YORKSHIRE WATER SERVICES LTD

PERIODIC REVIEW 2009

B3 – A BALANCED ASSET MANAGEMENT PLAN - OVERVIEW
MAINTAINING SERVICE AND SERVICEABILITY TO CUSTOMERS (WATER AND SEWERAGE)

CONTENTS

1. A BALANCED ASSET MANAGEMENT PLAN

1.1. STRIKING THE BALANCE

Getting the Balance Right - CEO View

'Everything we do, from turning valves in the street, to regulatory submissions, should be focussed on providing an ever improving service to customers, and ensure any contact a customer may have with our company is an enjoyable experience…..

Excellent asset management processes are essential to deliver all aspects of this vision. One thing is clear, to be successful in our vision we have to strive to ensure we make the right investment, in the right asset, at the right time, first time every time. This is an easy statement to make, but takes a great deal more effort to deliver.

Continuous improvement through both incremental change and more radical step change improvements are required to ensure the service is continuously enhanced as effectively and efficiently as possible'


CEO VIEWPOINT

Getting the Balance Right

biography

Figure 1 - Getting the balance right – CEO view1

1. Yorkshire Water has a proven history in Asset Management Planning of seeking a balance for customers, service and assets. This was evident in the risk management approaches adopted in PR99 and the LEADA approach to balancing risks, costs and customer benefits used at PR04. This is now fully aligned with the Company's vision 'To be clearly the best Water Company in the UK.'

2. Our Company vision is to be clearly the best Water Company in the UK and we have six distinct vision chapters. The AMP5 asset management plan is aligned closely with our Society, Service, Compliance and Value chapters as shown in figure 2. The company vision runs throughout not only our Strategic Direction Statement, but also the AMP5 plan itself:

1 Extract from International Water Association publication June 2006 (Water Asset Management International, Issue 2, June 2006)

Society	Service	Compliance	Value
1. Society recognises the value of what we do 2. We have influence on water related matters	3. We always, always consider the customers point of view 4. Our customers recognise the value of what we do	5. We enjoy a constructive relationship with our regulators and stakeholders 6. We proactively conserve and enhance the environment 7. We go beyond compliance where we believe the benefits exceed the costs	8. We outperform regulatory and other key financial targets 9. We are clearly Ofwat's frontier company
⇩	⇩	⇩	⇩
A customer SERVICE experience second to none		**A strong ENVIRONMENTAL focus**	**The lowest possible PRICES for customers**
STRATEGIC DIRECTION STATEMENT			

Figure 2 – Alignment of our vision with the asset management plan and SDS objectives

3. The commitment and consistency of our internal vision, our Strategic Direction Statement and our approach to PR09 all demonstrate our commitment to customers, not only in the service they experience, but also in the value of that service – a balance we constantly seek to achieve.

4. In PR04, the Company set out to 'maximise service from every pound spent', using the award winning, asset management planning tool 'LEADA'. This was the first time we used a large, wide ranging 'willingness to pay' customer consultation to shape the asset management plan to a significant extent. Not only have we embedded the PR04 asset management process into our business as usual Asset Management Planning and Investment Cycle (Section B3 2), we have put customers at the heart of our operations and planning, so that we focus on giving the customer the services they expect from us.

5. For PR09, we have the same principle of ensuring that customer feedback shapes our programme, in an overall balanced plan. We set out to ensure we were 'Striking The Right Balance', and this has been our touchstone throughout the whole planning process for AMP5, along with the other principles set out in figure 3. These were set out and approved at Board level and have shaped all stages of communication, development, challenge, governance and final approval of our plan.

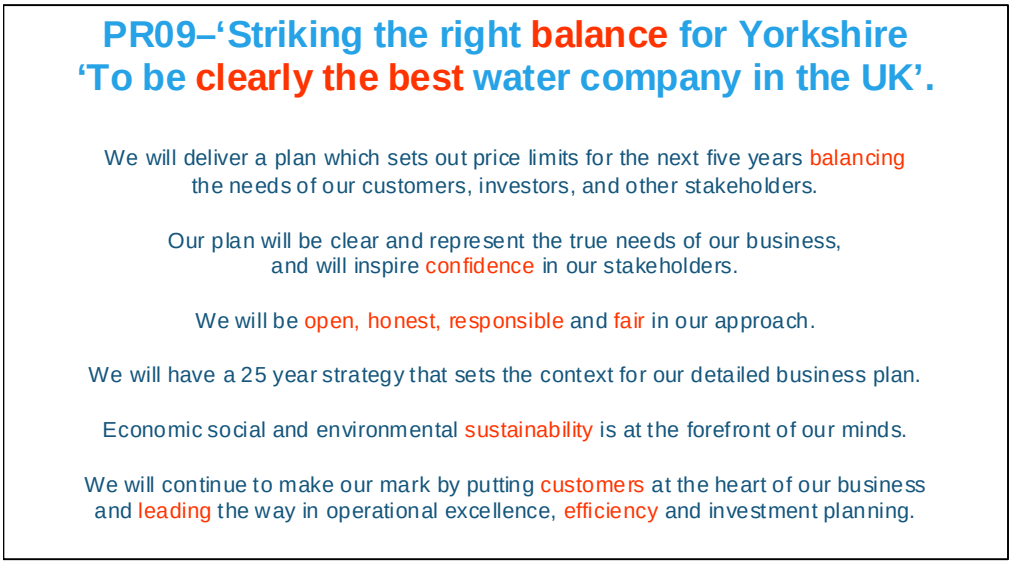

Figure 3 - PR09 Principles

6. Taking a balanced approach to asset management is nothing new for Yorkshire Water, and is clearly visible in both our measured performance and our approach to previous periodic reviews. We manage service performance, risk and cost pressures in our business usual activities.

7. Given our industry is here for the long terms needs of our customers , other stakeholders and the environment, we need to ensure that the balanced approach is right not only for a five year period, but must also take into account the pressures arising from the past and those already

visible in the future. As stakeholder priorities do not always align, we have considered the primary influence in each area of the programme.

8. We have therefore created a balanced investment plan for our customers, the environment and stakeholders, which meets the SDS objectives, and vision chapters of Service, Society, Environment and Value by:

- Efficient performance
- Our approach to risk management
- Our common framework approach
- Our targeted investment
- Balancing the needs of the future
- Our internal challenge for a balanced outcome in AMP5

9. In overall terms we have, and will continue to deliver an industry leading asset management plan with a higher level of service at a lower and sustainable cost.

1.1.1. Efficient performance – better service, lower costs

10. Efficient performance historically offsets the pressures upon the programme and customer bills, not only by our ability to target investment well, but by reduced costs feeding into unit costs, and also by the returns to customers.

11. We have a history of efficient, targeted investment, as is evidenced by our recent comparative efficiency assessments and this efficiency offsets future pressures on customers' bills.

12. The following analysis in table 1 shows Yorkshire Water to be one of the frontier companies in comparative efficiency positioning over the last few years.

