Sutton and East Surrey Water

PR09 – Final Business Plan
Reporter Report on Part A

April 2009
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PART A - THE COMPANY STRATEGY

A1 The Company Strategy

A1.1 Introduction

The Company has described its strategic objectives associated with performing its functions and meeting its obligations. It has listed four immediate challenges:

- A deficit in water resources in meeting its peak demand
- The presence of the molluscicide Metaldehyde in water sourced from Bough Beech reservoir
- Current difficulties in raising capital
- Giving customers fair value for money.

I confirm that the Company has addressed these issues in its plan.

A1.2 Development of Company Business Plan

Background

The Company has described two recent climatic events, a drought period between November 2004 and July 2006 and flooding in the summer of 2007, which highlighted the extremes which its assets must be able to withstand. It reports that customers responded well to requests to use water wisely but concludes from research that customers do not want to experience a loss of supply for any significant period of time.

Customers’ views

The Company has described its research undertaken to gauge customer views and has listed the main findings of that research as follows:

- SESW is highly regarded as a company that provides a high quality service to its customers and good value for money.
- Customers’ overwhelming requirement is for an adequate supply of good quality water.
- Customers were resigned to hosepipe bans but could not understand why drought orders or standpipes should ever be needed in modern day society.
- Most respondents simply accepted that interruptions to their water supply happened, but advance warnings of these would be much appreciated by customers.
- Water metering was embraced as a sensible way to pay for water and compulsory water metering was considered acceptable.
• Respondents considered climate change and water discoloration to be a low priority for investment.

I confirm that the summary above is consistent with the results listed in the research report undertaken by a specialist organisation.

The Company has listed the results of national customer research undertaken after publication of draft business plans showing that 27% of customers thought that its DBP offered poor value for money and 58% of customers would be concerned if proposals to ensure a reliable supply were delayed. The Company concludes that the large majority of customers broadly supported its DBP and found it value for money and affordable. I confirm that the actual research results are consistent with this claim.

The Company has also described its own research into customer views on its DBP. I have confirmed that the conclusion that customers ‘strongly supported our draft business plan proposals’ is supported by the report on the customer research (undertaken by an external research company).

A1.3 Programme and costs

I confirm that the Company’s outline business plan programme and capital expenditure summary is consistent with the rest of the FBP.

Capital expenditure

The Company has included the figures in the following table comparing the current AMP4 capital expenditure programme (2005 to 2010) with its proposed AMP5 programme (2010 to 2015) for both the draft and final business plans; the figures are in 2007/08 prices excluding efficiency adjustments.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Current Period (AMP4) 2005-10 £m</th>
<th>AMP5 Period DBP 2010-15 £m</th>
<th>AMP5 Period FBP 2010-15 £m</th>
</tr>
</thead>
<tbody>
<tr>
<td>The renewal and maintenance of existing infrastructure assets</td>
<td>31.5</td>
<td>33.0</td>
<td>27.9</td>
</tr>
<tr>
<td>The renewal and maintenance of existing non-infrastructure assets</td>
<td>43.7</td>
<td>44.2</td>
<td>45.6</td>
</tr>
<tr>
<td>New investment in relation to new or enhanced supplies to satisfy the increasing demand for water</td>
<td>21.1</td>
<td>55.4</td>
<td>41.7</td>
</tr>
<tr>
<td>New investment to meet water quality standards and to meet environmental and security guidelines</td>
<td>0.9</td>
<td>4.1</td>
<td>3.6</td>
</tr>
<tr>
<td>New investment to meet customers demand for enhanced</td>
<td>0</td>
<td>1.5</td>
<td>1.9</td>
</tr>
</tbody>
</table>
I confirm that the figures for the AMP5 period reconcile with Table A4 and the detailed sections of the DBP. The large increase in supply/demand expenditure compared with the current AMP4 period is due to a remedy for the peak demand deficit identified in the draft WRMP 2008; the reduction in the FBP compared with the DBP is due to the scaling back of domestic metering.

I note that the Company considers it has the resources to implement its proposed AMP5 programme with the exception of needing to recruit more meter readers, as the number of measured customers rises. I agree with this view and believe from my own experience that the Company has the staff with the capability to undertake its capital programme.

**Operating expenditure**

Base costs - I confirm that the base operating expenditure figure for 2007/08 of £24.368M is the same as the figure in Table B3.3.

**A1.4 Prices**

The figures listed for price increase reconcile with tabulated data in the detailed parts of the FBP.

**A1.5 Delivery**

**Renewal and maintenance of existing assets**

The Company has described its plan to continue capital maintenance expenditure at a similar level to the AMP4 period. I have reviewed the Company’s assessment of capital maintenance needs and consider the methodology adopted was well founded. The modelling undertaken to assess deterioration of the mains network and to utilise a risk-based approach to quantify future maintenance needs has broadly supported a business-as-usual approach. The sum of infrastructure (mains) and non-infrastructure (treatment works, pumping stations and other assets) is one million pounds less than the outturn forecast for the current 5-year period.

**Supply demand issues**

General – the conclusions from the draft Water Resources Management Plan (WRMP), submitted to Defra in March 2008, have been summarised. I confirm that the figures listed are an accurate presentation of the figures from the draft WRMP. For the FBP, the Company has reduced its planned installation rate for domestic metering in the AMP5 period but stated that it will accelerate beyond 2015 to achieve 90% metering penetration by 2025 (having proposed 2035 in the DBP).
Bough Beech uprating – I confirm that refurbishment of Bough Beech treatment works (TW) had been planned as the major capital maintenance project for the AMP5 period at the time of the last business plan. The selection of the uprating in capacity arose from the draft WRMP as the most economic option to meet the deficit in peak demand requirements. Prior to the draft WRMP the Company had identified the need and the option and, after discussions with the EA, had applied for the licence amendment and commenced feasibility work in advance. The two drivers, capital maintenance and supply/demand, should both be met by the work proposed by the Company. The uprating actually commenced during the AMP4 period with the second stage planned to start in April 2010 and to be completed during the AMP5 period. I confirm that the Company has been granted an abstraction licence by the Environment Agency for the increase in output.

Leakage – The Company has proposed to keep leakage at the current level during the AMP5 period 2010 to 2015. The current target is 24.5 Mi/d. In its Strategic Direction Statement (SDS) published in December 2007, the Company stated that it proposed to reduce the leakage target to 24.0 Mi/d. I challenged the Company on the change and was informed that the Company had calculated within the capital maintenance model that it could not deliver the reduction for the amount customers were willing to pay. The Company has also undertaken revised figures for the sustainable economic level of leakage (SELL) and concluded that is currently operating below the SELL and has no justification for further reductions in the AMP5 period.

Water efficiency - the Company refers to the proposed increase in water efficiency work as a result of the customer willingness to pay study. The work involves working with schools to improve water efficiency on those premises.

Metering – I confirm that the customer support for domestic metering is confirmed by the research undertaken by the Company. The Company proposal to achieve 90% meter penetration of domestic properties by 2025 varies slightly from the Strategic Direction Statement (SDS) which stated that the Company proposed to achieve 70% meter penetration by 2020 and 85% by 2025.

Quality issues

Lead – the Company has proposed to continue its policy of replacing lead communication pipes:

- encountered when renewing the connecting distribution mains (as it does for other old communication pipes of other materials) – I confirm that this expenditure will not be assigned to Quality as it is undertaken as part of the mains replacement projects
- when a tap sample from the connected property has failed the lead standard. I consider this to be a rational policy although the actual numbers replaced tends to be very small (currently less than 10 communication pipes per year for the existing 25µg/l standard and estimated to increase to 35 per year for the new 10µg/l standard).
The Company is also proposing for the AMP5 period to undertake a programme of replacing lead pipes in schools. The option to undertake this work is supported by the Drinking Water Inspectorate (DWI). In my opinion, it is a sensible proposal giving the opportunity to reduce lead levels to a minimum in a school environment and to have an educational benefit in involving the school in the work as it is undertaken. I have reviewed the estimated costs and consider them reasonable.

Discolouration - The DBP included discolouration proposals relating to replacing or relining mains under the mains renewal programme where iron levels, due to iron pick-up from the pipe walls, were high. This was a continuation of the policy adopted in the AMP4 period (and in the AMP3 period under a water quality programme). The Company has excluded this from the FBP proposals as the benefits would not have been material.

Pesticides – The detection of metaldehyde in Bough Beech Reservoir has resulted in discussions with the DWI and the proposal that the Company will work with manufacturers and the agricultural community to reduce the levels of metaldehyde entering water sources. I confirm that the proposal has received written support from the DWI.

New environmental standards – I confirm that the Environment Agency (EA) has not required the Company to make any sustainability reductions under the Habitats Directive. Identification of measures required under the Water Framework Directive would result from investigations under the National Environmental Programme (NEP) from which the EA requires the Company to undertake two studies. The scope of these studies has been defined by the EA and can be considered extensive. I questioned the Company as to whether it had challenged the level of scope proposed and was informed that it did not consider challenge was appropriate as it was required to include the work in its FBP as were other water companies. It would be the Government’s decision as to whether the work was undertaken.

