Part B

Chapter B1

The Post 2010 Environment and the Longer Term

The purpose of this chapter is to set out our view of the future operating environment. It provides a context for our Final Business Plan (FBP).

The most significant change since the Draft Business Plan (DBP) has been a significant worsening of the economic climate and an increase in volatility which reduces our ability to forecast over the period of FBP and beyond. These developments reinforce the objective we set out in the DBP of keeping bills as low as possible for customers, recognising a growing customer burden. However, since the DBP we have also had to accommodate a number of uncontrollable costs in the plan, including increases in abstraction licence charges, increases in business and cumulo rates, and Ofwat's licence fees.

The interests of our customers are inextricably linked to those of our investors - we need finance to maintain and improve our services to customers; and lower financing costs mean lower bills. In the current economic environment both customers and investors are placing increased value on stability. The spectre of deflation, in particular, is a critical risk to us being able to deliver the FBP.

In the longer term, as explained in our Strategic Direction Statement (SDS), the demands of our modern lifestyles, the impact of climate change and the need to protect our environmental and natural resources for future generations creates a complex and demanding set of challenges for the water industry over the next 25 years and beyond. This is further complicated by the current uncertainty in the financial environment within which we operate.

We believe that through continuous improvement and innovation we can meet these challenges and deliver our aim of being the best water and waste services company. We will achieve what our customers want - the highest customer service and standards delivered at the lowest possible prices.

We have included an introduction and an appendix to this Chapter to explain our planning framework, which ensures consistency between the SDS and FBP. The remainder of the Chapter follows the structure in the reporting requirements:

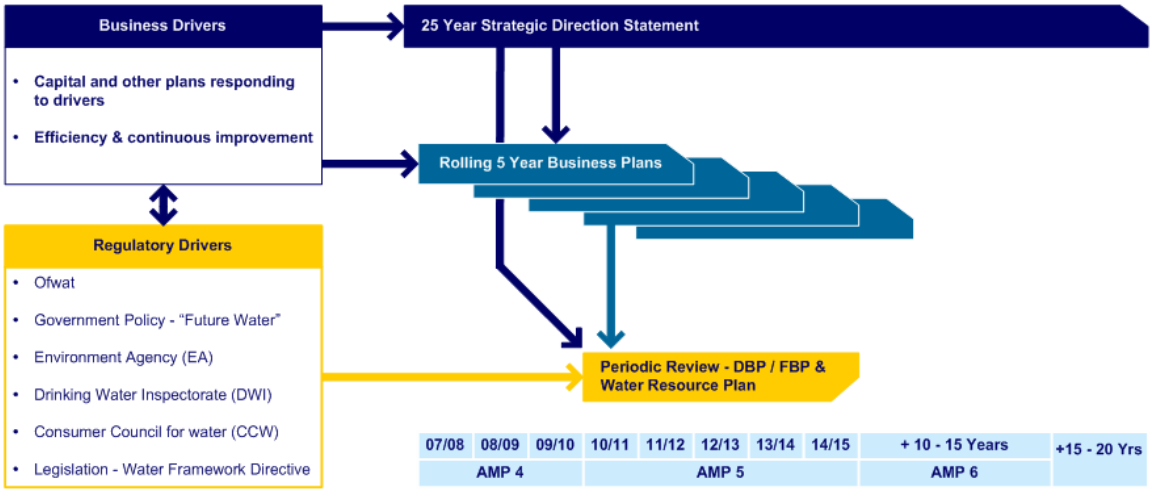
Contents

Chapter Overview

Our planning framework

Our planning process was initiated in 2006 with the objective of building an integrated planning framework within which a long term strategy could be developed and intrinsically linked to medium term operating plans and annual budgets through a 5 year rolling process.

This approach provides consistency between our internal plans and ensures continuity to our Periodic Review submissions:



At the outset of this process, we identified and developed 28 Key Business Issues. These enabled us to develop the strategic direction within which the SDS, DBP and our internal 2007 Business Plan, were developed.

In 2007, we took the unique step of publishing 20 Key Performance Indicators to measure our progress in delivering improved standards. The publication of performance against these measures ensures our processes are transparent. We have already made good progress, but still have further to go as we strive for upper quartile performance against either other companies in the water sector or other sectors, as applicable.

The process, including governance assurance, is described in detail in Chapter C8 (Appendix 4).

Our Vision	Key Strategic Intentions (KSIs)	Key Business Issues (KBIs)	Key Performance Indicators (KPIs)
Highest Standards **Lowest Bills** **Great People**	1. Providing a continuous supply of drinking water 2. Dealing effectively with waste water 3. Responding to customers' needs 4. Minimising our carbon footprint 5. Having the lowest possible charges 6. Having the right skills to deliver 7. Maintaining investor confidence 8. Promoting an effective regulatory regime	28 KBIs covering areas such as: • Climate change • Competition • Leakage • Private sewers • Safety • Sewer flooding • Sludge strategy • Water efficiency • Water Framework Directive • Customer service	20 KPIs covering areas such as: • Lost time incidents • Water quality • Customer written complaints • Unplanned interruptions • Debtor days • Total cost to serve a property • Pollution incidents • Sewage treatment works – breach of consents • Net energy usage

The challenges we will face

It has been through the development of the Key Business Issues that we have been able to articulate the nature of the future operating environment and its challenges. Our future challenges are wide ranging but the deterioration in the economic environment has dominated the period between DBP and FBP. The challenges explored further in this Chapter are:

- Emerging challenges – COPI and AMP4 investment.
- The macro-economic environment.
- Adapting to, and help in mitigating, the effects of climate change.
- Reducing our carbon footprint.
- Meeting customers' increasing expectations of standards of service.
- Ensuring stable serviceability is maintained, including recognising that assets installed post privatisation will require refurbishment or replacement.
- Responding to demographic changes.
- Preparing for, and adapting to, competition in the water industry.
- Including the need to develop more sustainable solutions to surface water drainage.

Link between our Strategic Direction Statement and our Final Business Plan

The planning framework has ensured that investment priorities and values in the FBP and SDS are aligned. The investment priorities are:

- Enhanced network resilience.
- Maintaining serviceability.
- Meeting new sewage treatment standards.
- Reducing sewer flooding.

In terms of investment in the 2010-15 period, the main changes from the SDS to the FBP are:

- The exclusion of private sewer adoption costs.
- Reduced investment to meet new environmental standards.
- Increased investment to maintain serviceability.

Overall, our proposed total capital expenditure is in line with AMP4 but lower than that in both the SDS and the DBP.

Comparison to the Draft Capital Incentive Scheme (CIS) Baseline

The main changes to the DBP implied in the CIS were:

- Significant reductions in water services non infrastructure maintenance.
- Exclusion of the high priority 1 in 20 year sewer flooding programme.
- Reduction in the unit costs of existing 1 in 10 and 2 in 10 sewer flooding programmes.
- Exclusion of some resilience schemes (water supply).
- Exclusion of the entire wastewater resilience programme and significantly reduced odour nuisance programme.

Planned improvements between the Draft and Final Business Plans

The DBP set out a number of areas where we planned to refine our assumptions in the FBP. This further work has improved the robustness of our Business Plan – the following table describes progress against these areas:

Area **(and Chapter for more information)**	**Summary of DBP refinement plan**	**Achievements**
Least Cost Planning Models (B3)	• Extended record of asset and service failures • Updated unit cost information • Improved structuring of costs within the model • Updating and calibrating to actual performance	• Reviewed the models (extended the failure record in infrastructure models) • Updated unit cost information • Improved structuring of costs within the model • Updated and calibrated models to actual performance

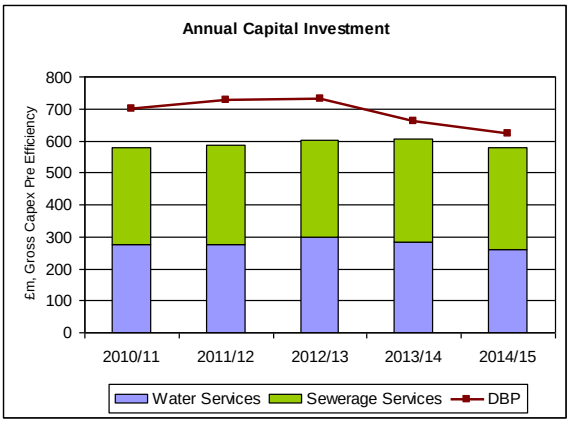
Area (and Chapter for more information)	**Summary of DBP refinement plan**	**Achievements**
Investment Manager and cost benefit analysis (C8)	• Extended time horizon for NPV analysis to 40 years • Review of risk assessments • Updating and calibration to actual performance • Extended range of scenarios and sensitivities	• Time horizon of 26 years used, with equivalent annual costs calculation including residual values to achieve comparable result • Additional scenarios and sensitivities undertaken • Improved linkage between investment planning and business planning process to deliver a holistic and balanced plan
Income and demand projection alignment (B8)	• Review of latest income trends (household and non-household) • Comparison to updated demand forecasts • Extended time series analysis to support demand forecasts	• Trend analysis undertaken – particular concern regarding non-household demand highlighted to Ofwat •Improved analysis and alignment between short term demand forecasts and modelling assumptions
Profiling (B3 – B6)	• Review scheduling of individual schemes to ensure delivery practicalities are adequately reflected • Review of efficiency profiles	• Asset Delivery teams within our water and waste functions have reviewed the profile of delivery for enhancement schemes •Efficiency profile confirmed (immediate impact linked to AMP5 contract strategy plans)
Quality programme (B4)	• Working with the EA to review whether all measures are necessary to achieve required improvement to river standards • Reviewing the position on unsatisfactory intermittent discharges (currently excluded from the programme) and the number of investigations for priority substances •Further refinement of the water quality improvements with the DWI	• Agreement with both the EA and DWI on the AMP5 quality programmes •Inclusion of catchment management and sustainable solutions
Sewer flooding (C6)	• Reviewing approach to additions to the sewer flooding register following completion of the Ofwat led research • Reviewing the implications of PR09/13 regarding the requirement to maintain the 1 in 20 register	• Register review and re-statement undertaken, which has resulted in a significant movement from the 1:10 and 2:10 registers to the 1:20 register

Area (and Chapter for more information)	**Summary of DBP refinement plan**	**Achievements**
Competition (B1)	• Review the scope for promoting competition • Review the synergy between resilience schemes and competition benefit	• Work has continued on investigating the impact of competition • This plan includes some elements (e.g. inset appointments) but not retail separation and competition
Cost of capital (B7)	•Reviewing financial market trends	• Extensive work undertaken, and a range of scenarios modelled
Customer research (C1)	• Extension of our Willingness to Pay research to include additional measures • Results from joint national research reviewed for inclusion in the FBP	•Additional measure valued (pollution) and cost of avoiding failure has replaced river quality impact for STW compliance • Additional focus groups held for domestic customers post DBP • Additional surveys of both domestic and business customers carried out post DBP • Alignment checked between our results and the Ofwat/CCWater led Joint National Research
Renewables – accounting treatment (B1)	• Allocation of investment between the appointed and non-appointed business reviewed	• No change in allocation from that used in the DBP
Climate change and growth assumptions	• Updated UKCIP projections (due to be issued Autumn 2008) reflected in FBP	• UKCIP delayed. FBP impact to be assessed when projections released

Profiling of expenditure and outputs

i. Delivery of the capital programme

We have commenced feasibility work on some schemes which will be delivered in AMP5. This will help to flatten the AMP5 investment profile, which in turn will reduce costs through delivery efficiencies, both through the supply chain and internally. This will also provide greater detail of the timing of elements of the investment programme which will assist us to efficiently finance our activities.