	2003/04	2003/04	2004/05	2005/06	2006/07
Water Operating Efficiency	A	A	A	A	A*
Water Capital Maintenance Assessment	C	A	B	A	A*
Sewerage Operating Efficiency	A	A*	A	A*	A
Sewerage Capital Maintenance Assessment	A	A	A	A	A

*Benchmark company

Table 1: Yorkshire Water Band and Rank in Ofwat Relative Efficiency Reports 2002 – 2007

13. We have achieved a quadruple A banding for water and sewerage operational and capital efficiency for 3 of the last 4 years. The last assessment (2006/07) which incorporated both capital and operational comparative performance shows that we are ranked within the top five companies for both water and sewerage opex and capex. We are the benchmark company for 2007/08 for both water and sewerage operating efficiency.

14. We have accommodated significant increases in input pressures both for operational costs (energy, labour) and capital costs (materials, labour) historically, demonstrating risk management at its best, and this has helped in balancing future price pressures for customers.

15. For the sewerage service in particular, our comparative performance is more pronounced. Since 1999/2000 we have been a band 'A' and in the top three ranked of all Companies for capital maintenance for every year of assessment. This is clearly the best comparative performance for sewerage capital maintenance since 1999/2000**,** as we are the only WASC to have achieved this consistently high and sustained performance.

16. We have achieved this efficient performance, whilst also ensuing that our service does not suffer, with consistently good performance OPA ranking, and stable serviceability in all categories in JR08.

Serviceability category	JR08 classification
Water Infrastructure	Stable
Water Non Infrastructure	Stable
Sewerage Infrastructure	Stable
Sewerage Non infrastructure	Stable

Table 2: JR08 Serviceability classifications

17. Comparative performance assessments illustrate therefore not only our approach to balanced asset management planning but it is evidence of our ability to use our risk assessments, our investment prioritisation via willingness to pay in LEADA and our closely managed serviceability performance reporting, which has been a key focus for improvement in AMP4.

18. **The strength of our ability to target investment underpins our planning for AMP5 and gives confidence in targeting investment to maximise the benefit of each and every intervention we make.**

1.1.2. Our approach to risk management

19. Our approach, and more significantly, our attitude to risk management is that **we should, can and do manage risk**.

20. We manage risk overtly, understanding our risks, making them visible and monitoring our progress as part of business as usual asset management.

21. At periodic reviews, we have taken a balanced approach to our capital maintenance plan, considering risk, willingness-to-pay, service and price. We have adopted the same approach at PR09.

22. A key improvement on our approach at PR04 is how we have used risk to build our plan. At PR04 we set out to achieve a broadly stable level of high 'red' risk across the AMP4 period.

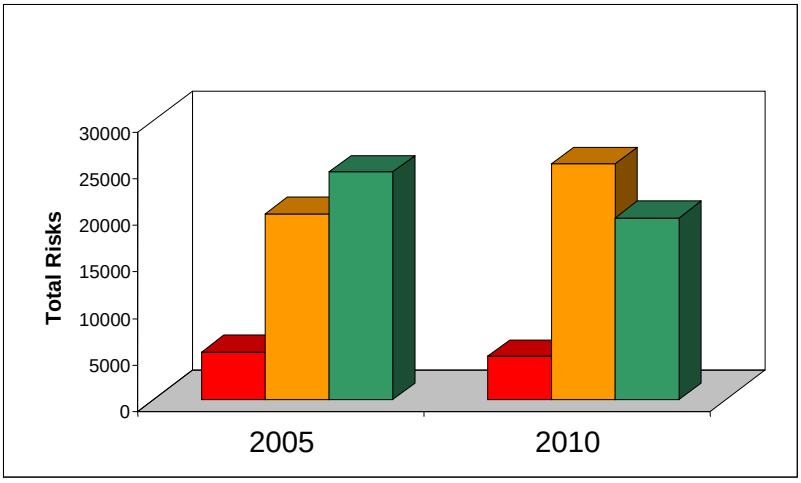

Figure 4 - Risk forecasts set out at PR04[2]

23. Our approach at PR04 was also one of balance and we had identified that the proposed level of expenditure for AMP4 would not be sustainable in the longer term, as illustrated by the increasing level of risks in the intermediate risk (amber) category in figure 4. The trend in risks is also illustrated, which shows the number of risks within each category following completion of the proposed levels of expenditure.

24. Our experience within AMP4 is that managing risks alone is not sufficient for ensuring targeted stable service and serviceability levels, especially when assessed at asset level.

25. For PR09 we have significantly improved our analysis, targeting investment directly to achieve stable serviceability and service levels to customers.

[2] Extract from PR04 Final Business Plan A1 page 7, para 10.

26. In particular, we now collect our information and undertake our risk and service failure assessments a lower level of granularity than PR04. We now assess risk and service failure at the level at which we would directly invest i.e. sub process, rather than asset type level. This means that whilst the absolute number of risks in 2004 and 2009 are not directly comparable, it does illustrate a similar picture.

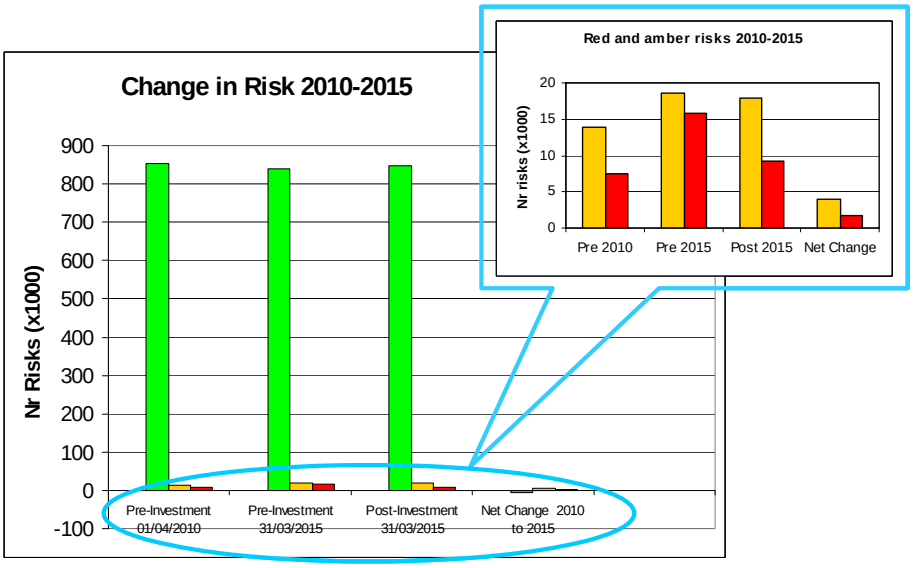

Figure 5 – Illustration of increasing amber risks in AMP5

27. The development of sub-process risk assessment ensures we better target our intervention type and intervention cost service risk, and enables us to balance risk to service across asset types, rather than balancing each group of asset risks individually.

28. We have learnt from our experience within AMP4, that understanding the relationship between which risks impact upon service levels and serviceability at a regional level is a more effective way of managing service level performance, than managing risk levels only.

29. For example, within AMP4 our understanding of waste water treatment works (WWTW) serviceability has moved on to the extent that we select which WWTW gets investment, not only on the basis of risk – which would have targeted 'red' risk, but also on the detailed understanding of WWTW design and performance. In some cases therefore we have not 'maintained' (i.e. replaced or refurbished) existing equipment, but changed the processes used on some works as an overt choice, whilst leaving other WWTW with 'red' risks.