Enhanced service levels: Resilience to flooding - The Company has referred to its proposed programme of work but given no details in Part A. Work is planned at three treatment works sites to improve flood resilience. At two sites, it proposes to undertake local protection works to reduce the risk of flooding from surface run-off. At a third site it is proposing to raise an access road in a flood plain to allow access to its river intake during flood events. I have challenged the Company on the need for the third scheme but agree that works are needed at the other two sites.

**A1.6 Efficiency**

The Company has referred to its planned efficiencies of 0.3% for opex and -0.8% for capex.
A1.7 Financing the future

The Company has made its case for an appropriate cost of capital and for certain items to be treated as Notified Items.

A2 Board Responsibility

The Company has described the involvement of the Board in the business planning process. I confirm from reviewing minutes of Board meetings and attending a meeting with the Board, during development of both the DBP and the FBP, that it took an active role in development of the Plan including proposed efficiency assumptions.

A3 Additional Reporter commentary

A3.1 Company overall strategy

I have confirmed in the commentaries above, relating to the numbered sections of the Company’s Plan Part A, links to the Tables A1 to A10 and to the Strategic Direction Statement (SDS). In summary, I confirm that the Company’s overall strategy accurately reflects the contents of the Part A Tables, including Tables A2 and A3, and that there are no material differences with the SDS. I also confirm that the Company has made no adjustment to its proposed price limits.

A3.2 Assessment of company approach

I confirm that the Company has used the same source information to provide data for Parts A and B of the FBP. The same personnel within the Company prepared numerical data for Parts A and B/C. Executive directors and support staff wrote the commentaries for Parts B/C and all such commentaries were reviewed by executive directors. The same executive directors wrote the commentaries for Part A of the Plan. I confirm that I reviewed numerical links between parts of the Plan as referred to in my Part A commentaries above and found no discrepancies. I also checked that key aspects and conclusions in Part A were representative of the conclusions from Parts B/C.

I confirm that I have reviewed the proposed capital programme, including the possible overlaps between Quality and Supply/demand schemes. I confirm that the small Quality element of the Plan does not influence other areas. I concluded that proportional allocation between supply/demand and capital maintenance had been undertaken in a justifiable manner based on throughput of the Works.

A3.3 Compliance with the Guidance

I believe that the Company has complied with the Ofwat Guidance.

A3.4 Material assumptions

I have commented on the key material assumptions under the Part A sections above.
A3.5 Efficiency assumptions

As referred to under A2 above, I confirm that the Company’s plan was presented to the Board during development. I believe that the Board take responsibility for the proposed efficiency assumptions.

A3.6 Areas of concern and challenges

I have listed challenges in the commentaries above. I have no particular areas of concern with regard to Part A of the Company’s Plan.

A3.7 Table commentaries

Table A2

I confirm that base levels of service are consistent with those quoted in table B3.1 and are not lower than those achieved in 2002/03.

No difference in carbon emissions is shown over the period: Table C8.3 shows an increase in carbon emissions of 0.2kt/year.

Tables A4

I confirm that the base capital investment forecasts by purpose category are consistent with Tables B3.5 and B3.6.

I have confirmed consistency between the Company’s capital programme and the database; costs from the capital programme have been correctly entered into the various parts of the FBP.

Table A6

I confirm that my commentary on efficiency has been included in Part B2.

Table A10

I confirm that the entries for columns 3 to 5 are consistent with Table C8.1, but columns 6 and 7 (capex and opex) do not reconcile because the figures in Table A10 include base expenditure which is not included in Table C8.1.
B1 The Post 2010 Environment

B1.1 Introduction

The Company has highlighted the following four key issues, which I confirm are consistent with the rest of the Final Business Plan (FBP):

- Addressing a shortfall in resources to meet demand in the critical period (peak week)
- The renewal and maintenance of existing assets to maintain stable serviceability
- Large increases in uncontrollable operating costs, in particular the cost of power
- Making adequate returns that will enable raising of the necessary capital.

B1.2 Achievements to date in the period 2005-2010

The outcomes have been compared with the outputs required in the Final Determination 2004 (FD04). The Company has confirmed broad achievement of outputs with the exception of new meter installations which are expected to be slightly below the target. I agree that the reason for the reduction is that less selective meters have been installed because of a reduction in the numbers of properties changing hands (selectives are undertaken on change of occupancy). The current estimate of the number of meter installations in the AMP4 period is 29,100 (the number has been omitted from the Company’s commentary on page 7) compared with the FD04 figure of 30,500.

The major addition to outputs was commencement of upgrading of Bough Beech TW increasing throughput by 9 Ml/d (providing both supply/demand and capital maintenance activity).

B1.3 Assessment of the post-2010 environment

B1.3.1 General

The Company listed its view of major potential changes compared with the past which could affect the stability of its plan relating to:

- The need for major supply side investment
- A realistic metering plan for demand management benefits and in response to Government and Environment Agency pressure
- Engineering and labour shortages relating to capital schemes
- Increased costs of energy and chemicals
- Requirement for more water efficiency
- The economic recession
- A large financing requirement
• The advent of competition
• Preparing for and reacting to the uncertain impact of climate change.

**B1.3.2 Competition**

The Company expresses doubts about the potential success of Ofwat’s competition proposals and concludes that:

• It does not expect accounting separation to have any impact on the management of its business
• It may come under competitive pressure from other suppliers for its single large commercial customer, Gatwick Airport
• It does not believe that it will lose any other customers to competitors.

**B1.4 Managing the key risks and uncertainties**

The Company has listed its anticipated key risks over the AMP5 period relating to:

• Deteriorating water quality
• Lead
• Power costs
• Capital expenditure – effects of economy and major construction investment on company’s programme
• Changes to accounting standards
• Pension costs
• Revenue
• Bad debts
• Financing
• Traffic Management Act
• Security matters
• Flooding.

Beyond 2015, the Company highlights the following additional uncertainties:

• Climate change
• Sustainability
• Competition.

**B1.5 Achieving the right balance for consumers and the environment**

The Company has highlighted that it has taken account of customer views, assessed its asset maintenance needs in accordance with the common framework and adopted a twin track approach to meet its forecast supply demand deficit.
B2 Improving efficiency

B2.1 Introduction

The Company has primarily based its efficiency assumptions on the following:

- Reports undertaken by Frontier Economics entitled *The scope for efficiency savings: 2010 to 2015: a report for Sutton and East Surrey Water (March 2009)*; this was an updated report from that produced for the DBP
- The reports undertaken for Water UK by First Economics entitled *The rate of frontier shift affecting water industry costs* (June 2008) and ‘*Frontier shift: an update*’ (17 December 2008)

B2.2 Overall approach to assessing the scope for improvements in efficiency for the AMP5 period

Efficiency values

The Frontier report examined two key components of potential efficiency savings: “frontier shift” – the assumed minimum improvement achievable by all water companies; and efficiency “catch up” – the potential efficiency savings SES might achieve through making additional annual gains relative to the frontier. The report concluded that:

- an appropriate range for assumed frontier shift would be 0% pa for opex and +0.8% for capex
- for opex, the Company should be in efficiency band A with an annual catch-up factor of 0.3% pa
- using Ofwat’s PR04 approach to capital efficiency modelling, the Company should have a capital efficiency target of 0.3% pa taking account of the Company’s special factors claims for water softening and regional wage costs.

The First Economics report concluded that a forecast opex frontier shift at or slightly above RPI would be supported by a number of different pieces of evidence (quoting an increase of between RPI+0% and RPI+0.75%). It suggested that it was reasonable to assume that the figure for capex frontier shift could be between RPI+1% and RPI+2%. In the December update, First Economics retained their opex forecast but stated that the capex frontier shift forecast could be reduced by up to one percentage point per annum.

The Reckon report included forecasts for the AMP5 period that:

- the rate of growth in water operating expenditure would be 0% relative to RPI
the rate of growth for water capital expenditure unit costs would be -0.5% per year relative to RPI.

The Company has assumed frontier shifts of:

- 0% for opex
- +0.8% for capex.

It has also accepted the Frontier conclusion on opex catch-up of 0.3% pa.

In Table B2.2, the opex efficiencies figures have been applied annually for the AMP5 period; the capex figures have been applied annually to the AMP5 period and beyond.

The Company’s view is based on the following:

- Evidence, as above, that shows little scope for continued frontier efficiency savings
- The Company faces material cost pressures that are outside of management control.

The Company has applied the same efficiency assumptions to base and enhancement opex and to capital maintenance and enhancement to infrastructure and non-infrastructure. I agree with the Company there is no logical reason or to differentiate between these categories.