For the FBP, our water and waste teams have reviewed scheduling at an individual scheme level for the key schemes to ensure the practicalities of delivery are adequately reflected. To illustrate the benefit of this review, we have identified three sites in our environmental programme where, due to complexity of construction, we cannot meet the statutory date. For these sites (Lichfield, Lower Gornal, Trescott), we have progressed discussions with the EA for date relaxations and notified Ofwat (13 January 2009).

ii. Future efficiency

At DBP stage, we submitted what Ofwat and other stakeholders have recognised as challenging efficiency targets for both opex and capex.

We have refined our plans based on new information and results from pilot studies. As detailed in Chpater B2, we have revised downwards our view on opex efficiency (whilst still ensuring significant benefits are delivered) and maintained our capex efficiency. Our efficiency targets are amongst the most challenging in the industry and in order to achieve the lowest possible bills we are aiming to deliver the majority of these efficiencies in the early part of AMP5.

Renewables - accounting treatment between appointed and non appointed activities

As in the DBP, our FBP proposals do not include any investment relating to wind generation and bio-crops as they are not considered part of the regulated business. These sources do however deliver benefits to enable STW plc to achieve the Government's carbon reduction targets.

Section 2: Assessment of the post-2010 environment

In this section, we set out our view of the future operating environment, and the key challenges we need to respond to.

The most significant change since the Draft Business Plan (DBP) has been a significant worsening of the economic climate and an increase in volatility which reduces our ability to forecast over the period of FBP and beyond. These developments reinforce the objective we set out in the DBP of keeping bills as low as possible for customers, recognising a growing customer burden. We discuss this issue first before discussing a number of other challenges (which we set out in the DBP):

- Climate change
- Minimising our carbon footprint
- Aging assets
- Demographic trends
- Competition

2.1 The impact of the current macro-economic environment

Before discussing the key macro-economic elements that impact our ability to finance our plan in AMP5, we discuss an immediate issue that we have to contend with: that of the impact of the economy on COPI and in turn our investment plan. We discussed this item with Ofwat (K Mason and colleagues) on 26 February 2009 and agreed that we would provide further details in the FBP of the need to log up additional capex in order to avoid us exceeding the RCV caps in AMP4.

2.1.1 COPI and AMP4 investment

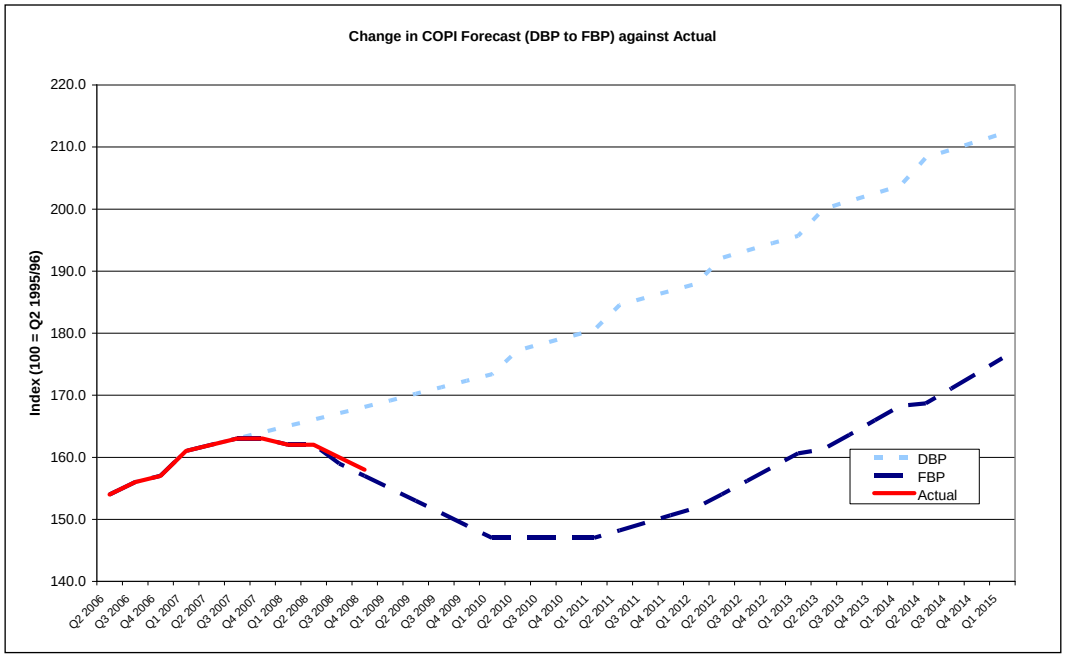
We consider that £187.7m of investment should be logged up as additional outputs in AMP4. As we set out below, we have calculated the RCV threshold using a methodology consistent with that applied at PR04 by Ofwat. Before we look at this investment in detail, we discuss the impact of COPI on, and our approach to, investment in AMP4.

As reported in New Civil Engineer,[1] there is mounting concern that the significant deterioration in the economic climate since the DBP will lead to reduced investment in the remainder of the AMP4 period. One of the impacts of the downturn has been the significant fall in the Construction Output Price Index (COPI).

New capex in the RCV is linked to COPI and hence significant changes to COPI have an impact on the value of the RCV threshold (which is based on the 2004 Final Determination after adjustments for any changes in required outputs).

Since the DBP, actual and forecast COPI have reduced significantly and this has had a corresponding impact on the RCV threshold. This is illustrated in the figure below:

[1] "Spending cuts fear for water industry", March 2009



Overall, the fall in COPI has reduced our RCV threshold by £110m since the DBP, with a risk that COPI may fall further – a 1% reduction in COPI equates to a £15m reduction in the RCV threshold.

Our approach to investment in the AMP4 period has been to target the delivery of efficiencies over the assumption made by Ofwat at PR04 (targeted at 6%) and then to re-invest such efficiencies rather than simply returning such gain to shareholders.

Until the economic downturn, we had planned to deliver our AMP4 investment programme, including these initiatives, within the RCV threshold. However, there is a significant risk that, due primarily to the fall in COPI, we will now exceed the RCV threshold for both the water and sewerage services. The fall in COPI does not have a corresponding impact on our investment programme as significant investment is already committed and a large proportion of our investment programme is of a different nature from the type of projects which are included within the calculation of COPI.

We do not believe it is appropriate to limit our proposed investment but are cognisant of the current regulatory framework which will not automatically include expenditure in the RCV above the 2004 Final Determination (after adjustments for any changes in required outputs).

This risk was discussed with Ofwat (on 26 February 2009) and we agreed to include in our FBP further details on the investment programmes we have undertaken to deliver future efficiencies – we believe these should be logged up as additional AMP4 outputs.

The efficiency initiatives can be grouped as:

- Increased distribution mains renewal rates (£31.9m)
- Investment in generating renewable energy (£18.5m)
- Investment continuity programme (£19.3m)
- Rationalisation of our office and operational sites – Severn Trent Centre (£64.0m)
- Renewal of our IT infrastructure (£54.0m)

The remainder of this section considers each of these areas in more detail.

2.1.2 Increased distribution mains renewal rates

Prior to AMP4, our driver for mains rehabilitation was compliance with the water quality standard for iron using a mixture of renewal and relining, with costs proportionately allocated between Quality and Maintenance. Our PR04 FBP submission used deterioration models to determine investment requirements to maintain stable serviceability - mains burst per km, interruptions to supply and leakage deterioration. The outcome of the PR04 Final Determination was below that we considered to be the minimum necessary to maintain stable serviceability. We have therefore chosen to invest in mains renewal at a level above that assumed in the PR04 Final Determination in order to maintain stable serviceability.

We have renewed mains and communication pipes in areas of high leakage or where individual mains frequently fail and lead to interruptions to supply or dissatisfaction with water quality. We have also increased our spend on trunk main renewal as our root cause analysis of interruptions to supply shows that increasing numbers of trunk mains bursts are the cause of interruptions. The interruption effect is particularly pronounced with PVC and asbestos cement mains as repair often requires the replacement of an entire length of pipe. Included in the total mains renewal expenditure is £15.1m for renewal of 45km of trunk mains.

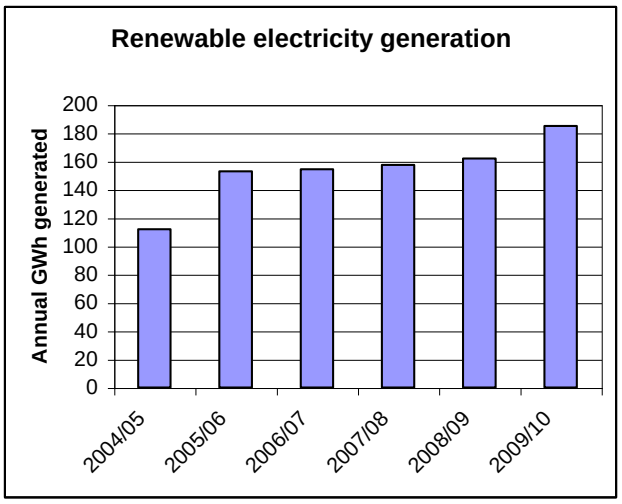
Our targeted approach has been successful in maintaining stable serviceability in terms of mains bursts per km and leakage deterioration. Interruptions performance has been adversely affected by process failures. The amount of mains renewal proposed in our PR09 FBP, 1,388km, is slightly above the forecast AMP4 level.

