consultants Baringa, we have been investigating what more we can do to become a truly totex-driven company and deliver the challenging level of efficiency we have committed to in our Business Plan. We consider that this is predominantly about the attitude of

685. Each of the key steps shown in Figure 38 is considered in more detail in the following sub-sections. To set the context, however, we first consider the intervention planning toolkit we have utilised to assist with the overall process.

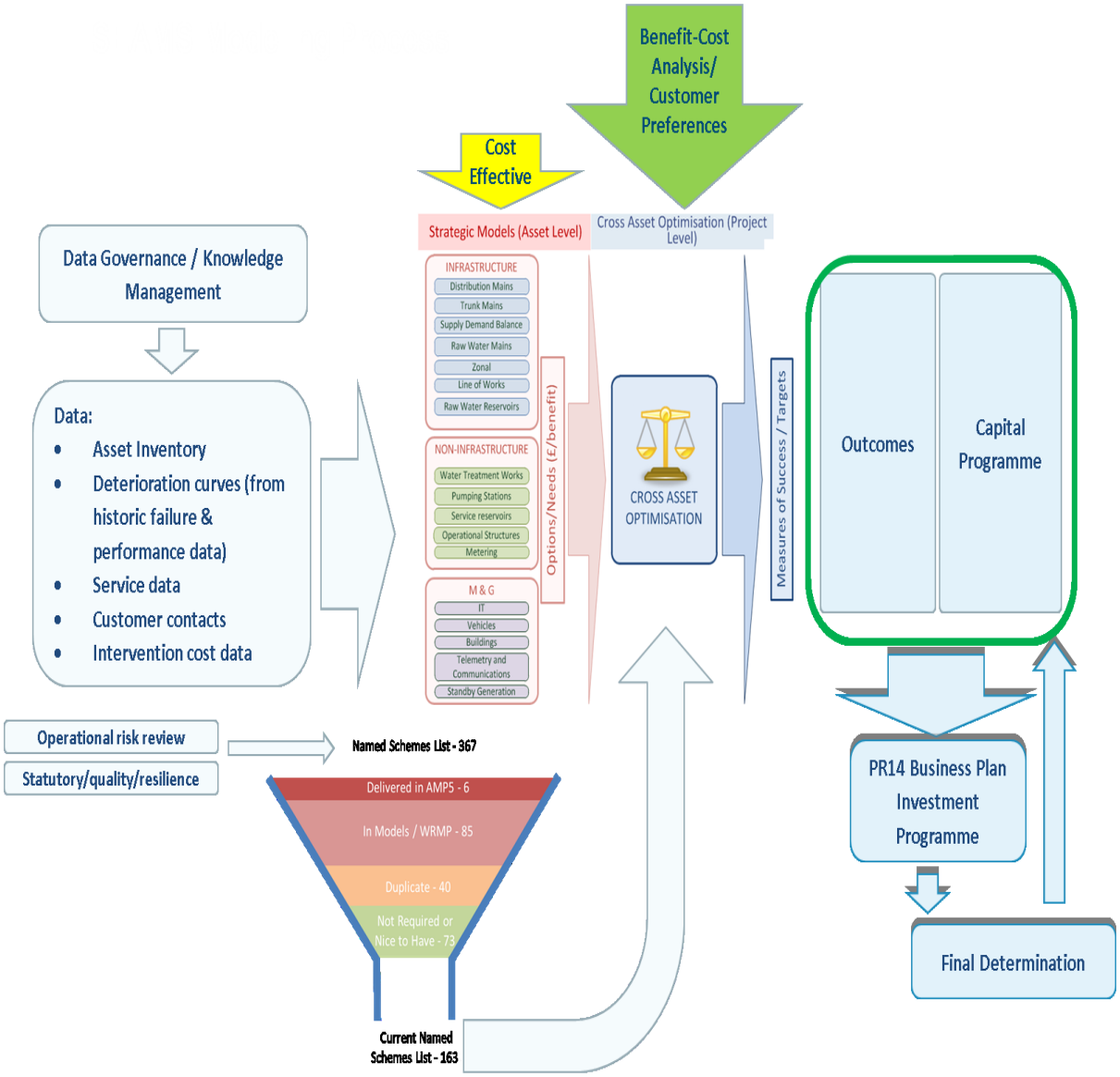
7.4.1 Our intervention planning toolkit

686. The process of determining an overall set of interventions involves gathering sufficient data to understand our assets, how they deteriorate, the types of possible interventions, what the intervention costs are and what individual schemes (named schemes) are required to deliver the cost-beneficial and affordable service levels to our customers. This data is then processed using a variety of tools that assist with optioneering, cost-benefit analysis and optimisation.

687. The toolkit used by Bristol Water to carry out intervention planning, and how they interact with each other, is shown diagrammatically in Figure 39 below.

our staff and the internal decision making mindset. We have been moving forward with the implementation of a plan to develop this (see **Section 3.2.3.5.1** above).

Figure 39: Bristol Water's toolkit for deriving interventions



Source: Bristol Water [573]

688. In particular, Figure 39 demonstrates the roles played by the strategic Asset Level Models (**ALMs**) developed as part of the SEAMS WiLCO models and named schemes in generating solutions based on need for consideration through optioneering and optimisation. These are considered in more detail in **Section 7.6.3** below.

689. The Cross Asset Optimiser (**CAO**) is an optimisation tool which is part of the SEAMS WiLCO suite. The CAO uses the outputs of the intervention identifiers to generate an optimal

[573] June Wholesale Plan (SOC002), p. 62.

combination of solutions, taking into account customer willingness to pay[574] for changes in performance. This is discussed in more detail in **Section 7.7.3** below.[575]

690. This ultimately results in a wholesale intervention programme, comprising of a capital programme and operational activities that will deliver the required outcomes at the lowest cost.[576] The wholesale programme is detailed in **Sections 9** and **10** below.

7.5 How we identify the need for an intervention

691. The assessment of need in the context of developing our PR14 Business Plan began with the identification of outcomes and performance measures, as informed by customer engagement (see **Section 6** above). These measures represent quantifiable performance targets, referred to as performance commitments, the achievement of which is incentivised through a system of penalties and rewards (see **Section 14** below). Whether or not we meet those performance commitments during AMP6 is largely dependent on the way in which we manage our assets.

692. Other factors which impact on the need for interventions include underlying issues with assets that need to be rectified including the impact of deterioration on levels of service, accounting for any future growth in demand, ensuring sufficient resilience within the system and complying with any regulatory or statutory commitments to undertake certain activities. This is demonstrated in Figure 40 below.

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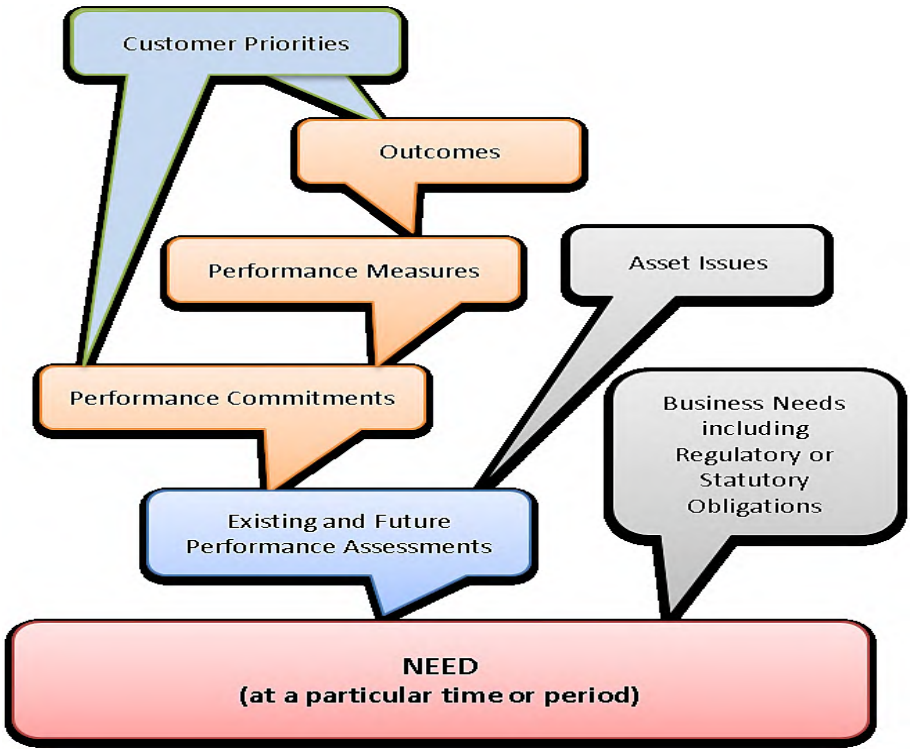
574 Our approach to Willingness to pay and our use of the data within our CAO was peer reviewed by Prof Susana Mourato (see Prof Susana Mourato: Bristol Water Willingness to Pay Peer Review ('**WTP peer review 2013**') (SOC138)).

575 See: December Wholesale Plan, Cross Asset Optimisation Model – WiLCO Model Specification **('CAO Wilco Spec')** (SOC300), which sets out in detail how the CAO was designed and works. In addition December Wholesale Plan, Cross Asset Optimisation Model - Work Package 2 Report **('Work Package 2 Report')** (SOC301), details the extraction, assessment, and provision of data for analysis of asset and operational performance of the CAO. Details of the conversion of willingness to pay data for use in the CAO is provided in December Wholesale Plan - WTP data conversions ('**WTP Data Conversions**') (SOC560). These same documents were also submitted in June 2014.

576 In its assurance, Mott MacDonald concluded that our Business Plan "*is based on robust models and a non-modelled process which is comparable with that of other water companies although the link to service risk could be stronger. At our review in December 2013 your plan was starting from a position of strong performance, has been revised as a result of customer engagement, and has a very high level of customer acceptability.*"(MM Assurance Report 2014, (SOC136), Section 3.3.3).

Figure 40: Assessment of Need



Source: Bristol Water

693. Where a potential shortfall against satisfaction of the performance commitments is identified it is examined to assess the potential impact and quantify the risk to customer-facing levels of service, or internal operational requirements such as health and safety obligations. In particular, we consider:

- which assets and their associated activities have the most impact on the measure;
- the consequences of taking no action, which may include failing to satisfy a performance commitment and incurring the associated penalty;
- the benefits of taking action (e.g. the mitigation of known risks and increasing the likelihood of compliance with performance commitments);
- what solutions or interventions are available; and
- which of those solutions or interventions are most suitable or applicable.

694. We identified needs through deterioration modelling of the assets responsible for the provision of base service to understand historic and current performance trends and predictions of performance in order to identify which assets contributed to deteriorating service, and when such deterioration is likely to impact.[577] We also identified specific needs based on non-deterioration related asset performance either associated with:

[577] Deterioration modelling is particularly useful as a means of predicting and prioritising strategic plans for capital maintenance. As part of our process, we ensured that our methodologies are compliant with the UKWIR, Capital Maintenance Planning, A common framework 2002 ('**UKWIR CMP common framework 2002**') (SOC376). Our approach to the planning of capital maintenance, and the link to the UKWIR common framework, is described in more

- base service (such as Health and Safety related) or
- the need for an enhanced service (where customers had expressed a preference for levels of service to change).[578]

695. In considering the potential for interventions arising from a resilience need, we worked with Halcrow[579] to undertake a resilience risk assessment and reliability modelling study to support the delivery of further resilience improvements in future AMPs. This enabled us to appraise the overall reliability of our major assets which make up our critical systems, to deliver resilience outcomes from the context of systems and their component response to hazard occurrence, thereby combining a complementary approach of strategic assessment of reliability with the bottom-up appraisal of critical asset hazard assessment. This innovative approach supported the development of robust holistic solutions for the management of resilience risks which were taken forward for formal review and appraisal during the optimisation phase of our process (see **Section 7.7** below).[580]

696. By determining a need for change we have established that some form of activity is required at some point in the future. The timing of an intervention will generally be specific to each individual case of need, and will be assessed accordingly, taking into consideration issues such as the risk involved, timescales imposed by external organisations or the timing of projected demand increases.

697. For instance, WRMP interventions are typically triggered by forecasted supply demand shortfalls, whereas the timing of the quality interventions is linked to DWI expectations and the dates of any relevant s19 Undertakings (see **Section 2.4.3.1** above).[581] These are often linked to the AMP cycle unless there is a pressing water quality problem. Similarly, NEP schemes are generally linked to the Water Framework Directive cycle and may in certain circumstances be the result of negotiation with the EA.

698. The timing of some maintenance interventions can be less specific than for enhancements given that assessment of need is based on forecast deterioration, and implementation of interventions is based on real performance. For some schemes, such as Bedminster Reservoir, the need for intervention may be more immediate (see **Section 9.3.3.4.1** below).

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detail in December Wholesale Plan, Asset Maintenance Planning and Common Framework Compliance ('**Common Framework Compliance**') (SOC302)

578 Asset Management, Wholesale Plan Level 3 December Submission ('**Asset Management December Plan**') (SOC292).

579 Now CH2M Hill.

580 December Wholesale Plan, Water Supply Resilience Risk Assessment - Technical report **('Water Supply Resilience Risk Assessment')** (SOC303), p. 2. This report presents a technical account of the resilience risk assessment work undertaken by Bristol Water staff and independent expert/specialist support provided by Halcrow.

581 A more detailed description of our approach to the identification of unacceptable residual risks associated with water quality and the most appropriate capital schemes to resolve them in accordance with water quality requirements is provided in December Wholesale Plan, Quality Schemes - Approach and Methodology **('Quality Schemes Approach and Method.')** (SOC304).

7.5.1 Impact of Bristol Water's approach to risk on assessing need

699. Understanding of our corporate risk appetite is an important driver of the investment decisions contained in the PR14 Business Plan.[582] Operational risks are a key area of corporate risk and we now assess these risks against our risk appetite before deciding whether to intervene.

700. The development of the interventions included in our plan started from consideration of risks formally identified on the risk register (which captures all identified risks at company level) and was supported by granular assessments of specific operational risks from operational staff and deterioration of our existing asset base as discussed above.

7.6 How we identify the most effective solutions

7.6.1 Identification of solutions

701. Having identified both a need, and the timing for when it must be addressed, we have to develop a plan that addresses that need in the most effective way. Interventions represent potential solutions to ensure our assets meet the performance targets we set, based on the customer-preferred outcomes and levels of service.

702. Dependent on the type of need, its scale and its nature, there are various methods for assessing the right solution. From the very simple cases to the more complex, we seek to determine the most effective set of asset interventions, activities or working practices to address a particular need. Whilst needs and the range of possible solutions can vary widely, the following should always form part of the approach:

- a range of options should be looked at including, where practicable, doing nothing, operational interventions, refurbishment and maintenance activities, abandoning existing assets and new asset choices;
- considering opportunities for innovation and more effective ways of working;
- assessing the effects of any option on future expenditure (e.g. expected asset life for future replacement costs, operational and maintenance requirements);
- the effects on benefits achieved should be assessed as some options may only deliver partial benefits by themselves but, in combination with other activities, may deliver the required service;[583] and
- wherever applicable, the whole life cost based on cash flow assessments or annualised costs of each option should be determined.

703. Identification of need and solutions is generally carried out in one of two ways:

- investment or intervention modelling using detailed asset data, deterioration models and cost models. Models are typically used to identify needs in terms of:

[582] See **Section 3.2.3.5.2** above for a general description of our approach to risk, and **Section 5.4** for details of our approach to risk in the context of the Business Plan.

[583] Our optimisation modelling enables us to identify a programme which takes into account different benefits from different interventions, maximising customer benefit for least cost.

- deterioration (i.e. the need arises at the point when the asset deteriorates to a point where its performance impacts upon customer service, which is measured by specific performance measures); and
- costs (based on costed standard solutions such as mains rehabilitation) for groups of assets that have similar characteristics and performance requirements (see **Section 7.6.3.1** below for further details on our use of these models);

- individual schemes related to particular needs that have clearly identifiable and distinctive issues or are mandatory and are not identified by deterioration modelling, such as raw water quality improvements, and Health and Safety interventions. These are termed 'named schemes' within our approach (see **Section 7.6.3.2** below for further details).

704. Our modelling system includes a specific 'Supply Demand Balance' (**SDB**) model which optimises WRMP interventions and feeds the CAO (see **Section 7.6.3.3** below for further details).

705. Planning and delivering interventions that will provide required outcomes and meet their associated targets are an important part of the overall management of our assets. We have developed a comprehensive asset management system that encompasses all aspects of delivering service to our customers. Asset life cycle activities are considered in a holistic way (i.e. with reference to how such activities and any potential assets impact the operation of the business, the level of service we provide our customers and the impact we have on the environment) with whole life assessments forming a key part of our process.

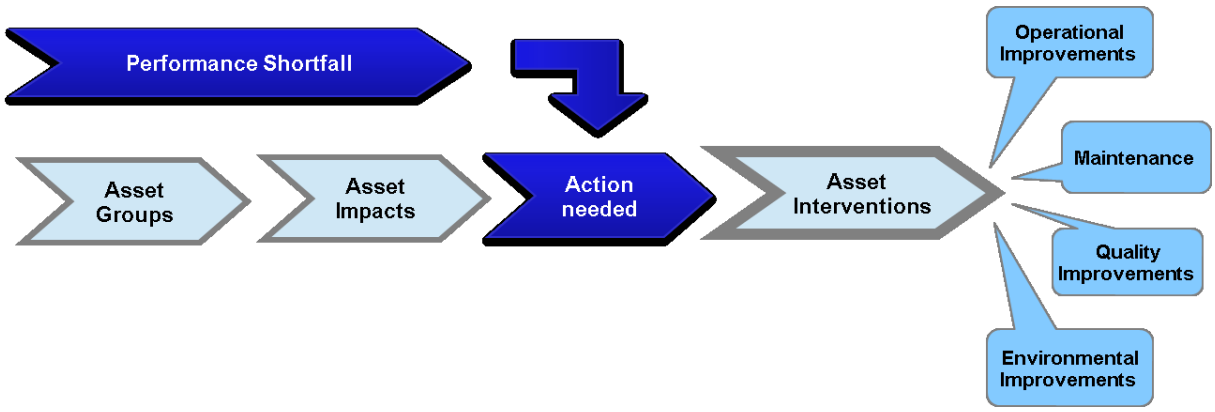
706. In other instances, such as in relation to needs identified as part of the WRMP process, we undertook workshop sessions to identify as many potential solutions as possible for the twin track approach of demand management and additional resources. These brainstorming sessions included participants from different departments within Bristol Water, from asset planners to front line operational staff, as well as representatives from our supply chain, including design consultants and contractors. Participants were encouraged to think creatively and put forward suggestions ranging from traditional solutions to innovative and 'out of the box' ideas. The resulting range of options were considered as part of the optioneering process (see **Section 7.6.2** below). Participants also considered pure opex versus capex and totex solutions, options around refurbishment and replacement, and the use of proactive and reactive interventions.

707. All our interventions (whether named schemes or otherwise) have been through the same process of optioneering which is described in more detail in the following sub-section.

7.6.2 Optioneering

708. For any performance issue or predicted shortfall we generally investigate a number of possible solutions and use a series of procedures to determine the best set of interventions. Such potential solutions can range from operational improvements to the replacement or addition of assets as shown in Figure 41.

Figure 41: Options to Address a Performance Issue



Source: Bristol Water[584]

709. Options are linked to the outcomes they will impact and examined for their ability to achieve the desired result, the risks involved, the likely cost, benefits and technical viability. Options which are assessed as technically unviable,[585] too expensive, too risky or which introduce problems which are worse than the problem to be solved[586] will be discarded at this early stage of the process.

710. All acceptable options are then assessed on a cost-benefit basis. This may be a two-stage process reflecting initial feasibility studies which progress to outline design.

711. For most needs which are not related to deterioration in asset performance, a selection of options or ways of working are developed. For a small number of needs, the options are assessed for a single scheme solution and a set of these options is derived that produces the largest benefit/cost ratio for that scheme.

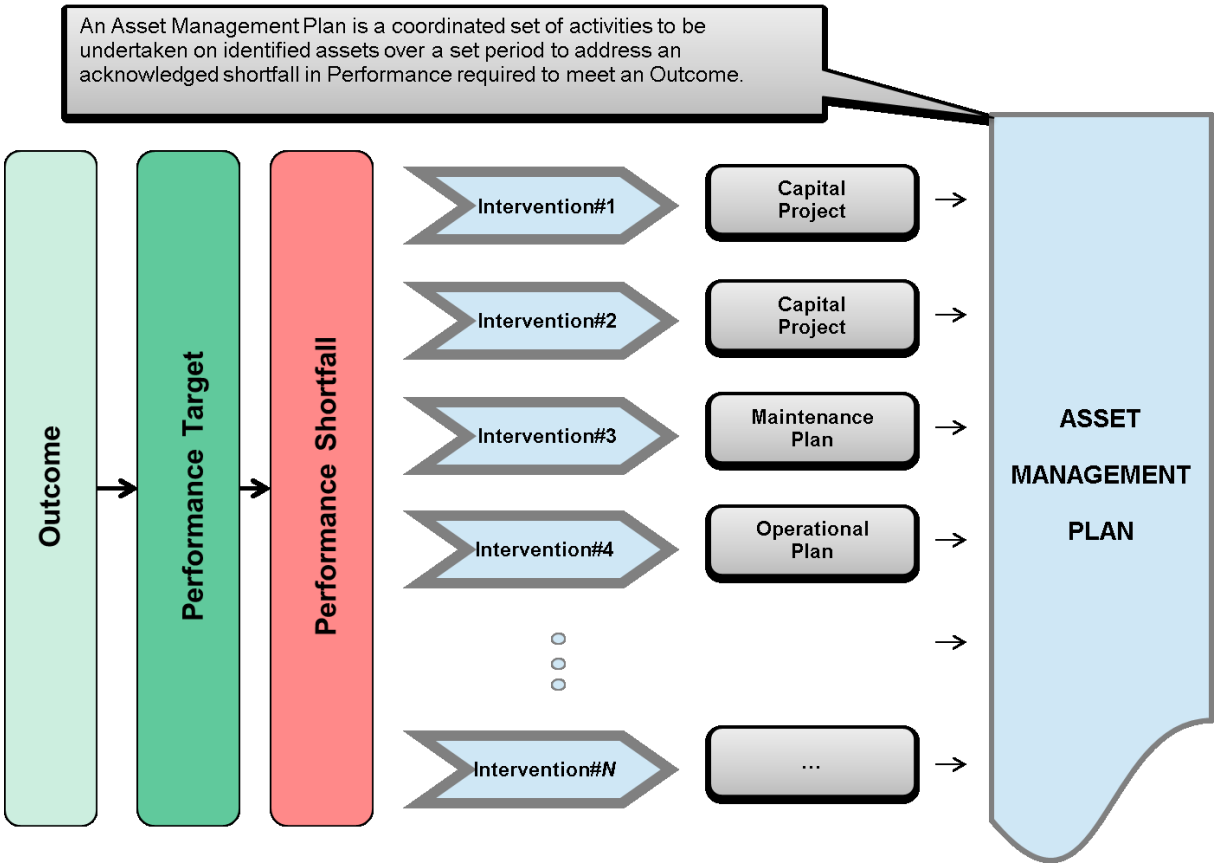
712. Figure 42 shows the example of a plan derived for a single issue (need) that employs a number of individual options.

584 June Wholesale Plan (SOC002), Figure 7 p. 48.

585 E.g. for a capex solution where the site constraints make a solution unbuildable.

586 For example, in order to address the problem of algal blooms in Cheddar Reservoir (see **Section 3.4.5** above) the use of barley straw placed in the water to remove the algae was considered. As the straw starts to rot, however, the surrounding water is discoloured and concentrations of taste/odour compounds increase. As such, this was discarded as an option. A more detailed discussion of the identification of the right solution to deal with the algal blooms is provided in **Section 10.2.2.1.1** below.

Figure 42: Addressing a Performance Issue with Selected Interventions



Source: Bristol Water[587]

713. For needs related to asset deterioration and maintenance, options are included in the ALMs (see **Section 7.6.3.1** below). These generally contain a range of performance scenarios that cover decreasing, maintaining and improving performance. Selected options are carried forward to the CAO.

714. The number of options considered will reduce from the many considered at the initial workshop stage, through feasibility to outline design. Not all options will go through all stages, as noted above, but to put this in context, at the second stage of optioneering during the development of our Business Plan, 218 options were evaluated for the 70 schemes under consideration.[588] As an example of this, for removal of algae from Cheddar Reservoir (see **Section 10.2.2.1.1** above), 30 options were considered initially, which were refined to nine options at Stage 1 and then to three options at Stage 2.

7.6.2.1 *Examples of Detailed Optioneering*

715. As noted above (see **Section 7.5**) the selection of options to maintain the supply demand balance was based on a structured process starting with as broad a range of possible options as possible. Working with a review panel facilitated by independent consultants, 140 potential interventions,[589] including demand management, leakage reduction and new

[587] June Wholesale Plan (SOC002), Figure 8 p. 48.

[588] See June Wholesale plan (SOC002), Table 11, for detailed list.

[589] Amec, Bristol Water Unconstrained Options Lists for WRMP ('**WRMP unconstrained options list**') (SOC361).

resource schemes were considered. The review panel included subject experts, an independent consulting engineer and a representative of the EA. This list of schemes was screened and ranked by the panel according to the following criteria:

- certainty of yield;
- flexibility and scalability;
- sustainability;
- environmental impact;
- acceptability and ease of promotion; and
- technical difficulty.

716. Based on the outcome of the ranking process, 35 of the most favourably ranked schemes were selected as candidates for the more detailed and rigorous cost-benefit analysis required for the WRMP.

717. The detailed analysis for the 35 schemes included both the capital and operating costs to deliver, as well as the social and environmental cost of the schemes. We used consulting engineers to calculate these costs. Black & Veatch calculated the scheme engineering costs and AMEC calculated the social and environmental scheme costs. Bristol Water calculated metering and leakage reduction costs based on company specific data.

718. To carry out the detailed analysis, consultants were give a basic design brief, including location, route, required output, process outline and operation. The consultants then used costing data from similar engineering works and processes from their databases to assess capital costs to deliver a realistic solution. Company specific data for power and treatment chemicals was used for estimating operating costs of the 35 options.

719. These options with their associated engineering and social costs were included in the supply demand model used to select the optimum combination of interventions for the WRMP (WiLCO model). From the 35 detailed options, 10 were output from the optimisation model as the solution to deliver the best value portfolio of schemes over 30 years for the WRMP. These are set out below:

- total leakage – Active Leakage Control (**ALC**) + pressure reduction;
- change of occupier metering ;
- Cheddar Reservoir Two;
- supply-pipe replacement;
- bulk transfer reduction;
- Honeyhurst transfer;
- demand management;
- Hunstpill licence transfer;
- Bridgewater bulk transfer; and
- Chew Stoke Stream reservoir.

720. An example of how this process was applied in practice in relation to Cheddar Reservoir Two is provided in Box 15 below.

Box 15: Cheddar Reservoir Two - key optioneering steps

As part of the optioneering for our WRMP, we asked consultants to validate our analysis and underlying data. In the case of the Cheddar Reservoir Two option the following reviews were carried out:

- Atkins and Arup carried out technical reviews of the WRMP, validating the data inputs and confirming the methodology followed;
- Arup reviewed the reservoir option compared to the next best available resource schemes of equivalent yield in our WRMP;
- Arup and the Environment Agency reviewed our base data and yield assessments for the source of the water – Cheddar Spring;
- Arup carried out a detailed site selection analysis, identifying a long list of 36 sites across the area and selecting the 5 most likely sites (based on multiple selection criteria);
- detailed investigations were carried out at five sites including ground conditions, planning and environmental considerations;
- a panel review of the short list of sites was conducted in order to select the current site; and
- Arup conducted a complete design review of the Cheddar source infrastructure requirements and reservoir design, re-costing the requirements in the context of the chosen site for Cheddar Reservoir Two.

More detail on the identification of Cheddar Reservoir Two as the best solution for meeting identified needs is considered in **Section 10.6** below.

Source: Bristol Water

721. For the majority of the Resilience, Quality, Infrastructure Maintenance, Non-Infrastructure Maintenance, and Growth schemes, our engineering consultants[590] assessed a range of options for each scheme including do nothing and opex-only (or no-build) options. For some schemes the no-build option was preferable; these involve delivering opex-only solutions such as a change in operating regime (see **Section 7.6.2.2** below). Where there was a clearly obvious option, this option would be selected for costing. Where, however, there was no clear advantage in a scheme, high level cost estimates were developed for all the options to enable us to choose between them.

722. For some of the growth schemes (see **Section 10.2.2.3.1** below) much of the optioneering was undertaken by our Network Planning team before the potential solutions were passed to our engineering consultants to develop. These were all pipeline schemes and the Network Planning team was able to assess the impact of no build and alternative pipeline arrangements to be able to define the start and finish points of the pipeline if needed. Our engineering consultants then took these start and finish points and optimised different routes that could be taken between them.

723. Details of all options considered for each scheme are listed in the respective scheme reports.[591]

590 Black & Veatch, Atkins.

591 With our June submission (and our December submission) we included various feasibility and strategic options reports. The reports detail the need and the options considered to meet that need and include assessments supporting the proposed interventions . These reports can be found at:

Water is safe to drink:

- Barrow UV Final Report June 2013 Version C (2) (SOC504);
- Final_Cheddar Final Water pH Correction Report July 2013 (SOC505);
- Final_Stowey Final Water pH Correction Report July 2013 (SOC506);
- Cheddar WTW Water Quality Improvement Final Report (**'Cheddar WTW Final Report'**) (SOC233).

Sustainable Environmental impact

- Amec BW NEP Catchment Management – Draft (SOC503);

7.6.2.2 *Details of opex-only interventions selected instead of capex solutions*

724. Whenever optioneering is carried out, opex or no-build solutions are considered although these may not be selected due to WLC implications and reliability. Some opex-only interventions that were considered and, where additional opex was identified, were promoted to the CAO (see **Section 7.7.3**) include:

- Wessex Water Newton Meadows reduced bulk supply;
- Active Leakage Control (**ALC**);
- Leakstop;
- business audits;
- water efficiency packs and schools education;[592]
- Almondsbury Reservoir Outlet Main - we went away from laying a new outlet main at c£1.8m to reducing the storage by running at a lower level and increasing pumping - this remains part of base expenditure; and
- Montpelier Reservoir Refurbishment - we selected operational changes instead of a new 2.4Ml reservoir saving c£1.2 - £1.5m - this remains part of base expenditure.

725. The opex-only schemes are treated in the same way as any other option within the CAO.

7.6.3 Using the intervention planning tools to identify potential solutions

726. As noted in **Section 7.4.1** above, we utilise a number of tools during the intervention planning process. At the start of AMP5, and based on lessons learnt during the PR09 process and CC10 redetermination, we wanted to improve the coverage of our existing investment models and develop a consistent approach to optimising our intervention programme. Having met with a number of consultants with capability in the area, we decided to use the SEAMS[593] WiLCO models to develop our approach because:

- it could allow coverage of our entire asset base through asset level deterioration-based models and named schemes;

- Outcome - Sustainable Environmental Impact - N348 baseline surveys (SOC507);
- Outcome - Sustainable Environmental Impact - N99 catchment management (SOC508);
- Outcome - Sustainable Environmental Impact -N113 SERA. (SOC509);
- Eel Screening Feasibility Report (SOC511).

Resilient Supply

- Resilient Supply – Supporting Information, Level 3 Wholesale Plan December Submission (**'Resilient Supply - December Plan'**) (SOC037);
- Water Supply Resilience Risk Assessment (SOC303);
- Site Risk Assessments (SOC510).

Sufficient supply

- Bristol Water Draft Water Resources Management Plan 2013 ('**dWRMP 2013**') (SOC161) specifically sections 9.3-9.6 and 10

592 We are already making use of water efficiency packs and schools education, and expect to continue to do so. As this is not a change of scope, it remains part of our baseline operation.

593 Additionally, we were familiar with the SEAMS work through its involvement in national projects and we had spoken to other companies who were successfully using the WiLCO suite.