I consider that the Company has made reasonable assumptions about its future efficiency values based on advice from Frontier Economics. Its opex assumptions are consistent with the Reckon report. Its capex assumption of +0.8% pa is consistent with the First Economics conclusions and compares with the Reckon proposal of -0.5%. I also note that the First Economics report takes no account of electricity purchase costs in its input price inflation forecasts.

The Frontier report points out that the Reckon figure is based on an assessment of past efficiency savings made by the industry and takes no account of frontier shift. It also questions whether Reckon’s analysis based on historic COPI increases was appropriate to the water industry construction elements. It further highlights Reckon’s statement that its forecast was based on a subjective view rather than as a logical conclusion of its analysis.

**Special factors**

The Frontier report cites three special factor issues relevant to opex: water softening, treatment complexity and regional wage costs.

The Company has given its views on the regional wage differentials figure used by Ofwat in the feedback to the DBP. The Company considers that the adjustment should represent 13% (as calculated by Frontier) of its relevant wage costs being the average for Outer London and Surrey compared with the national average. It concludes that Ofwat’s assessment following the DBP
adopts a similar approach but may have only used figures for Outer London rather than an average for Outer London and Surrey. Clearly both areas are of relevance to the Company’s circumstances. It is also unsure whether the Ofwat analysis took account of contract and hired employment costs.

**Efficiency initiatives**

The Company has described its approach to non-infrastructure capital works procurement and concluded that it is not of a sufficient size to implement framework agreements for its programme. I am aware that the Company utilises experienced and qualified staff to produce concept or outline designs supported by engineering consultants on the larger projects. It then seeks competitive tenders for construction contracts which include the detailed design elements. I agree that the Company does not have sufficient similar non-infrastructure assets to implement a rolling programme of works under a framework agreement. I consider that the Company’s approach is appropriate for the scale of its capital works programme.

The Company has not referred to any particular efficiency initiatives with regard to business or energy management nor to any benchmarking analysis.

I confirm that the Company has included its proposed efficiency targets in the various tables within the FBP for both capital and operating expenditure. I believe that these have been applied consistently throughout the Plan.

**B2.3 Outperformance of 2004 assumptions**

The Company states that it expects to report small efficiency savings in the current quinquennium if power costs are excluded from the analysis.

**B2.4 Table B2.1a Operating expenditure outperformance**
B2.5  Table B2.1b Capital expenditure outperformance

B2.6  Table B2.2 Water service efficiency improvements

I confirm that Table B2.2 has been completed in accordance with the Company guidance. I have reported on the Company’s efficiency assumptions in Section B2.2 above. I confirm that I consider the efficiency assumptions realistic and the process used to derive them reasonable at an overview level although demonstration of how they will be achieved does not form part of the Company’s plan.

Line 1 - The Company has entered a relative efficiency of band A (calculated by Frontier but differing from the band B category assessed by Ofwat in its 2007/08 relative efficiency analysis). The justification for this ‘improvement’ is taken from the Frontier report referred to above taking account of special factors for water softening, treatment complexity and regional wage costs. Frontier has concluded that the special factor allowances should be higher than the values used by Ofwat following submission of the Cost Base and DBP.

Lines 2 and 6 - As discussed above, the Company has assumed a continuing opex catch-up efficiency of 0.3% pa for the AMP5 period.

Lines 3 and 8 – A continuing level of opex efficiency of zero has been shown for all years.

Lines 10, 12 and 14 - The assumed continuing level of capex efficiency of -0.8% has been entered for the AMP5 period and beyond. The Company has assumed that the continuing level of efficiency improvement applies from the commencement of the AMP5 period rather than from the 2007-08 base year of costs.
Summary - changes from the draft business plan

The main changes on capital maintenance from the DBP are as follows:

- omission from the FBP of mains rehabilitation driven by iron pick-up (deletion of 13km of mains replacement and 43.2km of lining)
- Construction of additional filtration capacity at Woodmansterne TW (addition filters cannot cope with peak flows when softening plant running);

In terms of capital expenditure outputs, I consider that my DBP challenges have been met by the Company’s revisions for the FBP.

B3.1 Introduction

B3.1.1 Objective

The Company has described the objective of its B3 submission.

B3.1.2 Summary (and overview of infrastructure and non-infrastructure)

The Company has described its overall approach to asset management planning in its commentary and has included as an appendix its recently produced Asset Management Strategy document. The document describes the approach the Company will adopt in the planning period to 2035 to achieve the Company’s strategic objectives and is built around the following core elements:

- Asset management planning
- Asset operational activities
- Asset maintenance activities
- Data and reporting activities
- New assets and systems.

The document includes a Board Statement signed by the Operations Director. I also confirmed from discussions with the Board that the draft documents and the final document had been presented to the Board.

The Asset Management Strategy document was produced in early 2008 and updated in March 2009. I confirm that the document provides an accurate description of the systems that the Company has in place to manage its assets. It also provides links to the Company’s Strategic Direction Statement 2007 and to other Company plans including Water Safety Plans and various PR09 studies. The document makes appropriate reference to stakeholder engagement, the Capital Maintenance Planning Common Framework (CMPCF), climate change and carbon accounting. I believe that the document provides a fair and accurate assessment of the measures taken by the
Company in asset management planning. The document has been enhanced since the DBP and now includes individual responsibilities against job role/title within the Company’s management structure (I had previously highlighted that omission in my DBP report). I consider that the document provides an excellent description of the Company’s approach to managing its assets.

The Company has described in its FBP commentary, how it demonstrated that its asset management strategy links to the methodology for self-assessment of asset management planning, Asset Management Plan Assessment Process (AMPAP).

**B3.1.3 Key issues - infrastructure**

The Company has identified the following key issues in relation to its infrastructure renewals programme:

- underlying deterioration of the mains network
- introduction of the Traffic Management Act from 1 April 2008
- increases in construction and material costs above inflation.

**B3.1.4 Key issues – non-infrastructure**

The Company has identified the following key issues in relation to its non-infrastructure maintenance programme:

- underlying deterioration of plant and equipment
- increases in construction and material costs above inflation.

**B3.1.5 Differences between the Draft and Final Business Plan**

The Company has described the principal differences between the DBP and FBP as follows:

*Infrastructure*

- modelling - incorporation of a communication pipe failure model including leakage values; running of additional climate change scenarios
- omission from the FBP of mains rehabilitation driven by iron pick-up and related enhancements to service levels for interruption to supply and discolouration contacts identified from application of the cost benefit planning objective within the CMPCF analysis.

*Non-infrastructure*

- modelling – additional data validation and sensitivity analysis
- addition of filtration improvement scheme at Woodmansterne TW.
B3.2 Asset management planning - infrastructure

B3.2.1 Background

The Company has described the link to its Asset Management Strategy document and to its appointment of consultants Tynemarch to undertake its PR09 forward-looking analysis of capital maintenance requirements for its infrastructure assets. Its stated aim is to develop the most cost effective solution to achieve STABLE serviceability.

B3.2.2 Planning objectives, direction and delivery

The Company has evaluated stable serviceability in terms of the following indicators:

- number of bursts
- number and duration of interruptions
- leakage
- number of discoloration customer contacts.

I believe that these indicators are appropriate.

The modelling undertaken aimed to achieve a cost effective outcome. It included some assessment of social and environmental costs, and an assessment of the impact that climate change could have.

In conclusion for infrastructure planning objectives, I consider that:

- there has been a Board commitment to the Company’s asset management strategy processes following presentations by key managers on the Company’s proposals for the AMP5 period and beyond and following approval of the Strategic Direction Statement 2007 and the Company’s Asset Management Strategy manual. I believe that the procedures referred to in the Strategy manual are followed throughout the business
- the Company has clearly stated its planning objective for infrastructure planning to achieve STABLE serviceability
- the Company has endeavoured to challenge historic trends by instigating its modelling approach using the evidence from its records of the indicators listed above
- with regard to the cost beneficial assessment, customer willingness to pay (WTP) figures have been extracted from the WTP surveys undertaken for PR09
- from the evidence of the indicators, I believe that the Company did undertake an appropriate level of capital maintenance in the AMP4 period
- the indicators used by the Company to measure serviceability and service yield information on current performance and, through trend analysis and modelling, assist in forecasting future maintenance requirements
the Company has set out its planning objectives for ‘Stakeholder engagement’, and ‘Leadership, policy and strategy’ in accordance with the UKWIR report ‘Asset Management Planning Assessment Process’. Each point has been separately addressed and I can confirm that the Company carries out its business in the manner described in its commentary.

B3.2.3 Approach to asset management planning

Management

The Company has described in detail its approach to asset management planning in its commentary and provided more details than included in the DBP. I confirm that the description is consistent with the Asset Management Strategy document referred to above. The Company has set out its approach to asset management planning in the process flow chart and organogram provided in Appendices to its commentary. I confirm that the approach has been accurately described.