30. Similarly, with service reservoirs, we have managed risk to compliance by maximising the operational mitigation of secondary chlorination. This does

however create another customer impact and we have observed an increase in taste and odour contacts, as illustrated in B3 Section 3.0.

31. For PR09 therefore, we target investment directly at maintaining serviceability and service levels and do not directly target a number of risks to achieve in our capital maintenance plan. This is a development of our PR04 approach with a better understanding of how risk impacts service and serviceability for the key indicators.

32. At PR04 we forecast an increase in risks, which would put pressure on future capital maintenance needs. We did not then, nor now expect to reduce the level of risk to be managed by the company. Whilst our overall capital maintenance investment requirements have increased it is due to accommodating additional pressures, rather than reducing risk.

33. We can demonstrate that our capital maintenance proposals do not de-risk the business. In fact the opposite is true, **for the second successive 5 year period, it is evident that we will be managing our assets within a background of an increasing number of risks in both the water and sewerage service even with the proposed AMP5 investment.**

1.1.3. Our Common Framework Approach

34. Capital Maintenance Common Framework Planning takes both a historic and future view. We can clearly demonstrate that our historic investment has been necessary, well targeted and has maximised the benefit to service and stakeholders. Our comparative efficiency performance enables a confident view of typical levels of investment to maintain service, from which to base an assessment of future investment needs.

35. We consider that an assessment of sustained high ranking in comparative efficiency performance in the past is a useful indicator in informing typical historical levels of investment to maintain service, indicating that our investment historically was robust.

36. Typical levels of investment have been challenged to ensure we reflect where investment allocations may have changed over time. We consider that this is part of transparent and robust asset management planning and regulation. It is important that this reflects not only those elements moved out of capital maintenance for AMP5, as reflected in the draft CIS, but also must be informed by those areas in capital maintenance for the first time to avoid an artificially low assessment of typical historic levels. The future focus of the capital maintenance common framework is where this investment is justified and challenged. For example, odour investment to improve performance at key sites is allocated to capital maintenance in

AMP4 and will be Enhanced Level of Service in AMP5. This is therefore removed from historic analysis.

37. Similarly drainage area planning has focused on the impact of discharges on the environment as part of the quality investment of the AMP3 and AMP4 unsatisfactory intermittent discharge programme. In the future however, its key focus will be to assess service risk from overloaded sewers, surface water management and benchmark performance for climate change monitoring. Hence this has been allocated to capital maintenance in AMP5. The AMP4 area flooding sub-programme is allocated to Enhanced levels of service, and hence there is also a change in AMP5 capital maintenance.

38. Our asset specific assessment of typical historic investment, as part of our Common Framework Approach to Capital Maintenance Planning, is set out in B3 Section 3.0 Water Service Summary, B3 Section 7.0 Sewerage Service Summary and B3 Section 9.0 Management and General.

1.1.4. Our targeted investment - Balanced and Sustainable Service

39. Our plan is based upon the minimum required to maintain service and serviceability. To do this we will have to continue to manage an increasing level of risk to service throughout the AMP period.

40. Other asset management options to identify capital maintenance needs would result in significantly greater proposals. This illustrates the challenge we have, and are confident we can face given our successful history of targeted investment (see table 3).

41. For comparison purposes these more conservative scenarios of determining capital maintenance needs, are illustrated in table 3 below:

Capital Maintenance Scenario	Capital Cost (£ bn)	Difference from our AMP5 Plan
Eliminate all high 'red' risks		
Steady state investment in line with asset lives[3]		
Resolve all assets in poor condition (CG 5)		
Yorkshire Water AMP5 Capital Maintenance Plan (net of G&C)		

Table 3: Comparison of our Capital Maintenance Plan with other approaches

42. Looking back to 1999, with the assets and service levels of the time, we were forecasting the need to expend around £1bn in capital maintenance in AMP5. Since then the asset base has increased through the enhancement programmes and service levels have been significantly improved. This further supports our view that levels of capital maintenance need to increase in AMP5.

43. This information illustrates how we are adopting the same balanced robust approach to maintenance as in previous reviews, with the key difference being that the future is now significantly different and we have reached the point where we need to address some of the deferred investment from PR04 and PR99 and meet the challenge of revised statutory requirements.

44. Our plan includes £ associated with atypical investment, for one off investment or investment with defined outputs that would be missing from our typical historic costs.

45. Figure 7 below illustrates how we are proposing to balance some of the statutory and serviceability driven pressure on capital maintenance expenditure (gross of grants and contributions). The application of our risk based LEADA+ systems balance the pressure within the overall programme by over £50m. This is consistent with our approach at PR04.

[3] The potential range in investment is dependent upon whether 100 or 200 years is assumed as the typical life for sewers

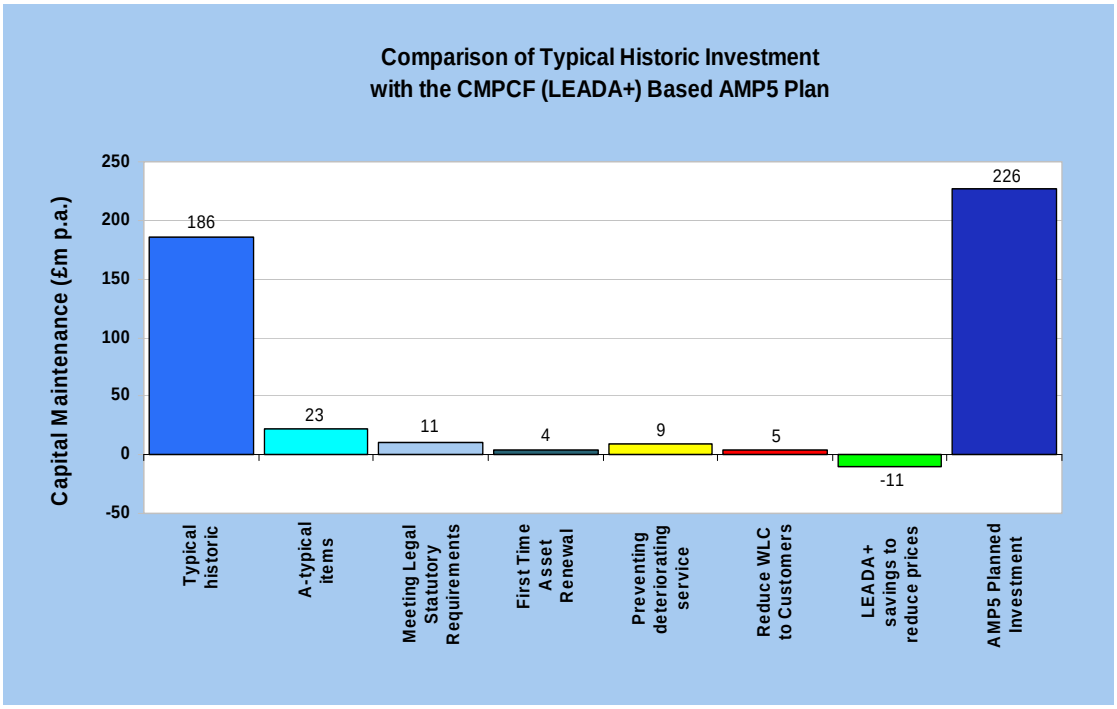

Figure 7 – Summary of pressures and efficiency being balanced within our CM Plan (Capital Maintenance expenditure gross £m p.a.)