We are therefore proposing that the additional output should be logged up. We have calculated the logging up value based on additional output when compared to the monitoring plan at unit rates assumed in the PR04 Final Determination, as shown in the table below:

2.1.3 Investment in generating renewable energy

We are a frontier company compared with the rest of the water sector in respect of renewable energy generation. This is largely due to our combined heat and power (CHP) plants which operate on biogas from sludge digestion. We have an installed CHP capacity of 30MW with a renewable energy production of 157.3 GWh (17% of annual usage) in 2007/08. Of this, 151.3 GWh was generated from biogas. The energy generated is largely utilised to supply our own operational sites. This lowers our operating costs and provides protection against the volatile energy market.

During AMP4 we identified, through gas monitoring and other analysis, opportunities to expand our biogas CHP capacity to maximise use of the available biogas on our sites. This has included new installations on digestion sites without energy production facilities and increasing the CHP capacity on existing sites.



To maximise the opportunity, we have invested in innovative technology to change the nature of surplus activated sludge and render it more suitable for anaerobic digestion. An increase in volatile matter destruction is obtained with this technology, with resulting benefits for CHP generation and total mass to be

recycled/incinerated. Following these AMP4 trials, we are proposing further projects for AMP5.

We have also invested in increasing our hydro-electricity generation capacity.

Energy production has increased from 112 GWh in 2004/05 to a forecast 185 GWh in 2009/10. The investment is clearly beneficial and contributes to reducing bills to customers in AMP5, as shown below. The table below is based on selling the Renewable Obligation Certificates (ROCs). The schemes are also cost-beneficial if the carbon is valued instead, using the social cost of carbon (as we have done with the AMP5 programme).
The full schedule of projects is shown in Appendix 2 (Schedule 1).

2.1.4 Investment continuity programme

It is widely accepted that the cyclical nature of water industry capital investment leads to inefficiency and increases the risks to delivery of regulatory outputs, as well as it being inefficient in terms of securing our borrowing requirement. Additionally, such investment patterns are detrimental in terms of customer affordability. This was the aim of the Ofwat Early Start Programme for AMP4, which we have sought to build on for AMP5.

In a recent UKWIR study, 85% of companies responding believed the cycle had either a negative or a significant negative impact on efficiency. The study estimated that longer-term planning could deliver capital efficiency savings of around 2.6% of capital turnover, by providing the time required for optimised staff utilisation, improved purchasing and greater innovation.

In order to enhance long term value, support our improvement plans and deliver greater efficiency, we are investing over £40m in AMP4 to delivery continuity in our investment programme – this investment is targeted on feasibility and design on schemes with a total forecast value of £1bn over 2010/11 and 2011/12.

In early March, we announced the appointment of our 11 contractors for AMP5 – these appointments have been made about a year earlier in the AMP process than previously. There has been favourable reaction to this: "*this is a positive move by SVT toward getting their capex programme for the next regulatory period up and running."* [2]

We have targeted our initial investment based on expert advice, including:

- Engaging Jacobs to investigate the maintenance issues identified through a review of service risk and site specific investigation. Over 100 sites have been reviewed, with 29 projects now approved to progress to outline design.
- Engaging Grontmij & Mott Macdonald to review maintenance issues at 38 of our sludge centres. We are currently reviewing intervention options.
- AMP5 Urban Wastewater Treatment Directive - we promoted 21 projects into our capital programme in June 2007 and have undertaken significant investigation works on these sites through internal resources and Mott Macdonald including large scale pilot plants at key sites.
- First time sewerage (S101a) - we appointed Jacobs to assess seven sites subject to S101a applications and these form the basis of our AMP5 programme.

2.1.5 Rationalisation of our office and operational sites – Severn Trent Centre

[2] Nomura Securities, 11 March 2009

The development of the Severn Trent Centre will enable the rationalisation of seven offices into a single location in Coventry. This will deliver reduced operating costs through the consolidation of our office sites and provide a modern flexible working environment to meet business needs, increase productivity and improve customer service. The business case and scheme were approved by the Severn Trent plc Board in September 2007 and construction has commenced with a planned completion date of September 2010. Further details are in Chapters B2 and B3.

We have included this investment in the PR09 FBP, with costs allocated between the water and sewerage services:

We consider the £64m investment incurred in AMP4 should be eligible for logging up and recognise it will be treated as an exceptional item in determining our future maintenance requirements.

We have had correspondence with Ofwat on the Severn Trent Centre (see Chapter B7).

2.1.6 Renewal of our IT infrastructure

The implementation of the Enterprise Resource Planning suite (using the SAP product) is fundamental to our information systems investment programme and underpins the planned efficiencies for AMP5. SAP is a sustainable option that will deliver operational savings, reduce capital costs of IS management and provide consistent better quality data held on a single platform. This investment was approved by our Board in December 2008. Further details are in Chapters B2 and B3.

The delivery of ERP (now SAP) commenced in AMP4 and we consider the £54m investment incurred in AMP4 should be eligible for logging up. The investment is apportioned 49.9% to sewerage services, 50.1% to water services. It has not been included in the PR09 FBP as it is an AMP4 project. However, we recognise it will be treated as an exceptional item in determining our future maintenance requirements, and the AMP5 element of SAP should be similarly treated as an exceptional item.

2.1.7 Conclusion

As outlined at our recent meeting with Ofwat (26 February 2009), we have invested in areas which will deliver future benefits to customers. The fall in COPI may mean that total investment in AMP4 exceeds the RCV threshold.

2.2 The macro economic environment

The most significant change since the Draft Business Plan (DBP) has been a significant worsening of the economic climate and an increase in volatility which reduces our ability to forecast over the period of FBP and beyond. These developments reinforce the objective we set out in the DBP of keeping bills as low as possible for customers, recognising a growing customer burden. However, since the DBP we have also had to accommodate a number of uncontrollable costs in the plan, including increases in abstraction licence charges, increases in business and cumulo rates, and Ofwat's licence fees.

The increased economic volatility since the DBP has widened the range of plausible economic scenarios over the period to March 2015. It is no exaggeration that the current degree of macro-economic uncertainty is unprecedented in the period since privatisation of the water industry. No previous Periodic Review has had to manage such uncertainty or volatility.

For this reason we recommend the PR09 Determination allows for a greater level of leeway in setting price limits in a way that is fair and equitable to all our stakeholders so as to explicitly allow us the capability to manage specific areas of macro-economic risk as it arises, rather than truing-up ex-post. Further information is contained in Chapter B7.

The three macro-economic elements which most acutely affect our business are: inflation; GDP growth; and interest rates.

2.2.1 Inflation and GDP growth

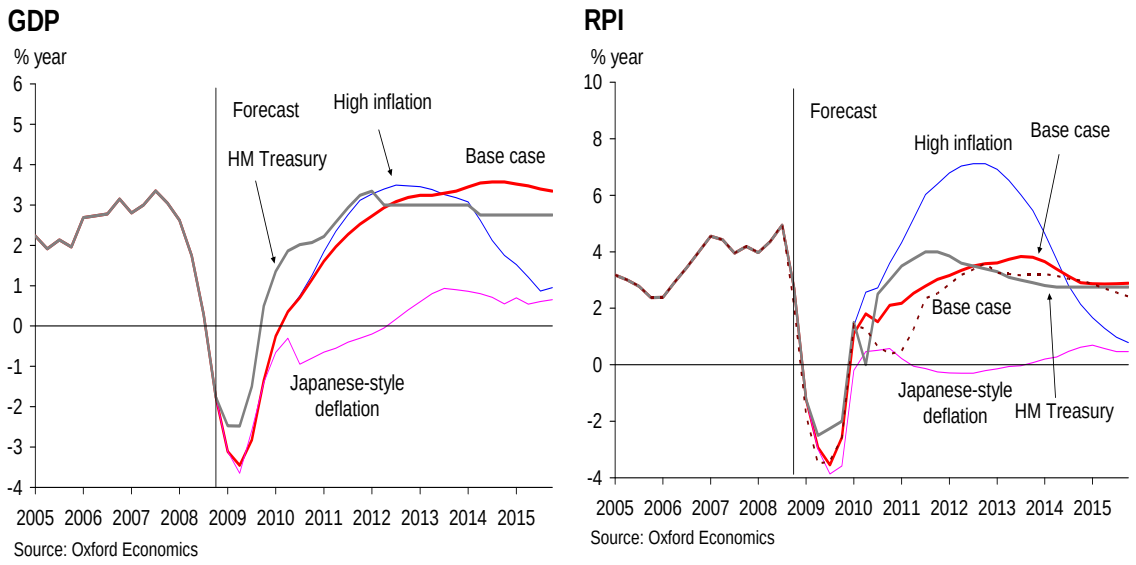
While most aspects of our Business Plan are in real terms, some items are in cash terms and hence inflation has an impact. In particular:

- The key financial ratios used by the rating agencies to determine our credit rating are cash ratios.
- Many of our costs are not automatically indexed to inflation and in the event of unexpected changes in inflation, there are lags before our costs adjust in real terms.
- Customer bills are in nominal terms, and while we are striving to minimise the customer burden and hence bills in real terms, we need to also be aware of the path of bills in nominal terms.

Future levels of inflation are highly uncertain. We commissioned Oxford Economics to provide us with a range of economic scenarios to enable us to stress test our plan against macro-economic risks that we might face over the period to March 2015. A summary of their base case, the three scenarios and their associated probability is shown in the table below.

Case	Features	Probability
Updated base	Sharp GDP fall in 2009, slow recovery in 2010 as the financial and household sectors adjust their balance sheets, with trend growth not resuming until 2011. The combination of looser macro policy and the improvement in competitiveness caused by sterling's decline facilitate some rebalancing of the economy.	40%
Deflationary scenario	The UK suffers a prolonged period of falling prices and very weak growth similar to that afflicting the Japanese economy through the 1990s. GDP growth and RPI hover around 0% to 2015. Oxford noted that a less severe form of this case, in which there was a deeper and more persistent recession than in the base case, but which did not trigger a deflationary spiral, was "arguably more likely".	10%
Inflationary scenario	Expansionary policies in the UK and internationally lead eventually to the re-ignition of inflationary pressures, similar (but less marked) to that seen in the UK in the mod 1970s. CPI reaches a peak of over 5% in this case, leading to the Bank of England raising interest rates sharply, triggering another marked downturn in economic growth in the medium term.	10%
HMT forecast scenario	Mimics the HM Treasury Pre-Budget Report forecast (of November 2008), taking account of data published since then. This sees the economy recovering steadily from the second half of 2009, but assumes that inflation stays under control.	10%

The potential paths for GDP growth and RPI are shown below:



The base case and scenarios above do not cover all the possible paths that the UK economy could follow over the coming years, but they do illustrate the plausible range of macro-economic risks.