Processes

For PR04, the Company commenced development of a capital maintenance approach based on application of the UKWIR Common Framework for Capital Maintenance Planning. This has been enhanced for PR09 and is in my view fully compliant with the Common Framework. It also takes account of subsequent guidance including the UKWIR review of the Common Framework, MD212 and the Ofwat PR09 guidance. The PR09 modelling has been fully described in the Tynemarch report. Enhancements to the approach used at PR04 are set out in Table B3-5 in the Company’s commentary. I attended a presentation and meetings with the Company and the modelling team to understand the approach and to raise questions and challenges.

Systems

The Company has set out the systems used in its modelling and I comment on specific matters as follows:

Willingness to pay (WTP) - I confirm that the modelling included conclusions from the Company’s willingness to pay (WTP) surveys undertaken by Accent. The three elements included were:

- unplanned interruptions to supply
- customer contacts regarding discoloration of supplies
- leakage (noting that leakage does not directly affect the customer unless there is also an interruption to supply)

Climate change – variables considered, based on an assessment by HR Wallingford of data from the UK Climate Impact Programme, were temperature (number of days air frost) and rainfall (expressed by total precipitation and soil moisture deficit).
Pressure reduction – as a development of the AMP4 modelling, the model incorporated the date for each DMA when pressure reduction was introduced.

Interruptions to supply – for PR04, the modelling included estimated numbers of customers linked to each main based simply on numbers of connections to each main; for PR09, the approach has been refined with the GIS software supplier analysing all valve positions and more accurately assessing the numbers of customers affected when a valve is closed to undertake a mains repair.

Leakage – the model includes leakage data for each DMA including background and burst related leakage. The assessment was calibrated so that background leakage for each main calibrates with the known leakage at DMA level (so there is no knowledge as to whether the assessment of leakage per main is accurate). The approach also assumes that there is background leakage in all mains including new mains.

Modelling scenarios - four scenarios were modelled for cost-effectiveness as set out in the Company’s report on the final business plan. The scenario adopted (CE4) included both climate change and social/environmental costs. Cost/benefit analyses were carried out for the scenarios based on variations in Willingness to Pay values.

Discoloration – the number of customer contacts about discoloured water was used as a surrogate.

Social and environmental costs – traffic disruption and noise aspects were investigated; the latter was found to be negligible and was not included in the analysis.

Costs – cost data for costs of burst repairs and cost of new mains was provided by the Company.

Conclusions

I confirm that:

- the Company’s approach to asset management planning is in line with its ‘business as usual’ procedures and activities
- without reservation, the Company made appropriate efforts to ensure reporter understanding of its processes and the data/analysis used in its capital maintenance planning
- there are clear links made between the asset data and serviceability outputs, both of which were used in the modelling, and the capital maintenance planning which is based for the most part on the outputs of the modelling. I believe that the data used were suitable and of appropriate integrity representing the full range of Company-specific data available.
I consider that the strength of the planning is that the modelling approach represents best practice. Such modelling however can not be expected to produce definitive results in terms of the current state of the mains network or future deterioration rates. In practice there are local variations in physical conditions around water mains and modelling cannot replicate those conditions. The mains actually identified by the modelling may be those with the highest risk of failure at a mains cohort level but may not in practice prove to be the mains which are the highest priority for replacement in the AMP5 period. However, the outputs from the model provide the Company with a good starting point for planning the AMP5 workload.

**B3.2.4 Business case by asset group**

*Data*

Information used in the analysis included the following:

- Number of bursts - taken from the Company’s records of bursts between April 1990 and February 2007. These included location, diameter, material, age of pipe, soil type, and surface use

- Leakage - calculated using the Company’s LEMON software for each DMA over a three year period. The figures included burst-related leakage and background leakage from mains and services within the distribution system

- Interruptions to supply - the number and duration of interruptions to supply from the Company’s DG3 data prepared for the June Return

- Customer contacts - on water quality discolouration obtained from the Company’s Hi-Affinity database

- Climate change – temperature trend lines for recent periods and forecasts beyond 2020 were linked to provide figures for the modelled period.

- Costs - were based on records of schemes from the Company’s Navision system. Mains replacement costs were based on the out-turn costs of specific schemes completed since 2006. I challenged the Company on use of this relatively short period of data and was informed that the period was selected to coincide with the period since polyethylene has been the Company’s preferred material for pipes of up to and including 200mm diameter. It has been assumed that 20% of such mains beneath rural and suburban highways will be installed using trenchless techniques: this estimate has been made on the basis of the Company’s AMP4 experience and knowledge of the locations of its assets; I consider this to be a reasonable assumption. I challenged the Company on the current proportions of mains laid by directional drilling and was informed that recent work in semi-rural areas had been running as high as 30%. The Company however expects lower proportions in more urban areas where there are a greater number of obstructions, particularly other services.
The costs, as used in the modelling, associated with individual instances of burst mains have only been collected since April 2007; prior to that costs were not coded for each burst repair.

For mains renovation/replacement driven by high iron levels, the Company has continued its sampling programme across its water mains network to identify DMAs in need of renovation. During AMP4 the Company undertook mains renovation (lining) and replacement to reduce iron levels; it proposed a continuation of that programme in the DBP but has excluded it from the FBP.

**Analysis**

I have reviewed the modelling work undertaken by Tynemarch, presented in detail in Supporting Information B3-2. Models have been developed of burst rate, unplanned interruptions, leakage and discolouration contacts. Each of these models relates serviceability to the mains attributes and other relevant data.

Validation of the burst, leakage and discolouration analyses is shown in a number of plots; the interruptions model is based on a direct count of properties taken from GIS. I consider that the modelling has been carried out in a professional manner with the aim of providing a robust analysis.

I challenged the Company in a number of areas, and in particular in relation to duplication of the Bough Beech trunk main. As its construction in pre-stressed concrete is unique within SES, it was confirmed that it has not been possible to develop a deterioration model of its burst rate. However, 7 bursts have been recorded over a 17 year period, allowing a 'constant' burst rate to be assessed.

Selection of the intervention to duplicate this main is based on the high cost associated with the large number of properties interrupted and the duration of interruption, rather than on any forecast of its future deterioration. In other words, the NPV of GSS payments and alternative supplies is greater than the NPV of the intervention. The resultant reduction in risk across the distribution and trunk main system has been taken into account by the selection optimiser, so that fewer distribution mains need to be replaced to maintain interruptions service stable.

The main results for the AMP5 period were:

1). Under the cost-effectiveness planning objective, 111 km of mains renewal required to maintain current serviceability at least cost plus 17.4 km for duplication of the Bough Beech trunk main; total 128.4km
2). As above, plus climate change additional 5.9km; total 134.3km
3). Using cost benefit analysis from the WTP survey (reduction in unplanned interventions and reduction in discolouration contacts), a small additional length could be justified but the Company has not included this.

I note that the analysis included a climate change assessment based on temperature change. I consider that there is still much uncertainty about the
actual effects of climate change and it is difficult to be confident that there is a real impact of increasing incidents of bursts.

I note that the Company has not decided to proceed with the proposal in the DBP to deliver enhanced service levels for interruptions to supply and discolouration contacts by undertaking additional mains renewals and lining to DMAs where high iron levels are deemed a risk. I confirm that this work would not have met the customer service improvement criteria in the Part B6 Guidance.

In summary, the Company is proposing to replace 0.78% of its network per annum during the AMP5 period for structural reasons; this is very close to the figure of 0.75% I quoted in the FBP for PR04. I believe that the PR09 modelling supports continuation of mains renewals as proposed at a similar rate to AMP4.

Conclusions

In conclusion I consider that:

- the asset observations used in the Company’s analysis are appropriate and the best available to the Company
- the data on interventions has been effectively linked to serviceability in terms of the four indicators used - number of bursts, number and duration of interruptions, leakage and number of discolouration contacts
- the infrastructure modelling approach is appropriate and has been validated against the historic data
- the forward looking analysis is based on the Company’s own historic data as used to populate the model
- within the limitations of any modelling, I consider that the assessment made about future asset performance can be considered as reasonably robust as is the impact on service. I believe that the primary influence on burst numbers (the main indicator) is particular extremes of climate i.e. prolonged dry periods or prolonged cold (freezing) periods: the frequency of occurrence of such events is impossible to model effectively
- as above, within the limitations of modelling, I consider that the identification of optimal interventions can be considered reasonably robust although mains modelling cannot be expected to identify accurately exactly which mains will be the highest priority for renewal: there are too many local variables for which data is not available (e.g local ground conditions)
- I consider that the interventions are likely to achieve the Company’s stated objective of maintaining stable serviceability and as such are aligned with the Company’s long-term plans
- I believe that the cost data used is robust being based on current contract experience for mains renewals and operational experience of costs of burst repairs
- I believe that sufficient sense checks have been made especially that the programme is similar to that undertaken in the AMP3 and AMP4 periods (noting that burst occurrences have been stable in AMP4)
I confirm that the Company has sufficient resources to undertake the programme (demonstrated by its ability to deliver a similar programme during the AMP4 period).