1.1.5. Balancing the needs of the future

46. As part of our commitment to customers in the long term, we also seek to balance future investment programmes, and as such must prepare for the future with sound science and by driving innovation.

47. There is a significant risk of major investment driven by the Water Framework Directive (WFD), in future AMP periods. In order to limit our potential obligations, we have included £26m in AMP5 for site specific investigations (Part B4, section 4.9 and table 12).

48. This will ensure we can defend against the water company becoming the default option to meeting the needs of the WFD, our exposure to which is hundred of millions, to over a billion pounds (as previously indicated in the WFD preliminary cost effectiveness exercise for Ofwat and DEFRA).

49. We consider the investigations important to avoid unnecessary costs, and have had good results from this approach in the past. An example from the last Periodic Review is Knostrop Storm tanks - we proposed an investigation at Knostrop as an alternative to a full scheme, in order to ensure the impact of the intermittent discharge was well understood. The capital cost estimate at the time was circa £75M (02/03 prices). Following investigation (<£0.5m), the refined solution is now estimated at circa £11m,

avoiding costs of over £60m. We think it is therefore important to get this information in AMP5, for potential AMP6 obligations to ensure that there is robust evidence of the environmental need.

50. Our approach to the WFD is supported by CCWater, the EA and Natural England. (Letters of support are included in B4 Sewerage Appendix A). Our independent Environmental Advisory Panel also support our proposals.

51. We are also preparing for the future by proposing to improve our benchmarking and planning capabilities for climate change – both by better understanding of surface water management, sustainable abstractions – and drainage area studies. This work is essential to prepare for the long term environmental pressures associated with the affects of climate change, whilst informing the pace at which this additional investment, and hence customer bills should increase.

52. This approach is fully consistent with our approach to using sound science to inform our investment needs, within an overall balanced programme.

53. We have written support from the EA for our surface water studies and drainage area plans, which is provided in B5 Appendix 1.

1.2. IMPROVING SERVICE AND THE ENVIRONMENT AT REDUCED FUTURE COST.

54. Innovation always has and will continue to play a key role in our balanced approach to meeting the needs of our stakeholders, maximising the benefit and driving downs costs from each and every intervention and to ensure all regulatory obligations are supported by sound science.

55. We know that both our stakeholders and customers continue to prioritise service and environmental improvements, and these future expectations need to be addressed.

56. The Drinking Water Inspectorate seek continual improvement in drinking water quality compliance. This includes improvements in the acceptability of water due to discolouration, taste and odour.

57. The Environment Agency, and Natural England seek continual improvements to the environment through catchment management, habitat improvement, improved WWTW compliance, reductions in pollution incidents and a better understanding of surface water management.

58. CCWater champion the reduction of both internal and external flooding, some of the most distressing service failures experienced by our customers.

59. We know from our customer consultation that all of these areas are also priorities for our customers, but not at any cost. With our current costs these improvements are *at best* partially supported, or in other cases are not supported by customers' willingness to pay.

60. We must therefore drive down our future costs to meet the aspirations of our customers and stakeholders.

61. Investing in research and development (R&D) is the key enabler for driving innovation and reducing costs. Not only do customers benefit via the return from capital efficiencies, but these reduced costs feed into our unit costs and drive down future costs to customers.

62. In fact, during AMP4, R&D has enabled the business to make significant gains in terms of service provision and cost savings (opex / capex) in a ratio of more than £4m saving to £1m spent; the gains from which are ultimately passed back to our customers.

63. The only way to meet our customer priorities for the future, which are set out in our Strategic Direction Statement, is to drive down costs and the best way to drive down costs is to focus on innovation.

64. It is not only customer priorities which are driving the need for innovation. Increased research and development within the water industry is recognised as a national strategic need.

65. The Council for Science and Technology[4] (CST) report 'Improving innovation in the water industry: 21st century challenges and opportunities', March 2009, sets out some key drivers and observations in its executive summary (extract below):

'Water is an essential national resource to be valued accordingly

- *Supply availability at increasingly high quality standards generates a financial cost and a significant carbon footprint which is not widely recognised*
- *The water industry's performance in terms of investment in technology and application of innovative solutions is highly variable between companies in both clean water delivery and in waste water and sewage treatment. There is an urgent need for a step-change*

[4] Improving innovation in the water industry: 21st century challenges and opportunities, Council for Science and Technology, March 2009.

- *Investment in research and development is low for the sector generally*
- *The regulatory regime militates against research and development and provides insufficient rewards for innovative solutions*
- *Insufficient attention is being given to long-term technology planning within the water sector in responding to its environmental impact in particular climate change, its energy use and carbon footprint*
- *There are skills issues which impact on the water companies and their supply chains'*

66. The report also states:

- *'We believe that the introduction of leading-edge technology – particularly on the wastewater side – is central to achieving both improved water quality and sewerage cleanup with lower carbon footprints.*
- *We see an urgent need for step-changes in the application of technology to address both climate change effects and enable further improvements to the efficiency of operations within the water sector to be made. We do not believe that current levels of incremental technology improvement will be enough, particularly in terms of addressing the most pressing challenges.*
- *There is a risk that continued low levels of R&D intensity will lead to limited scope for productivity gains in the future once today's practices and technological developments are incorporated by water companies. It could also mean that water technologies developed elsewhere will not be adopted in the UK due to higher costs of appropriation as a result of under-investment in the water sector's R&D base."*

67. Our application of R&D in Brinker® Technology Platelets is highlighted as a case study, within the report.

68. This is "a revolutionary technology to repair leaking or burst pipes from the inside thus, preventing the need for accurate above-ground location, excavation and repair. Our target is to repair 2,000 leaks using the technology in this financial year.

69. Brinker® and its patented technologies are working with companies like us to revolutionise the global water industry by bringing their globally field proven technology from the hydrocarbon industry to other industry sectors to help our customers.

70. In order to meet their leakage target Yorkshire Water repairs 7,000 leaks/bursts each year resulting in some 168,000 interruptions to supply. The resulting water quality problems and reinstatements cause around

18,800 customer contacts in addition to the resources employed to manage the 'events', and deal with subsequent reporting. One of the key priorities in their strategic development statement is to reduce leakage to half its current level by 2035."

71. We are therefore driving innovation to take a proven technology from another industry and apply it to meet this challenging target.

72. Initial tests showed the potential for dealing with leaks in our own distribution network, and subsequently a small number of engineered and real repairs have been performed.

73. Platelets® can be injected into a system with a known or suspected defect. The Platelets® are transported to the leak site with the flow in the system and when they reach a leak, fluid forces entrain them into it, thus providing a seal.

74. The technology potentially offers important benefits to the our customers as it will:

- Allow rapid live main repairs
- Reduce interruptions to supply
- Reduce the need to accurately locate the leak
- Avoid excavation and associated environmental nuisance/traffic disruption
- Deliver savings, which will be returned to customers.