- different modelling approaches could be developed within the asset level models depending on the data available, and these could be made more sophisticated as further data becomes available;
- the modelling approach was entirely visible through inspection of the model – there is no 'black box';
- optimisation would be across the programme on a cost-benefit basis using willingness to pay data; and
- the approach could be used to model supply demand balance.

727. Working with SEAMS we were able to convert our existing 'business as usual' strategic asset level models into the WiLCO format, as well as developing new models for other areas, as in the overall optimisation approach.[594]

728. In order to undertake the process of producing interventions for our plan, we have assembled a number of components for analysis in the WiLCO software:

- the schemes:
  - ALMs for dealing with general asset deterioration and maintenance activity, divided into Bristol Water's major asset types (infrastructure,[595] non-infrastructure[596] and management and general assets[597]); and
  - named schemes:
    - capital maintenance
    - required quality schemes
    - resilience schemes
    - water resources and development schemes

    Discretionary or Must Invest
- asset details of individual sites within asset groups;
- deterioration models related to the asset groups and derived from failure and condition data; and
- cost models related to the asset groups and derived from costs of rehabilitation and replacement.

729. To ensure that all data, inputs and outputs properly reflect current knowledge, during the process the various elements have been checked for errors and appropriateness, and been updated where deemed necessary.

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594 The process of developing ALMs and placing options in the cross-asset optimiser was assured by Mott MacDonald (MM Assurance Report 2014 (SOC136), p.5). Mott MacDonald considered the main drivers for asset deterioration models and the links to service. The modelling and optimisation provided by SEAMS was also peer reviewed by Atkins (Atkins FWRMP/SEAMS review Oct 2014 (SOC202)). The Atkins review was based upon a quality assurance audit of consistency between Bristol Water's WRMP and SEAMS – the optimising software used for computing the final planning scenario for Bristol Water's WRMP. Overall, Atkins concluded that the inputs and outputs from SEAMS are consistent with the WRMP, and any differences are immaterial with regard to the overall shape of the plan.

595 The infrastructure ALM covers distribution mains, trunk mains, supply demand balance, raw water mains, zonal, Line of Works and raw water reservoirs.

596 The non-infrastructure ALM covers water treatment works, pumping stations, service reservoirs, operational structures and metering.

597 The management and general ALM covered buildings.

730. Suitable interventions are generally evaluated and considered through ALMs or by evaluating particular solutions through a named scheme process. We also have a specific Supply Demand Balance (**SDB**) model to optimise WRMP interventions. ALMs, named schemes and the SDB model are each considered in more detail in the following sub-sections.

731. Our approach in using the SEAMS WiLCO model, with particular reference to the generation of capital maintenance investment estimates, was reviewed by CH2M Hill.[598] CH2M Hill concluded:

> *"It has been concluded that the approach adopted by Bristol Water for capital maintenance planning can be classed as good practice. It is risk based and forward looking; it is Outcome focused and consistent with the totex methodology required by Ofwat. In addition, certain elements of the approach are considered best current practice, including: capture and analysis of asset data and asset performance data, assessment of service risks, Outcomes analysis and scope of interventions.*
>
> *It is also evident that Bristol Water have undertaken optimisation of the business plan using the required key elements of: cost-benefit analysis principles, willingness-to-pay evaluation and customer consultation on preferences and affordability.*
>
> *The general approach to capital maintenance developed by Bristol Water and used during PR14 planning is considered sound with many constituent elements consistent with best current practice asset management principles.*
>
> *From what is presented in the documents reviewed, from discussion with Bristol Water personnel and also past CH2M HILL experience working on Bristol Water projects, it is very clear that the SEAMS WiLCO methodology and CAO tool have the key elements within them necessary for them to be considered best current practice asset management tools and techniques. Since the constituents of the tool are complete, a conclusion can be drawn that the approach, in principle, is good practice and compares favourably with other approaches used by other water companies and which meet up-to-date industry requirements."*[599]

7.6.3.1 *Asset Level Models*

732. ALMs contain a number of options for interventions or activities that address various performance measures linked to asset deterioration.

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[598] Bristol Water commissioned CH2M HILL to undertake an independent review of our approach to capital maintenance investment estimates for PR14 business planning and to compare and contrast this with other methods available. The review was undertaken in the style of an assurance exercise, as undertaken for PR14 business plans. The review aimed at evaluating the quality and suitability of our current procedures used to derive the capital maintenance investment case in particular when compared with other practices, and specifically those deemed 'best practice' methods. It included a review of the methodology and an appraisal of the process steps/elements of the SEAMS model and CAO to a degree sufficient to draw conclusions regarding the overall approach and the suitability of model outputs for the investment plan estimates, as well as a critical review of available methodologies with an assessment of good and best practice and advantages and disadvantages. (CH2M Hill CM Review Aug 2014 (SOC096)).

[599] CH2M Hill CM Review Aug 2014 (SOC096), p. 2-3.

733. We developed individual ALMs for our infrastructure, non-infrastructure and management and general asset groups as shown in Figure 43 below.[600] Each model contains aspects relating to performance and service requirements.

Figure 43: ALMs for different asset groups

Infrastructure Asset Level Models	Non-Infrastructure Asset Level Models	Management & General Asset Level Models
•Distribution Mains •Trunk Mains •Supply Demand Balance •Raw Water Mains •Zonal •Line of Works •Raw Water Reservoirs	•Water Treatment Works •Pumping Stations •Service Reservoirs •Operational Structures •Metering	•Buildings

Source: Bristol Water[601]

734. These ALMs utilise detailed asset data, deterioration models and cost models. The ALMs help to identify when a need will arise by identification of when an asset will deteriorate to a point where its performance impacts upon customer service as measured by specified performance measures. The ALMs also utilise cost data, based on costed standard solutions such as mains rehabilitation, for groups of assets that have similar characteristics and performance requirements.

735. Typically, the intervention options range from do nothing to replace on failure, with other choices in-between. The maintenance intervention options were developed and identified through a series of consultations with asset owners, stewards and analysts and are defined in the specifications recorded for each Asset Level Model.[602] The SEAMS WiLCO

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600 See also December Wholesale Plan, Asset Level Models - approach and methodology ('**ALM Approach and Methodology**') (SOC379) which sets out in detail how we developed the ALMs and used them within the intervention planning process. A range of supporting documents are also provided in relation to each of the ALMs used (see supporting documents numbered SOC410 to SOC470 including the Specification documents detailed in the following footnote for (SOC346-358)).

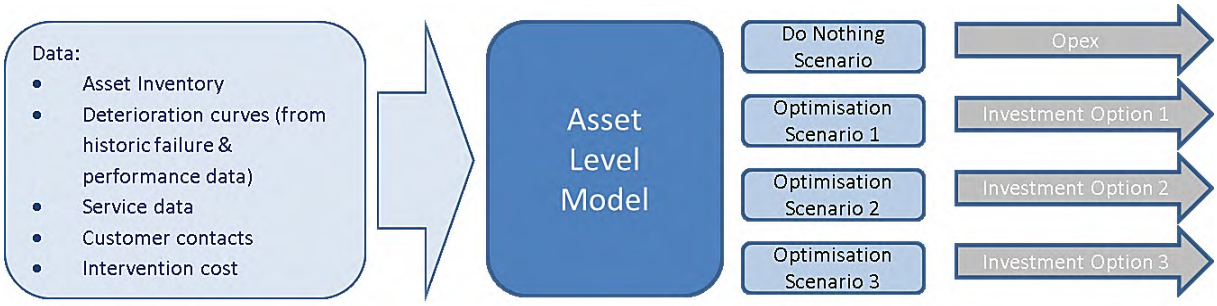
601 Whilst ALMs were worked on for vehicles, telemetry and communication and standby generation, these were ultimately addressed through named schemes.

602 June Business Plan – Wholesale Level 3 – ALMs – WP1 (Asset Level Models - Work Package 1 – Specifications):
Line of Works Asset Level Models - Work Package 1 – Specifications **('Line of Works ALM WP1')** (SOC346);
Mains Distribution Asset Level Models - Work Package 1 – Specifications **('Mains Distribution ALM WP1')** (SOC347);
Mains Raw Water Asset Level Models - Work Package 1 – Specifications **('Mains Raw ALM WP1')** (SOC348);
Mains – Trunk Asset Level Models - Work Package 1 – Specifications **('Mains Trunk ALM WP1')** (SOC349);
Raw Water Reservoirs Asset Level Models - Work Package 1 – Specifications **('Raw Water Reservoirs ALM WP1')** (SOC350);
Zonal Asset Level Models - Work Package 1 – Specifications **('Zonal ALM WP1')** (SOC351);
Buildings Asset Level Models - Work Package 1 – Specifications **('Buildings ALM WP1')** (SOC352);
Vehicles Asset Level Models - Work Package 1 – Specifications **('Vehicles ALM WP1')** (SOC353);
Meters Asset Level Models - Work Package 1 – Specifications **('Meters ALM WP1')** (SOC354);
Operation Structures Asset Level Models - Work Package 1 – Specifications **('Operation Structures ALM WP1')** (SOC355);
Pumping Stations Asset Level Models - Work Package 1 – Specifications **('Pumping Stations ALM WP1')** (SOC356);

software analyses these options and demonstrates cost-effective solutions based on comparison of overall costs, both capital and operating.

736. Figure 44 represents how asset data is translated into the ALM and is then optimised into interventions. Each option represents the most effective solution to meet the requirements of the particular scenario that applies to it.

Figure 44: Use of ALMs to translate data into interventions[603]



Source: Bristol Water

737. The resultant ALM outputs identify the amount of totex investment required for different levels of performance and these solutions progress to the CAO (see **Section 7.7.3** below).[604]

738. Our modelling through use of the ALMs is technically sound with good historical data and has been peer reviewed by Atkins[605] and assured by Mott MacDonald.[606]

7.6.3.2 *Named schemes*

739. Named schemes are interventions that are developed manually to address problems outside the scope of the ALMs.[607] Named schemes are typically individual schemes related

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Service Reservoirs Asset Level Models - Work Package 1 – Specifications **('Service Reservoirs ALM WP1')** (SOC357); Treatment Works Asset Level Models - Work Package 1 – Specifications **('Treatment Works ALM WP1')** (SOC358).

603 The 'do nothing' scenario is alternative terminology for 'no-build' or opex-only solutions.

604 For each optimised model we ran up to five different scenarios. Scenario "investment Need" represents a scenario where no proactive investment in the assets occurs at all, i.e. the assets are allowed to deteriorate and only reactive maintenance is carried out. Scenario -1 assumes a level of the investment resulting in deterioration of the service levels over the AMP period. Scenario 0 describes the investment scenario to maintain service and/or to meet regulatory requirements. Scenario +1 describes the investment scenario for an improvement in service levels. And finally, scenario +2 describes the investment scenario for an improvement in service levels higher than scenario +1. The levels of improvement or deterioration vary depending on the asset type, but are typically +/- 5 or 10%. There are some models which are calculated only, hence there are only two scenarios: the "Investment Need" scenario assuming no investment at all and the triggered scenario where investment is as a result of asset deterioration.

605 Atkins Wilco 3rd Review August 2013 (SOC137).

606 Mott MacDonald noted that: "*Overall your approach to asset level models is reasonable and we felt the improvements we suggested would not make a significant difference to the programme. You have attempted to consistently and clearly model as much as possible and have a thorough approach to validation and peer review. You have made good use of company data, with strong documentation, and where company data are not available you have followed a best-practice Delphi approach to expert judgement. The individual models are reasonable in what they model although the link to service could be stronger. Investment is therefore driven more by assets than by service.*" (MM Assurance Report 2014, (SOC136); p. 17).

to particular needs that have clearly identifiable and distinctive issues, or that are mandatory. They are related to growth, quality, resilience, environment and health and safety drivers, and may include raw water quality improvements, security of supply, water resource provision, SEMD[608] and major refurbishment schemes.

740. For named schemes relating to resilience, we considered areas where the risk of interruption to supply would be reduced by improving system resilience.[609] In relation to growth, we used specialist strategic network modelling to determine the potential effects on customers.[610]

741. A named scheme contains information relating to required performance and service needs. Each named scheme must have sufficient detail for it to be placed in the optimal position in the capital programme by the CAO. It may have one or more options for a solution. Unless there is a mandatory timescale, details of a named scheme may be analysed in the same way as an ALM (i.e. it will be selected at the most appropriate time from the optimisation).

742. Mott MacDonald assured a selection of named schemes that were designed to solve specific problems with demand, raw-water quality, level of resilience of supplies to large populations, or other 'one-off' problems. It also reviewed the overall process and the way the schemes were assessed for investment compared with best practice.[611]

743. The key steps in the named scheme process are shown in Figure: 45:

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607 For a detailed description of our approach to named schemes see: December Wholesale Plan, Named Schemes Approach and Methodology **('Named Schemes Approach and Method')** (SOC305).

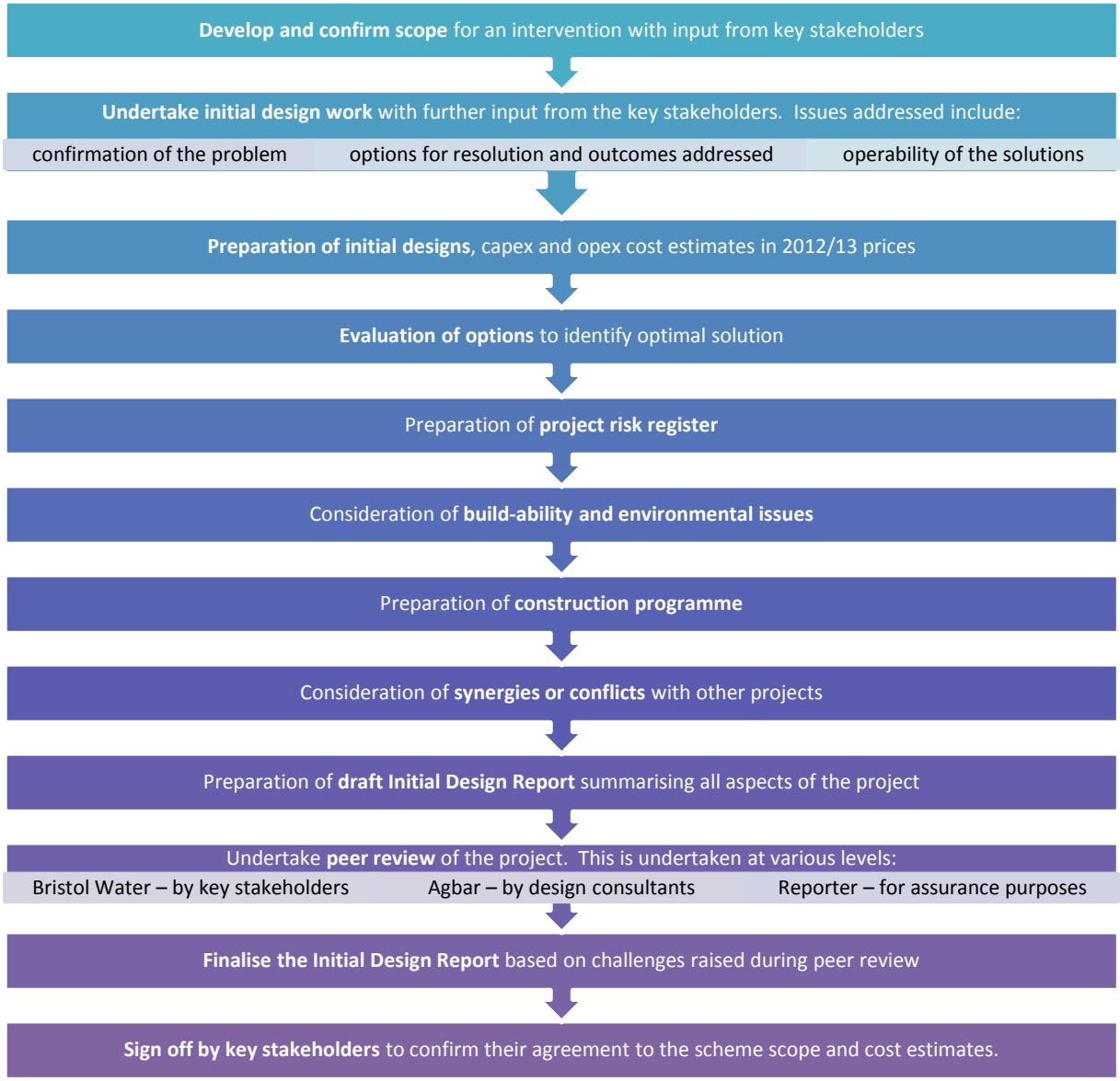
608 Security and Emergency Measures Direction 1991 (SOC212).

609 Mott MacDonald notes that we were supported in this process by CH2M Hill who applied the UKWIR resilience planning methodology, and that "*the process appears to be robust and compatible with the cross-asset optimiser, subject to the use of 'must invest' which takes the choice away from the optimiser*." (MM Assurance Report 2014, p. 15 (SOC136). See **Section 7.7.3** for comments on the use of 'must invest'.

610 Mott MacDonald notes that our "*process was reasonable, using a robust data source*" and that "*there is a strong 'line of sight' from your plans to accommodate population growth to outcomes for customers"*. (MM Assurance Report 2014, (SOC136)) p. 16.

611 In particular Mott MacDonald noted: "*You have followed a thorough approach to identifying needs for named schemes, which should have identified all main issues for a number of drivers such as resilience, growth, quality, and some aspects of maintenance. Your approach was reasonable, following a standard risk assessment that is directly linked to outcomes. It allows non-modelled schemes to be entered directly into the cross-asset optimiser*." (MM Assurance Report 2014 (SOC136); p. 5 and p. 15).

Figure: 45 Named scheme process



Source: Bristol Water

7.6.3.3 *Supply Demand Balance Model*

744. SDB requirements were modelled for a wide range of possible interventions.[612] These were optimised on an Average Incremental Social Cost (**AISC**)[613] basis to create a series of named schemes, which formed part of the input to the CAO.

745. The SDB model[614] selects the optimum combination of options required to maintain the target headroom over a 25-year period. The model optimiser has the objective of minimising the WLC of the competing groups of options available. The model function is

[612] For a more detailed description of our approach to assessing SDB, see: December Wholesale Plan, Supply Demand Balance, Approach and Methodology **('SDB Approach and Method.')** (SOC306).

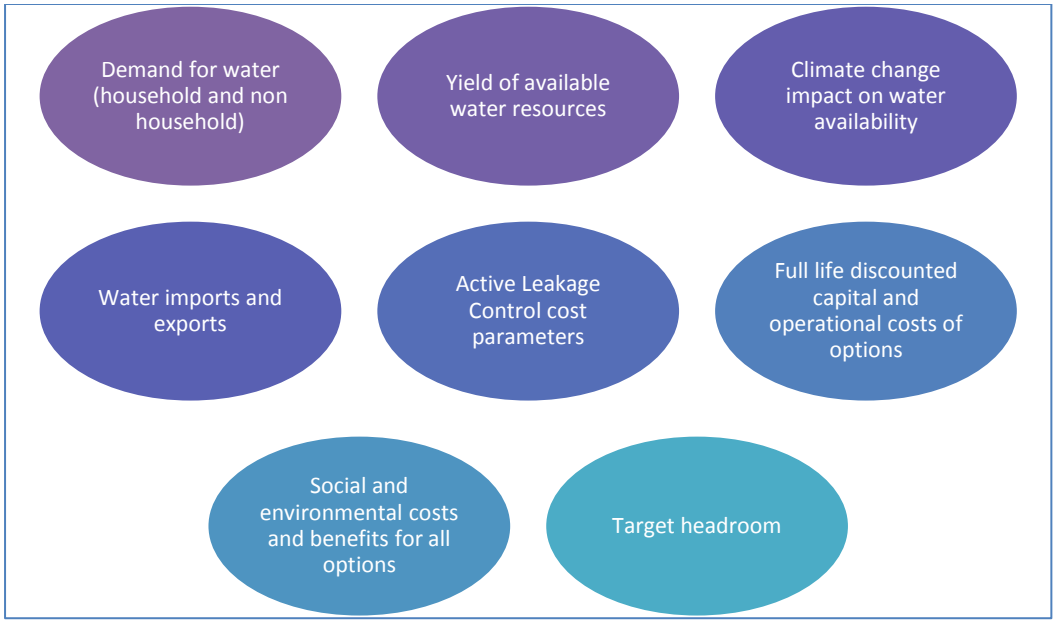
[613] UKWIR, The economics of balancing supply and demand **('UKWIR, balancing supply and demand')** (SOC377).

[614] SDB Approach and Method. (SOC306).

conditioned by real-world constraints, including headroom tolerance, Active Leakage Control (**ALC**) annual rate of change, feasible annual level of meter installation, etc.

746. The supply and demand model uses the key drivers shown in Figure 46:

Figure 46: Supply Demand Model Drivers



Source: Bristol Water

747. For any given scenario, the genetic algorithm[615] in the SDB model will output the optimum basket of investment options.[616] Individual options are selected from the following groups of interventions according to their impact on the WLC:

- supply schemes - water trading, unused or new water resource options;
- leakage schemes - variable in scale to maximise benefits balance with other schemes;
- infrastructure schemes - new mains and connection pipe options;
- metering schemes - household metering options; and
- demand management schemes - actions to help customers reduce consumption.

748. It then produces scenarios which are taken into the CAO. The approach has been carefully constructed so that there is no double counting between models informing the SDB and the CAO.[617]

[615] The model employs a genetic algorithm. This approach has been necessary due to the non-linear relationships between different investment options (between the level of leakage reduction and capital schemes for example).

[616] The optimum basket of investment options is defined as the collection of interventions that, over a period of 30 years, will result in the lowest WLC.

[617] Measures/Costs from ALMs that go into SDB have their respective measures/costs as Delta values in the CAO, where Delta means 'difference with values that have gone in SDB'. There are further measures/costs that are linked to the measures/costs that go directly into SDB and are therefore indirectly linked to SDB. These indirect measures/costs

7.7 How we identify the optimal package of interventions

749. Our complete Business Plan represents a collection of activities that is designed to meet the needs of the business as directed by the package of outcomes and performance commitments set up through consultation with our customers. We arrived at the optimal package through cost-benefit analysis based upon optimisation techniques, as well as considering scheme synergies. Each of these is considered in the following sub-sections.

7.7.1 Role of cost benefit analysis

750. Named schemes and ALM outputs were combined and assessed on a cost-benefit basis using Willingness to Pay (**WTP**)[618] values to identify the most optimal combination of interventions for various constraints. Risk scoring and intervention development were a key part of this; individual risks to performance were assessed (both manually and using modelling) scoring them against the valuation framework so they could be consistently assessed as to the costs and benefits. This ensured a wide range of options was considered.

751. In order to ensure that we deliver the most benefits for the cost of our activities we have ensured that cost-benefit analysis is at the core of how the CAO operates (see **Section 7.7.3** below).

752. The CAO compares the benefits of activities[619] with their costs.[620] It selects and schedules the schemes and interventions which provide the highest net benefit minus cost subject to any necessary performance requirements.

7.7.2 Scheme Synergies

753. In preparing the interventions and the inputs to the CAO, we consider needs at an holistic level, where appropriate, in order to take advantage of synergies.[621] An example is the Southern Resilience Scheme where the needs of improving resilience and meeting future demands were considered together in order to allow a more cost-beneficial scheme to be developed (see **Section 10.2.2.4.2** below).

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also need to be imported into the CAO with delta functions to avoid double counting. See Extended Delta Functions: SDB - ALMs - CAO (SOC365).

618 Customers' Willingness to Pay, our approach to capturing the data through research and the associated Peer review of our approach are discussed in **Section 6.5.5.**

619 By assessing changes in performance and customers' WTP for such a change.

620 Whilst the process is commonly referred to as Cost Benefit Analysis, the assessment identifies the benefit-to-cost ratio and requires that the ratio is at least greater than 1.0 i.e. that benefits are greater than costs.

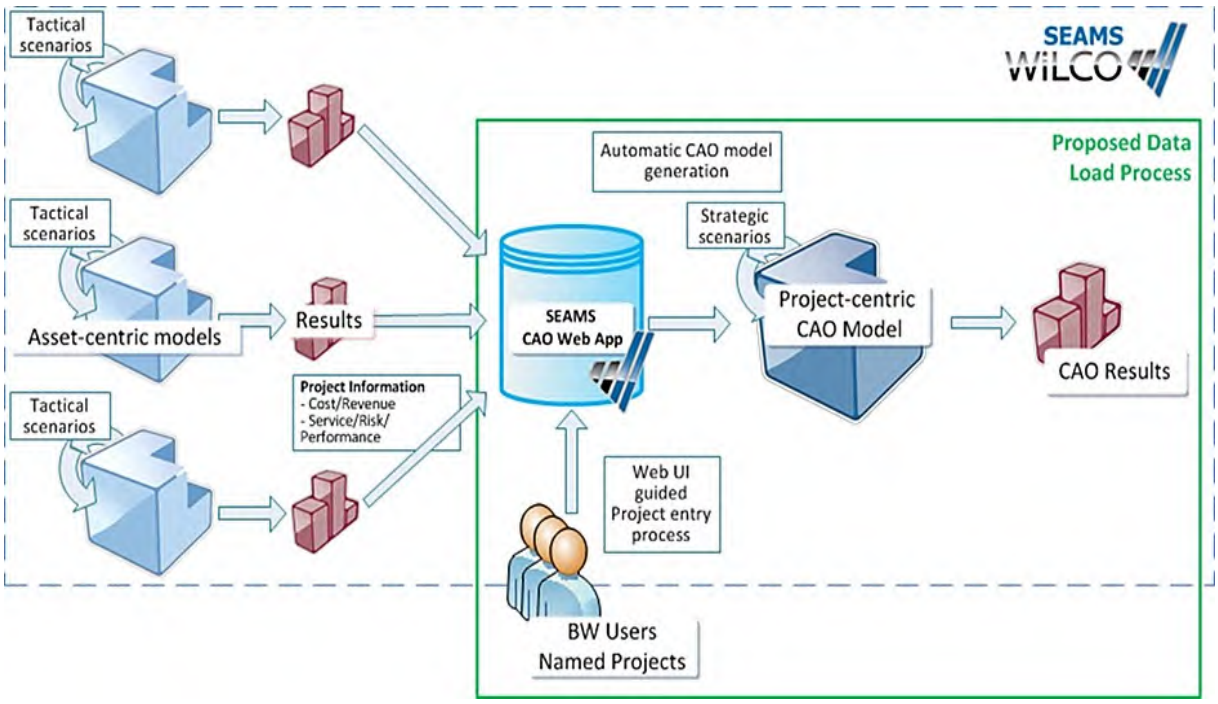
621 In this context, 'synergies' means where components of schemes can be combined to produce a lower cost total solution or greater overall benefits.

7.7.3 Cross Asset Optimisation

754. In developing our investment plan for AMP6, we passed all interventions through an optimisation process that assessed which solutions provide the best value for delivering overall targets of performance and cost.[622,]

755. The CAO is an intervention optimiser that uses the outputs of the various intervention identifiers, including scenarios from ALMs and the SDB model, along with named schemes, to identify which combination of interventions delivers the optimal solution in terms of delivering the performance commitments customers want for the lowest cost. This is demonstrated in Figure 47 below.

Figure 47: Cross Asset Optimiser



Source: Bristol Water/SEAMS

756. The CAO assesses all interventions on an equivalent basis, using customer WTP for changes in service in order to prioritise service and cost, resulting in a series of outputs which balance cost and benefit. This optimiser has been run using different constraints (predominantly around affordability and performance)[623] to reduce the size of the programme to be consistent with customers' acceptability around bills and preferences around the focus of investment.[624]

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622 A detailed description of our approach to optimisation and use of the CAO is provided in: December Wholesale Plan Cross Asset Optimiser (CAO) Approach and Methodology **('CAO Approach and Method.')** (SOC307). See also Cross Asset Optimisation and Uncertainty Analysis Process Summary **('CAO and UA process summary')** (SOC364).

623 By running the CAO with differing constraints (in terms of performance levels, affordability as well as unconstrained) we were able to investigate the maximisation of benefits and the minimising of costs under different scenarios. Details of the different scenarios are set out at p. 65 of the June Wholesale Plan (SOC002).

624 Our first stage customer acceptability testing indicated customer preferences for flat or only marginally increasing bills but increasing service (see **Section 6.5.7** above). The unconstrained cost beneficial programme is at least another

757. The constraints applied were:

- affordability (maximum level of capex); and
- performance e.g. no deterioration in service.[625]

758. We used these constraints to investigate the sensitivity of the optimisation in terms of which interventions dropped in and out of the plan dependent on the flexing of the constraints.

759. Following incorporation of the customer feedback from the first stage of the acceptability testing,[626] we were able to optimise to one plan, which became our single preferred plan. In some instances we picked the cheapest cost-beneficial intervention rather than the most cost-beneficial one since we wanted to constrain customer bills so that they were acceptable. This reflected customers'; views as identified in the acceptability research that to deliver their preferred bill levels they would accept a smaller improvement in the performance measure of negative water quality contacts.[627]

760. For ALMs and the SDB model, the complete results of several relevant scenarios are input into the CAO. Named schemes are described by a set of 'needs'. Each need will have one or more optimised intervention options that are considered.

761. A proportion of the named schemes are flagged in the CAO as 'must invest'. We regard these as mandatory because of the necessity to respond to the need to deliver these schemes. Accordingly these schemes, which have already been through a detailed optioneering process prior to their selection, are automatically selected by the CAO. We have constantly challenged the scope of these mandatory schemes to make sure they are consistent with our customers' priorities.[628] A scheme may be flagged as 'must invest' if:

- it addresses a statutory requirement (e.g. NEP schemes, or Health and Safety work);
- it addresses a regulatory requirement (e.g. a DWI undertaking):
- it addresses a requirement following a statutory or regulatory inspection (e.g. work following a Reservoirs Act inspection);

£80m larger (in 12/13 prices) and would result in significantly rising bills. As a result of stage one of the two stage acceptability testing, some interventions were either removed, added, or rescheduled within AMP6 and AMP7 to reflect customer feedback.

625 June 2014 Business Plan Evolution (SOC021), p. 29-30

626 See **Section 6.5.7.**

627 See Table 42 in **Section 6.5.7** above.

628 In its assurance, Mott MacDonald noted the role of 'must invest' schemes: "*Given the cost of the major resilience schemes their inclusion is likely to be a matter of management choice, considering corporate risk factors that may not be taken into account by the optimiser. It is therefore important that use of 'must invest' is fully justified in each case*." (MM Assurance Report 2014, (SOC136); p. 15-16). We have taken this advice on board in relation to the classification of must invest schemes and how they are tested. For instance, we ran a number of scenarios in the optimiser to test the sensitivity of the must invest schemes and the impact they had on the selection of other schemes. We used the results of this to confirm that the final selection of schemes was appropriate.

- it includes services or materials associated with a legal requirement (e.g. Roads and Street Works Act requirements, or WIA '91 connections); or
- it is for materials or services for which a particular analysis and assessment has been made (e.g. computer hardware or vehicles).

762. All non-mandatory named schemes and ALMs have benefits identified in terms of the performance measures they will impact.[629]

763. The totex related to named scheme interventions which spanned multiple investment categories were proportionally allocated on the basis of the decision to invest. This assessment was applied to the totex resulting from the intervention, including any transition spend[630] and the allocation of operating costs between wholesale and retail.[631]

764. We then took the capital components from the preferred CAO output[632] and reviewed them in light of the construction programmes, required delivery dates and priorities, to achieve a capital programme balanced across the years. We also created a 'minimum cost to maintain' capital programme for the Reliable Supply maintenance components and the minimum investment to maintain service components of the preferred capital programme.[633] This allowed us to identify where our programme plans do more than the minimum.

765. Following the development of the maintain programme, we were able to identify which interventions made up the difference between the 'maintain and enhance' case.[634]

766. We were then able to identify which interventions contributed to a step change in performance (considered as improvement) and which were to maintain existing performance.