B3.3 Asset management planning – non-infrastructure

B3.3.1 Background

The Company has described the link to its Asset Management Strategy document and to the appointment of consultants Tynemarch to undertake its PR09 forward-looking analysis of capital maintenance requirements for its non-infrastructure assets. Its stated aim has been to develop the most cost effective solution to achieving STABLE serviceability.

B3.3.2 Planning objectives, direction and delivery

The Company has evaluated stable serviceability in terms of the following indicators:

- turbidity
- cryptosporidium
- coliforms
- interruptions to supply
- health and safety
- pollution.

My conclusions for non-infrastructure planning are broadly as reported under infrastructure planning in Section 3.2.2 above:

- there is Board commitment to the Company’s asset management strategy
- the Company has clearly stated its planning objective for non-infrastructure planning to achieve STABLE serviceability
- the Company has endeavoured to challenge historic trends by instigating its modelling approach using the evidence from its records of the indicators listed above
- with regard to the cost beneficial assessment, the only relevant item from the customer willingness to pay (WTP) survey was unplanned interruptions and in practice the Company has not experienced any such customer interruptions from non-infrastructure failures. Some academic assessment of the potential to improve the risk of interruptions was undertaken but it was concluded that it had no impact on capital maintenance requirements
- from the evidence of the indicators and the Company’s continuing commitment to maintain its assets in a responsible way, I believe that the Company did undertake an appropriate level of capital maintenance in the AMP4 period
- the indicators used by the Company to measure serviceability and service yield information on current performance and, through trend analysis and modelling, assist in forecasting future maintenance requirements.
B3.3.3 Approach to asset management planning

Background

The Company’s approach to its asset management strategy for non-infrastructure assets is given in its commentary and in the report by its consultants Tynemarch.

For PR04, the Company undertook an assessment of capital maintenance needs from site visits to assess asset condition; it did not undertake a common framework, risk based approach to forecast future expenditure needs. It did however commission a risk-based pilot study by consultants Tynemarch after submission of the draft business plan. The pilot study approach has been developed for the PR09 analysis for all non-infrastructure assets. It is compliant with the Common Framework and takes account of subsequent guidance including the UKWIR review of the Common Framework, MD212 and the Ofwat PR09 guidance. The modelling methodology is based on Failure Modes, Effects and Criticality Analysis (FMECA).

In 2007, the Company installed a new Computerised Maintenance Management system (CMMS, known as Agility) which contains details of all assets and into which all maintenance and repair activity will be recorded. It will in future provide data on the history and failure record including intervention costs of each asset and greatly aid assessment of asset performance and intervention needs. I have had a demonstration of the system from the Company and consider that it offers a major improvement in non-infrastructure asset management. The system is accessed by any member of staff undertaking maintenance or intervention work on each asset and entries include timesheet data in relation to in-house repair work undertaken and costs of any parts, materials or contractor works used (with importing of costs from the Company’s accountancy software against the asset number and related work order). Timesheet data is automatically converted to cost within the system.

Planning objectives, direction and delivery

The PR09 FMECA modelling for the above ground asset maintenance programme has been fully described in the Tynemarch report. I attended a presentation and meetings with the Company and the modelling team to understand the approach and to raise questions and challenges.

All assets were classified into one of four facility types (the number of each is shown below):

- Water treatment works (8no.)
- Pumping stations (21 no.)
- Boreholes (35 no.)
- Service Reservoirs (34 no.).

The assessment of failure modes, likelihoods and durations and repair durations were made by holding expert panel meetings involving operations staff with knowledge of the assets. Available data from the Company’s supply
department on maintenance activities and failure records were used to inform the expert panel meetings. The expert panels also estimated the failure impact for each asset on the output from the Works (e.g. if duty and standby pumps fail, the whole pumped output is lost). The estimate of survival time (how long can a Works be out of action before customers are affected) was undertaken by experienced Company supply staff. The cost of failure utilised repair duration times decided by the Expert Panel. The scores and weightings applied to failures of each indicator were decided in discussion with senior Company supply department staff.

Results from the Company’s customer Willingness to Pay surveys were included in the modelling (for improvements in unplanned interruptions to supply).

Conclusions

In conclusion I consider that:

- the asset observations used in the Company’s analysis are appropriate and the best available to the Company
- the data on interventions has been effectively linked to serviceability in the modelling undertaken
- the non-infrastructure modelling approach is appropriate but there is a lack of historic data to enable validation
- the forward looking analysis is based on the expert judgements of senior Company operational staff
- within the limitations of any modelling, I consider that the assessment made about future asset performance can be considered as reasonable as is the impact on service
- as above, within the limitations of modelling, I consider that the identification of optimal interventions can be considered reasonable
- I consider that the interventions are likely to achieve the Company’s stated objective of maintaining stable serviceability and as such are aligned with the Company’s long-term plans
- I believe that the cost data used is of the right order being based on the expert judgement of the Company’s senior operational management but cannot be considered as robust as it is not actually recorded data
- I believe that sufficient sense checks have been made especially that the programme is similar to that undertaken in the AMP3 and AMP4 periods
- I confirm that the Company has sufficient resources to undertake the programme (demonstrated by its ability to deliver a similar programme during the AMP4 period).

I consider that the strength of the planning is that the modelling approach represents best practice. The weakness is the lack of asset specific data on failures and on historic costs of maintenance or other interventions and therefore the forecast costs of interventions cannot be of the highest accuracy. The Company’s installation of the Agility CMMS system will be of great benefit in undertaking similar modelling at the next periodic review.
B3.3.4 Business case by asset group

Data

The Company has described the principal asset observations used to generate the models under the following headings:

- Asset inventory and condition survey - work was carried out by consultant Atkins for two primary reasons:
  - to identify and tag all assets - the assets identified being used in the FMECA modelling and also to populate the new Agility CMMS
  - to assess asset condition for updating the Asset inventory (see Part 3 of the business plan) and calculating modern equivalent asset values (MEAV); the asset condition was not used to inform the FMECA modelling

- Maintenance records - historic data records (from 2000 to 2007) of failure records and maintenance from the Company’s old recording systems (‘Daily Weekly Operating Report’ recording plant unavailability in half day units, and out-of-hours call-outs due to breakdowns and other alarms and ‘Maintenance Daily Record Sheet’ recording planned and unplanned maintenance hours) to inform the Expert Panels; these data could not be used directly in the FMECA modelling because they were not usually asset specific (e.g. the pumping station where a failure had occurred would be identified but not necessarily which pump or which piece of equipment). Failure records for the period August 2007 to August 2008 are available from the Agility system, referenced against the asset inventory.

- Intervention costs – I confirm that the intervention costs were estimated by expert judgement by senior members of the Company’s supply department. There is therefore no direct link with the historic costs of projects nor with the Cost Base submission. I also acknowledge that it is difficult to provide a direct link with Cost Base.

Five ‘Expert Panel’ FMECA meetings were held at which Company staff reviewed possible failure modes and the consequences of such a failure. The result was a list of 491 possible failure modes across 20 asset groups. The Expert Panel split the possible failure modes into ‘repairable’ and ‘non-repairable’ (i.e. replacement) failure modes. A severity level and duration for each failure mode was allocated to indicate the consequence of the failure on service levels. Tynemarch used the data to develop probability and consequence models to forecast the expected number of service failures in each service area over the next 25 years. Intervention options comprising replacement and/or refurbishment of each asset were considered for each of the next 25 years: the choice of replacement or refurbishment of a particular asset was guided by the Expert Panel. SES also advised on the practical aspects of interventions: e.g. where it made sense to carry out works on several integrated assets at one site at the same time, especially if it meant taking the site out of service.
Analysis

I have reviewed the modelling work undertaken by Tynemarch, presented in detail in Supporting Information B3-3, and raised queries and challenges where appropriate.

Whilst the FMECA process requires expert opinion, in the case of failure rates it has been possible to validate this using historical data. The Company commentary presents three frequently occurring failures (air compressors, chlorination systems and treated water pumps) for which sufficient data are available in the Agility system to enable statistically robust deterioration plots to be derived (see Section B2.4 of Supporting Information B3-3).

I queried why the expert panel failure rates appear to increase more rapidly with age than the historical data. The Company response was that the observed data are naturally ‘censored’, in that the most unreliable assets are replaced sooner than others of the same age. Had this not been the case, the failures that would have been associated with them at higher ages would have increased the historical record. I view this to be a reasonable argument. The Company notes that in future the accumulation of records on historical replacements will allow this censoring factor to be taken into account.

The Company has used the expert opinion deterioration rates for these three cases, believing they represent future deterioration more accurately than the censored historical data. It believes that these relationships imply that the expert opinion deterioration rates for other asset types can similarly be relied on.