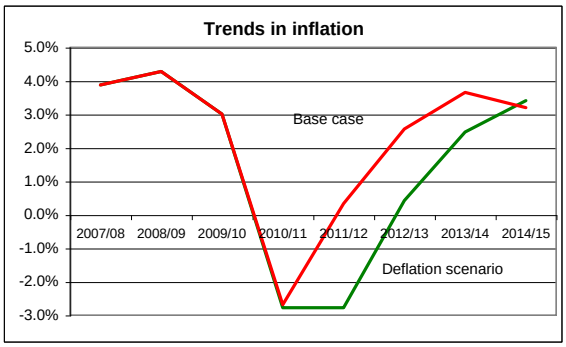
While most of the analysis in the Business Plan is in real terms, the plan must also work on a cash basis. This is because the financial ratios which determine our rating and hence the availability and cost of debt, and thereby a part of the costs that customers support, are in nominal terms.

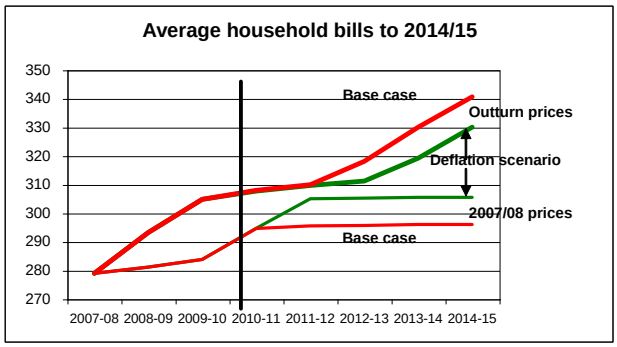
The threat of deflation

Price Limits need to be set which enable us, in a time of uncertainty, to finance the plan through a five-year period. A period of negative inflation would reduce our income levels and damage our financial ratios, which could affect our credit rating and our ability to raise finance on reasonable terms. This would ultimately be against customers' interests. Our plan provides for the risk of negative inflation for one year, but it would be problematic if this continued for a second year.

We would like to discuss further with Ofwat options by which this risk, which is beyond our control, can be managed. We have put forward a proposal in this plan whereby Price Limits would be set higher in the second year to allow for the possibility of continued negative inflation (though prices would still be lower in nominal terms than if inflation returns). Any additional revenue arising from higher prices would be returned to customers as and when economic conditions permit. If negative inflation did not occur in 2011/12, we would not use the additional Price Limits.

The following chart illustrates the path of real and nominal average household bills were the period of negative RPI prolonged for a further year, compared with our base case. In the deflation scenario, we are proposing a higher price limit in real terms for 2011/12, but bills would actually be lower in nominal terms over the period.





We consider that prices should to be set in a way which allows our key financial ratios to be sustained through a second year of negative RPI. We consider that Ofwat should:

- Set price limits based on alternative RPI assumptions, which contain a second year of negative inflation (as per the 'Deflation scenario' in the 'Trends in inflation' chart above).
- Require within its Determination that prices are based on the FBP values unless RPI falls below the FBP base case track in 2011/12. As such we would not utilise the additional Price Limits unless negative inflation occurred in 2011/12.

In turn we would undertake to return to customers any addition to prices due to a second year of negative inflation when economic conditions permitted or equally this could be a requirement that Ofwat impose on us.

The following table shows how the K factor for 2011/12 would vary under different inflation outcomes:

An alternative approach would be to set prices based on our central assumptions but have provision for price changes built into the Final Determination should negative inflation continue. In either case, any addition to price limits would be returned to customers at a later date, rendering such a move neutral to stakeholders over time.

Further information on inflation and the proposed mitigation of the threat of deflation is contained in Chapter B7.

2.2.2 Interest rates

We have assumed that our nominal pre-tax cost of debt is 6.8%, with transaction costs, commitment and other fees, and cash holding costs adding a further 0.2%, taking the total cost to 7.0%. This is equivalent to 4.5% in real terms (pre-tax), using an average RPI of 2.5%.

This assumes we retain our current 'single A' credit rating. Should the rating be downgraded the cost would be expected to rise.

Further information is contained in Chapter B7.

2.2.3 Conclusion

The current degree of macro-economic uncertainty is unprecedented in the period since privatisation of the water industry. No previous periodic review has had to manage such uncertainty or volatility.

For this reason we recommend the Determination allows for a greater level of leeway in setting price limits in a way that is fair and equitable to all our stakeholders so as to explicitly allow us the capability to manage specific areas of macro-economic risk as it arises, rather than truing-up ex-post.

Further information is contained in Chapter B7.

2.3 Climate change

Climate change is already occurring and is expected to accelerate over the coming century. We will need to adapt our assets and our operations to deal with higher summer temperatures, lower summer rainfall and more extremes of weather.

The areas where impacts are likely to be most significant and immediate action is needed are:

- Increased storm intensity leading to flooding of assets and increased sewer flooding.
- Higher summer temperatures and lower summer rainfall leading to an imbalance between water supply and demand.

The Effect of Climate Change

Temperatures will increase, with wetter winters and drier summers, and there are likely to be more extremes of weather. We will need to adapt our assets and our operations to deal with the changes which this will bring. The impacts can be split into the following four categories:

- **Drought** – lower levels of rainfall, reduced levels of groundwater and soil moisture, lower levels of infiltration.
- **Temperature rise** – higher peak and average temperatures, increased evaporation and evapotranspiration.
- **Flooding** – extreme summer rainfall, greater storm intensities, higher groundwater levels, and increased soil moisture.
- **Sea Level Rise –** backwater effect/tidal impact at weirs.

In order to plan for climate change we have held a workshop for all managers involved in asset strategy to assess potential impacts and responses. We have taken account of the Water UK report on the approach to climate change adaptation and the UKWIR report on strategy for climate change.

We will need to work more closely with other bodies affecting our operations, including local authorities, the Environment Agency and developers, to ensure sustainable solutions are found for problems created by the changing climate. For example, we need to ensure that new developments are water-efficient, that the discharge consent regime develops in order that it remains appropriate for new climate conditions, and that we play our part in the recommendations of the Pitt Review on flooding.

In assessing the effects, we have concentrated on:

- The more direct impacts of climate change, where it is possible to make forecasts, e.g. we have not considered the potential impact of population movements caused by climate change.
- Incremental adaptation measures - because the impacts are uncertain, incremental measures are generally preferable to large one-off changes.

- In addition, changes which contribute to climate change mitigation are likely to be preferred to those which add to our carbon impact, i.e. solutions have been chosen after taking into account the cost of carbon.

The effects of climate change can be reviewed by using the following categories for assessment:

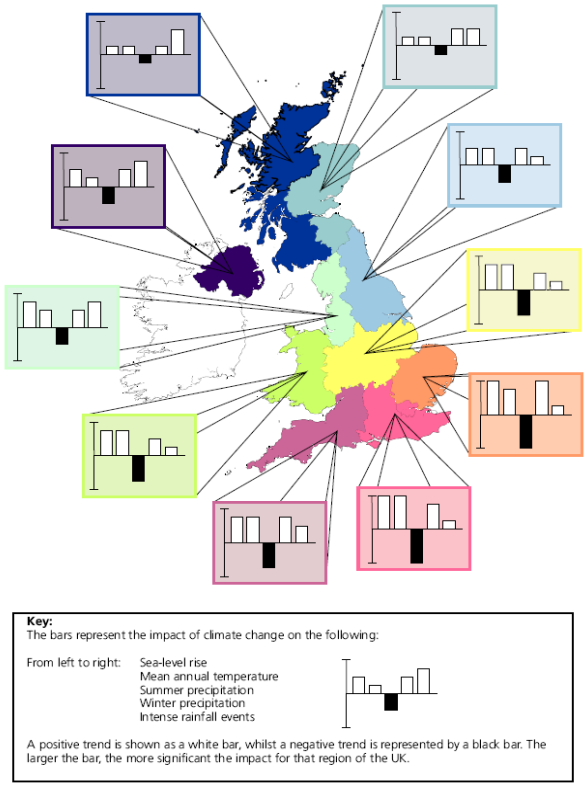
- **Severity** – impacts which have a significant impact on reliability of water supply are more significant than changes which affect costs of water treatment.
- **Uncertainty** – how certain is the change in climate, and the resulting impacts on the water industry
- **Urgency** – how soon does action need to be taken i.e. is action urgent because:
  - the impact of climate change is already being felt;
  - there is a long time-lag from planning to implementation; or
  - decisions are being made now on long-life investments where adding to capacity later to accommodate climate change would be costly.

This is in line with the approach set out in the recent Defra publication "*Adapting to climate change in England – a framework for action*", in which it was noted that "Different issues will require responses on different timescales, with a view to identifying the most cost-effective way forward. The response we make will depend both on when the impact hits, but also on the appropriate planning horizon. Large investment projects in assets that will last for 100 years will need a different approach to the decision on which crop to grow next year".

In terms of climate change impact, Climate Change – Towards a UK Water Industry Strategy (UKWIR, 2008), states that the Midlands is in an intermediate position relative to other regions of the UK:

- The expected increase in Midlands summer temperatures of between 1.5˚ - 3˚, and 10% - 30% decrease in summer rainfall by 2050, is expected to be higher than in northern regions but lower than in the south.
- The 20% increase in winter maximum daily precipitation in the Midlands by 2080, is expected to be similar to eastern regions but lower than western regions.

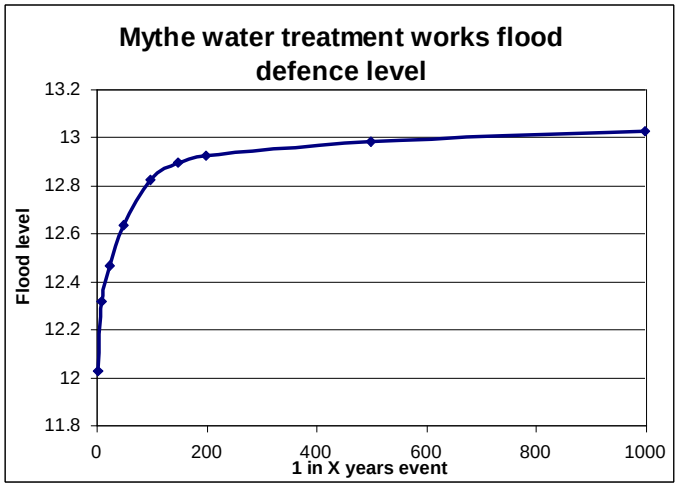
The map below summarises the expected effects by region of the UK, in terms of changes in rainfall, temperature, intense rainfall events and sea level rise.