767. The 'maintain' scenario, whilst of a lower cost than the submitted plan, was not consistent with the preferences of our customers who had expressed a preference to have increased levels of service with stable or declining bills (see **Section 6.5.2** above).

768. Our December Plan included the levels of service identified as favourable to customers with a Year One price reduction and then flat bills. The June Plan did the same, but with a greater price reduction, as did our DDR with a further price reduction. We have not amended the scope of the Business Plan as the performance commitments were developed in direct response to the first stage of our customer acceptability research (see

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629 Named Schemes Approach and Method (SOC305).

630 Transition investment relates to the expenditure companies would like to make in 2014/15 in preparation for the early delivery of outcomes in the AMP6 period. It is reported in Business Plan Table W3A and included in AMP6 expenditure reported in Table W3.

631 Ofwat, Regulatory Accounting Guideline 2 **('RAG2')** (SOC342), Section 3.

632 Extract from CPROG 9 Feb 2015 based on DDR plus open market costs and TM lining to enhancement.xlsx **Capital Programme 9 Feb 2015 Extract** (SOC546)

633 See commentary for Table W1 (December & June submissions Data Table W1 Commentary **('June Table W1 Commentary')** (SOC338).

634 Discussed in the commentary for Table W1 (June Table W1 Commentary (SOC338)).

Section 6.5.7 above); we have instead challenged ourselves to deliver what our customers want at the lowest possible cost.

769. We considered the outputs of the CAO carefully to give them a proper 'sense-check' at both the individual scheme level and at an overall plan level against our desktop models and our asset management knowledge before moving on to the next stages of the process.

7.8 How do we approach the costing of potential interventions?

770. Clearly, any assessment of cost effectiveness and any subsequent cost-benefit analysis relies on cost estimates being relevant and based on efficient base costs. In adopting a totex approach to costing, we have continued our historic approach of assessing all interventions from a whole life cost perspective.[635] Thus our approach to the optioneering for individual schemes (named schemes) was to carry them out on a whole life basis, as were the interventions considered as the response to the deterioration models.[636]

771. Examining the WLC of options wherever applicable provides us with the most cost-effective solutions across the life of the assets involved. WLC timescales are usually considerably greater than the five-year AMP periods typically used in regulatory price determination cycles. Despite aspects such as PAYG, this factor can result in slight imbalances between a totex determination and the optimal cashflow-based solutions, particularly where capex schemes provide the best options for major requirements.

772. Our WLC approach considers the capital and operational costs of all potential interventions that are suitable for addressing a particular 'need'. This includes operational workarounds, operational solutions and changes to operational practices, maintenance expenditure to keep assets operational and the provision of new assets.

773. The operating and capital costs used to build up the WLC included within our plan are based on a variety of sources including Bristol Water historic data (capex and opex),[637] supply chain estimates (from design consultants, contractors and suppliers, etc.),[638] and industry data (such as the water industry unit cost database 'TR61'[639]).[640] This builds on

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635 A detailed description of our approach is provided in: December Wholesale Plan, Costing and Estimating, Approach and Methodology **('Costing and Estimating Approach and Method.')** (SOC308).

636 Our approach to estimating totex was detailed in the June Wholesale Plan (SOC002); p. 69.

637 Generally costs are classified in our accounting systems and elsewhere, as operational costs or capital costs in the context of the type of activity to which they relate. Historical cost data on schemes is available from the SAP Project Systems and Finance/Control modules. See June Wholesale Plan (SOC002), p. 71-72 for further detail regarding our SAP data and management systems and how capex and opex is recorded.

638 Our supply chain contributors make use of their own information to prepare cost estimates that are fed into our costing process. This means that we are working with up-to-date information that is a reliable estimate of actual costs.

639 TR61 is a fully integrated tool that allows estimates of capital and operating costs and carbon emissions to be developed for a range of projects. It is specific to the water industry and is developed and maintained by WRc as a portfolio project.

640 The level of confidence that can be placed in each data source is actively considered and factored in to the CAO model as part of the uncertainty analysis. Further details are provided at p.73 of the June Wholesale Plan (SOC002). As new

the estimating approach used at PR09 which has been demonstrated to generate reasonable central estimates based on outturn costs (see **Section 3.6** above).[641]

774. The following Sections detail where cost data is derived from and how it is used within the various intervention types.

7.8.1 ALMs – source of cost data

775. Cost data used in the ALMs is derived from the following sources:

- historical total expenditure for similar interventions;
- supply chain estimates;
- validated engineering estimates; and
- data from the water industry unit cost database 'TR61' validated against comparable interventions.

776. All costs were adjusted to 2012/13 prices for use in the ALMs.

7.8.2 Named schemes – source of cost data

777. There are a variety of cost data sources available to us and in each case we select the best available.

778. Costs for named schemes are prepared against a defined scope for which a detailed bill of quantities is prepared. This is then costed by the supply chain team using the best available data and includes direct and indirect costs for both the client and the contractor including risk and contingency.[642] This is based on the supply chain team's experience of similar projects.

779. For a small number of named schemes for activities that repeat year on year, costs were based on historical expenditure.

7.8.3 Cost estimate risks

780. Our approach to cost estimates for schemes reflects the fact that there may be scope and variance during implementation. Given that costs are based on assumptions regarding scope derived at the planning stage, a contingency is included in the costing for some schemes to reflect project complexity. The activities that might give rise to additional cost, their likelihood and consequences are considered at the outset and included in a project risk register.[643]

7.8.4 Benchmarking of costs

781. We carry out benchmarking of our costs at a unit, scheme and programme level.

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and better data becomes available during the planning process, cost estimates are refined accordingly (June Wholesale Plan (SOC002) p. 74).

641 Based on December 2014 data, outturn costs for AMP5 specifically costed schemes are approximately 2% lower than the FBP09 estimates.

642 Mott MacDonald noted that our "*engineering costs are compiled in accordance with normal practice and although different cost estimation methods are used by different consultants, the overall process is good with a significant proportion of bottom-up costs*." (MM Assurance Report 2014, (SOC136) Section 3.3.6).

643 See June Wholesale Plan (SOC002), p. 73, for further details.

782. At a scheme level, costs are subject to internal review and are benchmarked against similar recent projects where these are comparable. This will be against actual costs from the Projects System module of SAP, the corporate enterprise resource planning system. Benchmarking is also undertaken using the water industry unit cost database, TR61, again where there are comparable projects.

783. We have initiated several, independent assessments of our cost-estimating procedures across operating and capital costs.[644] These studies have provided us with insights into the relative efficiency of our estimates in comparison with water industry best practice. Where room for improvement has been identified through benchmarking we have made adjustments to individual estimates or introduced efficiency challenges across relevant expenditure categories.

784. A selection of project costs was subject to review during the assurance process by Mott MacDonald.[645] In particular it assured the direct costs of five capital investment schemes and compared the costs with those of suitable benchmark companies.[646] A further 13 large infrastructure and non-infrastructure schemes were assured in advance of submission of the DDR.[647] Mott MacDonald was able to undertake a detailed, bottom-up comparison for some of the schemes and confirmed that for these schemes, the costs were within acceptable tolerances compared to other water companies.[648]

785. Overall, we believe the costs we have included in our plans compare favourably with those used in the industry as a whole and that our approach to costing is robust. Mott MacDonald stated that "*At the overall project level, your costs compare with our benchmark of recent industry costs (using four comparator companies)*".[649]

786. As a sense check, we have also considered how performance during AMP5 relates to the anticipated costs contained in CC10 and FBP09. As demonstrated in **Section 10.3.2.1** below, performance compared to the forecast for the specifically costed schemes has given the Board reassurance that the costing processes used produce reasonable central estimates of scheme costs. As a consequence the Board is confident that the cost estimates included in the plan are those that we expect that we will incur.

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644 MM Assurance Report 2014 (SOC136); CKBS Review of Benchmark Adjustment (SOC203).

645 MM Assurance Report 2014 (SOC136), p. 5.

646 The five schemes reviewed were Bedminster Service Reservoir, Paulton to Midsomer Norton, Southern support scheme, Glastonbury to Street growth scheme, and Croscombe Service Reservoir. These were estimated by Black & Veatch to have a value of £58m. (MM Assurance Report 2014 (SOC136), p. 17).

647 Mott MacDonald compared our cost estimates with our estimates for work of the same scope, using its benchmark cost data, covering both direct and indirect costs (MM Assurance Report 2014 (SOC136), p. 7). The new schemes included as part of this review were: six Trunk Mains schemes: Fishponds Road to Durdham Down; Henleaze Road to Durdham Down; Summerlands Road Weston; Chelvey to Portishead; Durdham Down Res; and Portway, and Stowey PH, Windmill Hill, Cheddar Algae and Barrow UV.

648 MM Assurance Report 2014 (SOC136), Section 3.3.2, p. 26. The review also resulted in some challenges by Mott MacDonald which were accepted by Bristol Water and responded to accordingly (see MM Assurance Report 2014 (SOC136), Table 3.2, p. 26).

649 MM Assurance Report 2014 (SOC136), Section 3.3.6).

787. Specific examples of benchmarking in relation to costs and individual schemes/interventions are provided in **Sections 9.4** and **10.3** below.[650]

7.8.5 Efficiencies

788. There are three principal ways in which efficiencies impact on intervention planning and cost estimates The first relates to ongoing business improvement aimed at delivering efficiency through the business, which impacts on levels of actual and historic cost that are used as inputs (see **Section 3.2.3.5.1** above for details of such business improvement programmes). The second relates to ensuring that scheme costs are efficient, and the third relates to ensuring that suitable efficiencies are applied at an overall programme level.

789. When looking at costs at a scheme level, efficiency is assessed in different ways for opex and capex:

- opex efficiency is assessed by reference to:
  - input price pressure and frontier efficiency; and
  - relative efficiency and an appropriate catch-up,
- capex efficiency is assessed by reference to:
  - an overall assessment of efficiency; and
  - input price pressure and frontier efficiency.

790. An outline of our approach to each of these is considered in the following sub-sections. Details of the actual levels of the efficiency targets are provided in the relevant sub-sections of **Sections 9** and **10.**[651]

7.8.5.1 *Wholesale opex efficiency*

7.8.5.1.1 Opex input price pressure and frontier shift

791. We place value on sound relevant benchmarking and trend assessments. Our assessment of input price pressure and frontier productivity growth is based on reports for Bristol Water by First Economics.[652] These reports set out a year-by-year estimate of input price inflation for Bristol Water's operating costs based on a detailed analysis of a range of input costs. The reports also identify productivity trends in a range of comparator industries to estimate the average annual rate of productivity improvement for water companies.

792. Further details of how this has been used, and the resulting frontier efficiency assessment are provided in **Section 9.3.2.3.1** below.[653]

793. As part of its assurance, Mott MacDonald considered our approach to efficiency. It noted:

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650 See also June Wholesale Plan (SOC002), p. 81.

651 Opex: **Section 9.3.2.3**; Capital Maintenance **Section 9.3.3.5;** Enhancement **Section 10.2.3.**

652 First Economics Report August 2013 (SOC014). This was updated in December 2014 to take account of updated projections of input price inflation and offsetting frontier productivity growth for AMP6: First Economics, Wholesale Input Price Inflation and frontier productivity growth December 2014 revision **('First Economics price inflation productivity growth Dec 14')** (SOC475).

653 See also June Wholesale Plan (SOC002), p. 75.

"We challenged your approach to forecasting future efficiency and wanted to check that it supported your statements to the local engagement forum. Opex has benefitted from below-inflation input price rises, but revenue has also fallen. We found that your approach was informed by industry research and carefully informed judgement on where future efficiencies may lie. We considered that your approach was reasonable. Since our assurance you have used external consultants (Baringa) to help identify potential savings and are continuing to research options to further reduce costs in the light of Ofwat's draft determination."[654]

7.8.5.1.2 Opex relative efficiency and catch-up

794. The assessment of relative efficiency is based upon a report for Bristol Water provided by Oxera.[655] The Oxera report discusses the use of a range of approaches for assessing relative operating cost efficiency. These approaches, and the preferred option, are set out in more detail in **Section 9.3.2.3.3** below.[656]

795. To set an efficiency assumption it is necessary to decide how much of any inefficiency can be removed, and the timescale required to remove it. This is captured in the rate of catch-up, which whilst challenging, should also be achievable. Details of the rate of catch-up assumed in the Business Plan are provided in **Section 9.3.2.3.3** below.[657]

7.8.5.2 *Wholesale capex efficiency*

796. There are three key ways in which efficiencies in capital expenditure can be delivered:

- doing the right mix of capital schemes and opex interventions to deliver the desired outputs (see **Section 7.8.5.2.1**);
- doing the right schemes (see **Section 7.8.5.2.2**); and
- doing the schemes at lower cost (see **Section 7.8.5.2.3**).[658]

797. Costs referred to in these sub-sections are the estimated costs prior to applying our efficiency challenge.

7.8.5.2.1 Doing the Right Mix

798. Companies have a wide range of potential capital schemes and operating activities they can undertake to maintain or improve service to their customers. In respect of capital schemes, some of the schemes could deliver more benefits relative to their cost than others, and consequently choosing the right schemes can have a significant impact on the overall efficiency of the capital programme. We consider that this element of capital efficiency has the potential to have the greatest impact on efficiency.

799. As set out above we have used an optimisation approach to determine the mix of schemes included in our plan. This takes into account the costs and benefits delivered by each

654 MM Assurance Report 2014 (SOC136), p. 18.

655 Oxera Opex efficiency wholesale Report November 2013 (SOC015).

656 See also June Wholesale Plan (SOC002), p. 76.

657 See also June Wholesale Plan (SOC002), p. 77.

658 See also June Wholesale Plan (SOC002), p. 78.

potential scheme and ensures that our plan is based on an optimal mix of interventions, including capital schemes. Consequently, we consider that our plan is fully efficient in respect of this factor.

800. It is possible that our understanding of the costs and benefits of potential capital schemes will change over time, or that the costs and benefits of schemes will turn out to be different from those forecast. This might mean that in retrospect our proposed programme would no longer appear efficient. However, we consider that as we have used central estimates of benefits and costs, any retrospective reassessment of the optimal programme is as likely to increase as it is to decrease. Therefore, we consider that changing the mix of investment is unlikely to create potential for additional efficiency.

7.8.5.2.2 Doing the Right Scheme

801. In many cases, there are a number of different ways in which a particular capital scheme can be delivered. For example, a new pipeline could take alternative routes, or a new treatment works could use a different mix of treatment processes. These different alternatives can impact substantially on the cost of a scheme, and therefore selecting the right option can have a considerable effect on the efficiency of our activity. We consider that this element of capital efficiency is less significant than doing the right mix of interventions, but greater than ensuring the schemes are done at minimum cost.

802. As explained above, we have undertaken relatively detailed design reports for all major capital schemes. These design reports investigate a range of possible solutions before identifying the optimal solution. The use of the CAO also strengthens our Business Plan by ensuring that the overall mix of options selected from named schemes and ALMs provides the most cost-beneficial approach to delivering performance commitments within the constraints of affordability and total cost. This approach ensures that our plan is as efficient as possible in respect of 'doing the right scheme'.

803. It is possible that new options previously not considered will be identified in the detailed design phase and that this will enable some schemes to be delivered at lower cost than included in the plan. On the other hand, in some cases detailed design will uncover issues not previously recognised that will lead to the costs of the scheme being higher than considered. We consider that the level of design we have undertaken in these schemes is sufficient to help us obtain reasonable central estimates of the costs. Therefore any variations reflect the uncertainty in the overall estimate of capital costs, rather than creating additional potential for efficiency.

7.8.5.2.3 Doing the Schemes at Lowest Cost

804. The third source of capital efficiency is making sure each scheme is delivered at an efficient cost. For the majority of our capital works, we sub-contract construction work to contractors through a competitive tendering process. We take a range of approaches to delivering work through contractors, depending upon the type of work, its associated risks and according to how we believe we will obtain best value. For some activities, we have entered into framework agreements, whereas for others we have used fixed price contracts for individual schemes or packages of similar schemes.

805. Competitive tendering does not necessarily ensure that we are delivering schemes at the lowest possible cost. It is possible that different procurement approaches might lead to lower or higher costs. However, we consider that our approach is in line with industry best practice, and cost comparisons undertaken by external consultants have shown that our costs are low compared to the industry average (see **Section 9.4** below). For example, a study into our network maintenance and mains rehabilitation contract showed our costs were below industry average.[659]

7.8.5.2.4 Frontier Efficiency

806. Our proposed rate of frontier efficiency on capital expenditure was based on analysis undertaken by First Economics.[660] Its analysis considered a range of input costs and predicted that capital expenditure price inflation will be higher than RPI. However, for our business plan, we capped cost increases at RPI. Details of the rate assumed are provided in **Section 9.3.3.5** below.

7.9 Benchmarking and assurance of our approach to planning

807. Our development and use of the SEAMS WiLCO models was peer reviewed by Atkins and assured by Mott MacDonald (see **Section 7.6.3**).

808. The Institute of Asset Management (**IAM**) has recently published a set of guidelines to the basic concepts and principles of asset management.[661] We consider that our methods and techniques for strategic planning of maintenance activity align consistently with the standards contained in the IAM document.

7.9.1 Review of our approach to capital maintenance planning

809. As noted above, CH2M Hill carried out a review of capital maintenance planning methods.[662] This work concluded that:

> *"The general approach to capital maintenance developed by Bristol Water and used during PR14 planning is considered sound with many constituent elements consistent with best current practice asset management principles."*[663]

810. The study compared the variety of methods available to water companies including bottom-up asset life cycle models, bottom-up risk-based models, top down econometric models and top-down historical spend models. CH2M Hill concluded that detailed, bottom-up, risk-based methods are the standard approach for capital maintenance investment plans for PR14 and should therefore be:

> *"Preferred as the primary method for CM investment estimating."*[664]

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659 Mott MacDonald, Bristol Water - Commercial Benchmarking Phase 2, Feb 2013 **('MM BW Commercial Benchmarking Feb 2013')** (SOC390).

660 First Economics Report August 2013 (SOC014).

661 IAM Asset Management - an anatomy **('Asset Management Anatomy July 2014')** (SOC094).

662 CH2M Hill CM Review Aug 2014 (SOC096).

663 CH2M Hill CM Review Aug 2014 (SOC096), p. 2.

664 CH2M Hill CM Review Aug 2014 (SOC096), p. 9.

811. Table 45 below compares and contrasts the different modelling approaches that could be used to assess expenditure requirements, and considers the potential advantages and limitations of the different approaches.

Table 45: Advantages and limitations of Top-down and Bottom-up approaches

Type	Advantages	Limitations	Recommendations
Bottom-up simple asset life cycle models	Can be done quickly using readily available data e.g. MEAV values (or other replacement costs) and assumed asset life values.	Assumptions considered to be too broad. Uncertainties about the impact of maintenance on asset life – can prolong asset life indefinitely – or maintenance costs may mean MEAV or replacement costs are underestimated. The approach is **not**: • risk based • forward looking • outcome focused • consistent with totex expenditure	**Not recommended as primary method for CM investment estimating.** Can be useful for benchmarking.
Bottom-up Complex models (e.g. SEAMs type or special survey)	Robust analysis capturing risks in a methodical and structured way. Service risks can be quantified and interventions prioritised.	Requires good quality data with good coverage of assets. Requires robust deterioration models – extensive technical knowledge to construct and run. Can readily incorporate impact of change drivers.	**Preferred as primary method for CM investment estimating.** These model types or equivalent have become the standard for CM investment plans for PR14.
Top-down – econometric models	Has statistical rigour. Reliability of outputs can be judged by the degree of significance of the explanatory variables.	Requires industry-wide data. Explanatory factors may not be easy to identify and may not be consistent in influencing investment spend. Interaction between variables may be complex and may not conform to modelling very well. Does not account for deterioration. Does not readily incorporate change drivers into analysis process. The approach is **not**: • risk-based • forward looking • outcome focused	**Not recommended as primary method for CM investment estimating.** Can be useful for benchmarking.
Top-down – historical spend	Uses readily available data. Can be made more reliable by introducing impact of factors such as change in asset inventory and potential impact of change drivers.	Does not account for deterioration. The approach is **not**: • risk-based • forward looking • outcome focused	**Not recommended as primary method for CM investment estimating.** Can be useful for benchmarking.

Source: CH2MHill[665]

812. With respect to our modelling system, SEAMS WiLCO, and our implementation of it, the study concluded that:

> *"Since the constituents of the tool are complete, a conclusion can be drawn that the approach, in principle, is good practice and compares favourably with other*

[665] CH2M Hill CM Review Aug 2014 (SOC096), Table 1 p. 10.

approaches used by other water companies and which meet up-to-date industry requirements."[666]

7.9.2 Benchmarking our approach to capital maintenance planning

813. The Utility Regulator for Northern Ireland (**UREGNI**) recently set out its preferred methodologies for capital maintenance planning.[667] Its assessment of the three strengths of forward-looking, risk-based systems is shown in Table 46, together with brief comments on how our methods are aligned:

Table 46: UREGNI - A forward-looking, risk-based assessment - Strengths

Water Regulator for Northern Ireland's Comment	Bristol Water's Position
A forward-looking, risk-based approach provides a rational economic basis for decisions on the timing of asset investment based on service. [668]	Capital maintenance planning undertaken through the use of a risk-based assessment of asset deterioration linked to service needs and assets. [669]
The analysis uses asset observations (including serviceability measures) to establish residual asset life. [670]	Deterioration models based on data from actual experience within the Company. Assessments of failure probabilities and remaining life are based on these models. [671]
The supporting analysis promotes learning and development which leads to more effective asset planning and investment. [672]	All assessments are reviewed to ensure consistency and completeness. Our asset management system incorporates aspects of regular review and continual improvement. [673]

Source: as per footnotes

814. The same annex contained four perceived weaknesses. However, as shown below in Table 47, the processes and resources we have in place mean that such potential issues are not problematic in our circumstances.

666 CH2M Hill CM Review Aug 2014 (SOC096),.p3.

667 Utility Regulator Northern Ireland, Northern Ireland Water Price Control, Our approach to Asset Maintenance **('UREGNI NI Water Asset Maintenance')** (SOC286).

668 UREGNI NI Water Asset Maintenance, (SOC286), p. 25.

669 June 2014 Business Plan Evolution (SOC021), section 4.2, p. 26.

670 UREGNI NI Water Asset Maintenance, (SOC286), p. 25.

671 June 2014 Business Plan Evolution (SOC021), section 4.2, p. 26.

672 UREGNI NI Water Asset Maintenance, (SOC286) p. 25.

673 June 2014 Business Plan Evolution (SOC021), section 4.2, p. 26.

Table 47: UREGNI - A forward-looking, risk-based assessment - Weaknesses

Water Regulator for Northern Ireland's Comment	Bristol Water's Position
Sound medium-term data on asset performance deterioration and potential interventions may not be available. [674]	We have sound data related to our assets, their performance and costs and therefore have developed good deterioration and cost models. [675]
May result in complex systems of analysis which mask material assumptions, are not well understood by the user and do not reflect the day-to-day investment decisions made by the company. [676]	Our analysis system is not a 'black box'. It has clear inputs and outputs and audit trails. We have expert, internal management of the system and full control and understanding of the results. [677] The results of this work were peer reviewed.[678]
Interventions must be defined in sufficient granularity to develop a well-targeted effective plan. [679]	Interventions are targeted at an asset, and where possible process or equipment, level to ensure plans are realistic and comprehensive. [680]
The available data may be weaker than the theoretical analysis requires resulting in a misleading or unreliable outcome[681]	Overall plans are built up from considerable detail and are constrained by overall performance commitments and customers' view of affordability. [682]

Source: as per footnotes

7.10 Comparing Bristol Water and Ofwat approaches to totex assessment

815. Our approach to intervention planning and cost assessment has enabled us to identify proposed need and expenditure on a bottom-up basis, split between the three key components of opex, capital maintenance and capital enhancement. This has then been checked through the use of third-party review, benchmarking and efficiency analysis to ensure that the right package is identified, at the lowest cost. These elements combine together to give a total totex figure.

816. In comparison, Ofwat has used econometric modelling to calculate a single figure for totex from which it derives proportional values for the three main components. This is supplemented by Cost Exclusion Cases and additional adjustments made at FD14 to compensate for perceived under-forecasting by the model. This approach is discussed in more detail in **Section 11** below.

817. Figure 48 shows, in simple terms, the differences in approaches.

674 UREGNI NI Water Asset Maintenance, (SOC286) ,p. 25.

675 June 2014 Business Plan Evolution (SOC021), section 4.2, p. 26.

676 UREGNI NI Water Asset Maintenance, (SOC286), p. 25.

677 June Wholesale Plan (SOC002), 'Intervention Planning', p. 62.

678 WTP peer review 2013 (SOC138), Atkins Wilco 1st Review March 13 (SOC344); Atkins Wilco 2nd Review May 13 (SOC345); Atkins Wilco 3rd Review August 2013 (SOC137), Atkins dWRMP review (SOC283), Atkins FWRMP/SEAMS review Oct 2014 (SOC202), MM Assurance Report 2014 (SOC136).

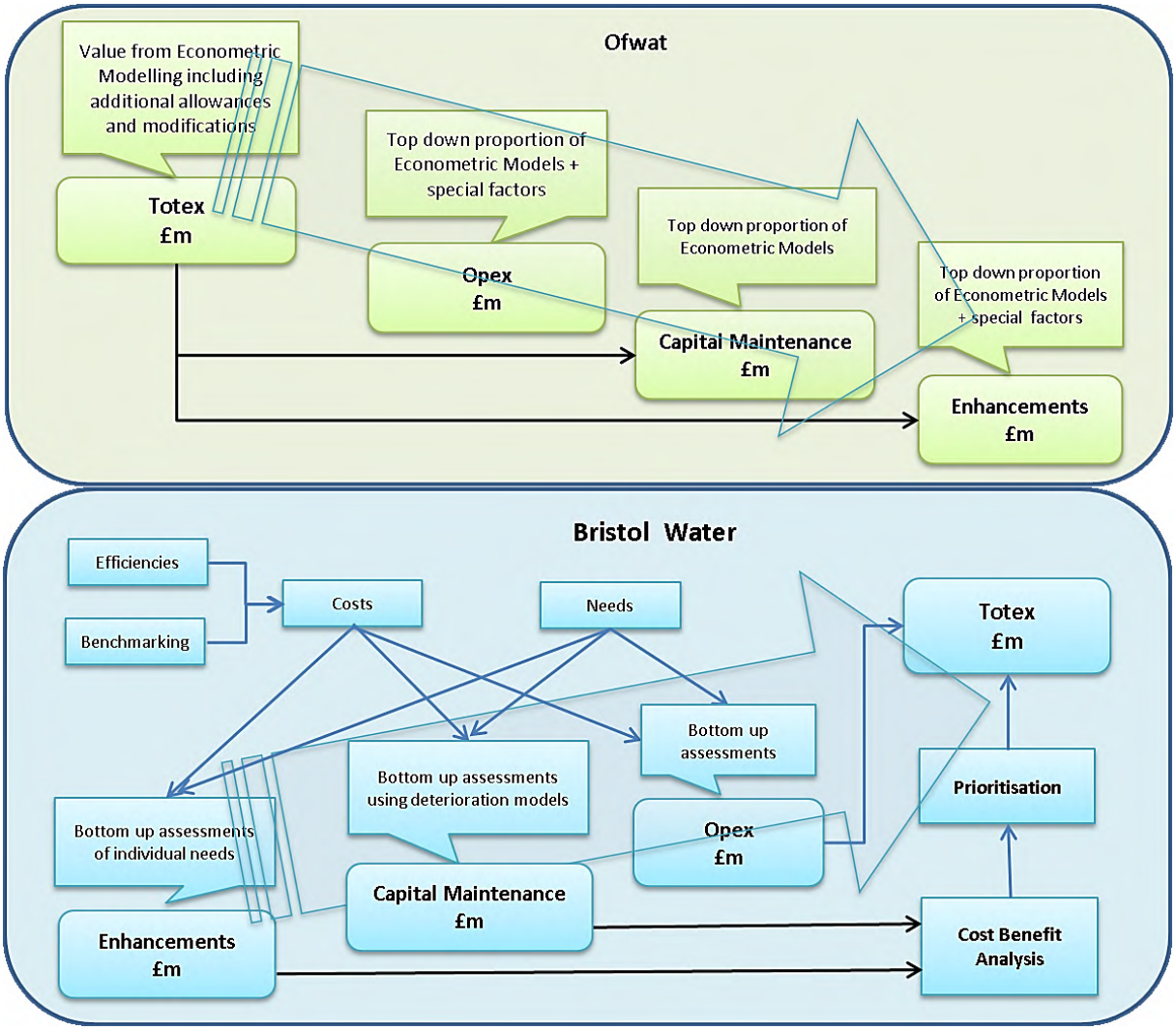
679 UREGNI NI Water Asset Maintenance, (SOC286) p. 25.

680 June Wholesale Plan (SOC002), 'Intervention Planning', p. 62.

681 UREGNI NI Water Asset Maintenance, (SOC286) p. 25.

682 June Wholesale Plan (SOC002), 'Intervention Planning', p. 62.

Figure 48: Assessment of Total Expenditure - Bristol Water and Ofwat Methodologies



Source: Bristol Water

7.11 Conclusions on our approach to totex-focused intervention planning

818. Bristol Water welcomes the focus on totex from an intervention planning perspective. It is consistent with its historic whole life cost approach, and allows for greater flexibility in the planning and delivery of solutions to satisfy the required outcomes.

819. Bristol Water's approach to intervention planning, which is based on a detailed engineering-driven, bottom-up assessment of need, scope, timing and costs has been reviewed and assured and is considered consistent with the PR14 methodology and industry good practice. Optioneering has identified a range of least-cost interventions, and cost-benefit analysis and optimisation has ensured that these have been put together in an optimal package.

820. Bristol Water's approach has allowed it to establish the needs of the business going forward in conjunction with its customers on the basis of the service they want and the price they are willing to pay. Bristol Water has identified the best solutions to meet those

needs through various methods designed to establish the most effective and beneficial plans.

821. Bristol Water received extensive external challenge on general procedures, specific schemes and costs to ensure it is taking the best approach and proposing a plan at the right cost estimate. Underlying costs have also been challenged through the business as usual benchmarking carried out as a matter of course. The benchmarking that Bristol Water has carried out demonstrates that its cost estimates are credible and fall within an appropriate range.

Part C: Determining the level of revenue for Bristol Water

8 An introduction to determining the level of revenue for Bristol Water

8.1 Executive Summary

8.1.1 Introduction

822. This Section provides an overview of the Building Blocks that must be taken into account in order to determine the total revenue figure. Whilst some of these Building Blocks represent issues where there is a difference in approach between Bristol Water and Ofwat, some, such as regulatory depreciation and taxation, are issues on which Bristol Water and Ofwat largely agree.

8.1.2 Key themes

823. **Sections 2** to **7** above provide background on the regulatory environment for water companies in England and Wales, Bristol Water's operations, the PR14 process and how Bristol Water's Business Plan was developed. From this Section onwards, this document focuses on the issues to consider when determining the level of revenue for Bristol Water.

824. Ofwat's FD14 reduced the average Bristol Water household bill from £198 to £162 in the first year of AMP6 followed by four years of £152.[683] This amounts to a 23% reduction (figures are in 2012/13 price base). Bristol Water's business plan for 2015 to 2020 had proposed a reduction in average household bills of 4.5%, or £9 in real terms, to £188. Due to movements in market data Bristol Water now proposes a bill of £187 in the SoC, a reduction of £11 in real terms.

825. This difference in revenue is largely because:

- Ofwat set the allowed level of total wholesale expenditure for Bristol Water at £409m, compared to Bristol Water's SoC that proposes wholesale expenditure of £537m;
- FD14 calculates a return on capital using a WACC of 3.6%. Bristol Water's Business Plan includes a small company premium to cover embedded debt costs and a higher asset Beta than large companies, and therefore proposes a WACC of 4.37%; and
- Ofwat used the PAYG ratio included in Bristol Water's business plan of 54%, and did not reflect the lower level of capital expenditure implied by reducing wholesale expenditure to £409m.