I also asked for a comparison between the total number of asset failures from the historical record and from the deterioration models, for each of the three asset types discussed above. The results and explanations are as follows:

<table>
<thead>
<tr>
<th>Asset Type</th>
<th>No. Failures (Historical)</th>
<th>No. Failures (Model)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air compressors</td>
<td>109</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>Chlorination system</td>
<td>522</td>
<td>1065</td>
<td>Large no. assets aged 2 years, for which expert opinion failure rate is significantly higher, albeit without further deterioration until 9 years old.</td>
</tr>
<tr>
<td>Treated water pumps</td>
<td>102</td>
<td>153</td>
<td>Data censoring assumed</td>
</tr>
</tbody>
</table>

The three deterioration plots presented in the Company commentary represent three of the four most frequently occurring failures. The Company has also provided me with a plot for dosing pumps (160 failures in the year for which data are held):
The apparent improvement with age may be due partly to data censoring but may be related to trends such as use of different manufacturers over time. The Company intends to investigate this further during the AMP4 period as the volume of historical data increases, which I believe is an appropriate course of action.

For civil assets whose replacement or refurbishment is triggered by ‘deterioration to a more expensive intervention state’, the (understandable) lack of historical data on refurbishments has prevented validation. Such data will be recorded in the future.

With regard to the nature of the interventions offered to the model for selection, I challenged the Company concerning their granularity. I took as my example the rapid gravity sand filter backwash system at Bough Beech, which is selected for renewal in AMP5 at a cost of £475k. This system comprises pumps, valves and the local control system: these are considered as a single component with an overall failure rate and a single intervention option to replace or refurbish the whole unit. The Company responded that when replacing units of this type and age (installed 1978) it would expect that all items will require replacement, noting that when pump no.1 failed in 2007 it transpired that a directly matched replacement unit was not available and the nearest equivalent unit would have required pipe work changes and a larger hole cut through the concrete roof of the filtered water tank the pumps sit on. As an interim measure it was therefore necessary to carry out a partial refurbishment of the pump and motor, at a cost of £49.7k.

Tynemarch entered the data into their intervention selection software to identify the optimal interventions as follows:

Interventions required on economic grounds, where the discounted failure costs that would be averted by the intervention are sufficient to justify the intervention costs. Further interventions are selected, or economic interventions are brought forward in time, so that service is maintained at minimum total (whole-life) cost according to the cost-effectiveness planning objective.
Information from the Willingness to Pay (WTP) surveys was considered in the analyses, in particular that related to paying for a reduction in unplanned interruptions to supply. There has historically been no significant interruption to supply caused by the failure of non-infrastructure assets (most such interruptions are due to infrastructure failures) and the analyses demonstrated that the 25 year maintenance programme was not affected by WTP.

I consider that the modelling has been carried out in a professional manner with the aim of providing a robust analysis.

The results of the modelling shown as a comparison with AMP4 expenditure are reproduced in the table below:

<table>
<thead>
<tr>
<th>Asset facility</th>
<th>AMP4</th>
<th>AMP5 (SES comm)</th>
<th>AMP5 (Tynemarch)</th>
<th>AMP6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boreholes</td>
<td>£1,643</td>
<td>£1,739</td>
<td>£1,610</td>
<td>£3,149</td>
</tr>
<tr>
<td>Pumping Stations</td>
<td>£922</td>
<td>£3,528</td>
<td>£3,267</td>
<td>£4,376</td>
</tr>
<tr>
<td>Service Reservoirs</td>
<td>£1,567</td>
<td>£1,534</td>
<td>£1,420</td>
<td>£2,745</td>
</tr>
<tr>
<td>Water Treatment Works</td>
<td>£28,709</td>
<td>£29,433</td>
<td>£16,865</td>
<td>£18,764</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>£32,841</strong></td>
<td><strong>£36,234</strong></td>
<td><strong>£29,054</strong></td>
<td><strong>£30,034</strong></td>
</tr>
</tbody>
</table>

I challenged the Company to explain the differences between the expenditure figures in its commentary and the figures from the Tynemarch model for AMP5. The back-up calculations confirmed the following:

- The outputs from the Tynemarch modelling have been increased by 8% to cover the overall allowance for Company on-costs. I confirm that this is consistent with the cost base allowance for refurbishment works undertaken by the Company’s supply department.
- Capital maintenance expenditure on Bough Beech TW and Woodmanterne TW has been added to the results of the modelling: Bough Beech works are a result of the major extension of the works planned under supply demand; there is therefore associated capital maintenance proportional allocation. I have checked that there is no double counting between work identified from the modelling and work as a result of the upgrading (see below).
- Capital maintenance expenditure is planned at Woodmansterne TW which was not included in the DBP. The Company is proposing to construct additional filtration capacity to resolve the operational problems with the existing filters. At times of higher outputs, the existing filters cannot cope with the softening load and the softening has to be reduced or bypassed. Such reduction results in water leaving the Works not fully softened; this leaves the Company in breach of its statutory obligation to soften. I confirm that I scrutinised this issue at the time of PR04 and have no doubt that the works are needed to allow full operation of the softening facility. I challenged the Company on why the scheme had been excluded from the DBP.
and was informed that it had not been picked up by the FMECA modelling (because there had been no turbidity failures, and had therefore been overlooked). A decision was taken after submission of the draft BP to include it in the Final BP.

Works at Bough Beech TW - A major upgrade is planned at Bough Beech in association with increasing output as a supply/demand scheme. Consultants were appointed to evaluate the cost of the Bough Beech works and to apportion costs between supply/demand and capital maintenance. Consequently the value of works proposed at Bough Beech under capital maintenance is greater than the value from the FMECA modelling. I have reviewed the Bough Beech cost estimates and concluded that they are fair and reasonable estimates for the work planned. I challenged the Company to illustrate how it had combined the elements from the FMECA modelling and from the consultants’ report on the planned uprating works at Bough Beech. It responded that it had been through the outputs line by line to ensure no overlap. I have been provided with a spreadsheet showing which lines have been deleted and retained from the FMECA modelling recommendations. I verified that there was no overlap.

Management and general

The Company did not undertake a common framework approach to its management and general capital maintenance needs. It proposes a 3.1% increase under this heading from the AMP4 figure as set out in Table 3-10 of its commentary. The most significant increase relates to ‘Office and Laboratory’ where expenditure is planned to increase from £371k in AMP4 to £564k in AMP5. This is mainly due to the proposed replacement of their Laboratory Information System (LIMS) which I agree needs to be updated. Elsewhere under this heading, the Company proposes to maintain its vehicles, computer systems etc in an acceptable condition.

Conclusions

In conclusion on the Company’s non-infrastructure analysis, I consider that:

- the asset observations have been gained from the Company’s operations staff and in my view are appropriate and the best available to the Company
- the data on interventions has been effectively linked to serviceability in terms of the six indicators used – turbidity, cryptosporidium, coliforms, interruptions to supply, health and safety and pollution
- the non-infrastructure modelling approach is appropriate and has been validated against the historic data
- the forward looking analysis is based to a limited extent on the Company’s own historic data but primarily on expert judgement; the Company has however put in place a new asset database which will provide very good data at the next periodic review
- in the case of non-infrastructure, the only link with enhancement relates to the largest project: maintenance of Bough Beech TW at the same time as enlargement of the works as a supply/demand scheme; the capital
maintenance works proposed are greater than concluded from the modelling because of the interaction with changes to assets needed for increasing the output of the works

- Works to uprate filtration capacity at Woodmansterne TW are required to allow the Company to comply with its statutory obligation to soften at all outputs and are supported by CBA
- I consider that the assessment made about future asset performance can be considered as reasonable as it is based on the judgement of staff with a working knowledge of the assets
- the identification of optimal interventions can also be considered reasonable as it has taken account of the effects of failures on customers and on a least cost approach to achieve stable serviceability
- I consider that the interventions are likely to achieve the Company’s stated objective of maintaining stable serviceability and as such are aligned with the Company’s long-term plans
- I consider that the cost data used is reasonable for comparability/modelling being based on Company expert judgement. The cost data for capital maintenance elements of Bough Beech works has been prepared by consultants and checked by the contractor currently working on the Bough Beech site; for an estimate, at feasibility stage, I consider it robust. I also note the Company’s stated approach that it would propose to expend the whole non-infrastructure capital sum and that if the planned projects could be delivered for a lower sum, it would extend the programme to bring in the next highest priority schemes
- I believe that sufficient sense checks have been made especially that the programme is similar to that being undertaken in the AMP4 period
- I confirm that the Company has sufficient resources to undertake the programme (demonstrated by its ability to deliver a similar programme during the AMP4 period).