Source: "Climate Change – Towards a UK Water Industry Strategy" – UKWIR report

The table below summarises our assessment of the most significant potential impacts of climate change on each area of our business.

Area	Assessment	Comment
Flooding – all areas	Consequence	Increased storm frequency is likely to increase the risk of assets being flooded and the efficacy of treatment works.
	Severity	Asset flooding can have a major impact on continuity of supply and waste water systems.
	Uncertainty	The extent of increase in storm frequency is uncertain but some impact can be expected.
	Urgency	Since increasing resilience of supply systems is under review, it would be prudent to include some allowance for climate change now, rather than add to protection later.
	Response	**Water Treatment Works** Our proposals for increased resilience provide some protection for climate change. In determining our flood resilience strategy we have been working with the EA to ensure we take the widest view of flood risk management reflecting developments such as Planning and Policy Statement 25 (PPS 25) and the 'Blue Corridor Vision' which impacts on our proposals to manage flood risk on some of our sites on the Lower Derwent catchment. We have adopted an uplift methodology to make an assessment of the potential impact of climate change on our assets as part of

Area	Assessment	Comment
		our engineering judgement of flood characteristics. We have followed best practice by designing a flood defence to the desired return period plus freeboard. The freeboard essentially allows for uncertainty. At Mythe, for example, we have proposed the flood defence level is set taking the annual probability of an extreme flooding event plus 500mm freeboard, allowing for a notional 200mm for climate change, and 300mm for model uncertainty. Our planned strategy is based on the following risk-based approach: **Appraising the Risk** Preliminary risk assessment to identify the sites at risk from flooding followed by a detailed risk assessment at those sites identified at greater than 1:200 year risk. **Managing the Risk** Development of contingency and escalation procedures in order to minimise the damage to property and the impact of flooding on customers. We propose only to pursue development in areas of flood risk were no sustainable alternative sites exist. **Reducing the risk through the development of a minimum asset standard** We are proposing that our water treatment plants have a minimum flood risk frequency of 1:200. The practicalities of design and the marginal cost of additional protection may result in a higher standard. For example, the diagram below shows that at Mythe a much higher standard can be achieved for little change in the height of protection – the level of protection being provided is against a more than 9,000 year event.  In determining the measures at each site in order to achieve this standard, we have analysed the peak flooding level predicted at the site, related this to topographical surveys undertaken at critical assets on the sites and evaluated various intervention options. The following options have generally been considered: • Do nothing

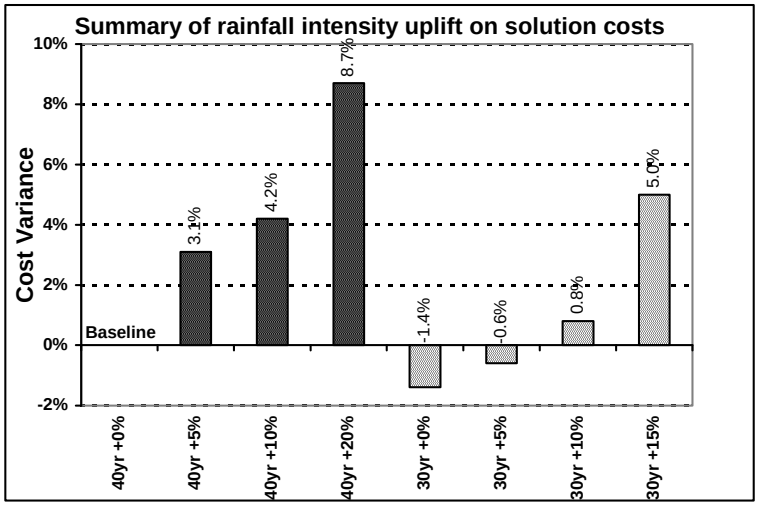
Area	Assessment	Comment
		• Seal vulnerable building and assets from ingress • Raise vulnerable assets above expected flood level • Structural flood defence • Abandon the works / alternative sources of supply We have installed temporary flood protection at Mythe and Homesford works and Willes Meadow intake. Our AMP5 resilience strategy includes permanent flood protection at all sites with a greater risk of flooding than the 1:200 standard. Priority will be given at those sites at highest risk from fluvial flooding. All of our investment proposals are cost-beneficial as defined by our cost-benefit methodology described in Chapter C8. **Sewage Treatment Works** We have reviewed the criticality of each works with regard to various factors such as the impact on the environment and the number of customers affected. The loss of process treatment to a major STW will lead to untreated, or partially treated, sewage being discharged to the receiving water. The ensuing pollution incident will generally lead to national media coverage, significant customer concern, extended recovery periods in the aquatic environment and atypical operational costs. All 12 large works sites were assessed for their susceptibility to fluvial flooding, using the EA's data for 1 in 75 year flooding events in the first instance. This was supplemented with additional data about known historical flooding incidents and, in the case of works in the river Tame basin, with recently produced data for 1 in 100 year events. Where a site was identified as being affected, a specific survey was undertaken at that site to review the topography in more detail to ascertain the specific impacts of flooding. We have identified unacceptable serviceability risks at two sites. Proposals have been included in our FBP to address these fluvial flooding risks. At Strongford, protection has been provided against causing a Category 1 pollution incident on a 1 in 75 year basis. We have carried out a resilience assessment on medium sized sewage works and large sewage pumping stations. Small sewage works and small / medium-sized pumping stations were excluded from this resilience assessment as the loss of these can be managed through operational processes such as tankering. We reviewed published flood data to ascertain assets which fall within, or were close to, the flood area. The data was reviewed in conjunction with our databases of site information such as photographs. This analysis provided an indicative measure of flooding risk. The actual risk depends on topography, site layout etc. The review identified for further more detailed screening: • 31 sewage treatment works with specific flood risk and 12 more where flood risk couldn't be ruled out

Area	Assessment	Comment
		• 25 large sewerage pumping stations (SPS) at risk A more detailed review at 20 selected sites was used to generate a unit cost for mitigating flooding risk at sewage works and sewage pumping stations. The service risk benefit through these interventions has been valued as avoidance of a Category 2 pollution incident on a >1 in 25 years frequency. Full details of our resilience proposals are included in Part B6 of the FBP.
Drought / higher summer temperatures – water resources	Consequence	Lower summer rainfall and higher temperatures will reduce deployable output and increase demand.

	Severity	The impact on water availability is likely to be significant and reliable water supply is our highest priority. Our assessment of the likely impacts follows the recommended best practice approach and uses the best available climate change scenario data. The UKCIP09 results are not yet available, but we are working with UKWIR to carry out early analysis of the implied impacts of the latest scenario results. We have been given no indication that the latest scenarios with produce climate change impacts that will be significantly less than implied by UKCIP02. The results of our analysis have been shared with the EA and with the Reporter. Since the draft Business Plan, we have adopted the EA's recommended best practice rainfall – runoff modelling approach. We have extended the record of river flows used in our deployable output assessment and assessed the impact of climate change using full rainfall runoff method, as prescribed. This has generated four new river flows databases: 1. the baseline "no-impact" flows 2. the dry climate change scenario 3. the mid-range climate change scenario 4. the wet climate change scenario These database improvements have allowed us to re-analyse the likely impact of climate change on baseline deployable output, and the uncertainty around this by comparison to the results for the wet and the dry climate change scenarios. The analysis takes the impact assessment down to the local catchment scale. Since the draft plan we have also done more work to assess the impacts of climate change on our groundwater sources. Under the mid range scenario the impacts are not significant, but under the more extreme, dry scenario there are some potentially large reductions in recharge and deployable output. These more extreme impacts have been incorporated into our headroom assessment. The overall impact on deployable output of climate change under the mid-range scenario is estimated be a reduction of 154 Ml/d by 2035.
	Uncertainty	Significant impact is expected but the timing and extent of impact is uncertain.
	Urgency	A long period from planning to implementation means that plans need to be made now.
	Response	Our plans for water resources include a balanced package of leakage control, metering, water efficiency, and small water resource developments. This is more flexible in response to variations in climate change impacts than major resource developments would be. In response to the challenges set out in Ofwat's CIS feedback, we have tested the sensitivity of our investment plan to the climate change impact assumptions. Under our latest assessment of climate change impacts, our total deployable

		output would reduce by 69 Ml/d by 2014-15. We have run our least cost investment model using a set of supply / demand inputs that exclude the climate change impacts on deployable output in order that we can derive what impact they are having on the investment plan. Full details are included in Part B5 of the FBP.
Drought / higher summer temperatures – water treatment	Consequence	Rainfall changes may affect raw water quality and changes in temperatures may affect treatment processes.
	Severity	The effects are unlikely to be major.
	Uncertainty	Both the extent of climate change and the impact on treatment processes are uncertain.
	Urgency	No need for immediate action.
	Response	Continue to monitor changes and participate in research.
Drought / higher summer temperatures – water distribution	Consequence	Higher temperatures and lower summer rainfall will increase summer demand, leading to shortfalls of peak capacity.
	Severity	Can be a significant problem locally.
	Uncertainty	Impact of higher temperatures is uncertain but some impact can be expected.
	Urgency	No need for immediate action – any problems arising can be addressed relatively quickly. Better forecasting of future capacity limitations is needed.
	Response	No immediate action needed – monitor trends and improve modelling.
Drought / higher winter temperatures – water distribution	Consequence	Higher winter temperatures will lead to fewer mains bursts. Periods of drought may increase mains bursts (as in late summer 2005).
	Severity	Unlikely to have a major impact.
	Uncertainty	Uncertain whether there will be a net increase or decrease.
	Urgency	No need for immediate action.
	Response	Continue to monitor trends and impacts.