826. However, in reaching a determination, Bristol Water recognises that the CMA may review all of the calculations, or 'Building Blocks', required to determine the total revenue figure.

8.1.3 Structure of the Section

827. This Section provides:

[683] Due to changes in inflation assumptions for 2014/15 since submission of the DDR, our average household bill for 2014/15 is now £198 in 2012/13 prices. The DDR refers to an average household bill for 2014/15 of £197.

- **revenue building block approach** - an overview of the building block approach to the calculation of total revenue used by Ofwat, and identifies the relevant Sections of this SoC that discuss disputed or complex building blocks (see **Section 8.2**);
- **regulatory depreciation** - details of the approach to regulatory depreciation (see **Section 8.3**); and
- **taxation** - details of the approach to taxation (see **Section 8.4**).

8.2 Building blocks

828. Ofwat has determined revenues for three price controls for Bristol Water: Wholesale, Retail Household and Retail Non-Household.

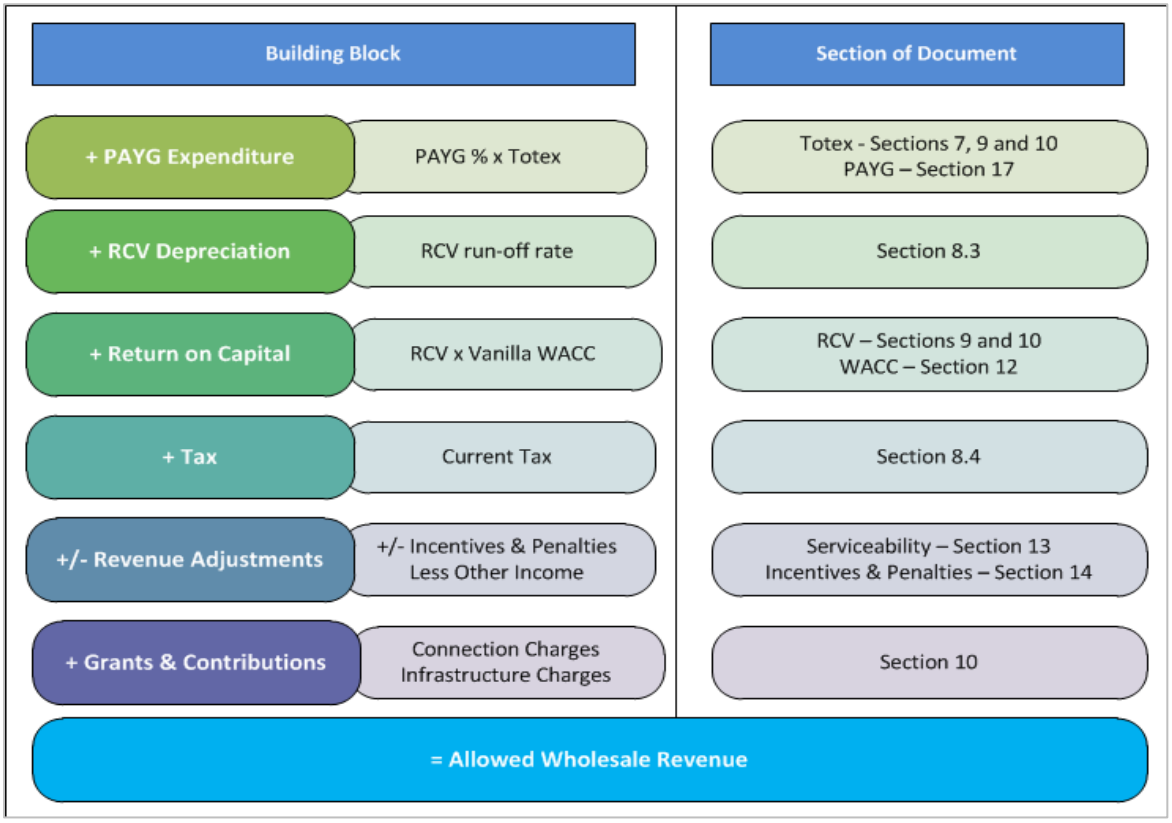
8.2.1 Retail building blocks

829. Retail revenues are determined by assessing the cost of serve and an appropriate margin. Retail Household revenue assumptions are set out in **Section 15**. Retail Non-Household revenue assumptions are set out in **Section 16**.

8.2.2 Wholesale building blocks

830. Figure 49 below sets out building blocks used to determine revenues for the Wholesale Price Control and the relevant Section of the SoC that discuss the issues relating to each building block.

Figure 49: Wholesale Price Control Building Blocks



Source: Bristol Water Regulatory Depreciation

831. Table 48 sets out Bristol Water's Revenue Allowance by building block, compared to FD14, and notes the Sections where revenue figures are specifically considered.

Table 48: Bristol Water's proposed revenue allowance compared to FD14

2012/13 prices	BW SoC	£m	FD14	£m	Section
Revenue building blocks: Wholesale					
Totex - baseline allowance	537		409		**Sections 9 & 10**
Totex - including menu choice			438		
Average PAYG rate	56%		55.3%		
PAYG Totex		299		242	
Pension deficit repair		-		2	**Section 9**
RCV					
Opening	410		403		
Additions (totex * (1-PAYG))	238		196		
RCV Depreciation	-129	129	-123	123	**Section 8**
Closing	519		476		
Average RCV	464		439		
WACC	4.37%		3.60%		
Return on capital		101		79	**Section 12**
Tax		18		5	**Section 8**
Removal of income from other sources		-9		-9	
Capital contributions (add back: income)		25		27	**Section 10**
Financeability adjustments (inc. menu choice penalty)		-2		-18	**Section 11 & 3**
Wholesale Revenue allowance		**561**		**451**	
Revenue building blocks: Retail					
Household cost allowance		47		45	**Section 15**
Household Margin		5		4	**Section 15**
sub total: Household allowance		**52**		**49**	
Non-Household costs		7		4	**Section 16**
Non-household Margin		3		3	**Section 16**
sub total: Non-Household allowance		**10**		**7**	
Total allowed revenues		**623**		**507**	
less: capital contributions		-25		-27	
Total allowed revenues for tariff calculation		**598**		**479**	

Source: Bristol Water analysis

832. Income from other sources reflects revenue that is not recovered through tariffs, such as the bulk supply of water to Wessex Water. This income is not set out in detail in the SoC as Ofwat has included the same value in FD14.

833. Capital contributions represent receipts from developers (see **Section 10.2.2.3.3** below) and have been included in the calculation for allowed revenues, according to Ofwat's

methodology. Capital contributions are removed from allowed revenues to calculate tariffs.

8.3 Regulatory depreciation

834. Bristol Water's approach to depreciation is not an area of dispute with Ofwat and the following Section is included for completeness.

8.3.1 Introduction

835. PAYG expenditure determines the revenue allowed for a percentage of the wholesale cost allowance incurred in a given period. The remaining cost allowance is added to RCV. Regulatory depreciation is the mechanism to provide revenue for the remaining cost allowance gradually over a number of years. RCV is reduced by the regulatory depreciation recognised in revenues. Regulatory depreciation is sometime referred to as "slow money", in contrast to PAYG expenditure ("fast money").

836. The PR14 process allows companies to flex both the PAYG and depreciation rates, meaning there might not be a direct link between the period that revenues are recovered and the life of assets.

837. Regulatory depreciation is categorised in Ofwat's models into two components:

- the run-off of the 2015 RCV ('opening balance'); and
- the depreciation of additions to RCV post 2015.

8.3.2 Bristol Water's approach to Regulatory Depreciation[684]

838. The approach we have adopted is to match depreciation to the life of the underlying assets.[685] For example, if an asset has an operational life of 25 years, the regulatory depreciation applied is also 25 years. Each year's depreciation mirrors the economic benefit which is being derived from the asset in that year, and reflects a reduction in the future benefit available. This approach means that the economic cost of the assets is balanced fairly between current and future customers.

8.3.2.1 Run-Off Rate of 2015 RCV

839. The run-off rate for 2015 RCV used in the plan is a reducing balance of 6.0%.[686] This run-off rate is based on:

- the underlying run-off rate of current cost depreciation of non-infrastructure assets;
- assuming that the infrastructure renewal pre-payment incurred during AMP5 is run off over the next 10 years (consistent with the previous 15-year approach to smoothing out infrastructure renewal expenditure); and
- depreciation of accumulated infrastructure enhancement assets over an 80-year life.[687]

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684 See Bristol Water PR14 Business Plan, Company Wide Plan, June 2014 **('June Company Wide Plan')** (SOC005), p. 167.

685 June Company Wide Plan (SOC005), p. 167.

686 June Company Wide Plan (SOC005), p. 167.

840. The run-off rate contributed by each of these factors was 4.3%, 1.2%, and 0.5% respectively.

841. This approach means that the depreciation is broadly consistent with the underlying life of the assets existing as at 31 March 2015.

842. The reducing balance approach is in line with Ofwat's guidance on depreciating the 2015 RCV.[688]

8.3.2.2 Depreciation of post-2015 additions

843. Additions post-2015 have been depreciated assuming a life of 30 years using a straight line approach.[689] This is the geometric average age of the assets being added during the period. The average age is relatively high because of the investment in long-life assets such as Cheddar Reservoir Two, new trunk mains and mains renovation. A smaller enhancement programme than set out in DDR would reduce the assumed asset life. For example, if there was no expenditure on Cheddar Reservoir Two in AMP6, the asset life would reduce from 30 years to 27 years:

- as with the run-off rate, this approach means that the depreciation on new assets is consistent with the underlying life of the assets; and
- the straight line approach is in line with Ofwat's guidance on depreciating new RCV spend.[690]

8.3.3 Ofwat position on Regulatory Depreciation

844. Ofwat's approach was for companies to propose RCV run-off rates in their business plans which Ofwat would assess and where necessary challenge as part of the RBR.[691]

845. We have received no challenge from Ofwat on our RCV run-off rates.

8.3.3.1 Comments on Ofwat's approach

846. Ofwat's approach has not changed since the publication of its guidance.[692]

8.3.3.2 Suggestions regarding the approach to be taken by the CMA

847. Our preferred approach is for the CMA to adopt the regulatory depreciation method used in our Business Plan.

8.4 Taxation

848. We have no objection to Ofwat's opex treatment of taxation in FD14. The tax allowed in the CMA's redetermination should reflect the actual current taxation expected to accrue from that redetermination.

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687 June Company Wide Plan (SOC005), p. 167.

688 Setting price controls for 2015 - 2020 – final methodology and expectations for companies' business plans Appendix 5: Guidance on business plan tables ('**Setting price controls final methodology A5**') (SOC228), W10 - cost recovery, p. 21.

689 See June Company Wide Plan (SOC005), p. 168.

690 Setting price controls final methodology A5 (SOC228), W10 - cost recovery p. 21.

691 Setting price controls final methodology A5 (SOC228), W10 - cost recovery p. 21.

692 Setting price controls final methodology A5 (SOC228), W10 - cost recovery p. 21.

8.4.1 Introduction

849. The taxation building block is the current tax accrued in each year of the AMP based on the expected profits that will be reported within Bristol Water's statutory accounts (subject to group gearing considerations).

850. The main influences on the tax figure are:

- the actual profit before tax prepared on a statutory basis with actual gearing, of which determining the right amount of opex is a key constituent part;
- the accelerated tax relief generated on the actual capital programme for PR14 (tax allowances net of depreciation);
- the unwinding of the accelerated tax relief generated on pre-2014 capital; programmes (tax allowances net of actual statutory depreciation);
- the cash payments to the pension fund in excess of the accrual in the accounts; and
- expenditure that is not allowable for tax purposes.

8.4.2 Bristol Water's approach to Taxation

851. Bristol Water based its tax charge on actual profit before tax and actual gearing. We used the actual depreciation generated in calculating the accelerated tax relief.

852. Bristol Water identified the tax allowances on the capital programme, by considering the tax life of each capital project with reference to:

- the nature of the project;
- the treatment of the project for statutory accounting purposes; and
- the expected tax allocation, with reference to historic treatments where possible.

853. For the purposes of completing the average tax lives within the Ofwat table we translated the average tax life generated on spend in each year of the AMP period into an average allowance life for each period, in order that the model generated appropriate allowances in each period.

8.4.3 Ofwat position on Taxation

854. Ofwat calculated taxation based on FD14 based actual statutory profit before tax and the actual gearing identified in FD14.

855. Ofwat used the actual depreciation anticipated in FD14.

856. Ofwat used the average tax lives and other data as supplied by Bristol Water plc in table A3.

8.4.4 Comments on Ofwat's approach

857. Ofwat's approach in calculating the tax is consistent with expectations.

8.4.5 Conclusions in relation to taxation

858. In carrying out its redetermination, we would like the CMA to:

- ensure that the revenue building block relating to tax is recalculated based on the actual profit before tax and the actual depreciation as anticipated to be disclosed on a statutory basis, assuming actual gearing levels; and
- consider requesting a reassessment of the average tax life of PR14 expenditure if there are significant changes in the final capital programme envisaged by the CMA's redetermination in comparison to Bristol Water's June Submission.

9 Base totex: the scope of our programme and proposed costs

9.1 Executive summary

9.1.1 Introduction

859. This Section sets out the scope of our wholesale base totex programme. Base totex refers to the combination of operating costs and capital maintenance. It excludes enhancement costs, which reflect step changes in service levels and costs (see **Section 10** below).

860. This Section builds on the description of our outcomes provided in **Section 6** above, and our process for translating these into our plan in **Section 7** above, and describes how this was applied in practice to this part of the wholesale business in order to forecast the levels of maintenance activity and expenditure needed to deliver the required levels of service. In particular it sets out:

- the activities which are comprised in the programme and the associated costs and details of how they were derived;
- the assurance processes we have undertaken;
- how these costs have been benchmarked against the industry; and
- how Bristol Water has assessed its existing efficiency and then applied a stretching efficiency target so that the costs included in the plan are challenging.

9.1.2 Key themes

861. The base totex included in Bristol Water's Business Plan is set out in Table 49 below. Whilst interventions have been assessed on a whole life cost basis (see **Section 7** above), due to the nature of costs being different, the resulting expenditure has been set out separately for operating costs and capital maintenance expenditure.

Table 49: Bristol Water PR14 Business Plan Wholesale Base Totex

	Bristol Water Business Plan £m 12/13 prices (SoC)
Opex	228
Capital Maintenance	156
Base Totex	385

Source: Bristol Water SoC[693]

Our approach to developing our business plan is consistent with good practice

862. Bristol Water's wholesale Business Plan is based on a robust process that has translated customer-driven outcomes and other indicators of need into an overall package that enables it to deliver the required level of service at low cost.

863. Bristol Water's assessment of its wholesale requirements reflects the nature of its operational environment, including the factors that increase or decrease its underlying

[693] Opex and base totex figures reflect reductions in input price pressure compared to DDR.In this and subsequent tables in this section line items may not sum to the total due to rounding.

costs (see **Section 3** above). In creating a plan that reflects, for example, maintenance needs and costs driven by treatment complexity (see **Section 3.4.6** above), Bristol Water has been able to draw on its detailed understanding of its assets and supply system, supported by cost benefit analysis, assessment tools and expert advice (see **Section 7** above).

864. Bristol Water's Board required considerable levels of assurance for all aspects of the development of the Business Plan as set out in **Sections 5** and **7**. The role played by independent experts in our assurance process is summarised in Table 50.

Table 50:External assurance and expert review

Independent View From Keith Harris	Totex	Base Totex Costing	Opex	Oxera
				CH2M HILL
			Capital Maintenance	Oxera
				Mott MacDonald
				CH2MHILL
		Enhancement Costing	Capex	Mott MacDonald
				Atkins
				ChandlerKBS
	Plan Challenges	Efficiency	Totex	ChandlerKBS
				Mott MacDonald
				Baringa
				ICS
				First Economics
	Viability of Business Plan	Financial Assessment	Modelling	KPMG
			Cost of Capital	KPMG
				Oxera
			Financeability	KPMG
	Consideration of Various Techniques	Modelling Approaches	Totex	BW Models
				Ofwat Models
				Oxera Models
				Industry Benchmarking

Source: Bristol Water

Bristol Water's cost assumptions are challenging and are set against a variety of benchmarks

865. Bristol Water has assumed challenging total efficiency targets which equate to savings of £31.4m for base totex. This breaks down into:

- **opex efficiency** = 1.5% p.a. cumulative[694] equating to savings of £14.m (on average, a 6% saving over AMP6); and

[694] Net efficiency is 0.9%, which reflects that wholesale input costs are expected to increase by 0.6% above RPI, updated for the SoC.

- **capital maintenance efficiency** = 10% equating to savings of £17.3m.[695]

866. Bristol Water has tested these efficiency estimates through:

- instigating detailed reviews of methodology and cost analysis by independent experts;
- benchmarking its capital maintenance expenditure through a range of approaches including:
  - an asset life replacement approach;
  - relatively simple econometric models developed by Bristol Water;
- engagement with external consultants to review its business operations to look for efficiencies that can be made; and
- benchmarking the schemes proposed to industry good practice, so that Bristol Water is confident it has identified the most appropriate interventions.

867. Bristol Water has used scheme specific benchmarking and independent assessment by Mott MacDonald and Chandler KBS (**CKBS**) of its cost estimating procedures to inform relative efficiency, and efficiency challenges have been applied accordingly.

868. On 6 August 2014, Ofwat notified Bristol Water that a substantial totex gap remained and that it continued to base its assessment on its cost model. Bristol Water therefore engaged Oxera to build additional, robust, econometric models to benchmark base totex.

869. Table 51 below sets out the results of Oxera's disaggregated modelling approach for operating costs and capital maintenance in combination. It shows that the base totex in Bristol Water's Business Plan is within the upper quartile range identified by Oxera, albeit that those statistical approaches which do not allow for 'special factors' (see **Section 9.3.2.**4 below) have been supplemented by other analysis of those factors.

Table 51: Oxera modelling approach for upper quartile costs

[695] These figures represent savings compared to pre-efficiency costs.

Analysis of Oxera modelling	SFA Frontier[696]	SFA (Upper Quartile)[697]	OLS (Upper Quartile)[698]	RE (Upper Quartile)[699]	Bristol Water SOC
Oxera Report Table 7.5[700]	356	Not shown	365	372	
Oxera Disaggregated range for Wholesale Base totex[701]	355-376	373-386	361-373	365-378	
Bristol Water opex Special Factors[702]			20	20	
Wholesale Base totex including Bristol Water special factors		373-386	381-393	385-398	385

Source: Oxera[703] / Bristol Water Analysis

870. As a result of the range of external challenge received, Bristol Water believes:

- the level of efficiency challenge assumed in its plan is demanding and will be difficult to deliver;
- that appropriate top-down disaggregated cost assessment shows that the cost estimates are within an efficient range; and
- its proposals reflect the most appropriate mix of cost-beneficial solutions to address customer requirements, at a level that customers can afford and are willing to pay.

Ofwat's totex assessment is insufficient to deliver the outcomes customers want

871. Based on a cost assessment approach that is discussed in more detail in **Section 11**, Ofwat set the allowed level of total wholesale expenditure at £409m, 24% lower than Bristol Water's proposal of £537m. The difference in base totex is £66m.

872. Bristol Water considers that the allowance is insufficient to efficiently deliver the services, outcomes and performance levels contained in the Business Plan and supported by

696 SFA refers to the four component stochastic frontier analysis modelling approach used by Oxera.

697 SFA Upper Quartile refers to the upper quartile expenditure predictions from Oxera's SFA model. The SFA upper quartile range has been calculated by Bristol Water using the "core" and "sensitivity 1" scenarios presented in tables 7.1 & 7.2 and figures from table 7.3 (Oxera BW Efficient Cost Level March 2015 (SOC536)). The conversion from frontier to upper quartile used the results in Table A5.1 (Oxera BW Efficient Cost Level March 2015 (SOC536)).

698 OLS refers to the Ordinary Least Squares pooled data statistical model.

699 RE refers to the Random Effects Statistical Model.

700 Oxera, Estimating Bristol Water's Efficient Cost Level using Disaggregated Modelling March 15 **('Oxera BW Efficient Cost Level March 2015')** (SOC536).

701 Table 7.5 in Oxera BW Efficient Cost Level March 2015 (SOC536) sets out the mid-point values for each modelling approach, including botex. We present the full range of Oxera's disaggregated modelling approaches (and therefore exclude botex) for opex and capital maintenance and compare the predictions in combination.

702 Based on ICS review of Bristol Water's Approach to Assessing Serviceability Status **('ICS Report on Serviceability')** (SOC268): Additional costs for Purton and Littleton (£8m); canal and river trusts (£8m); and additional congestion costs (£4m). Special factors are not included for the SFA approach as they should be automatically accounted for by this method to the extent that they can be captured by the data. Oxera has not assessed Bristol Water's special factors in the context of the RE and OLS models, nor the extent to which there may already be an implicit allowance in the upper quartile adjustment. The approach adopted here for special factors is consistent with Ofwat's approach to cost assessment.

703 Oxera BW Efficient Cost Level March 2015 (SOC536), p. 41-46.

customers (see **Section 6** above). Bristol Water does not consider that Ofwat's FD14 expenditure forecast can be met through reduction of the scope of its programme, or application of further efficiencies. As demonstrated in Table 52 below, there is a wide difference between the wholesale totex proposed in our Business Plan, the Oxera analysis and what has been allowed by Ofwat in FD14.

Table 52: Wholesale AMP6 Expenditure

	Bristol Water Business Plan (SoC) (£m)	Oxera upper quartile analysis adjusted for special factors[704] (£m)	Ofwat FD14 (£m)
Opex	228	209-223	188
Capital Maintenance	156	148-168	130
Base totex	385	373-398	318

Source: Bristol Water Analysis / Oxera

873. Ofwat's cost allowance assumes an immediate, additional 18% reduction in operating costs compared to Bristol Water's Business Plan.[705] The operating costs included within the Business Plan are broadly flat compared to 2013/14, in which year they were in line with the CC10 redetermination. The opex allowance is significantly lower than Oxera's disaggregated modelling results.[706] Bristol Water does not consider that a reduction of the magnitude envisaged by Ofwat is credible or deliverable.

874. Ofwat's cost allowance for capital maintenance is £130m, £26m (17%) lower than Bristol Water's Business Plan. This allowance is considerably less than indicated by Oxera's disaggregated modelling which indicates a range of efficient capital expenditure of £141-£168m (upper quartile £148m - £168m). It represents a 35% reduction compared to the level of maintenance assumed in the CC10 redetermination, and a 37% reduction compared to actual maintenance expenditure during AMP5. Bristol Water does not consider that the allowance for capital maintenance in FD14 is sufficient to maintain its supply system appropriately.

9.1.3 Structure of the Section

875. This Section is structured as follows:

- **base totex programme and outcomes** - an overview of the scope of Bristol Water's proposed wholesale programme including the allocation of expenditure to outcomes (see **Section 9.2**)
- **base totex programme scope and costs** - Bristol Water's proposed base totex programme and associated costs (see **Section 9.3**):

[704] OLS and RE models only as SFA already includes special factors. Oxera has not assessed Bristol Water's special factors in the context of the RE and OLS models, nor the extent to which there may already be an implicit allowance in the upper quartile adjustment. The approach adopted here for special factors is consistent with Ofwat's approach to cost assessment.

[705] Alternatively, the reduction can be met by a 7% cumulative year-on-year reduction in operating costs.

[706] Oxera BW Efficient Cost Level March 2015 (SOC536), p. 41-47.

- **operating costs** - a discussion of Bristol Water's anticipated wholesale operating requirements and the associated costs (see **Section 9.3.2**); and
- **capital maintenance -** a discussion of Bristol Water's anticipated wholesale capital maintenance programme, and the associated costs (see **Section 9.3.3**);

- **assurance, benchmarking and challenge** - details of the assurance and benchmarking carried out to ensure that the scope and costs of the programme are reasonable and efficient (see **Section 9.4**):
  - **efficiency** – a description of the evolution of the efficiency challenge (see **Section 9.4.2**)
  - **opex** - assurance and benchmarking of opex (see **Section 9.4.3**); and
  - **capital maintenance** - assurance and benchmarking of capital maintenance (see **Section 9.4.4**);
- **Oxera modelling** – a discussion of Oxera's modelling of opex and capital maintenance (see **Section 9.5**);
- **Ofwat view and critique** - Ofwat's assessment of Bristol Water's proposals and Bristol Water's critique (see **Section 9.6**); and
- **conclusions** – conclusions on the proposed wholesale plan and its various cost components (see **Section 9.7**).

876. Any figures within this Section are post-efficiency and in 12/13 prices unless otherwise stated.[707]

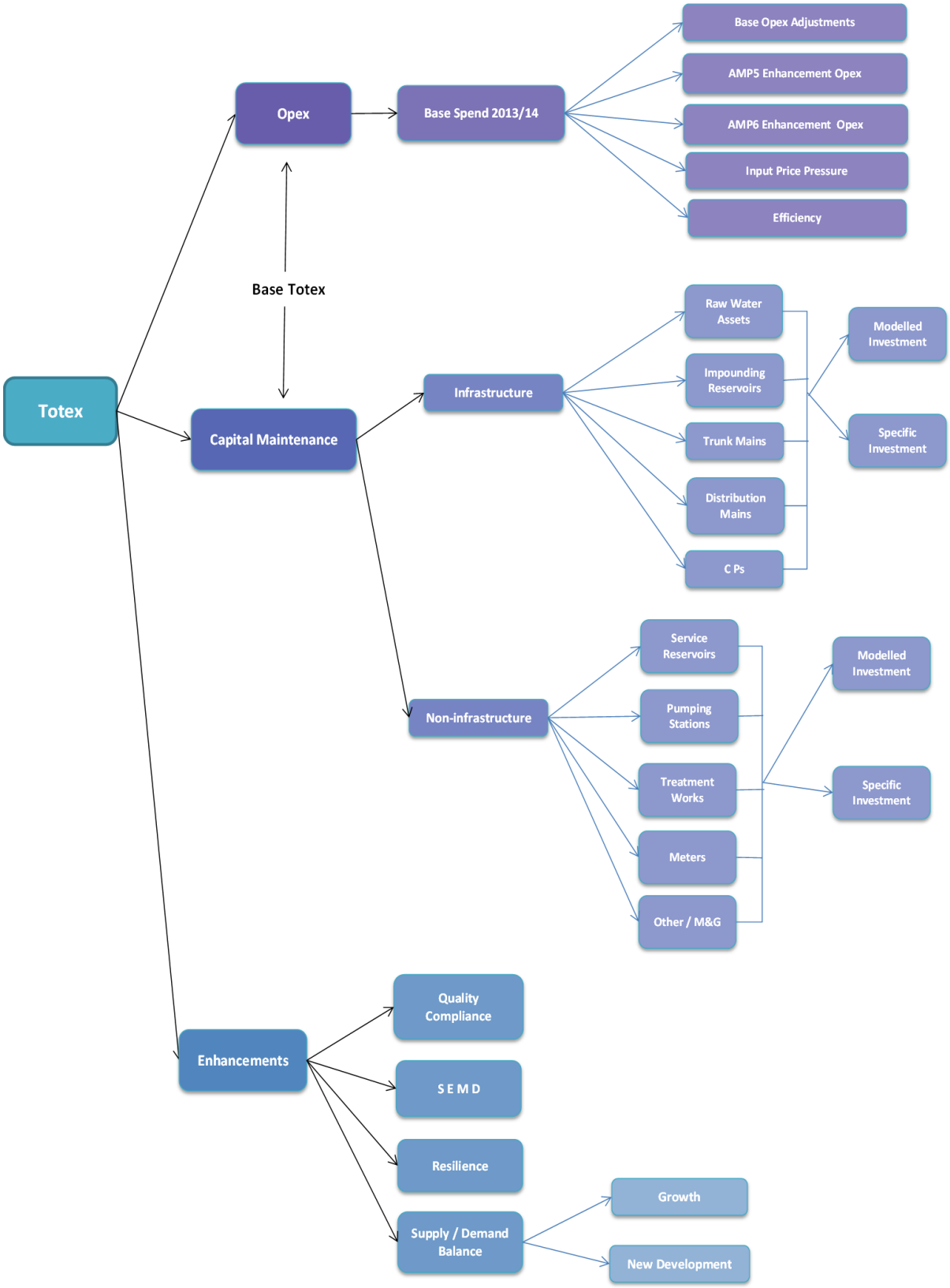
9.2 Base totex programme – link to outcomes

877. As discussed in **Section 7** above, our forecast expenditure requirements for Wholesale interventions were built up from a detailed assessment of the elements that are shown in their basic form in Figure 50 below.[708]

[707] Any figures contained in **Section 7** are pre-efficiency unless otherwise stated.

[708] AMP6 enhanced opex is included in base totex because it is a small amount most easily discussed with other opex issues and the historical amount on which opex benchmarking has been based includes opex arising from enhancement.

Figure 50: Disaggregation of Totex



Source: Bristol Water

878. Operating expenditure (**opex**) largely covers Bristol Water's general running costs (**base opex**) and includes the costs of operating our asset base, providing technical, professional and administrative support and the provision of consumable items. The largest cost elements are labour, power and materials. **Enhancement opex** is cost associated with operating capital enhancement additions prior to the asset forming part of the base at the next price review, or opex-only solutions used to deliver the necessary enhancement (see **Section 10** below).

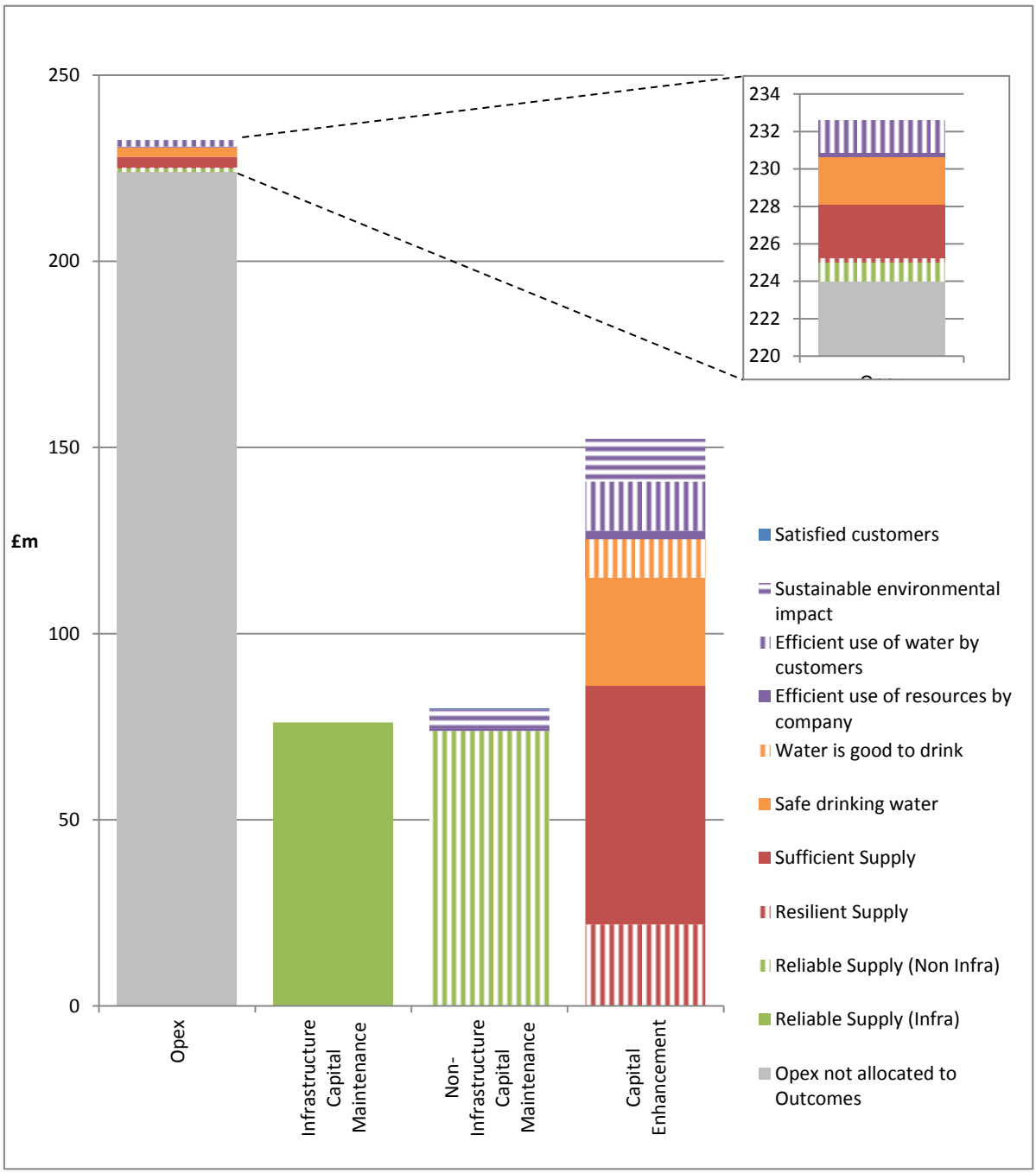
879. Capital maintenance covers the refurbishment or replacement of operational assets where there is no enhancement to service. The need for such activities is largely driven by deterioration although other aspects such as health and safety requirements and operational compliance are also factors. Capital Maintenance expenditure is split between Infrastructure Renewals Expenditure (**IRE**) and Maintenance Non-Infrastructure (**MNI**).