**B3.4 Further commentary**

**B3.4.1 Company commentary**

The Company has highlighted that its capital maintenance expenditure forecasts for the AMP5 period are similar to its planned expenditure in the AMP4 period. It notes however that the historical assessment of capital maintenance expenditure for infrastructure included in Table B3.5 is lower than planned for the AMP5 period. It concludes that this discrepancy is due to the infrastructure capital maintenance being assessed over a 6-year period which ignores its AMP3 mains renovation work which at that time was under the Quality programme and that mainlaying rates have increased at a higher rate than RPI. I note that the Company is not now planning any mains renovation work in the AMP5 period; I agree that mainlaying rates have risen at a rate greater than RPI.

For non-infrastructure, it also notes that the historical expenditure is shown as lower than the AMP5 proposals. It concludes that the reason is that cost increases have been higher than RPI over the assessment period. I believe
that it is acknowledged from various studies that construction costs have increased at a rate greater than RPI over the assessment period.

**B3.5 Response to specific Ofwat Guidance**

**B3.5.1 Activity reporting not in FBP tables**

I confirm that I believe that all activity has been reported in the tables.

**B3.5.2 Reference levels (RL) and Control Limits (CL)**

I confirm that the Company’s submission of its reference levels is complete. The Company has accepted the challenge made by Ofwat in the draft CIS or modified figures since the DBP as follows:

- Total bursts – Ofwat figures accepted (RL 334; CL 123)
- Interruptions greater than 12h – RL increased to 150 because of variability in figures from 2008/09 experience of large number for a single burst incident: CL unchanged from DBP
- DG2 – the Company has increased its CL to the Ofwat proposal of 18
- WTW coliforms – Ofwat figures accepted
- Service reservoir coliforms – Ofwat proposed CL 3% (definition has changed since DBP; Company has entered 0.1% in the table and confirmed 3% in its commentary)
- Enforcement actions – Ofwat CL of 1 agreed as realistic (had been 0 at DBP)
- Unplanned maintenance – Company has revised from DBP RL 1600, CL 300 to RL 1533 and CL 320.

Service levels – Ofwat challenged the Company’s original targets for DG3 because they predicted a shortfall for AMP4. The Company has amended its future overall performance score to RL 0.30 and CL to 0.20 (at DBP were 0.4 and 0.1 respectively).

**B3.5.3 Asset management assessment (AMA) response**

Ofwat introduced a positive challenge in the draft CIS because of reduced infrastructure renewals compared with AMP4. The Company responded to this challenge by re-affirming its decision to use the results of the water infrastructure renewal modelling to define the length of mains to be renewed. I consider that the Company has taken a pragmatic view of mains renewal needs by accepting the results of the infrastructure renewals modelling without modification. It has made the point to me that it has no better basis for selecting a length of renewals. It does of course believe that the length from the modelling is of the right order of magnitude. It had hoped to undertake additional replacement and relining driven by iron pick-up but acknowledges that the case cannot be made on improved customer service.
**B3.5.4 Site visit verification**

I visited four of the Company’s eight treatment works sites (Bough Beech, Elmer, Kenley and Woodmansterne) where most of the expenditure is proposed in the AMP5 period. I was satisfied that all assets existed as per the Company’s asset register.

**B3.5.5 Willingness to pay linkage to proposed activity**

I confirm that there are clear links between Parts A, B1 and willingness to pay (WTP) information supporting the Company’s proposed activity to maintain stable serviceability. The Company is proposing a broadly business as usual approach, supported by its capital maintenance modelling, with no demonstrable need for enhanced expenditure.

**B3.5.6 Exceptional item outputs**

I confirm that the Company is not proposing any atypical capital maintenance expenditure although I believe that there may be a case for work at Woodmansterne TW to be considered an exceptional item outputs. The Company is proposing to construct additional filtration capacity to resolve the operational problems with the existing filters. At times of higher outputs, the existing filters cannot cope with the softening load and the softening has to be reduced or bypassed. Such reduction results in water leaving the Works not fully softened; this leaves the Company in breach of its statutory obligation to soften. I confirm that I scrutinised this issue at the time of PR04 and have no doubt that the works are needed to allow full operation of the softening facility.

**B3.5.7 Enhanced metering**

The total expenditure reported as base maintenance to maintain meters during AMP4 was £984k.

**B3.5.8 Water mains up to 320mm diameter**

I have reported on the bursts cohorts plots in Part C3. The analysis shows that the worst condition cohorts down to a cumulative length of 138km (similar to the length proposed in the AMP5 period) account for 276 bursts (i.e. very close to 10% of the total number of bursts in the analysis).

**B3.5.9 Plan lower than AMP4**

See B3.5.3 above.

**B3.5.10 Missing serviceability outputs**

I do not believe that there any missing serviceability outputs.
### B3.5 Table commentaries

**Table B 3.1**

<table>
<thead>
<tr>
<th>Line</th>
<th>Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line 1</td>
<td>DG2 - The Company has proposed a level of 40 and control limit of 18</td>
</tr>
<tr>
<td>Line 2</td>
<td>DG3 – the performance score of 4.2 for 2008/09 reflects two individual serious burst mains on the pumping main from Bough Beech</td>
</tr>
<tr>
<td>Lines 3</td>
<td>WTW coliforms – the Company has accepted Ofwat’s challenge in the draft CIS and is now using a reference level of 0.07% and control limit of 0.6%.</td>
</tr>
<tr>
<td>Line 4</td>
<td>Bacti samples from service reservoirs – the Company has included in its commentary, an AMP5 reference level of zero and control limit of 3.0; the Company points out that 3% represents a single reservoir</td>
</tr>
<tr>
<td>Line 6</td>
<td>The actual pesticide failures have all occurred at Bough Beech WTW (2008/09 is an actual figure).</td>
</tr>
<tr>
<td>Line 10</td>
<td>A 100% percentage compliance in year 2007/08 for lead was achieved from 160 samples taken. At PR04 the Company had targeted a 95.2% compliance figure by the end of AMP4, demonstrating that the orthophosphoric acid dosing has been very successful. The target of 98.13% for 2014/15 reflects the new lead standard being introduced.</td>
</tr>
<tr>
<td>Line 11</td>
<td>A small number of iron failures at the tap continue to occur and this is likely to continue for the foreseeable future because of the significant (60%) length of unlined iron mains in the network. I consider the 0.40% annual failure rate to be a suitable projection, but there could well be significant variations from one year to the next because of the probabilistic nature of the sampling. The 99.6% figure is now an actual for 2008/09. I consider the control limit of 0.40% appropriate.</td>
</tr>
<tr>
<td>Lines 12 and 13</td>
<td>The Company has entered reference levels of zero and control limits of 1 for both lines; this matches the Ofwat draft CIS challenge for line 12; I consider values are realistic</td>
</tr>
<tr>
<td>Lines 14 and 15</td>
<td>I consider the Company is optimistic in forecasting 100% compliance for billing contacts and written complaints. I believe a target of around 99.5% is more realistic as there is a level of human error in dealing with such customer contacts which will not be completely eliminated</td>
</tr>
<tr>
<td>Line 16</td>
<td>No change in target for number of metered customers receiving a bill based on a meter reading is forecast.</td>
</tr>
<tr>
<td>Lines 17 - 19</td>
<td>The Company is forecasting that 5% of calls will continue to be abandoned because of the Ofwat requirement to include calls</td>
</tr>
</tbody>
</table>
abandoned to their Automated Payment Service.

The change management approach implemented by the Company in the last year should assist in a reduction in abandoned and ‘all lines busy’ calls to the fixed lines.

Line 20 The projections for bursts are consistent with the Company’s adopted level of service for the common framework model of 334 bursts per year; the control limit of 123 appears rather high based on experience in recent years (including a prolonged cold spell in winter 2008/09)

Line 21 The number of properties affected by unplanned interruptions of more than 12 hours varies widely from year to year. The Company has altered the entries in this line since the DBP following the challenge by Ofwat as explained in its commentary. The Company had one exceptional incident in the last year resulting in more than 4000 properties being affected for more than 12 hours which confirmed the wide variation that can be encountered in this parameter. Even the Company’s proposed control limit of 150 does not address the potential wide variation

Lines 22 and 23 It should be noted that the entry for 2007/08 was extrapolated from data over a 6 month period from Oct 07 to March 08 following installation of the CMMS. The reference level and control limit have been assessed from this first year’s experience of data compiled in the new CMMS.

I have no reason to expect the Company not to achieve its reference levels in 2008/09 and 2009/10 except where referred to in the table commentary above.

The entries in Blocks A and C are consistent with the entries in Table A2.