75. We agree with the findings of the CST report, and have already identified innovation as the key enabler to our Strategic Direction Statement, in December 2007 and again in our step change proposals for AMP5.

76. In addition to driving down cost for customers, we must also undertake strategic research into the significant challenges of the future:

- Adapting to climate change to ensure we understand the risks to service and performance, be it water resources, flood resilience or surface water management and sewer flooding.
- Mitigating our impact upon climate change to ensure we are ready to play our part in the national commitment to reduce carbon emissions. This includes research into energy efficient technology, reducing whole life cost and carbon impact.
- Research into new technologies for maximising renewable energy generation from our services (e.g. sludge digestion, anaerobic treatment).

- Scientific research to defend against emerging legislative pressures, and generating the sound science and, where necessary, defending against policy where it is not as joined up as it needs to be.

77. Our proposals will help inform our understanding and position on emerging legislative and climatic issues, thus ensuring future investment is based on clear definition of need, and we will work to define and develop future step-change technologies.

78. This will help us achieve customer priorities and play our part in the national strategic need to address the above issues.

1.3. INTERNAL CHALLENGE FOR A BALANCED OUTCOME

1.3.1. Accommodating additional pressures – DBP to FBP

79. Since the DBP, additional pressures have materialised and we have therefore managed these within the context of an overall balanced plan to ensure customers continue to view our proposals and value for money, as evidenced by the National research into customer views on the Draft Business Plan (DBP).

80. Our Final Business Plan has reduced by £ from the Draft Business Plan. This reduction has been used to offset other external economic price pressures that have manifested since the DBP.

81. We have balanced additional outputs, activities and cost pressures with cost reductions, reprioritisation and in some cases hard choices about risk and service. Some obligations have also been removed.

82. The following tables 4 and 5 summarise the balancing of our Water and Sewerage service investment programmes since the DBP, resulting in a reduced FBP investment programme.

83. The detail behind these choices, is provided in Section 1.3.2 and 1.3.3.

1.3.2. Balancing the AMP5 capital maintenance programme

84. A challenging approach has been taken to assessing the level of capital maintenance needed going forward; an approach that has expressly sought to minimise the impact on customers' bills not only in AMP5 but also with a view to the longer term.

85. We have adopted the cost-benefit approach within the UKWIR Capital Maintenance Common Framework and have used learning from our business as usual experience of LEADA (Leading Edge Asset Decisions Assessment) tools and processes throughout to help formulate our capital maintenance requirement, alongside the improvements that we have specifically developed for AMP5. We have used the Capital Maintenance Common Framework to fully substantiate any proposed movements from historical levels of capital maintenance expenditure, as set out in B3 Sections 3.0, 7.0 and 9.0.

86. There have been additional pressures since the draft business plan. Our actions have driven an overall reduction in investment since the DBP, to reduce the price pressure for customers.

87. Our balanced approach focuses on maintaining service levels and serviceability at least cost. We have repeatedly optimised and challenged the outputs of LEADA+ in order to maximise the benefits of our interventions, whilst accommodating our latest refined cost and activity forecasts. This has resulted in a capital maintenance requirement of £ net of grants and contributions, within an overall reduced asset management plan of £1,901m.

88. Our key areas of focus for balancing the capital maintenance programme have been:

- **£ has been saved by assessing scheme by scheme co-delivery potential.** Further LEADA+ development has enabled us to 'bundle' our schemes to ensure we are maximising the benefit from co-delivery of planned schemes on site. This comprises £6m savings in the water service capital maintenance programme and £11m in the sewerage service capital maintenance programme.
- **Repeat optimisation and challenge of the LEADA+ outputs.** This has ensured by reviewing outputs of our processes, schemes with multiple service benefits are fully maximised not only on cost benefit but in serviceability projections and optimised in the programmes. This has had particularly good result in the optimisation over both a five and ten year period for the sewerage assets investment needs resulting in a more cost effective programme to maintain serviceability

in AMP5 than at the draft business plan. Further detail is provided in B3 Section 7.0.

- **Reviewing latest evidence of external pressures with regard to third party driven investment** (diversions) has resulted in a reduction of £ for the sewerage service but we have had to accommodate an additional pressure of £ for the water service. This is associated with increasing investment associated with quarries, as the changed economic climate has improved viability of such workings. We therefore carry the risk of a return to AMP4 activity levels for sewer diversions.
- **Reviewing latest evidence of external pressures with regard to competition for waste disposal to land.** The trends forecast by Recycling Action Yorkshire (Draft Business Plan B3 Section 7.0 para 465) indicated diversion of biodegradable wastes from landfill and the scale of competition for land recycling routes in Yorkshire. We have reviewed the projections and have concluded that this is not yet being experienced at the rate forecast for the early years. We have therefore excluded £ proposed as part of the DBP programme, until there is more evidence of this trend, deciding that we will manage this risk. It is however still likely in the longer term that landfill tax will drive more waste to be recycled to land and we will monitor this closely. We are likely to need to accommodate some of this risk towards the end of AMP5.
- **Reviewing synergies with the enhancement programmes** has reduced the enhancement programme by £, where the sewerage National Environment Programme (NEP) and the bottom up capital maintenance proposals coincide.

89. We have also had to accommodate some upward pressures since the Draft Business Plan in that the latest forecasts for DOMS, DMA loggers, DMA meters, and Sheffield Trunk mains has added an additional cost pressure of £. This additional pressure has been balanced by deferring further step change improvements to discolouration contact numbers.

90. We have constrained LEADA+ to identify the least cost schemes which will maintain a stable service levels through to the end of AMP5 in 2015. The capital maintenance expenditure investment required to do this, is £, which is above our typical historical levels to maintain service. However, this includes several atypical items at a total of £, reducing the uplift to. This is primarily associated with the water service, as the sewerage service investment reduces below typical historic levels, once atypical investment is taken into account.

91. These atypical items comprise – a defined programme of area flooding, first time meter replacement, meter caps to enable automated meter reading, rebuilding of Acomb Landing - a key strategic WTW, and one off

investment to address the impact of PPC legislation limiting sludge disposal routes.

92. In seeking a balanced approach we have made the judgement that this level of investment will be sufficient to maintain serviceability until 2015. For the fifth quinquennium since privatisation, assets will not be maintained in line with their design lives – we estimate that this would require £ to £ of investment.

1.3.3. Balancing other programme changes since the DBP

93. Capital maintenance has not been our only area to balance our overall programme since the draft business plan

94. For the water service the additional pressures in capital maintenance have been balanced by deferring step change improvements to discolouration contacts. This is because, after re modelling and refinement of the activity and the resultant increased cost of our discolouration strategy there is insufficient customer support willingness to pay to further improve service levels. The capital maintenance programme is at the economic level of service, including for the DWI undertaking in the Rivelin Water Supply System and as part of our activity in DG3. Further detail is provided in B6 Water Service.

95. Our strategic direction remains unchanged and we remain committed to further reducing the impact of discolouration on our customers. To facilitate this direction of travel we will be investing circa £ of research and development expenditure in distribution (capital maintenance). This will be targeted at such service areas as discolouration, leakage, supply interruptions etc.