880. Our expenditure is primarily linked to the asset groups themselves which were the basis of our asset based bottom-up modelling and programme optimisation. This approach identifies expenditure in terms of operating expenditure, capital maintenance and capital enhancement, allocations which are required for reporting and tax purposes.[709] As we are able to identify how each intervention contributes to the delivery of individual outcomes, we can allocate expenditure in accordance with both approaches, except for base opex, which is not allocated in this way.[710] This is demonstrated in Figure 51 below.

[709] Bristol Water June Business Plan Data Tables **('June plan data tables')**, (SOC328), Table W3.

[710] In allocating expenditure to outcomes (June Plan data tables (SOC328), Table W1) only the relative increase in base totex was required because Ofwat did not expect companies to allocate base opex by Outcomes.

Figure 51: Allocation of totex to outcomes[711]



Source : Bristol Water

[711] Detailed allocation of each capital scheme is provided in the capital programme Extract from CPROG 9 Feb 2015 based on the DDR plus open market costs and TM lining to enhancement ('**Capital Programme 9 February 2015**') Extract (SOC546).

9.3 Our proposed base totex programme and associated costs

9.3.1 Executive summary

9.3.1.1 *Introduction*

881. This Section sets out details of Bristol Water's anticipated wholesale operating costs based on expectations regarding the day-to-day requirements for the business. It also discusses our proposed wholesale programme to maintain the provision of base service to our customers through capital maintenance.

9.3.1.2 *Key themes*

882. Bristol Water's operating costs reflect the Company's operating environment, and take account of those factors which increase or decrease the amount of expenditure required. This includes, for instance, factors such as power costs, input requirements (e.g. chemicals for water treatment) and the level of maintenance needed to keep Bristol Water's assets functioning at an appropriate level.

883. The level of opex efficiency assumed in the plan is 1.5% p.a. cumulative[712] equating to savings of £14m. On average this represents a 6% reduction over AMP6 and will be challenging to meet.

884. Bristol Water has quantified its future capital maintenance expenditure through the use of deterioration modelling covering much of its asset base, and the use of named scheme options where deterioration modelling is inappropriate.

885. In line with much of the industry, Bristol Water has invested in the data and tools to develop prioritised expenditure plans based on least cost asset spend analysis of its assets in line with good industry practice; the Business Plan reflects the outputs from that process.

886. Bristol Water has applied a very challenging efficiency assumption of 10% onto the basket of capital maintenance costs, resulting in a requirement of £156m.

887. The expenditure that Bristol Water has included in its Business Plan is a realistic, evidence-based and challenging assessment of its requirements.

9.3.1.3 *Structure of the Section*

888. This Section is structured as follows:

- **wholesale operating costs -** Bristol Water's AMP6 operating requirements and associated expenditure (see **Section 9.3.2**); and
- **wholesale capital maintenance programme -** details of Bristol Water's proposed capital maintenance programme and the associated costs (see **Section 9.3.3**).

[712] Net efficiency relative to RPI is 0.9%, which reflects that wholesale input costs are expected to increase by 0.6% above RPI, updated for the SoC.

9.3.2 Wholesale operating costs

9.3.2.1 *Introduction*

889. This Section sets out details of Bristol Water's anticipated wholesale operating costs based on expectations regarding the day-to-day requirements of the business in order to deliver its services to customers.

9.3.2.2 *Establishing our operating costs*

890. As set out in **Section 3.4** above, Bristol Water takes water from raw water sources of differing qualities, treats the water to an appropriate standard and then provides it to our customers across a complex and old network. To do so requires us to employ staff, use chemicals, buy power, carry out maintenance tasks, etc. All these day-to-day operational activities equate to expenditure required to keep the water supplies flowing and for appropriate levels of service to be met.

891. In order to calculate our anticipated operating requirements, activities, and costs for AMP6, we have followed a similar process to that used when planning for AMP5.

892. We have started with actual operating costs from a base year and made adjustments to ensure the amount was appropriate to use for AMP6. We have then assessed future changes in our costs and, in doing so, have applied input price inflation and frontier and relative efficiency adjustments to reduce the gap to the frontier company.

893. Each of these elements is considered in more detail in the following sub-sections:

- identifying the base year for operating costs (see **Section 9.3.2.2.1**);
- adjustments to base year costs (see **Section 9.3.2.2.2**);
- input price inflation adjustments (see **Section 9.3.2.3.1**);
- frontier productivity growth adjustment (see **Section 9.3.2.3.2**);
- relative efficiency adjustment (see **Section 9.3.2.3.3**); and
- special factors (see **Section 9.3.2.4**).

9.3.2.2.1 Base year for operating costs

894. We have used 2013/14 as the base year for our Business Plan operating costs calculation. 2013/14 is an appropriate year to use as:

- it is the most recent actual data available;
- actual expenditure in 2013/14 is in line with the CC10 Redetermination allowance for that year (see **Section 3.6** above); and
- the level of operating expenditure allowed for in AMP5 was based on factors that will continue in AMP6.

9.3.2.2.2 Adjustments to base year operating costs

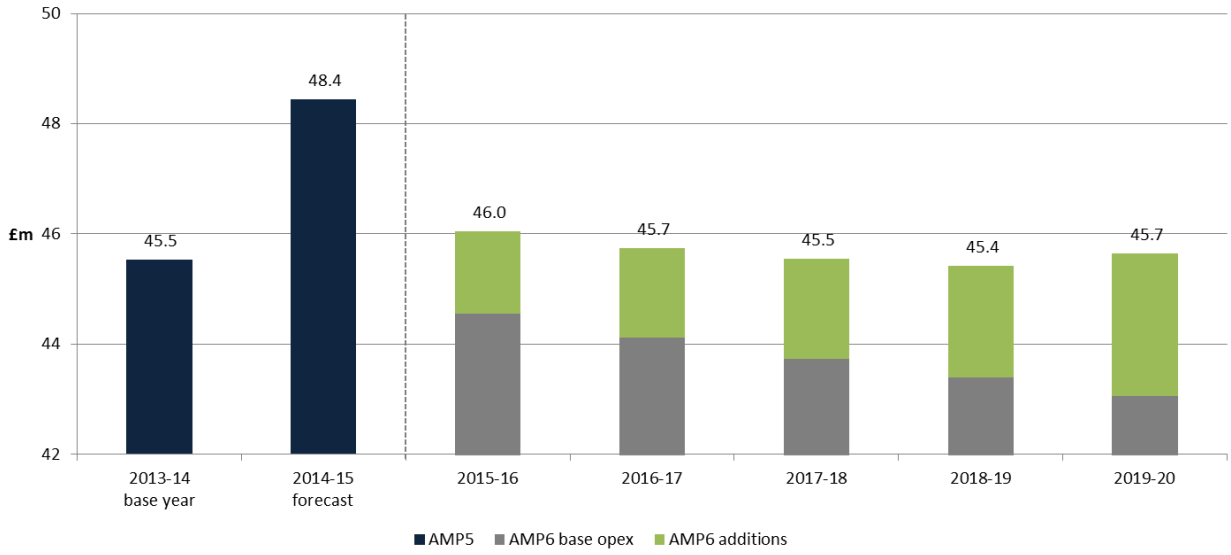
895. We have only proposed adjustments to the base operating costs where we consider that they meet the following criteria:

- central estimates indicate that Bristol Water costs will increase;

- the costs will increase for reasons beyond Bristol Water's reasonable control;
- reasonable management action could not substantially mitigate the effect of such increases; and
- RPI will not adequately capture the increase in costs.

896. The required increases to wholesale operating costs from the base for each year of AMP6 are summarised in Figure 52 below in 2012/13 prices and after allocation of efficiency.

Figure 52: Statement of Case Wholesale operating costs

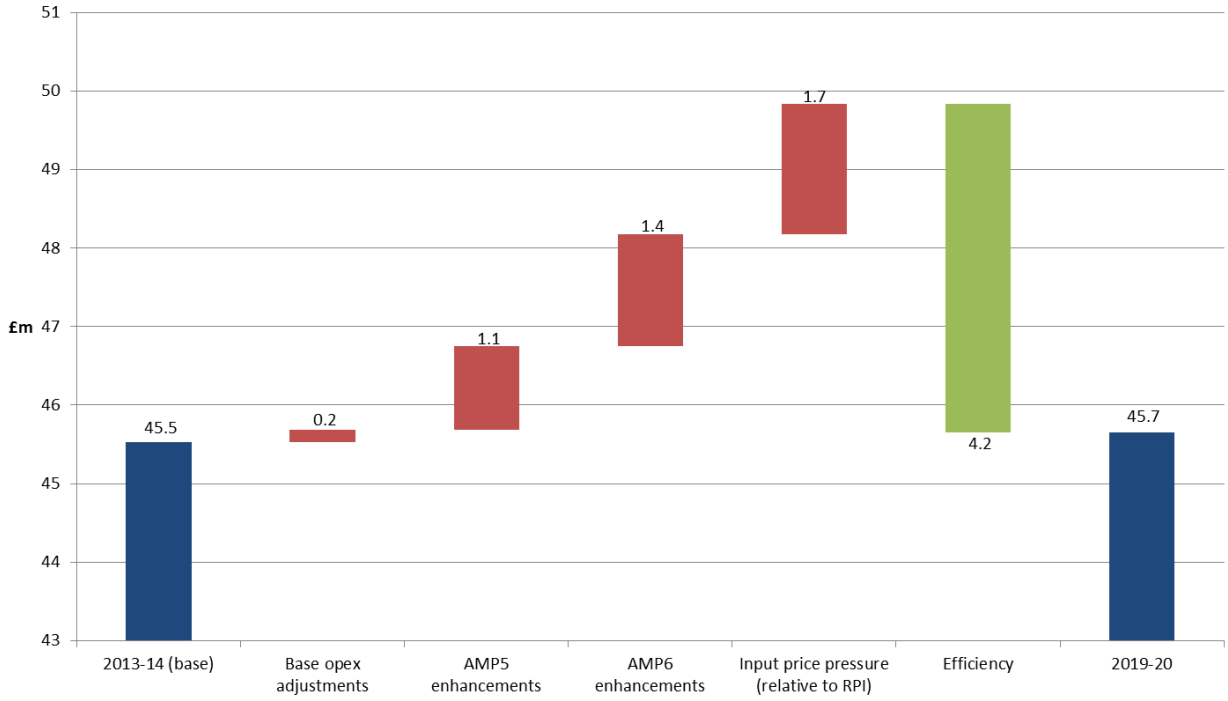


Source: Bristol Water Analysis

897. The proposed wholesale operating costs in 2019/20 represent a 0.3% increase on the base operating costs from 2013/14.

898. The impact of each adjustment to base operating costs is shown below.

Figure 53: Opex bridge (2013-14 base to Bristol Water proposed 2019-20, 2012-13 prices)



Source: Bristol Water Analysis

9.3.2.2.2.1 *Base opex adjustments*

899. No adjustment is proposed to the pension costs included in the base year. The deficit contributions made in 2013/14 are in line with the CC10 Redetermination and are consistent with the figures provided by Ofwat.[713]

900. The Carbon Reduction Commitment is a Government energy efficiency scheme designed to incentivise energy efficiency and cut emissions in large energy users in the public and private sectors across the UK. Participants must purchase and surrender allowances for their emissions, with the allowance price in the first phase (and therefore in our 2013/14 base year) being £12 per tonne of CO2. From 2014/15 onwards the price is increasing to around £16 per tonne.[714] This adjustment is for the above-inflation element of the increase that is not reflected in the base year (2013/14) opex.

901. The WRMP includes an 'enhanced' Leakstop scheme (scheme D005 subsidised supply pipe repair) which offers customers a subsidised replacement of their supply pipe if it leaks for a second time.[715] Under the Ofwat guidance this is classified as retail household activity

[713] IN 13/17 Treatment of companies' pension deficit repair costs at the 2014 price review, 31 October 2013 **('IN13/17 Pension Deficit Repair Costs October 2013')** (SOC104) stated that pension deficit repair costs allowed at PR14 would be based on those allowed at PR09. Ofwat has, however, used the FD09 assumption rather than the higher CC10 redetermination. The CMA may wish to consider whether this approach is appropriate.

[714] https://www.gov.uk/government/policies/reducing-demand-for-energy-from-industry-businesses-and-the-public-sector--2/supporting-pages/crc-energy-efficiency-scheme

[715] Water Resources Management Plan 2014 ('**WRMP 2014**') (SOC039) Section 8.5 Options that reduce network water losses , p.124.

that should be funded by wholesale, as ultimately it is the wholesale business that would benefit from reduced leakage. The additional operating costs for delivering this scheme have been calculated based on 300 supply pipe replacements p.a., for the duration of AMP6, at a cost of £50,000 p.a.

902. We have included an adjustment for additional wholesale operating costs associated with the delivery of the Open Water programme, which is based on our share of Ofwat's estimate of central market costs.[716]

903. These adjustments are summarised in Table 53 below.

Table 53: Summary of base opex adjustments (£m 12/13 prices)

	2015-16	2016-17	2017-18	2018-19	2019-20	AMP6
Carbon reduction commitment	0.2	0.2	0.2	0.2	0.2	0.8
Leakstop SP replacement	0.1	0.1	0.1	0.1	0.1	0.3
Open Water programme	0.1	0.0	0.0	0.0	0.0	0.2
Base opex adjustments	0.3	0.2	0.2	0.2	0.2	1.3

Source: Bristol Water[717]

9.3.2.2.2.2 *AMP5 enhancement opex*

904. The CC10 Redetermination allowed an additional £12.2m (in 2007/08 prices) of operating costs over the AMP5 period resulting from capital schemes. We have included an adjustment to reflect the allowed CC10 enhancement opex that is not reflected in the 2013/14 base year (i.e. additional operating expenditure in 2014/15 as a result of capital investments allowed at PR09). This is summarised in Table 54 below.

Table 54: AMP5 enhancement adjustment to base opex (£m 12/13 prices)

	2015-16	2016-17	2017-18	2018-19	2019-20	AMP6
AMP5 enhancements	1.1	1.1	1.1	1.1	1.1	5.4

Source: Bristol Water[718]

9.3.2.2.2.3 *AMP6 enhancement opex*

905. An adjustment is proposed for supply demand balance (**SDB**) expenditure to cover the additional costs of treating and distributing an increased volume of water due to population growth, as well as monitoring, managing and pro-actively maintaining a larger network. We calculated the average cost (per property) of each of these components based on our 2012/13 actual figures, and applied it to the number of new connections as forecast in the WRMP.[719]

906. Additional operating costs are expected as a result of PR14 enhancement schemes. The substantial increase in 2019/20 is due to the completion of the new treatment works at

[716] Bristol Water PR14 Business Plan, Retail Non-Household Plan June 2014 ('**June Retail Non-Household Plan**') (SOC004), p. 22.

[717] Bristol Water PR14 Business Plan, Wholesale Plan June 2014 ('**June Wholesale Plan**') (SOC002), Tables 4-6.

[718] June Wholesale Plan (SOC002), Table 8.

[719] WRMP 2014 (SOC039)

Cheddar to address raw water deterioration from increased algae (see **Section 10.2.2.1.1** below).

907. These adjustments are summarised in Table 55 below.

Table 55: AMP6 enhancement adjustments to base opex

	2015-16	2016-17	2017-18	2018-19	2019-20	AMP6
SDB expenditure	0.2	0.3	0.4	0.5	0.5	1.8
PR14 enhancement schemes	0.0	0.1	0.2	0.4	0.9	1.5
AMP6 enhancements	0.2	0.3	0.6	0.8	1.4	3.3

Source: Bristol Water[720]

9.3.2.3 *Efficiency - opex*

908. The breakdown of the efficiency challenge included in our operating costs is set out in Table 56 below.

Table 56: Opex efficiency challenge (£m 12/13 prices)

	Annual %	2015-16	2016-17	2017-18	2018-19	2019-20	AMP6 Impact (£m)
Wholesale input price inflation (relative to RPI)	0.6%	0.6	0.8	1.1	1.4	1.7	5.6
Frontier productivity growth	-1.0%	-1.0	-1.4	-1.9	-2.3	-2.8	-9.4
Relative efficiency	-0.5%	-0.5	-0.7	-0.9	-1.2	-1.4	-4.7
Total efficiency	-1.5%	-1.4	-2.1	-2.8	-3.5	-4.2	-14.0
Overall effect	-0.9%	-0.9	-1.3	-1.7	-2.1	-2.5	-8.5

Source: Bristol Water Analysis

909. Each of these elements is considered in the following Sections.

9.3.2.3.1 Input price inflation

910. Our assessment of frontier efficiency has been updated since our DDR to include the findings of a recent report obtained from First Economics.[721] The report provides projections of wholesale business input price inflation and offsetting frontier productivity growth for AMP6 (see **Section 9.3.2.3.2** below).

911. The First Economics report includes the impact of power prices. We have used the most recent forecasts as set out in that report to calculate the revised wholesale operating costs presented in the SoC.

912. The aggregate input price inflation (nominal) averages 3.8% for the period. This includes forecasts for wage inflation, taken from the Office for Budgetary Responsibility's (**OBR**)

[720] June Wholesale Plan (SOC002), Tables 7 and 9.

[721] First Economics, Wholesale Input Price Inflation and frontier productivity growth December 2014 revision ('**First Economics price inflation productivity growth Dec 2014**') (SOC475).

December 2014 forecasts,[722] and power, taken from Department of Energy & Climate Change (**DECC**).[723]

9.3.2.3.2 Frontier productivity growth

913. The First Economics report estimates the rates of frontier productivity growth to be 1.0% per annum for operating costs.[724] This is broadly in line with the figures that have been used in a number of other price control decisions.

914. The OBR RPI forecast from December 2014 suggests an average inflation increase of 3.2% p.a. over AMP6.[725] This gives an overall frontier efficiency target relative to inflation of 0.4% p.a., as shown in Table 57 below.

Table 57: Frontier efficiency target (relative to RPI)

	Annual %
Wholesale input price inflation	3.8%
RPI forecast	(3.2%)
Frontier productivity growth	(1.0%)
Frontier efficiency relative to RPI	**(0.4%)**

Source: First Economics[726], OBR[727]

9.3.2.3.3 Relative efficiency

915. The assessment of relative efficiency included within our proposed wholesale operating costs is based upon a report for Bristol Water provided by Oxera.[728] The Oxera report discusses the use of a range of approaches for assessing relative operating cost efficiency.[729]

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722 Office For Budget Responsibility, Economic and fiscal outlook, December 2014 ('**OBR Economic Outlook December 2014**') (SOC219).

723 First Economics price inflation productivity growth Dec 14 (SOC475).

724 First Economics price inflation productivity growth Dec 14 (SOC475).

725 OFBR Economic Outlook December 2014 (SOC219).

726 First Economics price inflation productivity growth Dec 14 (SOC475); p34

727 First Economics price inflation productivity growth Dec 14 (SOC475); OFBR Economic Outlook December 2014 (SOC219).

728 Oxera, Bristol Water's Relative Operating expenditure efficiency for wholesale water services, ('**Oxera Opex efficiency wholesale Report November 2013**') (SOC015)

729 Oxera Opex efficiency wholesale Report November 2013 (SOC015), section 2.4.3.1. The approaches were (1) Base Model: Pooled corrected ordinary least squares (COLS), which is similar to the approach previously used by Ofwat; (2) Model 1: Pooled stochastic frontier analysis (SFA). This is an improvement over COLS as it attempts to distinguish between random error and inefficiency; (3) Model 2: panel data (random-effects) model. The approach attempts to distinguish company effects and efficiency; (4) Model 3: time-invariant SFA. Extending SFA to a panel approach (using multiple years of data) but has the restriction that inefficiency is constant over time; (5) Model 4: time-varying SFA. This relaxes the assumption in model 3 that inefficiency is constant; and (6) Model 5: 'Robust Model' that takes into account company specific effects, time-varying inefficiency, firm effects, and persistent and transient inefficiency.

916. Of the range of options, Oxera concludes that the 'Robust Model' is the most reliable estimator of efficiency.[730] The approach used by Oxera is the same as presented to the CC in 2010.[731] One key advantage of this approach is that company specific cost differences are estimated directly by the model (to the extent they are captured by the data used). This reduces the need to assess them separately and individually for each company. The comparative analysis Oxera performed increases confidence that the robust model is correctly separating company special effects from persistent inefficiency.[732]

917. The 'Robust Model' identifies that our average efficiency since 2005/06 was 96%, that is, that on average Bristol Water was 4% less efficient than the most-efficient water companies. In 2012/13 our efficiency was 95%: that is, 5% less efficient.

918. In our plan we have based our efficiency assumptions on the basis that our inefficiency is 5%, consistent with the prediction of the 'Robust Model' for 2012/13.

919. To set an efficiency assumption it is necessary to decide how much of any inefficiency can be removed, and the timescale required to remove it. We consider that it is reasonable to expect Bristol Water to catch-up 60% of this difference over the six-year period up to 2020. This assumption provides strong pressure for Bristol Water to reduce costs, but leaves some incentive for Bristol Water to try and achieve more. A 60% catch-up rate is slightly more challenging than the previous catch-up rate of 54% used by Ofwat at PR99, PR04 and PR09.[733]

920. This catch-up rate results in an annual catch-up efficiency target of 0.5% applied from 2014/15 to 2019/20.

921. An alternative to a frontier approach would be to use an upper quartile method. Oxera identified the upper quartile efficiency as 97%.[734] With the catch-up profile in our plan the efficiencies are: 96%, 96.5%, 97%, 97.5% and 98% in each consecutive year. Over the

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730 Oxera Opex efficiency wholesale Report November 2013 (SOC015) p. 9. The residual between actual cost and benchmark cost is split into four components to take into account different factors affecting cost, given the cost drivers:

- the first component captures the company's heterogeneity (company effects), which has to be disentangled from persistent inefficiency effects (which are assumed to be time invariant). This is the equivalent of the special factors previously used by Ofwat;
- the second component captures persistent (or time-invariant) inefficiency;
- the third component captures transient (or time-varying) inefficiency; and
- the last component captures random shocks.

The overall inefficiency is the sum of the second and third components.

731 Competition Commission Determination Report August 2010 Appendices ('**CC Determination 2010 Appendices**') (SOC553), Appendix K para. 88.

732 In its report, Oxera compares the efficiency position of companies in 2008/09 using the Robust approach with that identified by Ofwat at PR09. The Ofwat PR09 approach made use of company specific adjustments based on submissions from companies. The two approaches produced similar results and the company effects identified by the model has overall similarity with the special factors used by Ofwat.

733 Ofwat used a 60% catch-up rate on efficiency residuals that had been reduced by 10%.

734 Oxera Opex efficiency wholesale Report November 2013 (SOC015) p. 12.

period the average is 97%, equal to the upper quartile. Given this, an upper quartile approach would produce the same overall level of opex.

9.3.2.4 *Special factors*

922. We have considered the extent to which our operating costs include costs for dealing with issues outside of our control, and which other water companies are less affected by. We have identified a number of issues where we think this is the case. Our PR14 opex cost exclusions[735] reflect our current circumstances and latest available data:

- the level of complexity of our treatment works compared to other companies means we experience additional costs due to treating difficult waters (see **Section 3.4.6** above);
- additional to the level of complexity of our treatment works we incur further costs associated with the treatment of water from the Gloucester and Sharpness Canal by the treatment works at Purton and Littleton. The water abstracted from the Gloucester and Sharpness Canal is of both poor and variable quality requiring extremely complex treatment processes (see **Section 3.4.3** above);
- the payment to Canal & River Trust for water from their canals. This is in effect an unavoidable abstraction charge additional to those levied by the Environment Agency (see **Section 3.4.3.1** above); and
- Bristol suffers from high levels of traffic congestion which result in additional costs (see **Section 3.3.5** above).

923. The costs associated with these special factors are £33.4 million over 5 years (£32.4 in 2012/13 prices). The additional costs due to congestion within Bristol includes £1.8m of capex costs (£1.8m in 2012/13 prices). These special factors were accepted in principle by both Ofwat and the CC for AMP5.[736]

924. Table 58 below summarises both the PR14 and PR09 costs.

Table 58: Special factors claims and value for PR09 and PR14

Item	Type of Claim	PR09 (£m) (2013/14 prices)	PR14 (£m) (2013/14 prices)
Costs not reflected in Totex Models for Treatment Complexity	Modelling Issue	14.24	13.0
Additional costs at Purton and Littleton	Operating Circumstance	19.49	8.35
Canal & River Trust Costs	Operating Circumstance	7.78	8.35
Additional costs due to congestion within Bristol	Operating Circumstance	2.65	3.65
Total		**44.16**	**33.35**

Source: Bristol Water[737]

[735] Bristol Water PR14 Business Plan, Cost Exclusion Cases June 2014 (**'June Cost Exclusion Cases'**) (SOC006) Section 'Opex' from page 245 and Bristol Water Representation on the PR14 Draft Determination Master Appendices October 2014 (**'DDR Appendices Oct 2014'**) (SOC020) Section 4.10.

[736] Final Determination: Setting price limits for 2010-2015 supplementary report Bristol Water Plc (**'FD09 Bristol Water report'**) (SOC371) section 3.2.1; CC Determination 2010 (SOC011) section 7.9.

[737] DDR Appendices Oct 2014 (SOC020) Section 4.10 p. 145.

9.3.2.5 *Conclusions on wholesale operating costs*

925. The operating expenditure allowed should reflect the actual operating environment facing Bristol Water. We consider that an appropriate way to assess operating costs is to start from 2013/14 costs and calculate forecasts based on expected adjustments and efficiencies. This is the approach that the CMA has used previously, and was adopted by Ofwat in its previous reviews.

926. The expenditure that Bristol Water has included in its Business Plan is a realistic, evidence-based and challenging assessment of its requirements.

9.3.3 Wholesale capital maintenance programme and costs

9.3.3.1 *Introduction*

927. This Section provides a discussion of Bristol Water's wholesale programme to maintain the provision of base service to its customers through capital maintenance. It details the required wholesale capital maintenance activities for AMP6 and the associated costs.

928. We have structured this Section as follows:

- **what is meant by capital maintenance** - an introduction to what is covered by capital maintenance and how it links to our outcomes (see **Section 9.3.3.2**);
- **infrastructure capital maintenance** - Bristol Water's anticipated capital maintenance requirements and costs for infrastructure assets (see **Section 9.3.3.3**);
- **non-infrastructure capital maintenance** - Bristol Water's anticipated capital maintenance requirements and costs for non-infrastructure assets (see **Section 9.3.3.4**); and
- **efficiency** - details of the efficiency challenge contained in Bristol Water's wholesale capital maintenance costs (see **Section 9.3.3.5**).

9.3.3.2 *What is meant by capital maintenance?*

929. Capital maintenance relates to investment in existing physical assets to maintain a desired level of service. In order to achieve this, assets will have to be repaired, refurbished or replaced. The need for such activities is largely driven by deterioration from wear and tear through operation and from ageing. In addition, capital maintenance can also be driven by other factors such as health and safety requirements and operational compliance. The Government has set out its view on the importance of investment in maintenance, renovation and replacement of infrastructure in the Water White Paper.[738]

930. To properly maintain and manage assets and asset systems, companies need to understand their condition, behaviour and capabilities. Bristol Water has undertaken

[738] In the Water White Paper, the Government acknowledges that: "*We also need to properly maintain our infrastructure as it ages and as pressure on capacity grows as the population increases…*" "*Our existing water supply and wastewater infrastructure is of varied age and condition, and some of it is well over a century old. But whatever its age, our existing infrastructure also needs a sustained and significant programme of investment in maintenance, renovation and replacement as necessary to ensure a high level of service*". Water for Life White Paper 2011 (SOC177), p. 46, para. 4.3.

detailed asset risk-based assessments to determine its capital maintenance needs taking into account customers' preferences and willingness to pay (see **Section 7** above). Bristol Water then cross checked the identified capital maintenance costs against a range of benchmarks which showed they were appropriate (see **Section 9.4** below).

931. Wholesale capital maintenance is divided between that required for infrastructure[739] assets and that for non-infrastructure[740] assets.

932. '**Infrastructure capital maintenance**' relates to capital expenditure on upstream assets (by upstream assets we are referring to everything involved in the generation of raw water including source assets, impounding reservoirs, raw water mains and aqueducts) and the underground pipe network of the Company. Infrastructure assets include all our water mains and their associated fittings and fixtures and are predominantly below ground. Differences in the extent, condition, operating environment and degradation of these assets will lead to differences in expenditure requirements between companies.

933. '**Non-infrastructure capital maintenance**' relates to capital expenditure on above ground assets including treatment works, pumping stations, service reservoirs (treated water reservoirs), metering, buildings, computing equipment (IT), vehicles and telemetry. Non-infrastructure assets incorporate a large proportion of more complex items (such as plant and machinery). As for infrastructure, differences in the extent, condition and degradation of these assets will lead to differences in expenditure requirements between companies.

934. Our infrastructure and non-infrastructure assets, and the characteristics of those assets specific to Bristol Water that impact on the associated levels of capital maintenance expenditure, are considered in more detail in **Section 3.4** above.

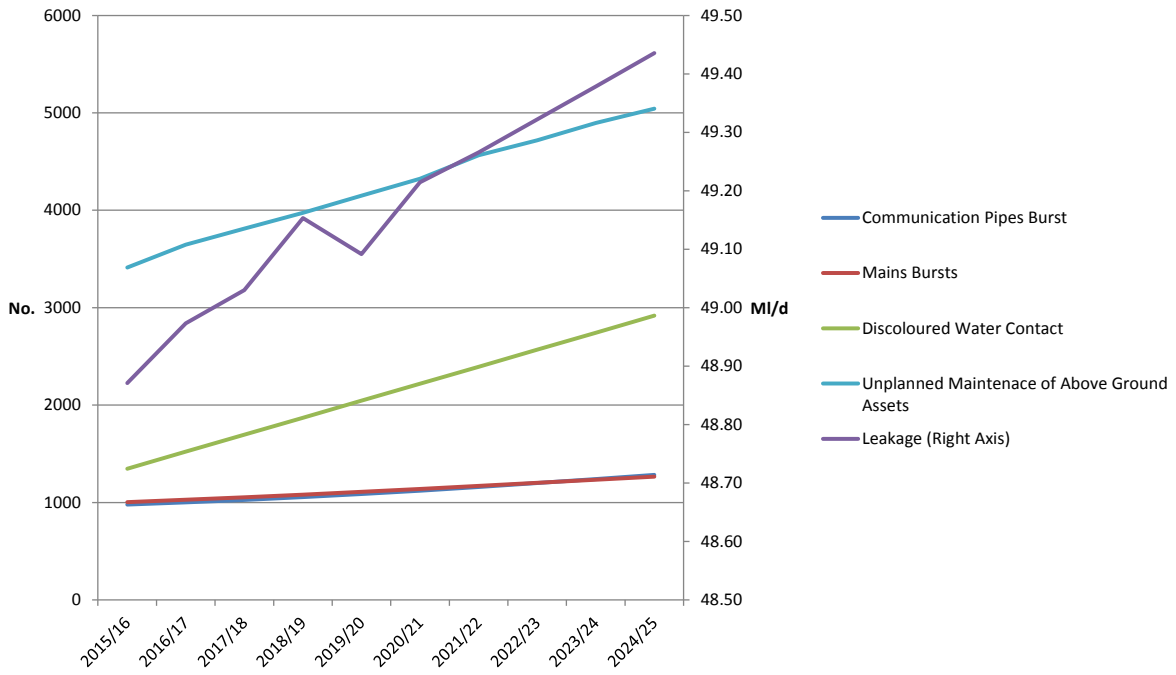
935. All the expenditure related to capital maintenance is required to deliver the Reliable Supply outcome (see **Section 6** above), which is measured through the asset reliability infrastructure and asset reliability non-infrastructure performance commitments (see **Section 14** below). These performance commitments have a penalty incentive associated with them.