Drought – sewerage	Consequence	Lower rainfall, reducing flows in sewers, may increase the likelihood of blockages.
	Severity	Unlikely to be a major impact
	Uncertainty	Impact of reduced rainfall on blockages is highly uncertain.
	Urgency	No need for immediate action.
	Response	Continue to monitor and participate in research.
Increased storm intensity – sewer flooding	Consequence	Increased storm intensity will increase sewer flooding.
	Severity	Sewer flooding is a major customer service failure and we are aiming to reduce the number of incidents. A higher number of incidents would be a significant problem.
	Uncertainty	The extent of increase in storm frequency is uncertain but some impact can be expected.
	Urgency	There has already been some increase in storm frequency. Sewer flooding is a key customer priority, as borne out in our Willingness To Pay research and should be addressed as a high priority.
	Response	We have already increased the capacity provided in schemes to resolve sewer flooding from protection against a 1 in 30-year storm to 1 in 40 years. To understand the sensitivity of potential peak rainfall intensities changes on sewerage design we have analysed a sample of recently completed projects. This work evaluated design performance using 30 year and 40 year design storms with rainfall intensities uplifted by +5%, +10% and +20%. Our current design standards provide for a minimum design standards for sewer flooding of 40 years internal and 20 years external and these were used as a baseline. The findings of this analysis are shown below:



Our analysis indicates that our current 40 year internal design standards provide an equivalent performance to a 30-year design storm uplifted by around 7%. The cost of providing this protection against climate change is only 1.4%. Until we can incorporate the findings of the UKCIP08 results into our design standards we plan to continue to base our designs on a 40-year internal standard. This aligns with the Defra sensitivity ranges whereby a 40-year standard provides protection midway between 2025 and 2055. Our AMP5 proposals are based on our current design standards.

In AMP5 we intend to develop a risk-based methodology that will integrate variable design standards with our cost-benefit approach based on risk of flooding. This will also incorporate the UKCIP08 findings. In line with the Pitt Review: Learning lessons from the 2007 floods (June 2008) we intend to identify vulnerable locations where the consequence of flooding is unacceptably high. For such sites (hospitals, schools, large inundated residential areas) we would seek to provide a higher design standard compared to potential flooding of single properties with low impact (e.g. internal garages) where a lower standard may be applied.

It is unrealistic to expect the sewerage system to cope with increasingly larger events. Over the long term, as a society, we need to remove surface water from our systems and constrain development so that local flood pathways are maintained and properties not built in vulnerable areas. We understand that the draft Floods and Water Bill will clarify responsibilities for this. We welcome the government's intention to increase the coordination between organisations responsible for inland flood risk management – EA, water companies, highways authorities, local authorities and internal drainage boards.

We are seeking to deal with surface water drainage in a more sustainable way. Retaining surface water in the sewerage system and passing it to sewage works for treatment is an inefficient use of the network. It potentially leads to flooding and an increased carbon footprint. We will investigate the scope for separating foul and surface systems through examining some pilot areas – separating the whole network would be an extremely costly task.

There is also great potential for sustainable drainage systems (SuDS) to deal with surface water and reduce the growth in

		sewer flooding problems, keeping down costs and reducing costs of pumping sewage. SuDS deal with surface water as close as possible to the point where the rain falls, by local storage of the rain water or providing the ability for the water to soak away. They avoid passing large volumes of water quickly downstream, reducing flooding from sewers and watercourses, which could also create opportunities for improved habitats for wildlife. We envisage that the least cost approach to achieving this objective will be to concentrate on areas due to be affected by new development (including redevelopment of brown field sites). We will seek the necessary legislative backing, encourage the installation of SuDS, and install our own SuDS devices in response to problems on existing systems. We will commence this by installing some trial pilot projects. Details of our proposals are set out in Part B5 of the FBP.

2.4 Minimising our carbon footprint

Our (SDS) Key Strategic Intention 4 (KSI 4) is *Minimising our carbon footprint*. In KSI 4 we state "*We believe we can deliver a leading position in sustainable operations thereby minimising our carbon footprint, provided it does not compromise standards or increase bills beyond levels which customers are willing to pay*."

Our approach in the FBP has therefore been an economic one which includes a shadow price for carbon. This is consistent with the approach required from Ofwat. We believe that this approach strikes the right balance between our intention to seek to minimise our carbon footprint and our other commitments to customers.

Further details are contained in Chapter C8.

2.5 Changing customer demands

Improving the choice for customers contacting us

Customer service expectations will increase and we will need to expand the choice of communication channels. Areas where we are seeking to make improvements include:

- Improved point of contact resolution - a programme is underway to increase the skills of our front-line agents to improve point of contact resolution. This will reduce the need to pass the call into an activity queue for later resolution, which will reduce back office work.
- Self-serve - customers can contact us via mail, telephone, and through our current self-serve options (e.g. our automated payment service). We are investing in web and voice self-serve solutions to increase the number of integrated transactions we are able to offer customers. We expect these solutions to be live in 2009. For those customers wishing to use this service it will extend our operating hours and enable a 24/7 service. This will reduce the number of contacts on the other channels and help reduce demand at peak times.
- Enhanced systems - we are investing in our systems to support and improve our business processes. For example, we will be automating our meter exchange process.

- Reducing operational failures and speeding up response times - we have created a root cause analysis team which is looking at the reasons why we receive written complaints, and are improving management information on the causes of contacts.

We are changing operational customer service processes to deliver better service. This initially applied in Sewerage, with the key objectives to improve our speed of response to customer contact, increase productivity of our field teams, improve customer satisfaction, and improve first time job resolution.

Response times to issues such as flooding, blockages and pollution are much improved, for example:

- Reduced response times for pollution incidents from 67 minutes to 29 minutes.
- Reduced response times for internal sewer flooding from nearly 17 hours to 33 minutes.

The improvements resulted from changes including improved scheduling of jobs, training, ensuring the right equipment is available to resolve the problem first time.

The following benefits are expected after extending the approach throughout the company.

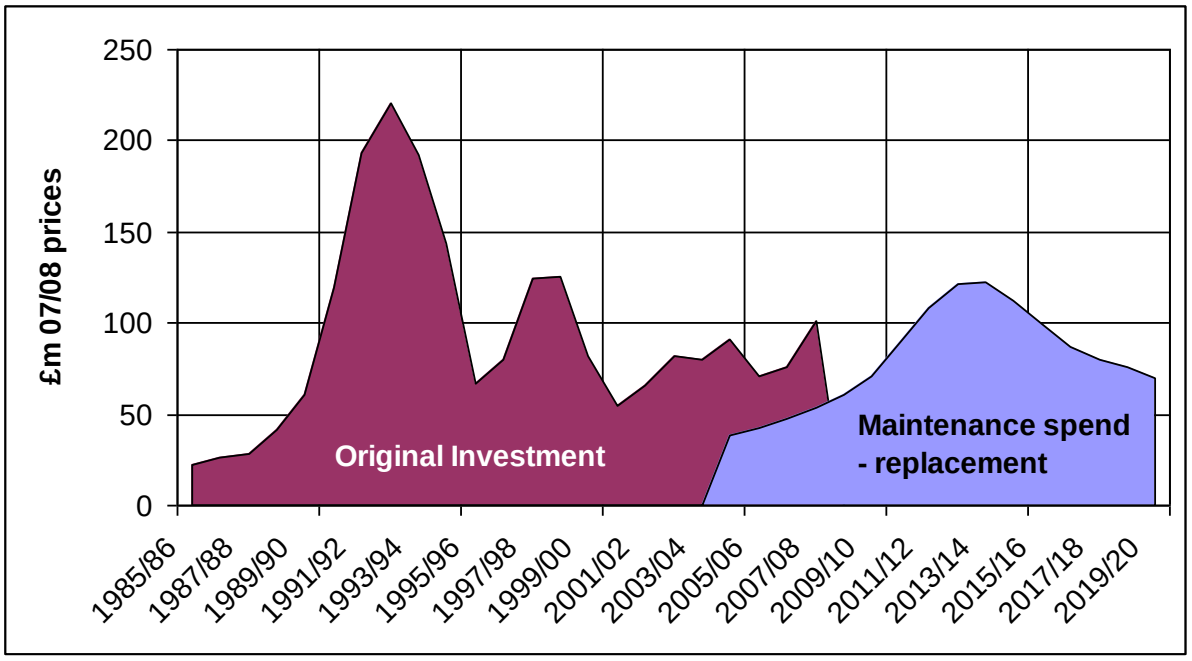
- Reduced written complaints through keeping customer promises and delivering service level agreements.
- Reduced abandonment of customer calls by reducing customer chase calls driven by not meeting promises.
- Reduced costs by increasing “Right First Time” volumes.
- Reduced leakage through early identification and correct prioritisation.

2.6 Ageing assets

Serviceability of our non infrastructure assets is stable, in terms of maintaining performance on water and sewage treatment compliance measures. However, our models for forecasting asset deterioration and service impacts, which have been developed using the UKWIR Capital Maintenance Planning Common Framework, indicate that an increase in maintenance spend at water, sewage and sludge treatment works will be needed in AMP5 in order to maintain our current high performance of compliance against standards. This results mainly from the high level of expenditure in AMP1 (1990/91 to 1994/95); the 20-year life assets of this expenditure are coming towards the end of their useful life.

The total effect is shown in the graph to the below, and is considered in more detail in Chapter B3.

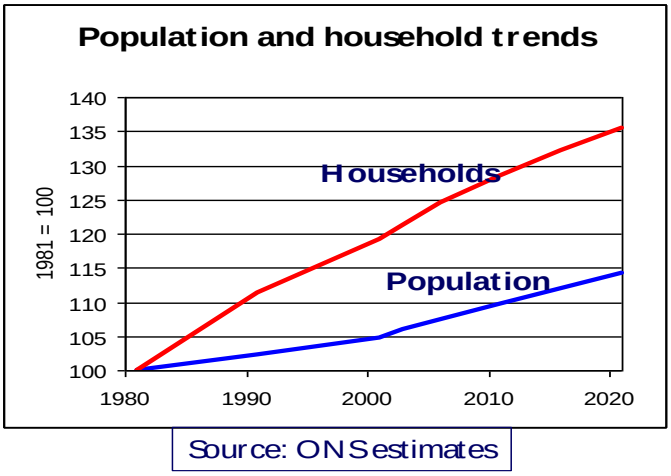
Impact of assets with a replacement cycle:



2.7 Demographic trends

Demand for water and sewerage services, although not increasing rapidly in total, is showing changing patterns due to a number of demographic factors:

- Falling household size is increasing the number of properties to serve. Population growth is projected to be around 0.2% pa, but the number of household customers is projected to increase more rapidly (0.6% pa). The graph on the right shows these points and also indicates that the effect is likely to increase in the future:

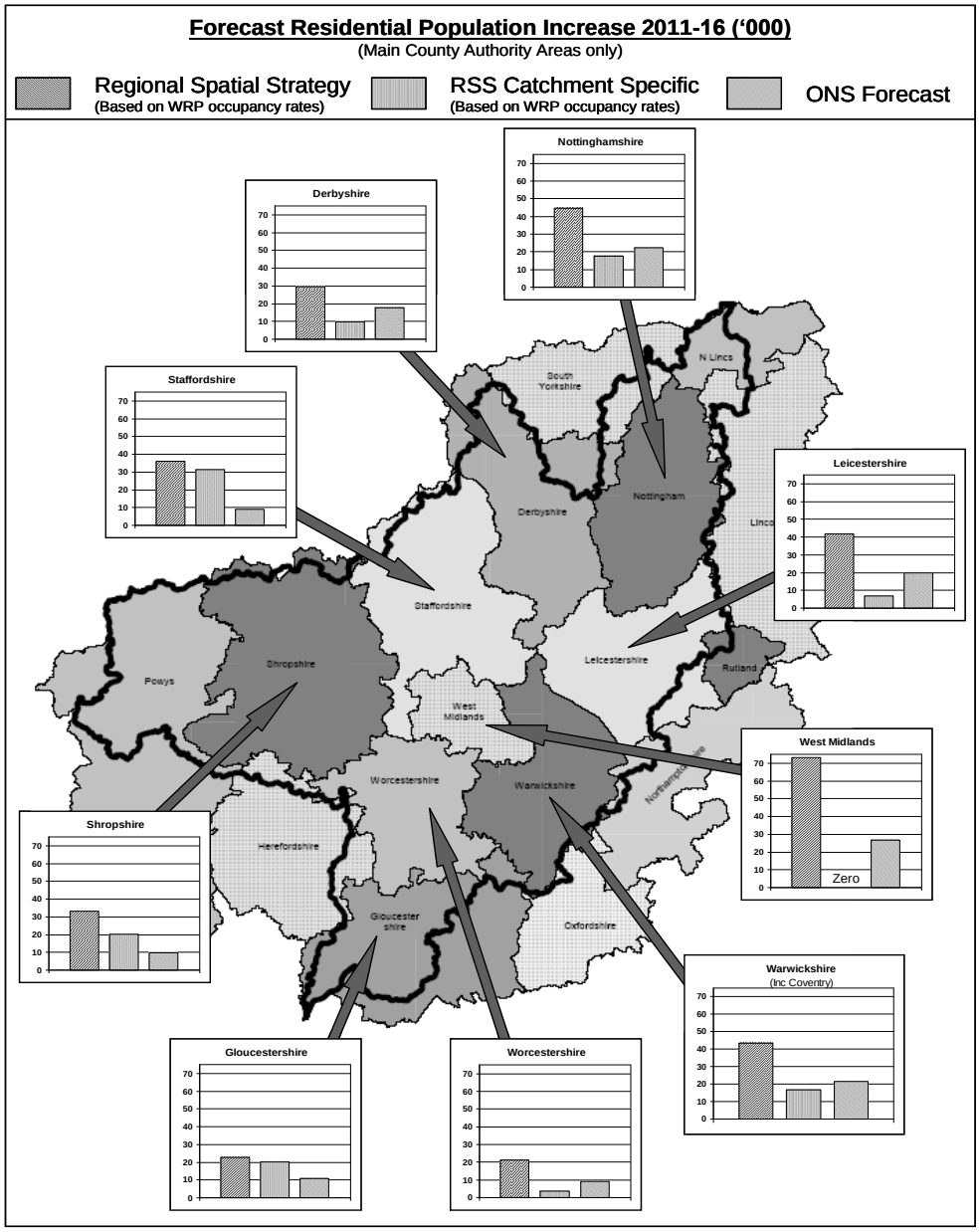


- There is a continuing movement in the population away from city centres to more rural areas.
- Drainage is being affected by increasing paving over of gardens, increasing sewer flooding.
- There is projected to be a shift in demand from industrial use to domestic use, and there is a trend towards higher peak domestic use as a result of more use of pools and other high water use summer activities.
- There is currently a drive from national government to dramatically increase the supply of new housing. Many towns and cities in the Midlands have been identified as growth points.

To meet these changes in demand, we will need to ensure that capacity at treatment works and in our infrastructure networks for both water and sewerage services is increased where

demand is growing. The diagram below shows further detailed information on population growth in our region:

Regional spatial strategy and ONS projections:



Further information is contained in Chapter B5.

Section 3: Managing the Key Risks and Uncertainties

In the previous section, we set out our view of the future operating environment, and the key challenges we need to respond to. We believe that through continuous improvement and innovation, we can meet these operational challenges and deliver our aim of being the best water and waste services company. The biggest risk to our ability to deliver the FBP pertains to financial risk and in particular, deflation.

In this section we provide further details on the steps we are taking to manage risk and uncertainty. There will however, remain areas of significant risk which need to be addressed through the regulatory framework as notified items – this area is examined at the end of this section.

3.1 Financing the Final Business Plan

The biggest risk to our ability to deliver our FBP is the financial risk, in particular relating to the economic environment and more specifically deflation.

Our approach is to mitigate such risks through the regulatory framework rather than using notified items to cover a long list of risks.

The table below shows the main risks we face, and our risk mitigation approach:

Risk	Approach
Cost of capital (WACC)	Our WACC takes into account the long term view on the cost of borrowing but there is a risk that this may increase in the short term.
Commercial demand	Our FBP is based on a central estimate of falling commercial demand. We are seeking to recalculate the impact of changes beyond this estimate as the Revenue Correction Mechanism does not cover all changes in commercial demand.
Electricity prices	We are seeking to hedge our risk on future electricity prices in order to provide mitigation against price volatility and to protect customer interests – discussions are ongoing with Ofwat.
Deflation	The regulatory model was not built to withstand sustained deflation – we are seeking to set price limits in recognition of this scenario. The actual prices we set customers would be based on the prevailing economic conditions such that we would set prices lower than the price limits if there were improvements in the economy.

3.2 Notified items

In principle we consider that wherever possible, we, rather than customers, should bear and manage macroeconomic risks:

- We believe in a regulatory regime of high level outputs. A large number of notified items and other grounds for resetting prices between reviews would not be consistent with this.
- We are better placed than consumers to accept and manage most of the risks facing us. For customers to manage such risk, a wide range of notified items would be needed. This could lead to frequent reopening of the Periodic Review outcome, with resulting price instability, increased workload for Ofwat, and increased regulatory burden on us. In contrast, as evidence of how we have managed risk, we have hedged power costs, held significant amounts of cash on our balance sheet, and fixed the cost of our debt in advance through swaps. This is in order to reduce risk without affecting customer bills during AMP4.

Consequently, we are seeking to reduce the number of notified items so that they only cover material, uncertain items, where do not believe we can reasonably bear the risk. These items are in respect of:

- IFRS-driven changes to Corporation Tax.
- Private sewer transfer.
- Charges for lane rentals / traffic management.
- Changes arising from the development of competition.

3.2.1 IFRS-driven changes to corporation tax

Our total Corporation Tax charge over the AMP5 period is projected to be around £60m higher than in 2007/8, primarily due to the abolition of Industrial Building Allowances (IBAs) and associated tax changes. We believe that HMRC, in the summer of 2009, are very likely to decide upon the tax treatment of assets which historically would have been eligible for IBAs. This should enable Ofwat to take account of the actual outcome of this legislation when price limits are set in November 2009.

At present, there is still some considerable uncertainty as to the final impact of these changes and also in a number of other tax areas.

One such area is in respect of the enforced application of International Accounting Standards (IFRS), which the Accounting Standards Board has recently stated will be implemented by 2013. We estimate that the effect of one of the changes, for IAS23, could increase our tax payable by around £8m per annum. However, both the timing and the amount of these changes are uncertain. Consequently we ask that tax changes arising from the application of IFRS are included as a Notified Item.

Further details are contained in Chapter B7.

3.2.2 Private Sewer Transfer

The Water Act 2003 contains provision for transfer of ownership of private drains and sewers to Water and Sewerage Companies (WaSCs).

In their letter PR09/26 dated 12 February 2009 Ofwat state that even though the recent ministerial statement has reduced uncertainty around the timing of transfer ‘from 2011’ significant uncertainties remain. As a result, Ofwat have decided not to change the guidance issued at the DBP stage but each affected company should set out its current estimates of costs and forecast levels of maintenance and enhancement activity associated with the transfer.

Until the draft regulations are released for comment it is not clear what types of sewer networks will transfer to WaSC ownership. Water UK has liaised closely with Defra and agreed that there are four different types that could be considered for transfer as follows:

- Private drains and sewers that currently drain by gravity and connect directly to existing public sewers.
- As above but drain through existing sewage pumping stations.
- Private surface water sewers that discharge directly to what are referred to as controlled waters i.e. streams, lakes, canals etc.
- Private drains and sewers that discharge to private sewage treatment works.

Ofwat in their letter PR09/26 have set out a series of assumptions:

- Transfer will include all private sewers and lateral drains and private sewage pumping stations which communicate with the public network.
- No distinction will be made between household and non-household premises.
- Surface water sewers and drains draining directly to watercourses will be excluded.
- Sewers and drains draining to privately owned sewage treatment facilities will be excluded.
- Sewers and drains, except those upstream of private sewage pumping stations, will transfer automatically at midnight on 31 March 2011.
- Sewers and drains upstream of private sewage pumping stations; the pumping stations and rising mains will transfer gradually over a 10 year period commencing at midnight on 31 March 2011. This will take place as and when they are located, surveyed, and where necessary, upgraded to an adoptable and serviceable state at the Company expense. After 10 years all such assets will be deemed to transfer to the sewerage companies whether or not they have been found and upgraded.

We are concerned that the ministerial announcement only refers to England. If the Welsh Assembly elect to follow different principles this could result in our English and Welsh customers receiving a different levels of service. This will also lead to inefficiencies and confusion. We have assumed that this will not be the case and England and Wales will be similar.

In the Water Industry we have been working to three key dates but all are reliant on Defra publishing the supporting regulations:

- April 2010 – introduction of new build standards.
- April 2011 – transfer of drains and sewers that currently drain by gravity to existing public sewers.
- April 2015 - transfer of sewage pumping stations and associated drains and sewers. This to reflect the issues around transfer such as health and safety, land ownership, access, security of power supply, easements, etc.

Ofwat have requested that cost estimates for sewage pumping stations associated rising mains and upstream sewers and drains should allow for a phased transfer over 10 years commencing on 31 March 2011 (i.e. commencing 4 years earlier than planned).

Our estimates of the expenditure implications of the transfer are contained in Chapter B4. These have not been included elsewhere but, given the uncertainty of scope and timing, will

need to be included as a Notified Item unless this automatically qualifies as a Relevant Change of Circumstance.

Further details are contained in Chapter B4.

3.2.3 Changes for lane rentals / traffic management

The Traffic Management Act 2004 is a recent piece of legislation effective from 1st April 2008, which significantly affects the management and practice of street works conducted by utilities.