96. Investment to address the impact of climate change upon water resource plans have been deferred, until there is better available evidence. Additional investment for lead compliance in the quality programme has been accommodated.

97. The DBP flood resilience proposals for the water service have been reduced to accommodate a single asset resilience scheme, not included in the DBP. We are proposing to improve asset and service resilience by extending connectivity to Scarborough which currently depends upon a single source of water supply at the east coast.

98. For the sewerage service, several WWTW were removed from the National Environment Programme (NEP) (as reflected in the draft CIS baseline) and we have accommodated increases in costs for the statutory element of the rBWD (B4) by reducing costs of other quality and supply

demand proposals. Following the draft CIS baseline feedback, we have accommodated an additional £ of supply demand investment to provide for regional growth at WWTW, over and above our site specific proposals.

99. The sewerage service plan has also accommodated a further DG5 overloaded sewer properties to resolve for first time flooding £ (see B5) and has incorporated a modest programme £ of flood resilience at sites.

1.4. SENSITIVITY IN PROGRAMME COSTS

100. In order to further challenge and build confidence in our proposals, we have tested the sensitivity of our capital maintenance cost estimation through the use of additional Monte Carlo simulation. For the FBP the analysis has been applied to over £ of our capital maintenance plan, this being the Water and Sewerage elements only.

101. We have adopted a pessimistic assumption for the possible distribution of capital cost for individual schemes; the tested assumption being that the cost may vary between 33% lower and 67% higher. We have adopted 75% confidence intervals as used by other sectors. Each solution has been subject to 1000 iterations. The results are shown in table 6 below.

Service	Number of schemes	AMP5 Plan	Uncertainty band
Water			
Sewerage			
Total			

Table 6: Estimated Uncertainty in Capital Maintenance Programme Costs

102. The table demonstrates that our capital maintenance programme costs have an associated +/-1.2% error band, demonstrating a high degree of confidence in our programme costs.

1.5. SENSITIVITY IN WILLINGNESS TO PAY VALUATION

103. We have also assessed the sensitivity of Willingness to Pay valuation. Our approach to cost benefit for investment planning means we prioritise schemes which deliver the greatest benefit to customers first whilst maintaining service levels. This means that capital maintenance schemes have a greater net benefit than those to improve service levels; hence service improvements are the most sensitive to cost benefit analysis.

104. So, for the draft business plan we have assessed the sensitivity of service improvements with up to 30% uncertainty in Willingness to Pay and with cost uncertainty from -7.5% to +10%. Given our confidence in our cost

estimates, we consider this a broad test range. The work is detailed in Part C8, with matrix sensitivity testing in the combinations of changes in cost, with changes in benefit valuation.

105. Given we have high confidence in our FBP costs, the following results summarise the impact of possible reductions in benefit associated with WTP uncertainty.

106. Areas for service improvement where a benefit reduction arising from the WTP uncertainty could affect the service improvement proposals are set out in table 7.

Service Improvement	WTP uncertainty	Affected by benefit reduction due to WTP uncertainty?	Capex £M
DG5 overloaded sewer	+/- 5.0%	NO	0.0
DG5 other causes	+/- 5.0%	NO	0.0
Pollution	+/- 8.4%	@ 10% benefit reduction	-1.9
Odour	+/- 11.2%	NO	0.0
DG2 Pressure	+/- 7.1%	NO	0.0
DG2 Pressure after reduction for low income[5]	+/-27.1%	NO	0.0
Flood resilience - Water service	+/- 13.3%	NO	0.0
Flood resilience – SWR service	+/- 8.4%	@ 10% benefit reduction	-0.3
Bathing Beaches	+/- 9.7%	NO	0.0
Bathing Beaches after reduction for low income[6]	+/- 18.8%	NO	0.0
TOTAL			**-2.2**

Table 7: Estimated Programme Impact of Change in Benefit to Customers

107. The results presented in the table illustrate that even with pessimistic assumptions around uncertainty in benefit valuation, we can have a high degree of confidence in the choice of service improvement (the most sensitive) and maintenance schemes in our plan.

[5] Pressure is a WTP service area with a lower WTP value for low income customers, and therefore has been tested with and without a low income adjustment

[6] Bathing Beaches is a WTP service area with a lower WTP value for low income customers, and therefore has been tested with and without a low income adjustment

108. The £m investment which could be affected is only % of our service improvement proposals, and only % of our investment programme, demonstrating robust FBP proposals.

2. SUMMARY OF OUR CAPITAL MAINTENANCE PLAN

2.1. STRUCTURE OF THE SUBMISSION

109. In total our capital maintenance submission exceeds 400 pages and as a result we have produced this overview of our plan which extracts the key messages from the main report.

110. Our capital maintenance submission follows the structure set out in the reporting requirements. However, because we operate consistent asset management processes across both water and sewerage services, B3 Sections 1 and 5 have been combined, as have B3 Sections 2 and 6.

111. In B3 Sections 3, 7 and 9 we have set out in considerable detail our analysis, evidence, conclusions and proposals. Where these are common to the asset types within a service (e.g. water assets), then we have set out a generic approach for the service. We have restructured the documents to ease navigation and to be more reflective of our common framework approach.

112. In particular, since the draft CIS and feedback on the DBP we have provided more evidence to address gaps or questions arising from the CIS Asset Management Assessment (AMA) with significant additional material being provided on:

- Stakeholder engagement – B3 Section 1&5
- Data – B3 Section 3 Water
- Analysis – B3 Section 3 Water
- Data – B3 Section 7 Sewerage
- Analysis – B3 Section 7 Sewerage

2.2. WATER SERVICE SUMMARY

113. We are proposing to maintain our water service within AMP5 by investing **£622m** (gross) & **£607m** (net).

114. Excluding atypical investment, our AMP5 proposals are £88m above typical investment levels (gross) for the water assets due serviceability pressures.

115. The AMP5 investment proposal includes investment to address significant specific pressures and external factors as highlighted below:

- £31m for meter replacement
- £39m to retrofit meter caps to enable automated meter reading

- £7m to complete the Sheffield Trunk Main Undertaking
- £28m to meet statutory requirements associated with impounding reservoirs due to a change in the acceptable level of risk by inspecting engineers, plus failsafe disinfection requirements at WTW
- £15m for first time replacement at Acomb Landing WTW, a key strategic site
- £14m to address structural issues at major service reservoirs causing bacteriological problems at Service Reservoirs
- £42m to address a ensure no deterioration in acceptability of water (DOMS), an area previously benefiting from the S19 programme
- £20m to maintain bursts against the natural rate of rise at an average of 218 per 1000km
- £7m to increase R&D for our innovation strategy, reducing future costs to customers (see section 1.2)

116. Targeted LEADA+ planning and balancing risk has off set these pressures by £20m

117. Of these additional pressures, we have identified meter replacement, meter caps for AMR and Acomb Landing WTW as 'atypical' investment, totalling £85m.

118. We have also provided asset type by asset type summaries in Appendix 1.

2.3. SEWERAGE SERVICE SUMMARY

119. We are proposing to maintain our sewerage service within AMP5 by investing **£509m** (gross) & **£494m** (net).

120. Excluding atypical investment, our AMP5 proposals are £6m below typical investment levels (gross) for the sewerage assets.