936. Figure 54 below illustrates how service levels are predicted to deteriorate without a proactive approach to capital maintenance where we only fix on failure:

[739] Infrastructure is used generically to describe all of the Company's tangible assets, but from a regulatory purpose defines a set of assets defined in Ofwat, Regulatory Accounting Guideline 2 2003 ('**RAG2**') (SOC342), para 1.1 as underground systems of mains and sewers; impounding and pumped raw water storage reservoirs; dams; sludge pipelines; sea outfalls; and information about infrastructure assets e.g. zonal investigations records.

[740] RAG2 (SOC342), para 1.1 – non-infrastructure assets are defined as all other assets that are 'Not infrastructure assets'.

Figure 54: Modelled deterioration of service assuming only reactive maintenance



Source: Bristol Water/SEAMS WilCo CAO

937. The chart reflects output from our SEAMS WiLCO Cross Asset Optimiser (**CAO**) optimisation model that has been peer reviewed by Atkins and assured by Mott MacDonald (see **Section 7** above). In the scenario presented, only reactive maintenance expenditure is allowed and results in significantly deteriorating service levels. The graph shows that in the absence of pro-active capital maintenance the number of unplanned maintenance events on above ground assets will increase as the asset base deteriorates. In addition, the numbers of mains bursts (leading to interruptions) and leakage will increase. Discoloured water contacts would also increase. As set out in **Section 6** above, our customers have shown a clear preference for maintaining or improving service levels.

9.3.3.3 *Infrastructure Maintenance*

938. The major elements of our infrastructure maintenance investment programme include:

- programmes to maintain the structural integrity of our raw water reservoirs;
- continuing the work on relining the Line of Works aqueduct; and
- replacement of over 230km of distribution mains, at an average of 46km per annum. This also includes the investment to improve the 'unplanned customer minutes without supply' measure.

939. A large proportion of our assessment of need has been undertaken through detailed analysis of asset deterioration and the resulting refurbishment or replacement requirements brought about by asset failure risks (See **Section 7** above).[741]

940. Forecast capital maintenance expenditure is shown in Table 59 for infrastructure assets.

[741] June Wholesale Plan (SOC002), 'Intervention Planning', p. 62.

Table 59: Bristol Water's Infrastructure Capital Maintenance Expenditure AMP6 £m

Asset Type	AMP4	AMP5	AMP6
Aqueducts	6.2	12.1	5.5
Raw Water Reservoirs	4.6	10.3	10.6
Mains & Communication Pipes	35.1	91.2	47.6
Infrastructure other	14.9	14.7	12.7
Total	**60.8**	**128.3**	**76.3**
Less trunk main lining[742]		26.2	
Total excluding Trunk Main lining	**60.8**	**102.1**	**76.3**

Source: Bristol Water[743]

941. Details of the programme are provided in our Wholesale Business Plan, but a summary of what each of the categories in Table 59 above covers is provided in the remaining paragraphs of this sub-section.

942. A large proportion of the expenditure on aqueducts is in relation to completing structural repairs to the Line of Works aqueduct. This was constructed in 1846 to carry raw water from the Mendip Hills for treatment at Barrow Treatment Works (see **Section 3.4.7.3.1** above). Inspections have identified sections of the aqueduct that if not repaired could result in structural collapse.

943. Expenditure on raw water reservoirs covers work to maintain structural integrity following inspections under s10 Reservoirs Act 1975 together with emergency drain-down improvements.

944. Mains and communication pipes activity is focussed on replacing those mains with the highest observed burst rates in order to maintain a stable burst rate. In addition, widespread replacement will take place in some distribution zones where background leakage is high in order to maintain levels of overall background leakage. Expenditure in this area is planned to reduce considerably compared to AMP5. If these replacements did not go ahead, however:

- the burst rate would increase leading to greater numbers of unplanned customer interruptions, and higher leakage (see Figure 54 above); and
- background leakage would increase making it more difficult to achieve the targeted reduction leakage.

945. Infrastructure other relates to expenditure on replacing stop-taps, valves and fittings, maintaining GIS records, maintaining hydraulic models and active leakage control.

9.3.3.3.1 Factors affecting infrastructure maintenance expenditure

946. There are two factors that will increase our infrastructure maintenance costs compared to other companies:

[742] During AMP5, Ofwat required Trunk Main Lining to be categorised as Capital Maintenance. Thus it is removed from the AMP5 total for comparison purpose.

[743] Capital Programme 9 February 2015 Extract (SOC546).

- we have a proportionately greater amount of upstream assets than most other companies and therefore would be expected to incur more maintenance costs in this area (see **Section 3.4.3.4** above);[744] and
- we have the second oldest network in the industry.[745] An older network has a higher rate of degradation and therefore needs more maintenance to maintain its performance (see **Section 3.4.8** above).

947. The impact of mains age on degradation by reference to burst rates, and the resultant impact on capital maintenance costs, is considered in more detail in the following sub-section.

9.3.3.3.1.1 *Mains age and Degradation*

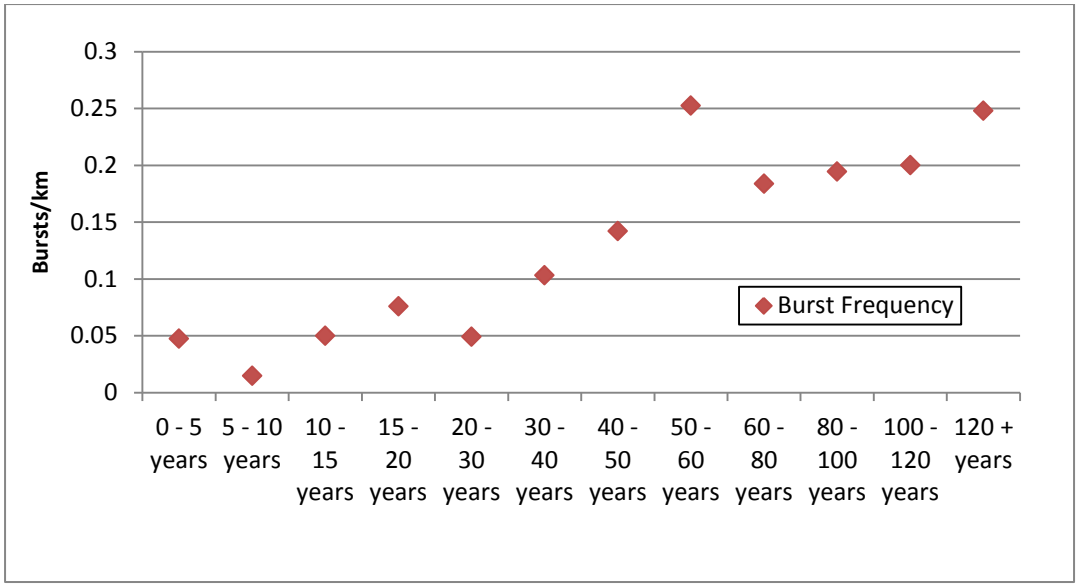
948. In order to maintain stable serviceability, companies have targeted their capital maintenance to maintain a constant burst rate. This requires companies to balance the benefits of replacing mains (which will reduce the burst rate) against the degradation of the network (which will increase the burst rate) against the background of an increasing asset base. A higher degradation rate will lead to a need for a greater length of mains to be replaced.

949. A key element of network degradation is mains that have never previously burst beginning to start bursting. Figure 55 sets out Bristol Water data for the average burst rate of mains that have never previously burst. This is obtained by calculating the burst rate of mains during a year given that those mains have not burst in the previous ten years.

[744] As demonstrated in **Section 3** Figure 11. Bristol Water has the second highest amount of upstream assets in the industry and at 25.4% has a proportion of upstream assets that is almost twice the average of 13.5%.

[745] The average age of Bristol Water's mains as at 31 March 2008 at 69 years is the second oldest in the industry, for which the average age of mains is around 53 years. See **Section 3.4.8**

Figure 55: Burst Rate of Mains with no previous bursts



Source: Bristol Water

950. Figure 55 shows that older mains that have never previously burst are typically more likely to burst in subsequent years than younger mains. In turn this means that the older a network is, the more bursts it will have from mains that have never previously burst. As a consequence the degradation rate for older networks will be higher. This demonstrates that the age of the network is a key driver of its degradation rate.

951. Age of mains was found to be a statistically significant explanatory driver of infrastructure maintenance costs in both Bristol Water's and Oxera's modelling (see **Sections 9.4.4.2.5** and **9.5** below).

952. As set out in **Section 3.4.8** above Bristol Water has the second oldest network, and therefore would be expected to have much higher degradation than an average company. This in turn will lead to a higher requirement for capital maintenance expenditure.

9.3.3.4 *Non-Infrastructure Maintenance*

953. The major elements of our non-infrastructure maintenance investment programme include:

- continuing to maintain our treatment works, pumping station and reservoir assets including work on treatment works structures;
- replacement of Bedminster Service Reservoir; and
- major Health & Safety initiatives[746].

[746] In the December Submission (Bristol Water PR14 Business Plan, Wholesale Plan December 2013 ('**December Wholesale Plan**') (SOC476), p.31.) we allocated these interventions to the 'safe working practices' outcome, but in response to Ofwat's Draft Determinations for the enhanced companies we allocated them to asset reliability –non infrastructure for the June Submission (June Wholesale Plan (SOC002),p148).

954. As for infrastructure assets, a large proportion of our assessment of need has been undertaken through detailed analysis of asset deterioration and the resulting refurbishment or replacement requirements brought about by asset failure risks.[747] We have also used named schemes to manage individually identified issues and refurbishment requirements. This approach is discussed in more detail in **Section 7.6.3.2** above.

955. Table 60 below shows the main elements of capital maintenance expenditure for non-infrastructure assets for the AMP6 period.

Table 60: Non-infrastructure Capital Maintenance Expenditure AMP6 £m - Basic Elements

Asset Type	AMP4	AMP5	AMP6
Raw Water Reservoirs & Sources	2.4	1.8	0.0
Treatment Works – process	11.6	19.4	26.9
Treatment Works – structures	0.8	1.2	7.2
Pumping Stations	4.4	13.9	9.3
Reservoirs & Towers	2.1	3.0	10.3
Meter replacements & Leakage reduction	3.4	3.7	4.5
M&G Buildings	0.3	10.3	2.5
M&G H&S	0.1	0.4	4.3
M&G Information Technology	7.1	13.8	9.6
M&G Other	7.9	6.1	5.3
Total	**40.0**	**73.6**	**79.9**

Source: Bristol Water[748]

956. Details of the programme are provided in our Wholesale Business Plan, but a summary of what each of the categories in Table 60 above covers is provided in the remaining paragraphs of this sub-section.

957. Expenditure on treatment works is required to be higher than in AMP5 for both process plant and treatment works structures. This reflects the need to start undertaking maintenance on the additional processes that were added to treatment works during the 1990s as part of the water quality improvement programme. Increased expenditure on treatment works structures reflects the need to replace several life-expired chemical tanks.

958. Expenditure on pumping stations has reduced compared to AMP5, reflecting that the AMP5 programme included refurbishment of three of Bristol Water's largest pumping stations.

959. Expenditure on service reservoirs is higher than in AMP5 as a result of the need to replace Bedminster Service Reservoir (see **Section 9.3.3.4.1** below).

960. Expenditure on Health and Safety is anticipated to increase from AMP5 levels as a result of the need to replace a substantial amount of aged electrical switchgear that is not compliant with current safety standards.

[747] June Wholesale Plan (SOC002), 'Intervention Planning', p. 62.

[748] Capital Programme 9 February 2015 Extract (SOC546).

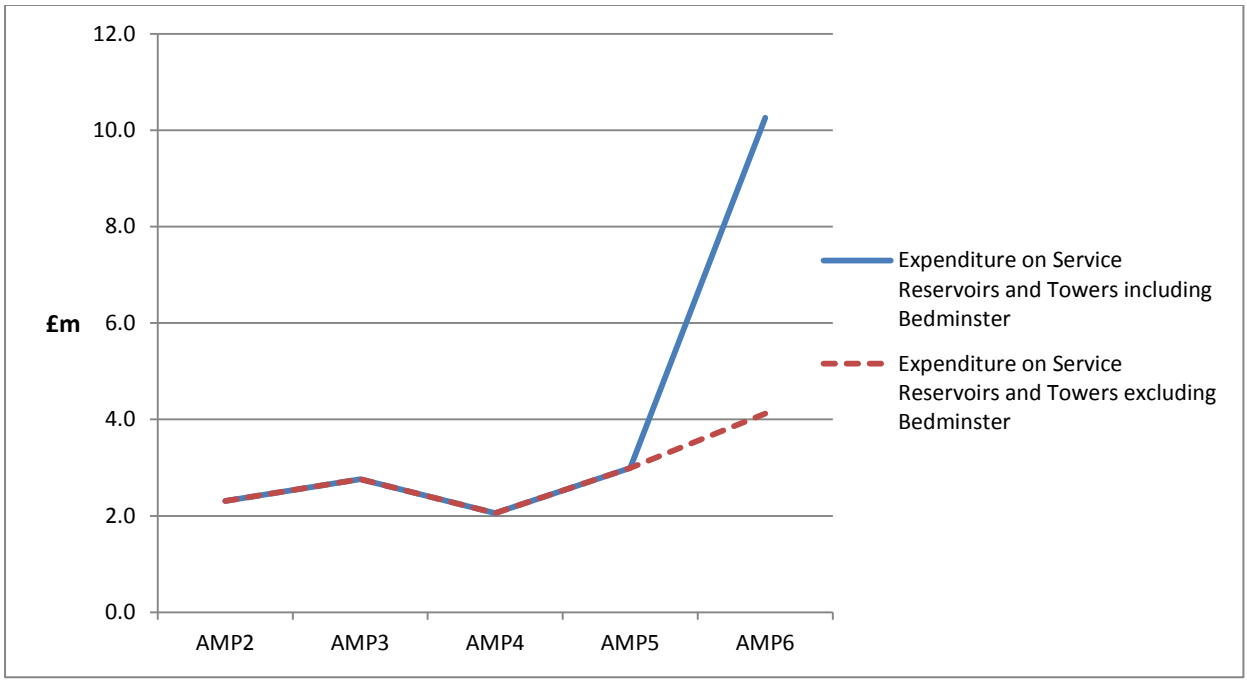
9.3.3.4.1 Bedminster service reservoir

961. An atypical intervention included as part of the non-infrastructure capital maintenance programme, which is likely to be over and above those identified through a benchmarking process such as top-down modelling, is the replacement of Bedminster Service Reservoir (**Bedminster SR**).

962. An explanation of what a service reservoir is, as well as the background details specific to Bedminster SR and the operational issues it faces, are provided in **Section 3.4.7.1** above. As a result of the reduced storage available with Bedminster SR out of service, some incidents will result in interruptions that would have previously not done so. As a consequence, Bedminster SR being out of service results in a greater risk of interruptions on the area of the city it supplies affecting over 30,000 customers.

963. The cost of replacing the reservoir is anticipated to be £6.143m,[749] and results in an atypical level of maintenance spend on service reservoirs, as shown in Figure 56.

Figure 56: Expenditure on Service Reservoirs and Towers



Source: Bristol Water June Cost Exclusion Cases[750]

964. The optimisation process (see **Section 7.7.3** above) has identified the need to replace this reservoir as part of our overall programme. Further details regarding the specifics of this scheme are provided in the Business Plan.[751]

[749] Capital Programme 9 February 2015 Extract (SOC546).

[750] June Cost Exclusion Cases (SOC006) p. 152.

[751] June Cost Exclusion Cases (SOC006).

9.3.3.4.2 Factors Affecting Non-Infrastructure Maintenance Expenditure

965. Two factors that can have a major impact on a company's non-infrastructure maintenance costs include water quality treatment complexity, and the amount of pumping activity it must engage in:

- **water treatment complexity** - as set out in **Section 3.4.6** above, companies with poor quality raw water are likely to need to utilise more complex treatment processes, which will lead to higher levels of maintenance cost. A considerable proportion of Bristol Water's raw water quality is of poor and/or variable quality, and as such over 98% of our treatment works are categorised as being very complex (see **Section 3.4.5** and **Section 3.4.6** above). This means that Bristol Water's capital maintenance costs associated with water treatment are likely to be higher than the industry average.; and
- **pumping requirements** - as explained in **Section 3.4.7.2** above, the nature of Bristol Water's region means that it has a higher pumping head than average and therefore would be expected to incur slightly higher maintenance costs on pumping stations.

9.3.3.5 *Efficiency – capital maintenance*

966. We have included a capital maintenance efficiency of 10% equating to savings of £17.3m. This has been identified through independent benchmarking of our costs.

967. Capital maintenance efficiency is discussed in **Section 9.4.2**, with the detail behind the assumptions presented in the benchmarking **Section 9.4.4**.

9.4 How we have assured, benchmarked and challenged our costs

9.4.1 Executive summary

9.4.1.1 *Introduction*

968. This Section sets out how base totex costs have been assured and benchmarked in order to assess Bristol Water's relative efficiency and ensure that the costs reflect an appropriate level of efficiency challenge.

9.4.1.2 *Key themes*

969. Bristol Water's operating expenditure during AMP5 is in line with the CC10 Redetermination allowance, and any movement in operating costs over the last five years have been in line with those of other companies.

970. Bristol Water has benchmarked its bottom-up asset based assessment of capital maintenance requirements by using a range of asset life and econometric techniques discussed in this section. In addition, Oxera has developed econometric models of maintenance expenditure (see **Section 9.5** below). These benchmarking approaches show that the costs included within Bristol Water's plan can be considered efficient.

9.4.1.3 *Structure of Section*

971. This Section sets out:

- **evolution of Bristol Water's efficiency challenge** - an overview of Bristol Water's approach to efficiency and how the challenge it has applied has evolved along with the Business Plan (see **Section 9.4.2**);
- **opex** - assurance, benchmarking and challenge of Bristol Water's proposed opex (see **Section 9.4.3**);
- **capital maintenance** - assurance, benchmarking and challenge of Bristol Water's proposed maintenance capex (see **Section 9.4.4**); and
- **conclusions** – conclusions on assurance, benchmarking and challenge (see **Section 9.4.5**).

9.4.2 Evolution of our efficiency challenge

972. In preparing our Business Plan we have targeted including an optimum scope of work at a challenging cost. As set out in **Section 7** above, we have followed a process to optimise our intervention programme, based on asset based cost assessments that have been assured by external experts and using our customers 'Willingness to Pay' (**WTP**). Our optimisation process has also been reviewed by Atkins and assured by Mott MacDonald (see **Section 7.9** above). Therefore, prior to application of programme-wide efficiency challenges, our asset based assessment of the cost of our intervention programme is at a realistic and appropriate level.

973. Throughout the development of our Business Plan, we have continued to seek different views and challenge ourselves that we have the right programme and the right cost (see **Sections 9.4.3** and **9.4.4** below). Specialist external consultants have independently reviewed our cost and efficiency assumptions. We have listened to their analyses and adjusted our plan where appropriate.

974. On 6 August 2014, Ofwat informed us that the size of wholesale totex gap was still large (see **Section 4.3.2** above). We revisited the analysis already performed and the views of our experts. As a result, we included a further reduction of £20.9m to the June Submission cost base in our Draft Determination Representation (**DDR**), and increased our capital efficiency challenge to above 10%. In reducing costs to this level, our Board agreed to accept a very high level of risk.[752]

975. In respect of capital expenditure, Mott MacDonald concluded that Bristol Water's costs are reasonable and comparable to other companies.[753] However, CKBS reviewed a selection of schemes and also the challenge of moving towards upper quartile costs.[754] As a consequence, our DDR included additional adjustments to the cost of delivering our

[752] Extract from minutes of Bristol Water Board of Directors meeting 30 September 2014 ('**Board Meeting Sept 2014 minute extract**') (SOC397).

[753] Mott MacDonald PR14 Technical Assurance Report October 2014 ('**MM Assurance Report 2014**') (SOC136).

[754] CKBS Independent Assessment of PR14 AMP6 Project Costs Elemental Level Review Bristol Water April 2014 ('**CKBS assessment PR14 AMP6 project costs elemental**') (SOC531).

intervention programme compared to our June submission by increasing the level of efficiencies applied to capital projects.[755]

976. Bristol Water has now assumed a challenging overall efficiency target of 8.3% which equates to savings of £49m. This breaks down into:

- opex efficiency = 5.8% (1,5% p.a. cumulative)[756] equating to savings of £14m;
- capital maintenance efficiency = 10% equating to savings of £17m; and
- capital enhancement efficiency = 12.5%[757] equating to savings of £17m.

977. Table 61 below compares our proposed cost level, post efficiency assumptions, to the bottom-up challenge received:

Table 61: Comparison of totex costs to the bottom-up challenge

	Maintenance	Enhancement	Opex
June Business Plan	£165m (inc. 5% efficiency)	£165m (inc. 5% efficiency)	£233m
Range based on bottom-up challenge	£164m to £170m	£152m to £169m	£233m
DDR	£156m (below range)	£152m (lowest of range)	£233m (per Oxera analysis)
SOC	£156m (As DDR)	£152m (As DDR)	£228m (reflecting an update to input price pressure)

Source: Bristol Water analysis[758]

978. Table 61 shows that:

- maintenance spend is slightly lower than the range of bottom-up challenge;
- enhancement spend matches the bottom of the challenge range. We have aligned to CKBS who assume risk allowance would balance out over the programme overall, which is contrary to our experience; and
- operating costs reflect a catch up to the frontier company that is consistent with Ofwat's approach in PR99, PR04 and PR09.

979. In addition, we engaged Baringa to provide external scrutiny and assistance in identifying efficiency improvements (see **Section 3.2.3.5.1** above). The initiatives Baringa has helped us to identify are not sufficient to achieve the efficiency target included in our plan, which demonstrates that meeting our efficiency assumptions will be challenging.[759]

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755 Bristol Water Representation on the PR14 Draft Determination October 2014 ('**Bristol Draft Determination Representation October 2014**') (SOC048), p. 5.

756 Net efficiency is 0.9%, which reflects that wholesale input costs are expected to increase by 0.6% above RPI

757 Capital enhancement has an efficiency of 12.5%, except for the Trunk Mains Lining scheme, which remains at 10%, consistent with the capital maintenance efficiencies, and Cheddar Reservoir Two, which remains at 5% in line with advice from CKBS.

758 Capital Programme 9 February 2015 Extract (SOC546).

759 Project Channel business case review, steering group, 27th January 2015 extract ('**Project Channel business case review January 15**') (SOC550).

980. During our engagement with Ofwat in August 2014, it was suggested to us that we ask a senior independent regulatory expert to review our plan. We engaged Keith Harris to assess our business plan, challenge it and report directly to our Board.[760] Mr Harris's view is that FD14 does not provide sufficient costs to deliver the services that customers want. Set out below are quotes from Mr Harris, made in respect of Bristol Water's Business Plan at a Capstone Infrastructure analyst conference in December 2014:

> *"This is a good company. It's got a strong plan and it's got very broad customer support. The crucial thing about the customer support is this: No customer, no groups of customer are seeking a 20% price cut. They would much rather put the money into greater system reliability and have a more modest price cut."*
>
> *"In my view, there are certain areas of this determination by Ofwat which are weak and are not consistent with decisions that the CMA have taken on water utilities and other utilities in the past."*
>
> *"They've been rather Draconian on the level of capital maintenance, taking capital maintenance back down to levels which happened in the years 2000 to 2005. Their approach to allowing expenditure to meet new obligations, by their own models, does not fulfil that obligation in totality."*[761]

981. In summary, we conclude that our proposed wholesale totex, aimed to meet our optimised capital programme, is very challenging to meet in practice. Our Board concluded that the cost level represents the maximum amount of risk acceptable to the Board.[762] Planning for further cost reductions would likely lead to unacceptable impacts on shareholders, customers and other stakeholders.

9.4.3 Operating costs - assurance, benchmarking and challenge

9.4.3.1 *Operating costs - assurance*

982. PwC has reviewed the allocation of our operating costs between wholesale, retail household and retail non-household and confirmed that it had been completed in accordance with Ofwat guidance.[763] PwC also assured that the outputs of our detailed operating cost calculations were appropriately reflected in both the data tables submitted to Ofwat and our financial model.[764]

983. As part of its overall assurance of the Business Plan Mott MacDonald has reviewed the methodology and approach we have taken to calculating our operating expenditure.[765]

---

[760] Keith Harris is the owner and managing partner of Lorraine House, a company that primarily provides policy, operational and investment advice in the utilities sector. Mr Harris was a member of Ofwat's Future Regulation Advisory Panel as well as a Director of WaterUK.

[761] Capstone Infrastructure Corp. 2015 outlook conference call transcript (SOC478).

[762] Board Meeting Sept 2014 minute extract (SOC397).

[763] 2014 price review cost allocation for retail and wholesale price controls, Ofwat, March 2014 **('Price Review - Cost Allocation Retail and Wholesale 2014')** (SOC101).

[764] PwC PR14 Agreed upon procedures report ('**PwC agreed upon procedures June 2014**') (SOC102).

[765] Mott MacDonald Assurance Report 2014 (SOC136).

This includes consideration of the adjustments applied to the base costs, as well as the operating expenditure relating to specific capital schemes (the opex impacts of capex) and opex-only schemes. This is discussed in more detail in **Section 10.3.2.3** below.

984. Since submitting our Business Plan, we have engaged Baringa to provide external scrutiny and assistance in identifying efficiency improvements (see **Section 3.2.3.5.1** above). The initiatives Baringa has identified from its work to date are not sufficient to achieve the efficiency target included in our plan, which demonstrates that meeting our proposed operating costs will be challenging.[766]

985. In addition, Oxera has developed a wholesale opex efficiency modelling approach.[767] We have used this to provide a cross check to the estimate of wholesale operating costs derived above (see **Section 9.5** below).

986. For this SoC, Mott MacDonald has assured the reforecasting of the opex data.[768] Financial model input values were checked back to original sources and a random selection of calculations were audited and no errors were found.

9.4.3.2 *Benchmarking our proposed operating expenditure*

987. This Section discusses the benchmarking work we have carried out in relation to operating expenditure and the resulting conclusions.

988. The different benchmarking approaches we have used, and the results they have generated, are considered in the following Sections:

- actual performance against PR09 allowance (see **Section 9.4.3.2.1**);
- operating cost movements since 2008/09 comparative to CC10 allowance (see **Section 9.4.3.2.2**);
- how our costs have changed compared to the rest of the industry (see **Section 9.4.3.2.3**); and
- benchmarking specific costs (see **Section 9.4.3.2.4**).

9.4.3.2.1 Actual performance against PR09 allowance

989. As set out in **Section 3.6** above, our operating costs are expected to be marginally below the PR09 allowance for AMP5.

990. A yearly comparison of the AMP5 operating cost with the CC10 assumptions and explanation of any one-off exceptional items of expenditure is provided in **Section 3.6.3** above. In particular, a one-off item of expenditure in 2013/14 relating to an Ofwat investigation was allocated 100% to Retail Non Household and was removed from base opex for the purposes of the Business Plan calculations.

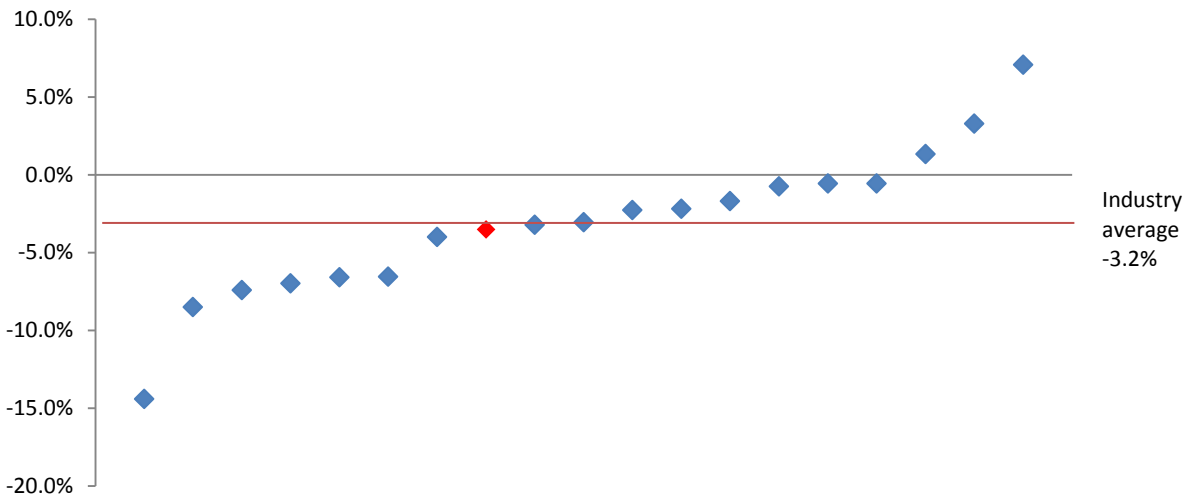
[766] Project Channel business case review January 15 (SOC550).

[767] The Oxera econometric model used to estimate catch-up efficiency potential was based on appointed operating costs rather than wholesale costs only.

[768] Mott MacDonald SOC Opex assurance (SOC552).

991. Figure 57 below summarises actual operating cost performance (for the first four years of AMP5) against CC10 for Bristol Water and Ofwat's FD09 for all other companies. It highlights that Bristol Water (shown in red) has performed slightly better than the industry average and has contained operating costs below those allowed by the CC.

Figure 57: Comparing AMP5 opex performance against Ofwat/CC10 allowance



Source: Bristol Water, Ofwat[769]

992. Due to the delay in commencement of delivering our AMP5 plan (a result of the need to seek a redetermination), and adjusting for one-off costs in 2014/15, we would expect our actual costs for the five years of AMP5 to be in-line with the industry average.