Highways Authorities now have the option of implementing permit schemes charging for occupying the highway, with penalties for either non-compliance with permit schemes or overstaying the relevant time limit. At present, we do not know the extent to which either local authorities will take up the option of permit schemes, or how they will enforce penalties, and as a consequence there is a significant level of uncertainty as to what level of costs will be efficiently incurred over the AMP5 period, although we have incorporated an estimate of £7m into the FBP (£10m at DBP). Due to both materiality and uncertainty, we believe that the present Notified Item should be retained. This could be a symmetrical Notified Item, with a central estimate included in price limit assumptions.

Further information is contained in Chapter B3.

3.2.4 Changes arising from the development of competition

As for the costs of structural and system changes arising from competition policy, the extent of such changes in the water industry is fundamentally uncertain. If there is to be significant structural change, this will require primary legislation, for which government backing will be needed. At this stage, we have only included costs of accounting separation and inset appointments.

It has been the case in other utilities which have opened up to competition, such as gas, electricity or water in Scotland, that a significant level of cost has been incurred by incumbents in making those structural and system changes that have allowed competition to happen. We believe that such costs, if material, should not be borne by shareholders and consequently, due to the fundamental uncertainty, that a Notified Item would be appropriate unless this automatically qualifies as a Relevant Change of Circumstance.

Further information is contained in this Chapter (Section 2.8).

3.3 Research, development and innovation

The water industry faces a number of challenges where solutions to overcome them need developing and defining. Research and development allows us:

- to develop and trial a number of innovative technical approaches to ensure we deliver the most cost effective and dependable solution.
- to address these upcoming issues delivering maximum customer benefit in a timely and cost effective manner.
- to minimise the level of risk and uncertainty faced by the business and its customers.

For complex issues the lead time from the initiation of a Research & Development (R&D) project to the implementation of a solution, within the business, can often extend beyond the

five year AMP cycle. An example of this is the change in drinking water standard for arsenic (December 2003); we carried out 10 years of research to develop a novel adsorption process that could then be implemented at a number of sites.

The following examples highlight our track record of delivering and implementing effective R&D:

Biological Phosphorus Removal (BPR) from Wastewater. By the end of AMP4 we will have about 100 works where phosphorus removal from sewage is required. The conventional technology is to dose metal salts to precipitate the phosphorus, however, there are issues surrounding the increasing costs and the security of supply of the metal. Substantial amounts of extra sludge are also produced by adding metal salts to the process. Over a number of years, we have embarked on a R&D programme to assess the feasibility of BPR, starting from bench scale tests, through pilot plant trials and culminating in the successful implementation of BPR at a number of works. This solution has delivered capex, opex and carbon footprint benefits.

Arsenic Removal from Potable Water. In 1993 the World Health Organisation revised the health standard for arsenic from 50 to 10µg/l. We began a series of trials to evaluate a number of technical solutions. During the research work, we entered into an agreement with an industrial partner, to develop and trial a novel adsorption media. We were able to have a capital solution in place for 16 groundwater sites in advance of the enactment of the UK legislation (December 2003). This solution has proven to be both robust and cost effective in relation to the alternative best available technology.

Disinfection by-products in potable water. In the UK, tri-halomethanes (THMs) are included in the water quality regulations. The Drinking Water Inspectorate recently indicated that two additional classes of disinfection by-products, haloacetic acid (HAAs) and N-Nitrosodimethylamine (NDMA), are likely to be included in any future revision of the regulations. We have undertaken a considerable amount of research to develop a cost effective and robust technical solution for THM compliance. We are also involved in some fundamental research with a number of leading academic partners to determine the formation mechanisms and occurrence of HAAs and NDMA. In the case of NDMA this also involves the development of appropriate analytical methods. By gaining an in-depth understanding of the formation of these disinfection by-products, we will be able to develop the most cost effective strategy to achieve any future standards.

Reducing energy usage and meeting the challenges of the carbon reduction commitment. This is a key priority and as a result the current R&D programme includes a substantial number of initiatives to help the company achieve its ambitious targets. For example, regarding saving energy on activated sludge plants smarter control of aeration is being implemented through using ammonia as a parameter to control the blowers (in addition to dissolved oxygen). We are also collaborating with an industrial partner to develop a novel compressor that has the potential to save 20% of current aeration electricity usage. Internal generation of renewable electricity is also a key component of our strategy. R&D is targeting optimising the quality and quantity of biogas (used to generate electricity) that can be produced from our anaerobic digestion plants. Longer term initiatives regarding the potential of using the sludge we produce as a fuel is also underway.

Reducing our carbon footprint - areas currently in development are digestion optimisation technologies, hydro generation, waste to energy, energy crop digestion and wind turbines.

3.4 Water Framework Directive

We are working with our stakeholders to achieve the Water Framework Directive requirements for good ecological status in our watercourses over three six year cycles to 2027 and have included a significant number of projects associated with the first of these cycles in this plan.

There is no visibility of the required programme beyond AMP5 and we are concerned that the future programme for AMP6 and beyond will challenge customer affordability and willingness to pay. We encourage our regulatory stakeholders to ensure that holistic, sustainable, catchment-based, cost beneficial programmes can be developed.

Section 4: Achieving the right balance for consumers and the environment

The FBP sets out the detailed proposals for the next five years which are required to make progress in achieving our long-term plan.

The scale of improvements proposed in the forthcoming period has been determined by:

- The need to meet new obligations
- The need to maintain bills at an affordable level.
- An assessment of where benefits of improvements exceed the costs.
- The desire to ensure that the right investments are made. This is especially important where future requirements or the impact of major influences on our business, such as the need to adapt to climate change as set out in the previous section, are uncertain. We will need to be flexible in our response to challenges. We have included provision for pilot projects and investigations in our plans to assess the effectiveness of innovative solutions. We have also developed our research and development capability to respond in an innovative way to the challenges we face.

Customers and the environment are at the centre of our plan. We have taken into account customer views through market research, including a major willingness to pay survey carried out in 2007. This established the value which customers put on improvements in the different areas of service provision and used this in our investment optimisation system. All proposals also take into account the need to contribute to climate change mitigation by managing our carbon footprint, as well as other social and environmental impacts.

These key elements are covered in more detail in other areas of the plan:

C8, C1:	Customer priorities (including willingness to pay)
C8 Appendix 4:	Planning and optimisation
C1:	Wider stakeholder views

4.1 Sustainability

The objective of sustainable development is to enable people to satisfy their needs and enjoy a better quality of life, without compromising the quality of life of future generations. We recognise that our activities can have a major impact on sustainability, and in our plans we aim to make a contribution to all for of the government's five guiding principles:

- Living within environmental limits.
- Ensuring a strong, healthy and just society.
- Achieving a sustainable economy.
- Promoting good governance.
- Using sound science responsibly.

Defining sustainability

The UK Government has defined the goal of sustainable development as: "to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life, without compromising the quality of life of future generations".

We recognise our responsibility to contribute to sustainable development by taking full account of our impact on the local community and environment in everything we do. We have a major impact on our communities and regional economy:

- Through the services we deliver.
- As a major employer.
- As a purchaser of goods and services.
- Through our impact on the local environment through abstraction of water and discharge of waste water.
- Through our management of our public access recreational sites.

We have a large capital programme, investing in long-life assets, and we need to take full account of the needs of future generations of customers in our investment decisions.

The government has established five guiding principles to achieve the sustainable development goal. Our contribution towards achieving these principles is set out below:

Making our Contribution

Living within environmental limits

- Achieving environmental improvements through improved sewage treatment, reduced water abstraction and fewer pollution incidents, where the benefits from these improvements exceed the costs.
- Encouraging efficient use of water through measures such as education programmes, increased metering, and fitting water-efficient devices.
- Dealing more effectively with surface water (rain water) to reduce flooding and reduce our carbon footprint. We will investigate the scope for separating foul and surface systems and develop sustainable drainage systems (SUDS) to deal with surface water as close to the point where the rain falls as possible.
- Contributing to climate change mitigation through increased generation of renewable electricity and increasing the energy efficiency of our activities.

Ensuring a strong, healthy and just society

- Giving a very high priority to health and safety.
- Ensuring that proposed service improvements take account of willingness to pay amongst low-income groups.
- Applying cost-benefit analysis to potential improvements in service.
- Continuing to increase metering, as the only fair means of charging for the services which we provide.
- Developing payment options and continuing to support our charitable trust which provides help to those in debt – to help the most needy and least able to pay.
- Making sure that those who can pay but won't are pursued effectively.
- Building a talented, diverse workforce with the right skills, experience and behaviours, and ensuring that we retain key skills and experience.
- Championing skills development in the region and engaging with schools and colleges.

- Maintaining a culture where valuing diversity in all its breadth is part of the normal way of working.
- Promoting the well-being of the Midlands for the benefit of our communities and for Severn Trent.

Achieving a sustainable economy

- Increasing efficiency, so that water bills remain amongst the lowest in the country.
- Encouraging charging mechanisms which provide for environmental and social costs falling on those who impose them (Polluter Pays principle).
- Adapting to climate change so that we can continue to provide a reliable service in a changing environment.
- Increasing the resilience of our services so that we can continue to maintain service when there is a failure in one part of our network.
- Encouraging development of competition to improve the efficiency of resource allocation.

Promoting good governance

- Ensuring that our plans take full account of the views of our customers and other stakeholders.
- Working with Ofwat to help develop:
    - A regulatory regime which takes a long-term approach and facilitates continued investment.
    - New approaches to price-setting, encouraging accurate business planning and "menu regulation", to encourage companies to reveal accurate forecasts.
    - A new framework for competition to allow for more customers being eligible for competition and a new approach to access pricing.

Using sound science responsibly

- Ensuring that our policy on climate change adaptation and mitigation takes account of the latest scientific evidence on climate change.
- Developing new approaches to generation of renewable energy.
- Innovating to make our activities more efficient and sustainable, including:
    - Developing treatment processes which are more energy-efficient and use less chemicals.
    - New developments in catchment management to improve the quality of water and waste water entering treatment works, so reducing the cost of treatment.

4.2 Least cost planning – do nothing solutions

Our business plan will deliver 160 sewerage quality enhancement obligations through capex solutions at specific sewage treatment works. Our central estimate approach to investment planning, and specifically service risk, has enabled us to accommodate the enhanced discharge requirements at over 30 locations without additional capital investment, yet maintaining our serviceability position.

The consequential reduction in the enhancement capex programme will deliver the same level of serviceability as a more generic approach but at a lower impact on the customer's

bill. The central plan is more dynamic than a generic plan and subject to change as new data becomes available and additionally offers reduced scope for efficiency as the outputs are defined with more confidence at an earlier stage.