121. The AMP5 investment proposal includes investment to address specific pressures as highlighted below:

- £16m to address 130 external flooding locations (historically in ELoS)
- £16m to undertake 37 drainage area plans (modelling has, historically, been carried out in quality enhancement via the uID programme)
- £25m to meet statutory requirements for asset equipment
- £10m for first time overhaul of Hull STF, a key strategic sludge disposal site
- £12 m for additional sludge disposal capacity to address the shortfall arising from the application of PPC within AMP4 and AMP5
- £5m to address deteriorating sub-threshold serviceability trend/s in sludge treatment facilities

- £1m to address poor condition sea outfalls, to support the rBWD
- £7m to increase R&D for our innovation strategy, reducing future costs to customers (see section 1.2)

122. Targeted LEADA+ planning and balancing risk has off set these pressures by £63m.

123. Of these additional pressures, we have identified both external flooding and the PPC related sludge capacity as 'atypical' investment, totalling £28m.

124. We have also provided asset type by asset type summaries in Appendix 2 and for Management & General assets in Section 3.

2.4. CAPITAL MAINTENANCE AND THE ASSET MANAGEMENT ASSESSMENT (AMA)

125. We support the use of inter-company comparisons such as AMA as part of effective comparative regulation.

126. We welcomed the detail provided in the draft CIS that has helped us understand the AMA process, and have used this to review the AMA process against the principles of Capital Maintenance Planning Common Framework Approach. We recognise that the AMA approach was still under development at the draft CIS.

127. We have then refined our FBP, in order to better reflect some of the issues raised by the AMA.

2.4.1. Challenging typical historic investment to maintain service

128. It is important to challenge the level of historic investment both in application of the common framework and as part of the AMA. We noted that the AMA did not reflect comparative performance with regard to historic investment, as the challenge to historic levels relied upon the 'double the uplift' principle i.e. a mirror challenge to historic levels, based upon the value of uplift proposed for AMP5.

129. Without a change to the method, this would lead to <u>those companies who have been inefficient historically having an advantage over those have been efficient</u>, i.e. those who balanced risk, service and prices in the past. We consider that this was an unintentional weakness in the approach and are aware that this has already been identified by Ofwat for further refinement.

130. We therefore propose that an assessment of sustained high ranking in comparative efficiency performance in the past is a useful indicator in informing typical historical levels of investment to maintain service, indicating that our investment historically was robust.

131. We also consider it important that typical levels of investment have been challenged to ensure we reflect where investment allocations may have changed over time, as part of transparent and robust asset management planning and regulation.

132. It is important that this reflects not only those elements moved out of capital maintenance for AMP5, as reflected in the draft CIS, but also must be informed by those areas in capital maintenance for the first time to avoid an artificially low assessment of typical historic levels. The forward looking analysis capital maintenance common framework is where this investment should be justified and challenged.

133. For example odour investment to improve performance at key sites is allocated to capital maintenance in AMP4 and will be Enhanced Level of Service in AMP5. This is therefore removed from historic analysis and we agree with this approach. This should also be the case with DG5 overloaded sewer flooding, which is moved to supply demand.

134. Similarly drainage area planning has focussed on the impact of discharges on the environment as part of the quality investment of the AMP3 and AMP4 unsatisfactory intermittent discharge programme, whereas in the future its key focus will be to assess service risk from overloaded sewers, surface water management and benchmark performance for climate change monitoring and hence has been allocated to capital maintenance in AMP5. The AMP4 area flooding sub-programme is allocated to Enhanced levels of service, and hence is also a change in AMP5 capital maintenance.

135. If, as a result of the ‘double the uplift’ approach, investment that is new to capital maintenance in AMP5, is used to challenge the level of historic investment this results in a negative bias i.e. artificially low view of typical levels of investment due to:

- An assumption that the additional activity and investment could have been accommodated in the already efficient historic levels
- An assumption that service levels and serviceability would have been achieved
- A false assumption of the relationship between historic investment and serviceability

136. The AMA approach to date, therefore is not reflective of the Common Framework approach by which the industry should plan its capital maintenance requirements with regard to historic analysis as it can result in a false view of typical historic levels, from which to challenge the AMP5 proposals.

137. We suggest therefore, that the AMA is refined in order to categorise elements which make the 'future different', readily identifying those not previously in capital maintenance, and then challenge these distinctly from the historic investment as part of the forward looking challenge.

138. This will enable a better use comparative performance to challenge historic levels of investment and ensure that the typical historic level from which the challenge to future proposals are made, are without bias and robust.

2.4.2. Challenging the forward looking analysis of the Common Framework approach

139. As we agree with comparative performance as an integral part of regulation, we endorse the AMPAP assessment and the use of its categories to inform the AMA.

140. We support its use therefore in the challenge to the forward looking element, aligned with common framework planning.

141. We suggest however, that a better reflection of comparative regulation would be to set a benchmark company in each of the 4 sub-services, from which the remainder of the industry could be compared and rewarded accordingly (i.e. by ratio to the benchmark company). We understand this is already being considered by Ofwat.

142. In selection of the benchmark company, we would expect that those companies that have been unable to demonstrate robust and efficient capital maintenance in the past (i.e. via comparative efficiency) would not be suitable as selection as the benchmark company.

143. This approach would be consistent with other comparative methods used elsewhere in regulation and would move towards more 'competition' in asset management planning.

2.5. STRENGTH IN BUSINESS AS USUAL ASSET MANAGEMENT

144. Since the 1999 Periodic Review we have been developing, improving and embedding asset management into the way we do business and plan our asset strategies. This has delivered significant efficiency and service

benefits to customers. In B3 Sections 1, 2, 5, and 6 we describe this in depth.

145. At Yorkshire Water we have a documented and fully embedded 'End to End', Asset Management Plan and Investment Cycle (AMPIC) which has taken all the benefits of our LEADA processes and integrated them with our efficient operating procedures and procurement strategies. This was instigated immediately following our PR04 Final Business Plan (FBP) in preparation for the beginning of AMP4. Our business as usual internal processes, have contributed to the evolution of LEADA to LEADA+, and underpin our AMPAP self assessment.

146. Through the development of LEADA+ we have utilised the Asset Management Planning Assessment Process[7] (AMPAP) tool developed through the United Kingdom Water Industry Research (UKWIR) research programme, to review our capital maintenance planning capabilities. Our overall assessment is positive and, we believe, reflects the progress we have made over the 5 years since Ofwat's assessments at the FBP.

147. We have assessed our capabilities for both Water and Sewerage services. We have also assessed each 'stream' within the Management and General areas. The radar plots are contained within Part B3 Sections 2 and 6. We have taken one of the AMPAP assessment diagrams and related to it a number of the key aspects and attributes of our integrated AMPIC processes as shown in figure 9.

148. The principles of LEADA+ flow right from the heart of our business strategy. We want to be 'clearly the best' and we see asset management as a core competency in balancing potentially conflicting pressures.