9.4.3.2.2 Operating costs movement since 2008/09 compared to CC10 Redetermination

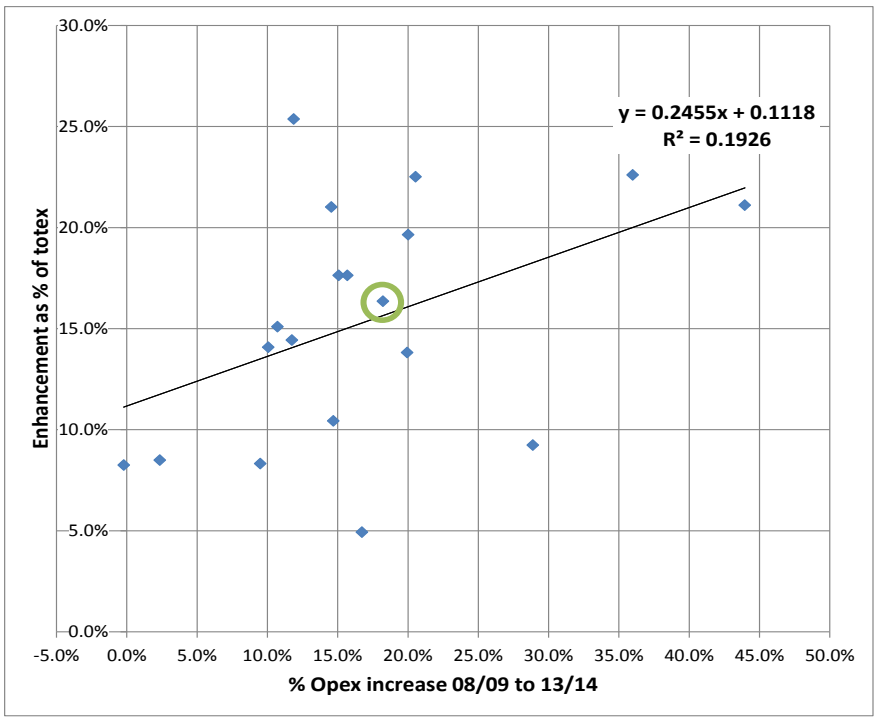
993. A comparison of the change in costs between 2008/09 and 2013/14 with that assumed in the CC10 Redetermination is provided in **Section 3.6.3.3** above. It demonstrates that overall, our actual operating costs have been similar to those contained in CC10.

9.4.3.2.3 How have our costs have changed compared to the industry

994. Figure 58 below summarises regulatory account submissions from across the industry for the period 2008/09 to 2013/14. It highlights that companies with an above average enhancement programme in AMP5 have experienced higher operating cost increases. This would be expected as enhancements tend to result in higher operating cost levels.

[769] Bristol Water analysis performed using the Ofwat opex outperformance feeder models, available from http://www.ofwat.gov.uk/pricereview/pr14/prs_web1412fdfeederlegacypop.

Figure 58: Increase in operating costs since 2008/09 compared to enhancement expenditure



Source: June Submission[770]

995. Bristol Water's cost increase (circled) for the period is similar to many in the industry and is in line with expectations for companies with a significant enhancement programme.

9.4.3.2.4 Benchmarking specific costs

996. As indicated in **Section 9.4.3.1** above, Mott MacDonald has reviewed the methodology and approach we have taken to calculating our operating expenditure relating to specific capital schemes (the opex impacts of capex) and opex-only interventions.

997. The data used for input price pressure and frontier productivity growth is sourced from First Economics (**Sections 9.3.2.3.1** and **9.3.2.3.2**). The catch-up efficiency included in our estimation of operating costs was based on an Oxera model of operating cost efficiency for the appointed business (**Section 9.3.2.3.3**).

9.4.4 Maintenance expenditure – assurance, benchmarking and challenge

9.4.4.1 *Assurance – capital maintenance*

998. We have commissioned several studies into the validity of our approach in order to assess the robustness of our planning approach, whether our methodologies and cost estimating align with industry good practice, and whether the resulting costs are reasonable.

999. The overall process for developing the intervention plan including the development of costs, development and use of the models, application of the willingness to pay data and use of constraints, was covered by Mott MacDonald's assurance (see **Section 5.5.9.1**

[770] Bristol Water PR14 Business Plan, Company Wide Plan, June 2014 **('June Company Wide Plan')** (SOC005), p.129

above).[771] Mott MacDonald concluded that our costing and estimating of projects followed a robust process.[772]

1000. Additionally, ICS provided further independent review when it examined and challenged the entire approach to business planning at Bristol Water (see **Section 5.5.9.6.3** above), advising our Board that we have "*produced a good business plan: the technical content behind the plan is robust and the plan is built around what customers want and value.*"[773].

1001. Our approach to Willingness to Pay surveys and the use of the resulting data and other data from the valuation framework within the optimisation process was favourably peer reviewed by Professor Susana Mourato of the London School of Economics (see **Section 5.5.9.6.1** and **Section 6.5.5** above)[774].

1002. Our intervention planning system (SEAMS WiLCO), its models and its implementation have been examined and scrutinised by external parties as part of our periodic review assurance (see **Section 7.6.3** above).[775]

1003. We asked CH2M Hill (formerly Halcrow) to review our approach to capital maintenance.[776] This review concluded that the type of risk and reliability focused, bottom-up analysis of maintenance needs that we have employed is the industry leading form of valuation.[777] It provides the most direct assessment of requirements. Other methods such as top-down econometrics or past cost projections have shortcomings related to in-built assumptions and lack of detail and are suited primarily to guides and benchmarking, which is how we have used them.[778] Further detail is provided in **Section 7.9** above.

1004. Mott MacDonald and CKBS also reviewed the costing for a number of capital enhancement schemes (see **Section 10.3** below). We utilised the same approach to the derivation of costs for schemes for both capital maintenance and capital enhancement.

1005. In addition, Oxera has developed a wholesale opex efficiency modelling approach.[779] We have used this to provide a cross check to the estimate of wholesale operating costs derived above (see **Section 9.5** below).

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771 MM Assurance Report 2014 (SOC136).

772 MM Assurance Report 2014 (SOC136), section B7.

773 ICS letter to the Board of Bristol Water on business plan advice and challenge 2014 ('**ICS letter to Board 2014**') (SOC337).

774 Prof Susana Mourato: Bristol Water Willingness to Pay Peer Review ('**WTP peer review 2013**') (SOC138).

775 Atkins Review of Bristol Water PR14 Model, Third Review (**'Atkins Wilco 3rd Review August 2013'**) (SOC137);MM Assurance Report 2014 (SOC136).

776 CH2M Hill - Capital Maintenance Review 29 August 2014 ('**CH2M Hill CM Review Aug 2014**') (SOC096).

777 CH2M Hill CM Review Aug 2014 (SOC096) section 7.1, p. 29. CH2M Hill concluded that *"The general approach to capital maintenance developed by Bristol Water and used during PR14 planning is considered sound with many constituent elements consistent with best current practice asset management principles".*

778 CH2M Hill CM Review Aug 2014 (SOC096), table 2, p.13.

779 The Oxera econometric model used to estimate catch-up efficiency potential was based on appointed operating costs rather than wholesale costs only.

9.4.4.2 *Benchmarking our proposed capital maintenance expenditure*

9.4.4.2.1 Introduction

1006. This Section discusses the benchmarking work we have done in relation to capital maintenance expenditure and the resulting conclusions.

1007. We have applied these approaches to both infrastructure and non-infrastructure capital maintenance requirements separately as described in the following Sections.

- actual PR09 performance against CC10 allowances (see **Section 9.4.4.2.2**)
- how our costs have changed compared to the rest of the industry (see **Section 9.4.4.2.3**);
- MEAV-based assessment (see **Section 9.4.4.2.4**);
- Bristol Water econometric modelling (see **Section 9.4.4.2.5**); and
- conclusions on benchmarking of non-infrastructure capital maintenance expenditure (see **Section 9.4.4.2.6**).

9.4.4.2.2 Actual PR09 performance compared to CC10 allowance

1008. Table 62 below sets out actual expenditure during AMP5 compared to the PR09 CC10 Redetermination, together with estimates of expenditure from the replacement cost and modelling approaches set out in the following Sections.

Table 62: Capital Maintenance Comparison (2012/13 prices)

Source	Maintenance Expenditure (£m)
Bristol Water Maintenance Expenditure 2010-15	£202
CC2010 Determination (adj by RPI)	£196
Bristol Water plan for AMP6	**£156**

Source: Bristol Water[780]

1009. Within our plan, maintenance expenditure is £156m. This is 23% lower than expenditure in AMP5 and represents a significant level of internal challenge.

9.4.4.2.3 How do our costs compare to the industry

1010. To identify how our costs compare to the industry, we have considered the maintenance spend across the industry on a £/population basis for AMP2 to AMP5, including the identification of the lower to upper quartile range ("quartile range") of expenditure and the mean. We have then overlaid our own levels of expenditure for AMP2 to AMP6. Details of what this demonstrates is set out in the following Sections:

- how our infrastructure capital maintenance costs compare to the industry (see **Section 9.4.4.2.3.1**); and
- how our non-infrastructure capital maintenance costs compare to the industry (see **Section 9.4.4.2.3.2**).

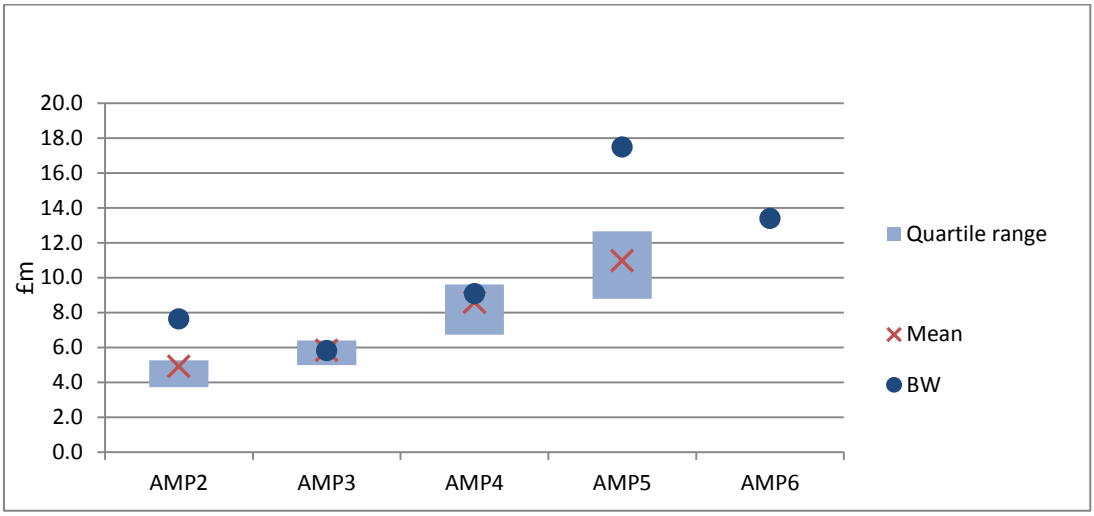
[780] Capital Programme 9 February 2015 (SOC546).

9.4.4.2.3.1 *How our infrastructure capital maintenance costs compare to the industry*

1011. In AMP5 Bristol Water's expenditure on infrastructure capital maintenance excluding trunk mains relining was £102m (2012/13 prices), of which £22m was on upstream assets. [781] In AMP6 our plan includes expenditure of £76m (£85m pre-efficiency), £16m of which is on upstream assets. [782] This is a reduction of 25%.

1012. Figure 59 below compares Bristol Water's infrastructure capital maintenance spend with the rest of the industry normalised on a per capita basis. The graph shows the range of industry expenditure between lower and upper quartile alongside the average and Bristol Water's expenditure.

Figure 59: Industry infrastructure maintenance expenditure



Source: Bristol Water

1013. The chart shows that expenditure across the industry has been increasing, Bristol Water's expenditure has tended to be higher than average, and was particularly so during AMP5. Forecast expenditure in AMP6 is at the upper quartile range for AMP5. See **Section 9.3.3.3.1** above for a discussion of the reasons why Bristol's infrastructure maintenance costs might be expected to be higher than average. This includes the proportionally greater amount of upstream assets compared to other companies and the relative age of our assets.

1014. The chart shows that our proposed expenditure is at the upper end of the historic range. Given the additional cost drivers of an older network and a greater amount of upstream assets, this is appropriate.

9.4.4.2.3.2 *How our non-infrastructure capital maintenance costs compare to the industry*

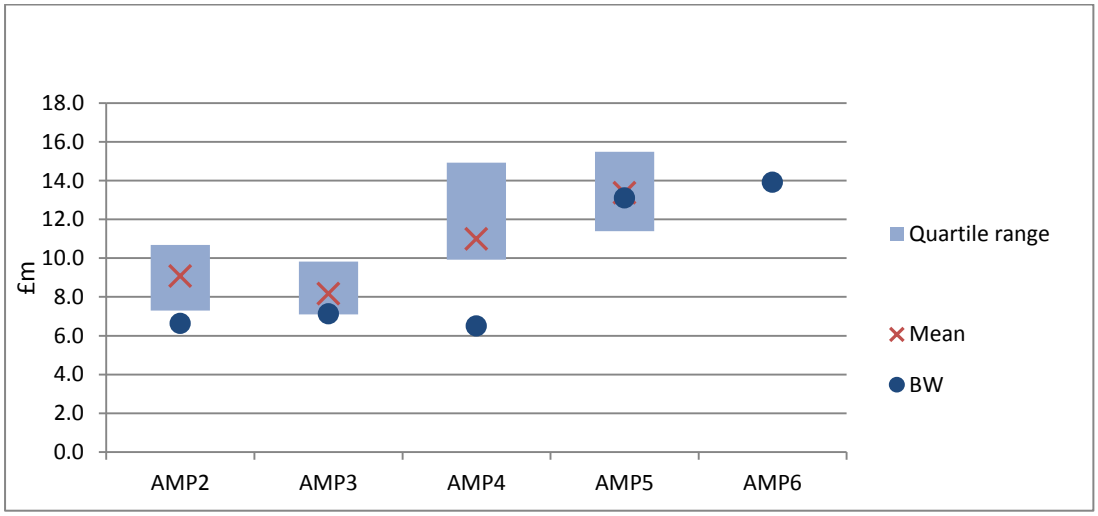
1015. In AMP5 our expenditure on non-infrastructure capital maintenance was £73.6m, and in AMP6 it is planned to be £79.9m. Table 60 (in **Section 9.3.3.4**) sets out in detail the Non-infrastructure expenditure for AMPs 4, 5 & 6.

[781] Upstream assets (aqueducts & Raw water reservoirs) = £22.4m.

[782] Upstream assets (aqueducts & Raw water reservoirs) = £16m.

1016. Figure 60 below compares Bristol Water's non-infrastructure maintenance spend with the rest of the industry normalised on a per capita basis. The graph shows the range of industry spend between the upper and lower quartiles of expenditure per head, alongside the industry average and Bristol Water expenditure.

Figure 60: Industry non-infrastructure maintenance expenditure



Source: Bristol Water

1017. Figure 60 shows that expenditure across the industry has been increasing, reflecting the knock-on impact of the improvements in water quality delivered during the early '90s that led to increasing complexity of treatment works. The additional assets that were added then to improve water quality are now beginning to require capital maintenance. The graph also shows that although the movement in expenditure between AMP4 and AMP5 for Bristol Water was large, the overall movement between AMP3 and AMP5 was in line with the industry.

1018. Factors that impact on Bristol Water's non-infrastructure capital maintenance requirements, including the complexity of water treatment and the amount of pumping the network requires are considered in **Section 9.3.3.4.2** above. These factors suggest that Bristol Water's non-infrastructure maintenance requirements are likely to be higher than those of an average company.

1019. The graph shows that the planned expenditure on non-infrastructure maintenance is close to the industry average for AMP5. Given the greater complexity of water treatment works, and the higher pumping requirements this is appropriate.

9.4.4.2.4 MEAV assessment

1020. One approach to estimate capital maintenance expenditure requirements is to consider the replacement values (by reference to Modern Equivalent Asset Valuation (**MEAV**)) of all the assets and how often, typically, each asset would last until it needs to be replaced. There are factors that could lead to such an approach overestimating or underestimating the real need for capital maintenance:

- **age of assets:** if a company's assets are relatively young on average, then maintenance would be expected to be below a replacement based estimate. If a high proportion of the assets were relatively old, then maintenance costs might be expected to be higher;
- **maintenance costs exceeding replacement value** - some assets will require ongoing maintenance through their lives. In such cases, the total maintenance costs over the life of the asset might be much higher than the replacement value. This can lead to maintenance costs being underestimated by a replacement-based estimate; and
- **replacement value exceeding maintenance costs** - for some assets, ongoing maintenance can prolong the asset life significantly. In such cases the total maintenance cost over a particular period can be below the replacement value. This can lead to maintenance costs being overestimated by a replacement approach.

1021. Despite the above, MEAV is a reasonable method to use, as part of a range of tests, to benchmark costs. Other regulators such as Ofgem have used MEAV-based approaches as part of their cost assessment toolbox.[783]

1022. The tables provided in the following Sections set out Bristol Water's gross MEAV for different infrastructure and non-infrastructure asset classes.[784] For each asset class a typical life is applied to estimate the level of maintenance expenditure that would be expected for that asset class over the medium to long term.

1023. The estimated lives used in each of these tables are longer than those typically used for accounting lives and are at the high end of what is plausible. Using an assumption of longer lives leads to a lower estimate of maintenance requirements.

1024. It is worth noting that this approach could be made more robust if data on asset values for all companies were available. Asset life replacement cycles could then be identified through econometric analysis. Ofwat was not, however, able to release the information required for us to undertake such an analysis.

9.4.4.2.4.1 *MEAV assessment of infrastructure capital maintenance expenditure*

1025. Table 63 below sets out Bristol Water's gross MEAV for different infrastructure asset classes.

[783] Ofgem, RIIO-ED1: Final determinations for the slow-track electricity distribution companies 2014 ('**RIIO ED1 final determination 2014**') (SOC372), p. 23.

[784] Bristol Water December Business Plan: Wholesale Tables **('December Wholesale Tables')** (SOC529), Table W5.

Table 63: Infrastructure maintenance asset replacement estimate

Infrastructure	MEAV Value £m[785]	Estimated Life Yr[786]	Implied Spend per AMP £m
Reservoirs	546.1	125	21.8
Raw water transmission	113.0	125	4.5
Aqueducts	66.2	125	2.6
Water mains <320mm	797.1	100	39.9
Water mains >320mm	353.7	125	14.1
Communication pipes	290.8	100	14.5
Total	2,166.9	111.1	97.6

Source: Bristol Water analysis[787]

1026. Given that Table 63 reflects an estimated life that is at the high end of what is plausible, the potential biases identified above that might lead to maintenance costs being overestimated should have been avoided. Consequently, the maintenance amounts indicated in these tables should be considered to be at the low end of what might be expected in practice.

1027. In total, this approach suggests that an appropriate benchmark for the level of capital maintenance for Bristol Water infrastructure is £98m in each AMP period, compared to £76m included in our plan.

9.4.4.2.4.2 *MEAV assessment of non-infrastructure capital maintenance expenditure*

1028. Table 64 below sets out Bristol Water's gross MEAV for different non-infrastructure asset classes.

Table 64: Non-Infrastructure Maintenance asset replacement estimate

Non-Infrastructure	MEAV Value £m[788]	Estimated Life Yr[789]	Implied Spend per AMP £m
Pumping	117.3	50	11.7
Treatment Works	513.0	50	51.3
Service Reservoirs	167.2	125	6.7
Treated water storage	27.3	125	1.1
Customer meters	36.3	20	9.1
Management and General	108.2	20	27.0
Total	969.4	48.3	100.4

Source: Bristol Water analysis[790]

1029. Given that Table 64 reflects an estimated life that is at the high end of what is plausible, particularly for non-infrastructure assets, the potential biases identified above that might lead to maintenance costs being overestimated should have been avoided. For example, the asset class 'Management and General' includes assets such as vehicles and computers that have a much shorter life than 20 years. Consequently, the maintenance amounts

785 December Wholesale Tables (SOC529), Table W5.

786 Bristol Water estimate based on maximum plausible asset life.

787 June Cost Exclusion Cases (SOC006), Capital Maintenance, Table 5 p. 177.

788 December Wholesale Tables (SOC529), Table W5.

789 Bristol Water estimate based on maximum plausible asset life.

790 June Cost Exclusion Cases (SOC006), Capital Maintenance, Table 6 p178.

indicated in these tables should be considered to be at the low end of what might be expected in practice.

1030. In total, this approach suggests that an appropriate benchmark for the level of non-infrastructure capital maintenance for Bristol Water is £100m in each AMP period, compared to £80m included in our plan.

1031. In combination, this MEAV analysis suggests that £198m is an appropriate benchmark for capital maintenance for Bristol Water. This amount is similar to the CC10 allowance for capital maintenance, and only slightly less than the amount actually spent in AMP5. Planned expenditure for AMP6 of £156m is well below this benchmark.

9.4.4.2.5 Bristol Water Econometric modelling

1032. An alternative approach to estimate capital maintenance requirements is to use an econometric approach that compares companies' actual maintenance expenditure taking into account the scale of the companies and any characteristics that would lead to differences in costs between them.[791]

1033. In order to provide an additional approach with which to benchmark our expenditure we developed separate econometric models for infrastructure capital maintenance and non-infrastructure capital maintenance. They are described in detail in our cost exclusion case for capital maintenance.[792]

1034. Details of how we have used modelling, and the benchmarking results it produced, is considered in the following Sections:

- modelling of infrastructure capital maintenance (see **Section 9.4.4.2.5.1**); and
- modelling of non-infrastructure capital maintenance (see **Section 9.4.4.2.5.2**).

9.4.4.2.5.1 *Infrastructure modelling*

1035. A quantitative benchmark for infrastructure capital maintenance expenditure was developed by Bristol Water.[793] This model had a dependent variable of infrastructure capital maintenance expenditure 2010-15 per population supplied, with explanatory variables of average age of mains, proportion of upstream assets, and length of mains per head (see Table 65 below).

1036. Companies plan capital expenditure over the five-year AMP periods, rather than reacting year to year. For this reason basing the model on expenditure during a complete AMP is the most appropriate approach.

[791] One risk with such an approach is that if some companies have been under-maintaining their assets then the econometric models will under-predict the level of maintenance required given that the historic data will reflect the underspend but not account for it as an underspend.

[792] June Cost Exclusion Cases (SOC006), p.178-181.

[793] June Cost Exclusion Cases (SOC006), Capital Maintenance, Economic modelling approach p.178.

Table 65: Infrastructure model variables

	Description	Data Source
Dependent Variable	Average infrastructure expenditure (2010-2015) divided by population served	Ofwat modelling Data 2012/13 population data
Explanatory Variables	Average age of mains	From PR09 Table C3.1[794]
	Proportion of MEAV related to upstream assets	JR11 Table 25a abstraction and raw water transport MEAVs as proportion of total MEAV
	Length of Mains divided by population served	From PR09 Table C3.1 2012/13 population data

Source: Bristol Water analysis[795]

1037. A unit cost dependent variable was used after testing for returns to scale allowed us to reject the possibility of substantial economies of scale. Use of a unit cost model also ensured that problems with co-linearity were avoided. Population served was used as a scale variable as it is fully exogenous to the company.

1038. Table 66 below shows the parameter estimates for the infrastructure capital maintenance model. This shows that the model parameters are all significant and that the model has a considerable level of explanatory power. The parameter estimates for the explanatory variables are all of the right sign and magnitude.

Table 66: Infrastructure Model Parameters

Parameter	Estimate	Std Error	P
Constant	-17.85	9.355	
Average Age of Mains	0.3166	0.1114	<1%
Proportion upstream assets	27.35	11.49	<5%
Length per population	1.337	0.6366	<5%
R-Square	0.44		
F-Statistic	3.66		<1%

Source: Bristol Water[796]

1039. Table 67 sets out the predicted impact of each of these factors on Bristol Water's expenditure requirements for infrastructure maintenance.

Table 67: Infrastructure maintenance model results

	£m for Bristol Water Population
Average Expenditure per Head	64
Upstream relative to average	19
Age relative to average	30
Length per population relative to average	-5
Predicted Expenditure	**108**
Upper Quartile	96

Source: Bristol Water[797]

[794] The length and age of mains are those as at 31.3.2008, whereas the modelled cost is over the period 2010-2015. Since both the average age and length of the main network will only change by a small amount over the period considered, and most companies are likely to see similar evolutions of these measures, this is considered to be acceptable.

[795] June Cost Exclusion Cases (SOC006), Capital Maintenance, Table 7 p179

[796] June Cost Exclusion Cases (SOC006), Capital Maintenance, Table 8 p. 179.

1040. This model predicts that the central estimate for Bristol Water's infrastructure expenditure is £107.8m per five-year AMP period. The expenditure included in our Business Plan is considerably less than this at £76m.

9.4.4.2.5.2 Non-infrastructure modelling

1041. We also developed a model for non-infrastructure maintenance.[798] This model had a dependent variable of non-infrastructure capital maintenance expenditure 2010-15 per population supplied, with explanatory variables of pumping head and non-infra MEAV per head. The first of these captures differences in pumping requirements, and the second differences in treatment requirement.

1042. Companies plan capital expenditure over the five-year AMP periods, rather than reacting year to year. For this reason basing the model on expenditure during a complete AMP is the most appropriate approach.

1043. Ideally, there would be a variable relating to raw water quality that could be included in the model. Such a variable is not available, however, and a proxy is required. The MEAV of treatment works is the largest of the different non-infrastructure asset classes, and therefore companies with more complex treatment works will tend to have higher non-infrastructure MEAVs compared to the population served.[799]

Table 68: Non-Infrastructure model variables

	Description	Data Source
Dependent Variable	Average non-infrastructure expenditure (2010-2015) divided by population served	Ofwat modelling Data 2012/13 population data
Explanatory Variables	Non-Infrastructure MEAV divided by population served	JR11 Table 25a 2011/12 Population data
	Pumping Head	Ofwat Modelling data

Source: Bristol Water[800]

1044. A unit cost dependent variable was used to ensure that problems with co-linearity of the explanatory variables were avoided. Population served was used as a scale variable as it is fully exogenous from the company.

1045. The model did not include a constant as the uncertainty in the constant if included was considerably greater than its value. Table 69 shows the parameter estimates for the model.

[797] June Cost Exclusion Cases (SOC006), Capital Maintenance, Table 9 p. 180.

[798] June Cost Exclusion Cases (SOC006), Capital Maintenance, p. 178.

[799] MEAV of treatment works per population supplied might be a better proxy than non-infrastructure MEAV, however this data is not available to Bristol Water.

[800] June Cost Exclusion Cases (SOC006), Capital Maintenance, Table 9 p. 180.

Table 69: Non-Infrastructure Model Parameters

Parameter	Estimate	Std Error	P
Constant	0	N/A	
Pumping Head	0.06346	0.0186	<1%
Non-Infra MEAV per head	7.652	3.762	<5%
R-Square	0.93		
F-Statistic	107.1		0%

Source: Bristol Water analysis

1046. Table 69 shows that the model parameters are all significant and that the model has a very high level of explanatory power. The explanatory variables are all of the right sign and magnitude.

1047. Table 70 below sets out the predicted impact of each of these factors on Bristol Water's expenditure requirements for non-infrastructure maintenance.

Table 70 Non-Infrastructure capital maintenance model results

	£m for Bristol Water Population
Average Expenditure per Head	77
Pumping Head relative to average	6
Treatment relative to average	6
Predicted Expenditure	**89**
Upper Quartile	79

Source: Bristol Water analysis

1048. The model predicts expenditure of £89m. The expenditure included in our plan is considerably less than this at £80m.

9.4.4.2.5.3 *Bristol Water Econometric Models Combined*

1049. Overall, the econometric modelling has identified a central benchmark for capital maintenance costs for Bristol Water of £197m. This is similar to the prediction of the MEAV/life-cycle based approach (£198m) and allowed expenditure at CC10 (£196m).

1050. Bristol Water asked Oxera to review these internal models. Oxera's review has found that:

- the Infrastructure Maintenance Model is relatively robust and passes standard diagnostic tests including the CMA's test for 'fit for purposes'. However, it notes that Bristol is an outlier in the model and that this might be an issue with the estimation of the proportion of upstream assets coefficient;
- an alternative functional form of the Non-Infrastructure Maintenance Model would be considered more robust. This alternative form passes standard diagnostic tests including the CMA test for 'fit for purposes'. This alternative form would reduce the disaggregated benchmark for Bristol Water by £7m, but would still leave the benchmark to be greater than the costs included in our plan; and

- further work was required to put these models on a fully robust footing.[801]

1051. Bristol Water considers that these econometric models provide a reasonable cross-check on the appropriate level of maintenance expenditure within our plans. An advantage of the models is that their relative simplicity adds transparency, and the results are easily replicable.

1052. For completeness however, Bristol Water asked Oxera to develop a more robust modelling approach of capital maintenance efficiency.

9.4.4.2.6 Summary of Benchmarking Evidence

1053. Table 71 below sets out a summary of the evidence from the various benchmarking approaches.

Table 71: Summary of capital maintenance benchmarking results

	Capital Maintenance Expenditure £m
Expenditure in AMP5	202
Allowed Expenditure CC10	196
MEAV/Asset Life Approach	198
Bristol Water Econometric models	197
Bristol Water Plan	156

Source: Bristol Water analysis

1054. Table 71 shows that the costs included in our plan are below the majority of the identified benchmarks. Overall this gives strong weight to our view that the costs included in our plan are appropriate and challenging.

9.4.5 Conclusions on benchmarking, assurance and challenge

1055. Bristol Water's costs have been robustly assessed and independently assured.

1056. The costs proposed are supported by external benchmarking and the efficiencies included are appropriate given independent assessments of both industry relevant frontier and catch-up efficiencies.

1057. We consider that our approach to identifying capital maintenance requirements is robust and that this has been confirmed through third-party assurance. It has resulted in a Business Plan that reflects the preferences of our customers.

1058. A wide range of benchmarking approaches have been used to demonstrate that this level of expenditure is efficient and challenging.

9.5 Oxera benchmark modelling of base totex

1059. In the previous Sections we have shown separately for opex, infrastructure capital maintenance and non-infrastructure capital maintenance that the costs included in our plan are within the range of benchmarked efficient costs.

[801] Email from Oxera to Bristol Water 24 September 2014 (SOC559).

1060. Following Ofwat's note on 6 August 2014 informing us of substantial totex differences, it became clear that Ofwat was not open to adjusting its modelling approach. As a consequence, we engaged Oxera to provide further evidence on the shortcomings of Ofwat's modelling approach and to develop alternatives. Initially, and due to the short time available for responding to Ofwat, the work focused on adding extra explanatory factors to Ofwat's cost models in order to support cost exclusion cases (the process designed to reflect cost differences relative to Ofwat's models), as set out in **Section 11**. This initial analysis identified further approaches that could improve the robustness of the cost modelling. The results of the further modelling are set out below.

1061. Oxera's report sets out the mid-point values for each approach, including botex, from £356m to £372m.[802] Table 72 below sets out the full range of results of Oxera's disaggregated modelling approaches, excluding botex, for opex and capital maintenance and compares the predictions in combination.[803] It shows that the base totex in Bristol Water's Business Plan is within the upper quartile range identified by Oxera, albeit that those statistical approaches which do not allow for 'special factors' (see **Section 9.3.2.4** above) have been supplemented by other analysis of those factors. The results of the SFA approach are frontier efficiency. As a consequence we have also included the upper quartile predictions of the SFA approach. OLS and RE model results are upper quartile efficiency.

[802] Oxera BW Efficient Cost Level March 2015 (SOC536), Table 7.5.

[803] Oxera BW Efficient Cost Level March 2015 (SOC536).

Table 72: Comparison of Oxera modelling approach results with SoC and FD14

Modelling Stream	SFA Frontier	SFA Upper Quartile [804]	OLS Upper Quartlie	RE Upper Quartile	Bristol Water SOC	Ofwat FD
	£m	£m	£m	£m	£m	
Opex						
Model Results	193	195	162	159		158
Un-modelled Costs	30	30	30	30		30
Opex	222	225	192	189	228	188
Capital Maintenance Separate						
Infrastructure capital maintenance	69-74	72-77	80-85	82-85	76	62
Non-infrastructure capital maintenance	72	75-82	81	83	80	67
Total Maintenance	141-146	147-159	161-166	165-168	156	129
Capital Maintenance Combined						
Combined Maintenance Model	132-141	148-158	156-170	173-180	156	129
Total						
Oxera disaggregated range for Wholesale base totex[805]	**355-376**	**373-386**	**358-373**	**364-378**		
Bristol Water opex special factors[806]	0	0	20	20		
Wholesale base totex including special factors	**355-376**	**373-388**	**378-393**	**364-398**	**385**	**318**

Source: Oxera/Bristol Water Analysis[807]

1062. Table 72 shows that:

- the range identified by the frontier SFA analysis, and the OLS and RE approaches without taking into account special factors is slightly below the amount included in our plan; however
- the costs included within Bristol Water's plan are within the range identified by the SFA modelling if an upper quartile approach is used;
- the costs within the plan are within the range identified by the OLS and RE modelling if account is taken of the relevant opex special factors;
- the amount assumed for Opex by Ofwat is considerably below the SFA results of the operating cost models developed by Oxera, which consider company specific effects; and

804 The SFA upper quartile range has been calculated by Bristol Water using the "core" and "sensitivity 1" scenarios presented in tables 7.1 & 7.2 and figures from table 7.3 (Oxera BW Efficient Cost Level March 2015 (SOC536)). The conversion from frontier to upper quartile used the results in Table A5.1 (Oxera BW Efficient Cost Level March 2015 (SOC536)).

805 For the OLS and RE methodologies, the upper quartile adjustment for total base totex was undertaken after aggregation to mitigate risks of cherry picking and to capture potential trade-offs between the individual activities (see Oxera BW Efficient Cost Level March 2015 (SOC536), p. 42). The base totex is not, therefore, the simple sum of the figures above but is instead an appropriate reflection of the modelling results.

806 Based on ICS Report on Serviceability (SOC268): Additional costs for Purton and Littleton (£8m); canal and river trusts (£8m); and additional congestion costs (£4m). Special factors are not included for the SFA approach as they should be automatically accounted for by this method to the extent that they can be captured by the data. Oxera has not assessed Bristol Water's special factors in the context of the RE and OLS models, nor the extent to which there may already be an implicit allowance in the upper quartile adjustment. The approach adopted here to special factors is consistent with Ofwat's approach to cost assessment.

807 Oxera BW Efficient Cost Level March 2015 (SOC536).

- the total base totex allowed by Ofwat is well below the bottom of Oxera's upper quartile range.

1063. In respect of the OLS and RE models, Oxera notes: *"For OLS and RE, the models fail to account for noise or error in the modelling and factors unique to Bristol Water"*.[808] As a result it is reasonable to take into account factors unique to Bristol Water in assessing efficiency. Therefore including an allowance for special factors in these modelling streams is appropriate.

1064. In presenting its results, Oxera notes: "Thus, while Bristol may be able to improve its efficiency in some areas, it may not be something that can be achieved immediately. It is likely that it will require some time to implement best practice in areas that can be improved."[809]

1065. Some of the differences in company efficiency will relate to differences in historic levels of investment in supply systems. For example, a network with younger pumps is likely to have a higher pumping efficiency, and therefore lower power costs. This will make it more efficient. However, the lowest whole life cost approach to improve pump efficiency is unlikely to be widespread replacement in the short term, and is more likely to be phased over a longer period taking into account maintenance requirements. This means that the lowest cost approach of reducing the gap in efficiency will take a long time to deliver.

1066. Overall, we consider that the benchmarking evidence provided by Oxera supports our view that Bristol Water's asset based estimate of required expenditure is reasonably efficient and appropriate for inclusion in the redetermination of prices.

1067. We also consider that Oxera's benchmarking demonstrates that the Ofwat cost allowance for base totex is below a credible range.

9.5.1 Opex Econometric modelling

1068. The table below sets out the results of the opex efficiency modelling undertaken by Oxera.

[808] Oxera BW Efficient Cost Level March 2015 (SOC536), p. 48.

[809] Oxera BW Efficient Cost Level March 2015 (SOC536), p. 48.

Table 73: Oxera Wholesale Opex Modelling Results (£m)

Modelling Approach	SFA Frontier	SFA Upper Quartile[810]	OLS Upper Quartile	RE Upper Quartile
Estimated Wholesale Opex	193	195	162	159
Unmodelled Costs	30	30	30	30
Total Opex per Oxera modelling	223	225	192	189
Bristol Water Special Factors[811]	-	-	20	20
Total opex including Bristol Water special factors	223	225	212	209

Source: Oxera/Bristol Water Analysis[812]

1069. Oxera's SFA model estimates a frontier benchmark and takes into account company specific effects. As a consequence it effectively automatically takes into account special factors that might lead to companies' costs being different. The frontier benchmark is £223m, just slightly below the costs included in our plan of £228m.

1070. Oxera note that in practice it will take time for Bristol Water to approach frontier efficiency, and that this would need to be taken into account in setting a cost allowance. In **Section 9.3.2.3** we have set out our approach of catching up to an efficient frontier over time. The results of the wholesale opex modelling are broadly consistent with the appointed business model used to set the catch-up rate. Consequently, we consider that our opex efficiency assumption remains appropriate.

1071. Oxera notes "*For OLS and RE, the models fail to account for noise or error in the modelling and factors unique to Bristol Water*".[813] Bristol Water has estimated £20m of factors unique to Bristol Water that lead to higher costs: payments to the canal and rivers trust, higher costs of treatment at Purton and Littleton, and higher costs due to congestion within Bristol.[814] After taking into account these special factors, the operating costs predicted by these alternative approaches remain slightly below the costs included in our plan. We consider that the four factor SFA approach is a more robust approach for assessing company specific cost differences and, therefore, is a more appropriate benchmark. In addition, whilst the OLS and RE approaches show a lower opex benchmark their results for maintenance are higher. We have, therefore, used these approaches to benchmark base totex in total.

9.5.2 Oxera Econometric assessment of Capital Maintenance

1072. Table 74 below sets out the range of modelling results from the three approaches for infrastructure and non-infrastructure maintenance separately.

810 The SFA upper quartile range has been calculated by Bristol Water using the "core" and "sensitivity 1" scenarios presented in tables 7.1 & 7.2 and figures from table 7.3 (Oxera BW Efficient Cost Level March 2015 (SOC536)). The conversion from frontier to upper quartile used the results in Table A5.1 (Oxera BW Efficient Cost Level March 2015 (SOC536)).

811 DDR Appendices Oct 2014 (SOC020), appendix 4.10. Oxera has not assessed Bristol Water's special factors in the context of the RE and OLS models, nor the extent to which there may already be an implicit allowance in the upper quartile adjustment. The approach adopted here for special factors is consistent with Ofwat's approach to cost assessment.

812 Oxera BW Efficient Cost Level March 2015 (SOC536), p. 45

813 Oxera BW Efficient Cost Level March 2015 (SOC536), p. 48

814 DDR Appendices Oct 2014 (SOC020), appendix 4.10

Table 74: OXERA modelling results – infrastructure and non-infrastructure capital maintenance (£m)

Modelling Stream	SFA Frontier	SFA Upper Quartile[815]	OLS Upper Quartlie	RE Upper Quartile	Bristol Water
IRE	69	72	85	85	76
IRE (mains age instead of MEAV)	74	77	85	85	76
MNI	72	75	81	83	80

Source: Oxera/Bristol Water[816]

1073. The SFA Model results represent frontier efficiency, whilst the OLS and RE model results represent upper quartile efficiency. The table shows that the costs included within our plan are within the range of estimated costs.

1074. Table 75 sets out the modelling results from the combined maintenance model.

Table 75: OXERA modelling results – combined capital maintenance (£m)

Modelling Stream	SFA Frontier	SFA Upper Quartile[817]	OLS Upper Quartlie	RE Upper Quartile	Bristol Water
Capital Maintenance	132	148	156	173	156
Capital Maintenance (exc MEAV variable)	141	158	170	173	156

Source: Oxera/Bristol Water[818]

1075. The table shows that as for the more disaggregated models, the costs included within our plan are within the range of costs identified by the models.

9.6 Ofwat's view of base totex in FD14

9.6.1 Executive summary

9.6.1.1 *Introduction*

1076. This Section sets out Ofwat's view of Bristol Water's proposed base totex programme and costs as well as Bristol Water's comments on Ofwat's approach.

9.6.1.2 *Key Themes*

1077. The FD14 allowance for operating costs is 18% below the operating costs forecast in Bristol Water's Business Plan. The reduction has already taken effect in relation to 2015/16 bills, and equates to approximately £8m per annum. The scale of the reduction is significant in regulatory terms and not credible in a mature regulated industry, with the magnitude of reduction equating to 66% of Bristol Water's opex wage bill (see **Section 9.6.2.1** below). Nor is it supported by reference to historical performance. At PR09, both

[815] The SFA upper quartile range has been calculated by Bristol Water using the "core" and "sensitivity 1" scenarios presented in tables 7.1 & 7.2 and figures from table 7.3 (Oxera BW Efficient Cost Level March 2015 (SOC536)). The conversion from frontier to upper quartile used the results in Table A5.1 (Oxera BW Efficient Cost Level March 2015 (SOC536)).

[816] Oxera BW Efficient Cost Level March 2015 (SOC536), p. 42

[817] The SFA upper quartile range has been calculated by Bristol Water using the "core" and "sensitivity 1" scenarios presented in tables 7.1 & 7.2 and figures from table 7.3 (Oxera BW Efficient Cost Level March 2015 (SOC536)). The conversion from frontier to upper quartile used the results in Table A5.1 (Oxera BW Efficient Cost Level March 2015 (SOC536)).

[818] Oxera BW Efficient Cost Level March 2015 (SOC536), p. 44

Ofwat and the CC assessed Bristol Water's operating costs as being 5%-10% behind the frontier. An 18% reduction for PR14 is not consistent.

1078. In its FD14, Ofwat allowed £27m less expenditure for the capital maintenance of base service than was included in Bristol Water's Business Plan (see Table 76 below).

Table 76: Capital maintenance expenditure in the Business Plan and in Ofwat's FD14

Capital maintenance expenditure purposes	Business Plan AMP6 expenditure (£m)	Ofwat FD14 AMP6 expenditure (£m)
Infrastructure Maintenance	76.3	129.6
Non-Infrastructure Maintenance	79.9	
Total	**156.2**	**129.6**

Source: Bristol Water Analysis[819]

1079. Ofwat based its FD14 allowance on its refined base totex modelling. In **Section 11** Bristol Water sets out why it considers that the results of this modelling do not form a safe basis for assessing future levels of expenditure and efficiency. Bristol Water does not believe that Ofwat's modelling allows sufficient expenditure to maintain the base level of service it is committed to provide to its customers.

9.6.1.3 *Structure of Section*

1080. This Section sets out:

- **FD14 opex** - Ofwat's view of opex as set out in FD14 (see **Section 9.6.2**);
- **comments on FD14 opex** - Bristol Water's views on Ofwat's approach and allowance for opex in FD14 (see **Section 9.6.3**);
- **FD14 capital maintenance** - Ofwat's view of capital maintenance expenditure as set out in FD14 (see **Section 9.6.4**);
- **comments on FD14 capital maintenance** - Bristol Water's views on Ofwat's approach and allowance for capital maintenance in FD14 (see **Section 9.6.5**); and
- **conclusions** - conclusions on Ofwat's approach to base totex in FD14 (see **Section 9.6.6**).

9.6.2 Ofwat's approach to and view of operating expenditure

1081. This sub-section considers Ofwat's assessment of opex, and the approach it has taken to reach that view. This is set out in the following Sections:

- Ofwat's assessment of opex (see **Section 9.6.2.1**); and
- details of the approach taken by Ofwat to reach its assessment (see **Section 9.6.2.2**).

9.6.2.1 *Ofwat's assessment of opex*

1082. Under Ofwat's base totex assessment approach in its cost models (see **Section 9.6.2.2** below), no distinction is made between capital expenditure and operating expenditure. To

[819] Table W3 (updated) on Water service expenditure by purpose, October 2014 (SOC530); BW analysis of FD14.

obtain a general cost allocation for opex from Ofwat's total allowance we have extracted information from the Ofwat financial model, which provided a breakdown of the menu choice totex of £438m. We have then pro-rated these amounts down to the baseline totex of £409m, adjusting for any specific amounts that Ofwat provided in the FD14. This suggested an Ofwat opex allowance of £188m, as per Table 52 above.

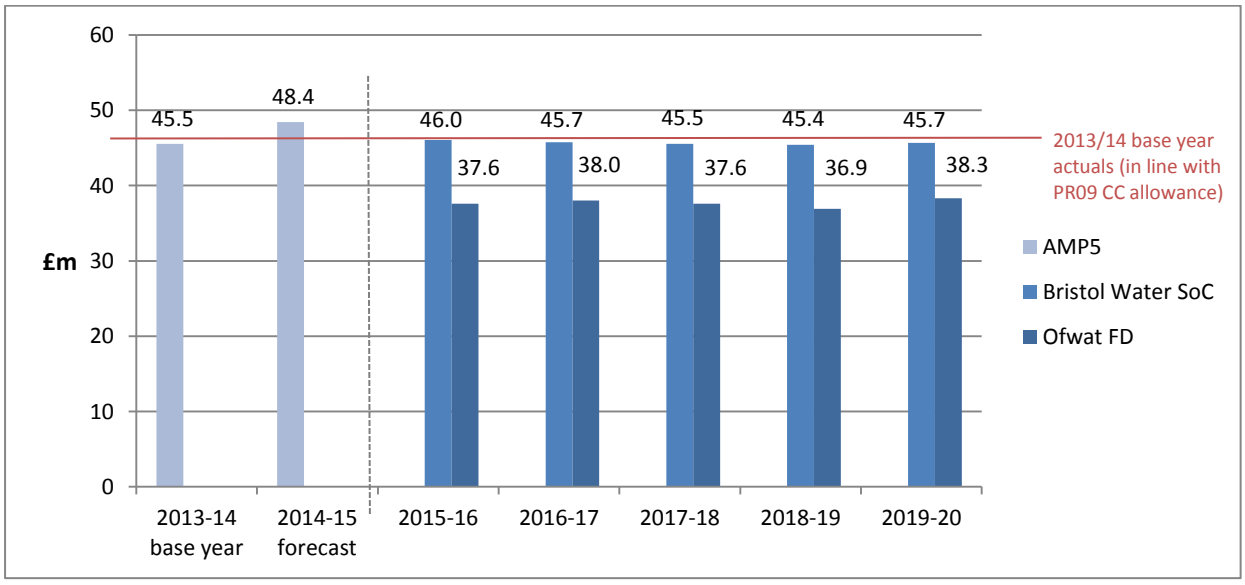
Table 77: Ofwat's wholesale operating costs (£m 2012/13 prices)

	2015-16	2016-17	2017-18	2018-19	2019-20	AMP6
FD14 baseline	37.7	38.0	37.6	36.9	38.3	**188.4**
Bristol Water SoC	46.0	45.7	45.5	45.4	45.7	**228.4**
Difference	**(8.4)**	**(7.7)**	**(7.9)**	**(8.5)**	**(7.4)**	**(40.0)**

Source: Ofwat FD14 financial model, Bristol Water analysis

1083. The adjusted Ofwat operating costs are presented in Figure 61 below in comparison to the Business Plan and the 2013/14 actuals (which are in line with the CC10 allowance).[820]

Figure 61: PR14 SoC wholesale opex compared to Ofwat FD14 allowance (2012/13 prices)



Source: Ofwat FD financial model, Bristol Water analysis

1084. The average Ofwat allowance is £37.7m per year, which represents an 17% reduction from the 2013/14 base year operating costs and an 18% reduction from the average costs calculated by Bristol Water and set out in the preceding Sections.

9.6.2.2 *Ofwat approach to assessing opex*

1085. Ofwat has used a top-down totex approach to assess overall levels of expenditure.[821] It then appears to allocate the base totex costs it has identified from its cost assessment

[820] CC Determination 2010 (SOC011). The final CC model showed opex for the appointed business of £47.4m for 2013/14 in 2007/08 prices. Actual expenditure was also £47.4m of which the wholesale component was £38.8m (£45.5m in 2012/13 prices).

[821] See **Section 11**

approach between operating costs and capital maintenance pro-rata to the amounts included within Bristol Water's plan.

1086. Ofwat does not appear to have applied any cross-checks to ensure that the resulting level of operating costs included in FD14 is appropriate.

9.6.3 Bristol Water's view on Ofwat's FD14 approach for operating costs

1087. This Section sets out our view of Ofwat's approach to and assessment of opex:

- our view of Ofwat's assessment of opex, and whether it is credible or achievable (see **Section 9.6.3.1**); and
- our view of the approach taken by Ofwat to reach its assessment (see **Section 9.6.3.2**).

9.6.3.1 *Deliverability of Ofwat's assessment of opex*

9.6.3.1.1 The overall level of reduction is unachievable in practice

1088. The immediate 18% reduction in operating costs implied by Ofwat is substantial in scale compared to other regulatory determinations. We consider that such a reduction is unlikely to be achievable for a regulated business that has been subject to 25 years of price cap regulation and strong incentives to improve efficiency. We believe, therefore, that a determination which imposes such a major reduction would need to be supported by extremely robust evidence and analysis. It appears, however, that the proposed reduction is not supported by any evidence as Ofwat does not appear to have performed any analysis on operating costs. Ofwat has not provided a reasoned view on Bristol Water's opex efficiency.

1089. The numbers proposed by Bristol Water already include a challenging 1.5% p.a. cumulative efficiency target that was set based on the detailed work of independent economic consultancies (see **Section 9.3.2.3** above). Therefore the proposal that operating costs can be reduced a further 18% with immediate effect is unrealistic.

1090. We are a stable business, providing a service through a fixed network to customers. The scope for reductions in operating costs is limited compared to other industries. We are unable to turn off/sell off parts of our cost base or choose when certain costs are incurred.

9.6.3.1.2 The size of reduction is particularly misplaced given the nature of the cost base

1091. Fees paid to Government for business rates, abstraction licences, etc. form a substantial part of our operating costs (23% of base opex, or £10.3m per annum). These are essentially fixed costs and so the opportunity to reduce these costs is limited.

1092. Employment costs have been challenged following previous price reviews. We have undertaken a number of efficiency improvement programmes and reduced headcount associated with operating costs.

1093. Power savings are assumed within our efficiency programme (see **Section 9.3.2.3.1** above) and form a key part of how we intend to achieve the efficiency challenge. The only way higher levels of saving could be achieved is for market prices to fall further than assumed

in our input price assumptions, which were based on forecasts from DECC (September 2014). Whilst prices fell substantially in the three months ending December 2014, they increased in January 2015. The notable volatility observed in recent months suggests that reliance should not be placed on short-term fluctuations in price as a basis for future projections.

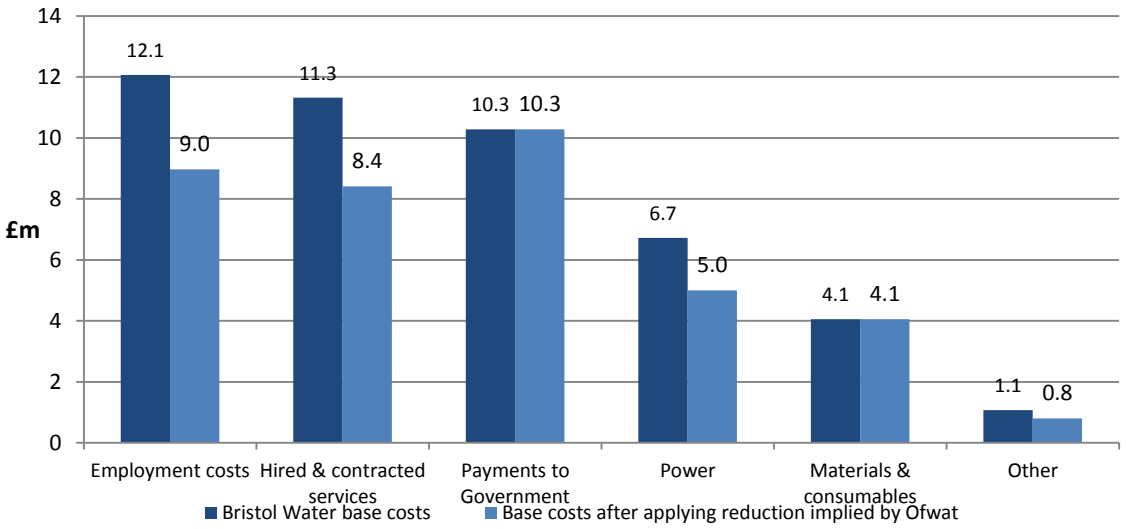
1094. Materials and consumables are purchased through a procurement hub to ensure we obtain low prices that would otherwise be unachievable for a company of our size. The opportunities for further reductions in these costs are limited.

1095. Due to enhancements and input price pressure, our costs are expected to rise above the base operating costs. We have included a challenging efficiency assumption of 1.5% that effectively reduces our operating costs back to the 2013/14 base level by 2019/20. This will be difficult to meet, as confirmed by our Baringa-led efficiency project.[822]

1096. The only way to radically reduce costs would be to reduce our service levels. This would, however, be in direct conflict with customer expectations as contained in our outcomes (see **Section 6** above) and would inevitably compromise our ability to satisfy the performance targets associated with the outcomes, resulting in the application of penalties (see **Section 14** below).

1097. Figure 62 below shows how the operating costs proposed by Ofwat could potentially impact on the major cost areas for Bristol Water. In assuming that no reductions are possible for payments to Government and materials and consumables, the reduction represents 26% of the remaining operating costs. These reductions reflect cost savings over and above what is already a very challenging efficiency target.

Figure 62: Bristol Water 2013/14 wholesale base operating costs by nature (2012/13 prices)



Source: Bristol Water

[822] Project Channel business case review January 15 (SOC550).

1098. In conclusion, we do not see any way that operating cost reductions of this size can be achieved without a significant reduction in service levels. Bristol Water does not consider this scale of reduction is credible or deliverable.

9.6.3.2 *Comments on Ofwat's approach to assessment of opex*

1099. Ofwat has used a top-down totex approach to assess overall levels of expenditure (see **Section 11** below). In focusing on totex and PAYG to identify revenue requirements, Ofwat has chosen not to specifically disclose a wholesale opex allowance in its FD14. Separate operating and capital cost analysis is crucial, however, to enable an accurate assessment of tax and financeability to be made. The impact of Ofwat's high-level totex approach on financeability is considered in **Section 17**.

1100. In previous price reviews, Ofwat has separately assessed operating costs using base year operating costs; making adjustments for known cost changes, and making adjustments for frontier and catch-up efficiency.

1101. An alternative approach would be to use a disaggregated approach and model different elements of cost separately. This would identify separate benchmarks for opex, infrastructure capital maintenance, and non-infrastructure capital maintenance.

1102. Bristol Water considers that the omission of a separate assessment approach for operating costs is a major weakness in Ofwat's overall cost assessment process. In the case of Bristol Water it has led to an estimate of operating costs that is not deliverable.

1103. Ofwat's approach to cost assessment, and the models and tools that it has used, are considered in more detail in **Section 11** below.

9.6.4 Ofwat position on proposed capital maintenance programme

1104. Ofwat assessed Bristol Water's base totex (opex and capital maintenance) requirements as a whole using a top-down approach (see **Section 11** below). The estimated costs were then allocated to capital maintenance in Ofwat's financial model pro-rata to the split of costs included in companies' plans. Table 78 sets out the costs Ofwat allocated to capital maintenance in its financial modelling.

Table 78 Ofwat vs Bristol Water view of AMP6 capital maintenance spend

Ofwat pro-rata assessment of total AMP6 Capital Maintenance Expenditure	£130m
Bristol Water view	£156m

Source: Bristol Water analysis

1105. Ofwat has not published any assessment of the detail of the capital maintenance elements of our Business Plan except for its response to our cost exclusion case (referred to in the FD14 as cost special factors) concerning Bedminster SR (see **Section 9.3.3.4.1** above).

Ofwat does not, therefore, appear to have reviewed our Business Plan in detail to determine what should be excluded in order for its assessment of cost to be met.[823]

1106. Ofwat's approach to special factors and cost exclusion cases is discussed in **Section 11.2.2** below.

9.6.5 Bristol Water's view of Ofwat's assessmentof capital maintenance

1107. Ofwat's prediction of Bristol Water's capital maintenance requirements is considerably less than the amount included in our plan, or the amount actually incurred during AMP5. This is in stark contrast to the wide range of benchmarking approaches set out above that demonstrate that the costs included within our plan are efficient.

1108. We set out a discussion of Ofwat's modelling and cost assessment approach in **Section 11**. In particular, there are two key elements of capital maintenance expenditure that are not explained through Ofwat's modelling:

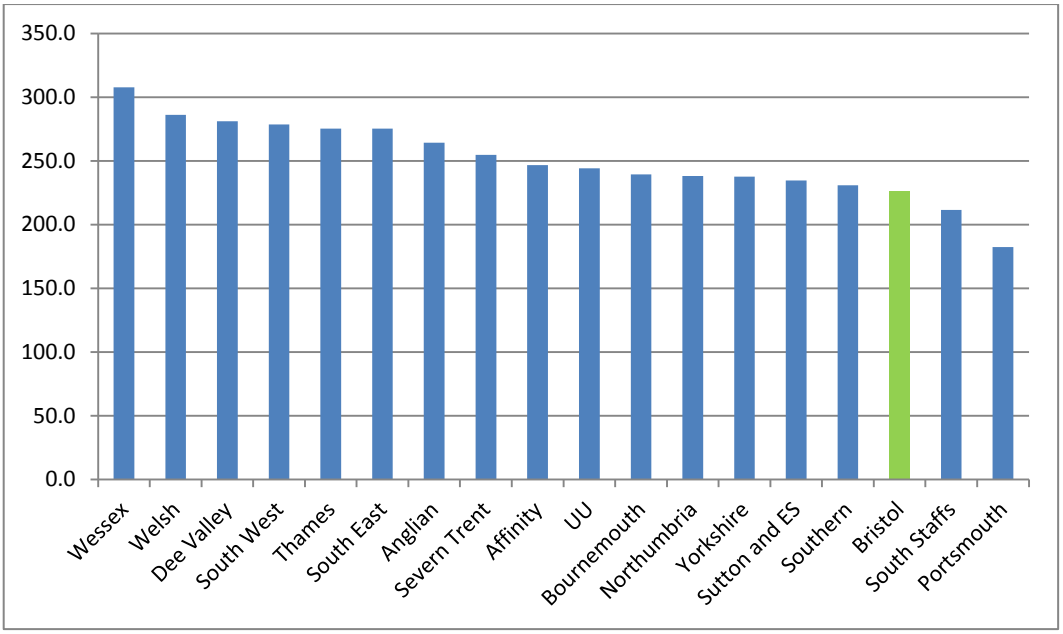
- the model incorrectly predicts low costs per head for Bristol Water; and
- the model does not take into account a number of factors that lead to Bristol Water's costs being higher than average.

1109. Ofwat's modelling approach predicts that Bristol Water's base totex costs should be below the industry average. This is shown in Figure 63, which shows the upper quartile efficient base totex (opex and capital maintenance) per head of population supplied predicted by Ofwat's base totex models.[824] We have used population served to normalise expenditure as it is a reliable measure of scale and is exogenous to companies.

[823] At a meeting with the Ofwat Wholesale cost team, 22 September 2014 in London members of the team explicitly stated that the Wholesale cost team could not comment on the maintenance activities submitted in our plan as it had not read the detail.

[824] Ofwat, Base totex models.

Figure 63: Base totex costs predicted by Ofwat for each Company (£m 2012/13 prices)



Source: Bristol Water Analysis/Ofwat

1110. We have shown above that Bristol Water's capital maintenance costs would be expected to be slightly higher than the average for the industry due to a greater proportion of upstream assets; an older network; more complex treatment processes, and a higher pumping requirement. In **Section 11** we show that extending the modelling to take account of these factors would result in a much higher estimate of Bristol Water's costs.

1111. During the PR14 process we have sought to utilise all opportunities to demonstrate to Ofwat the robustness of the scope and costs associated with our Business Plan. We utilised the cost exclusion case approach, submitting four capital maintenance cost exclusion cases.[825] In the cost exclusion cases we set out our view that the replacement of Bedminster SR was atypical expenditure over and above long-term needs.[826]

1112. We explained the historical movement of capital maintenance costs in our DDR and why the remainder of the expenditure was expected to be typical for the future.[827]

1113. We consider that a robust assessment of Bristol Water's requirements, also taking into account the cost exclusion cases for operating costs and Bedminster SR would have resulted in a baseline for base totex greater than the amount included in our Business Plan.

1114. If the allowance for capital maintenance is insufficient, then either:

[825] See June Cost Exclusion Cases (SOC006) and DDR Appendices Oct 2014 (SOC020), sections relating to: Capital Maintenance; Bedminster Reservoir; Asset Reliability – Unplanned customer minutes lost; Asset reliability – Discoloured water contacts.

[826] June Cost Exclusion Cases, (SOC006) p. 138.

[827] DDR Appendices Oct 2014 (SOC020), p. 64..

- maintenance expenditure would be constrained to a level that would not be sufficient to match the underlying degradation of the assets. This would lead to deterioration in customer service contrary to the wishes of customers and result in penalties for failing to deliver service commitments (see **Section 13** below). In addition, it would lead to a need for a significant increase in maintenance expenditure in future periods in order to avoid further deterioration; or
- Bristol Water would have to spend in excess of the amount assumed in its determination, considerably reducing the return available to its investors.[828]

1115. Whilst in practice, we would endeavour to minimise the impacts on customers, an insufficient allowance for capital maintenance would inevitably have some impact on service levels.

1116. In its modelling approach, Ofwat used the variation in differences between plan and model expenditure to estimate 'upper quartile' efficiency.[829] We have some concerns about this approach in respect of capital maintenance expenditure:

- there are indications of deteriorating performance during AMP5 (see **Section 11.3.1.2.2**). Using a level of maintenance expenditure below average for a period when service is worsening could lead to deteriorating performance being locked in across the industry; and
- not all of the differences between company expenditure and the model will be due to differences in efficiencies. A large part of the difference is likely to be due to un-modelled explanatory factors or timing differences in the profile of expenditure. Given this, making an adjustment that effectively assumes all of the difference relates to efficiency is not a reasonable approach.

1117. Overall, Bristol Water does not consider that Ofwat's assessment of capital maintenance requirements was robust and that constraining expenditure to this level would not be in the best interests of customers.

9.6.6 Conclusions on Ofwat's FD14 assessment of base totex

1118. The reduction in opex proposed in Ofwat's FD14 is neither credible nor deliverable.

1119. Ofwat has agreed that the outcomes delivered by Bristol Water's capital maintenance expenditure are required. However, Ofwat's FD14 only includes £130m for capital maintenance expenditure, £26m below the amount included in our plan.

1120. Bristol Water considers that the FD14 allowance is insufficient to maintain its supply network. Constraining expenditure to this level would impact adversely on customer services and lead to higher costs in the long run.

[828] As a result of the menu-sharing incentive, each additional £10m spent by Bristol Water reduces return on regulatory equity by 0.7%.

[829] Ofwat upper quartile calculation (SOC380).

9.7 Conclusions on base totex

1121. Bristol Water has built up its expenditure requirements based on bottom-up assessments of the needs and solutions.

1122. Bristol Water has sought, and been given, assurance that its process for identifying needs and costs is robust. It has used external benchmarking to assess whether its costs are reasonable. The benchmarking confirms this. Ofwat however has identified a cost allowance (£409m) for Bristol Water that is considerably below the costs included in its plan (£537m). The difference in base totex is £67m.

1123. Bristol Water has tested its proposed plan in terms of costs, service level and bills with customers. The Business Plan was considered acceptable by 92% of customers.

1124. Bristol Water has assumed challenging total efficiency targets which equate to savings of £31m for base totex

1125. As a result of the range of external challenge received, Bristol Water believes:

- a detailed, asset risk-based methodology is the most appropriate way to determine its cost requirements;[830]
- the efficiency challenge assumed in our plan is demanding and will be tough to deliver;
- that appropriate top-down disaggregated cost assessment shows that the cost estimates are within an efficient range; and
- the proposals reflect the most appropriate mix of cost-beneficial solutions to address customer requirements at a level that customers can afford.

1126. Ofwat has based its cost assessment on an approach that is overreliant on models that are not safe to use for this purpose. As a consequence it has significantly underestimated the required level of costs.

1127. Bristol Water would like the CMA to consider whether Bristol Water's plan in relation to base totex is justified by making use of an engineering assessment of the needs, solutions and costs.

[830] CH2M Hill CM Review Aug 2014 (SOC096).