149. We work to continuously improve our asset management processes, and have already undertaken a significant asset management programme 'Capital Transformation' to drive this improvement in AMP4. This focussed on:

- Ensuring the **'End to End'** AMPIC process is being operated to greatest efficiency.
- Developing processes to ensure **'Data'** quality is high (ISO 9001 achieved).
- Enhancing the application of **'Risk'** across our asset management,
- Applying **'Lean'** processes and thinking in asset management and scheme delivery.
- Clarifying **'Accountability'** ensuring clarity of role and relationships between roles.

7 UKWIR Report on the Asset Management Planning Assessment Process

- Leadership and technical **'Training and Development'** to give people the skills they need.

150. It is through focusing on what our customers want established by our "Willingness To Pay" study (WTP), driving this through our asset management and capital maintenance planning processes to plan the most efficient way of delivering service (LEADA+), and then focus on the most efficient and effective delivery (Capital Transformation) that ensures we 'strike the right balance' of service and price. Figure 8 illustrates how all our processes fit together.

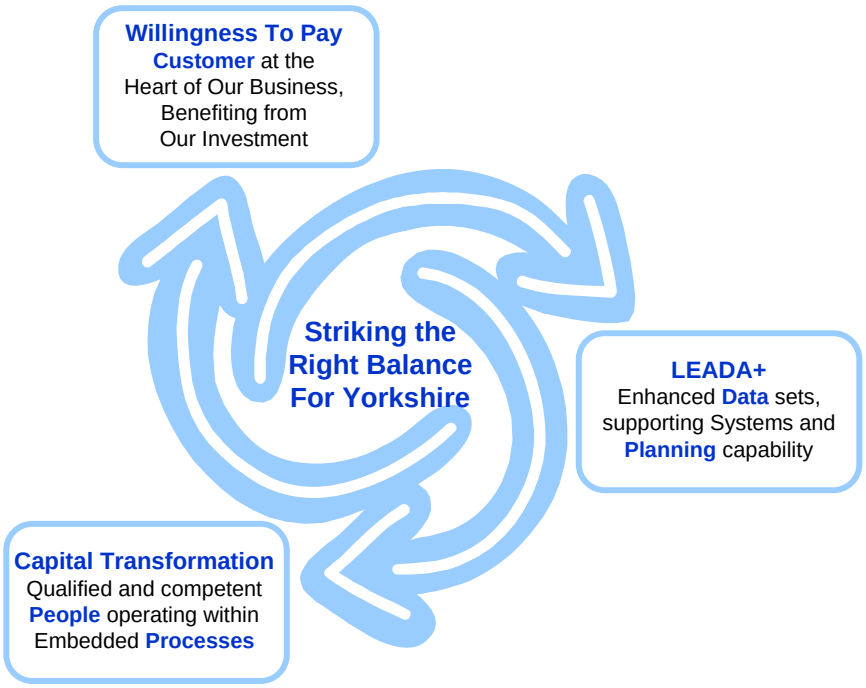

Figure 8 – Striking the Right Balance through Integrated Business Processes

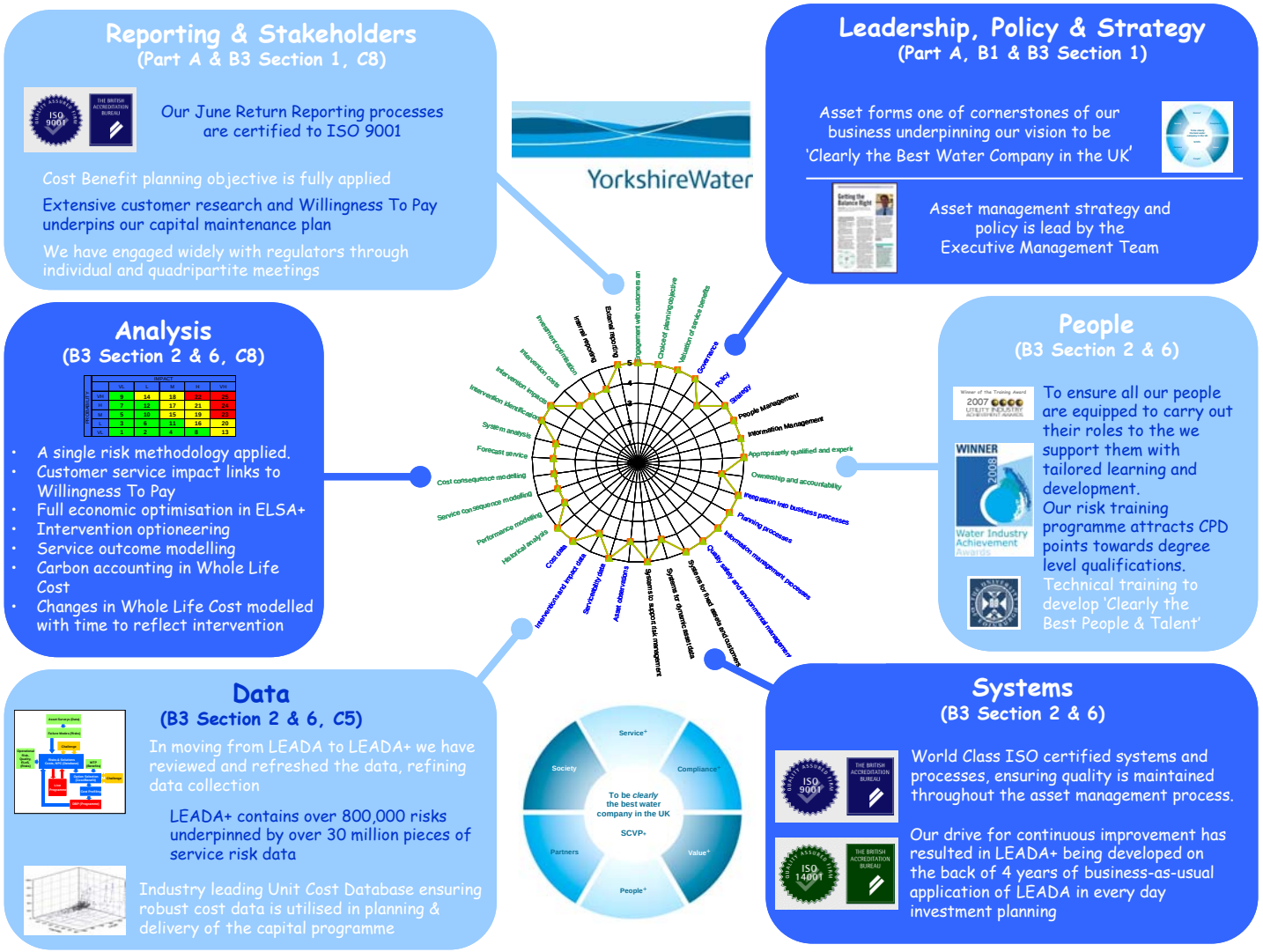

Figure 9 – Overview of Yorkshire Water's Asset Management Planning and Investment Cycle

3. REPORTER CHALLENGE

151. We have ensured that the Reporter and his team have been exposed to all of the processes which underpin the derivation of the plan. All methodologies, data sources, assumptions, modelling, analysis and costing processes have been reviewed and challenged. We are confident that the Reporter has been able to comprehensively scrutinise the plan.

152. The number of material issues has reduced from the FBP, demonstrating the continued engagement, challenge and detailed analysis carried out with the Reporter.