Table B3.3
outturn expenditure for the Final Determination. The Company provided me with its back-up spreadsheet compiling all figures for this line; I also reviewed supporting data and documentation. The following elements have been included:

a) Power price rises – the Company has contracts in place for power consumption to March 2010. 2009/10 forecast is therefore based on actual contract rates and predicted volume of water supplied (distribution input). For future years, the Company has used the ‘high’ Bergin report electricity costs (and assumed the same percentage increase for gas).

b) Power (Bough Beech UV treatment) – step-change increase of £50k in 2009/10 due to installation of UV treatment at Bough Beech TW.

c) EA Abstraction charges – increase of 10% p.a. compound as stated in letter from EA (Company has used 7.5% real increase in opex calculations).

d) Traffic management – Company has allowed for step change in inspection costs as actual national rate has risen for local authority inspectors from £26/h to £50/h (step change annual cost of increase of £33k in 2009/10); step change of £10k in 2009/10 for Section 74 overruns; estimated step change of £204k due to major change in New Roads % Street Works Act in 2010/11.

e) Business rates – Company has made some assumptions on transitional relief with advice from consultants. I understand that Ofwat will know reliable figures in time for the Final Determination.

f) Regulation – Company has included f o recast outturn increase for 2008/09 for FBP and WRMP, reductions in next four years and increases for future FBPs every 5 years (Company best estimates appear reasonable).

g) Executive Directors – Company has had lower costs in 2007/08 with Finance Director on long-term sick leave. Also overlap of MD designate with current MD. 370k increase in 2009/10 dropping to £177k increase 2010/11 continuing with no further increase.

h) Softening – Forecast increase in softening costs £143k in 2008/09 rising to £282k in 2009/10 due to rising consumable costs (and Cheam TW being put back to full capacity following capital maintenance works in the AMP4 period).

i) Chemicals – Company has calculated a general chemicals cost/Ml for 2009/10 budget including known value for hydrochloric acid; also step change of 210% increase in phosphoric acid unit rate from actual new tender for 2008/09. Item also includes step change increase in costs for carbon regeneration of £77k in 2009/10 using rate of £270/m3 (since preparing FBP, actual carbon cost rate from submitted tender was £312k). Future years Company has used Bergin electricity percentage increase as surrogate for general chemicals.

j) Pay increases – Real pay increase of 0.5% p.a. assumed.

k) Softening Pellet disposal – increased pellet disposal costs £31k 2008/09 rising to £58k 2009/10.

l) Supply Dept services – increase of £85k in 2009/10 budget.

m) Supply Dept consultancy – increase of £34k in 2009/10 budget.


p) Works Dept costs – 94k increase in 2008/09 rising to 160k in 2009/10
q) One-off burst repairs – major bursts from Bough Beech main; one off increase 2008/09 £269k; reduction £269k 2009/10
r) Quality analysis – additional cost of £46k in 2008/09 due to changes in monitoring at various sites falling to £29k in future years; future annual cost therefore assumed to be £17k less than 2008/09
s) Insurance – forecast £37k reduction in 2009/10 rising to 38k increase in 2014/15 based on broker advice on premiums; reduction due to agreeing broker to be paid fee rather than commission; net effect appears neutral
t) Security – increased security £17k 2009/10 rising to £77k 2010/11 and beyond due to SEMD security issues; latter figure based on estimated testing costs for service reservoir vibration alarms; costs should have been included in Part B4?
u) Competition – assumed additional staff for accounts separation £43k 2009/10 then £187k from 2010/11 for new retail company (assumed retail manager + accountant) includes 25k annual software costs for three years to set up systems so increase falls to £162k in 2013/14
v) Bough Beech – increased chemicals usage due to revamping of TW (excluding output increases which are under supply/demand): increase £62k in 2012/13 rising to £123k in future years
w) Discharge consent – step change increase of £30k from 2009/10 due to new discharge to sewer from Cheam TW
x) Sludge removal – based on tax increase of 8% p.a. from 2009/10 and following two years; no further increase assumed beyond
y) Works costs – based on assumed step change contractor and material increases of £30k in 2009/10
z) Bad debts – analysis of write-offs over last 5 years and assumptions about increases during recession. In FBP for 2008/09, bad debt forecast to be 0.56% of turnover (average 2004-2008 0.6%). Company assumption 2009/10 and beyond 0.92%. Expenditure increase assumes: step change of bad debt increase £48k in 09/10 + growing staff numbers on debt liaison and collection (total additional cost 2009/10 £69; 14/15 £289k).
aa) Council commission – the Company has assumed that commission paid may increase in the future; current average commission is 7.15% of revenue collected; assumption that it will rise linearly to 11.99% in 2014/15
bb) SAE claim – flooding of properties from two major burst mains, insurance claim excess: £218k increase 2009/10 and corresponding reduction 2010/11
c) Miscellaneous issues – 2009/10 budget shows increase of £125k above 2008/09 expenditure
d) Rechargeable works credits – estimate on basis of current development work: £414k reduction in budget for 2009/10; assumed reduction falls to £103k 2011/12 and beyond
e) Social club
Table B3.5

From my review, I confirm that all forecast expenditure in the table relates to base service only.

<table>
<thead>
<tr>
<th>Item</th>
<th>Total (£k)</th>
</tr>
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<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Block E: Infrastructure renewals charge - I consider the Company’s approach, using a 15-year period, to be reasonable and consistent with the method of calculation used in the regulatory accounts as reported in JR08.

Table B3.6

Line 1 No expenditure is planned on maintenance of raw water aqueducts, dams and reservoirs in the foreseeable future

Line 2 The items included in this line for AMP 5 are made up as follows:
- District metering:
- Domestic meter replacements:
- PRV’s:

Line 3 The figures included in this line can be broken down into the expenditure at each Water Treatment Works. The most significant expenditure is at Bough Beech

Line 4 Investment in water pumping stations is programmed to increase significantly over the last three years of AMP 5. This is partly due to the fact that non-infrastructure expenditure on Bough Beech is concentrated in the first two years and there is an obvious desire to
spread spending on other assets to the other three years

Lines 5 and 6
No exceptional items of expenditure are planned on service reservoirs (Line 5) or Management and General (Line 6) in the AMP 5 period

B3.6 Specific company challenges and responses

Infrastructure

I challenged the Company on:

- use of the relatively short period of data for its actual mainlaying costs used in the modelling and was informed that the period was selected to coincide with the period since polyethylene has been the Company’s preferred material for pipes of up to and including 200mm diameter
- the current proportions of mains laid by directional drilling and was informed that recent work in semi-rural areas had been running as high as 30%. The Company however expects lower proportions in more urban areas where there are a greater number of obstructions, particularly other services
- provision of data used in the modelling including: leakage results at DMA level; customer numbers linked to each main; climate change trend lines; details of the Bough Beech duplicate main cost benefit calculations; water quality complaints spreadsheet; most of the data was provided and further review will be carried out prior to preparation of the final business plan.

Non-infrastructure

I challenged the Company on the following:

- to illustrate how it had combined the elements from the FMECA modelling and from the consultants’ report on the planned uprating works at Bough Beech. It responded that it had been through the outputs line by line to ensure no overlap. I confirm that I have reviewed the spreadsheet and agree that there is no overlap or duplication
- had model outputs been reality checked against Atkins site condition survey data?
- does the Company propose to validate intervention costs used in modelling with any actual scheme costs?
- request for details of failure records from existing Company systems – I was provided with a spreadsheet listing 60 failure records in the form of number of work orders per annum at Company works. With a single exception, the range of work orders was from less than 1 to 26 per annum for the 60 defined failure modes. Examples were:
’failure of pump, motor and controls at one treatment works 1.9 p.a.’; ‘failure of sand conveyor 5 p.a.’ I confirmed that these figures had been used to inform the workshops assigning failure rates to assets

- details of age of each asset on which works are proposed in the AMP5 period – a spreadsheet of the information was provided. I noted that there was some variability in the ages of similar assets proposed for intervention

- details of modelling results. I was provided with copies of the outputs noting 206 schemes in AMP5; size from £1k to £1.8M; 8 of 12 largest schemes are at Bough Beech; 146 schemes have value less than £50k; 20 between £50k and £100k; Bough Beech includes on access road; 7 schemes on diesel generators.
B4  Quality Enhancements

B4.1  Introduction

The main section headings of this commentary correspond to the headings used by the Company in its Business Plan.

The Company has described proposals under the following water quality drivers:

- The Statement of Obligations published by the Secretary of State
- Deteriorating raw water quality
- Distribution system renovation
- Lead communication pipe rehabilitation.

It has further listed three ‘other drivers’ not directly relating to drinking water quality but included under the Quality programme:

- The environmental impact of water abstractions
- The Security and Emergency Measures Direction
- Water UK’s Standard for Security Arrangements for Operational Assets (SSAOA).

The Company has excluded one driver, flood resilience, which had previously been included in the DBP (flood resilience proposals have now been included in Part B6).

The Company has provided updated information since the DBP with letters of support from the Drinking Water Inspectorate (DWI). It has also added work to meet the security requirements of Advice Note 7.

B4.2  The quality enhancement programme – drivers, outputs and activity

B4.2.1  Summary of the proposed programme

The proposed outputs described by the Company include Quality outputs (correctly included in Part B4 tables) and other water quality related projects which do not actually have any expenditure under Part B4 (but are included elsewhere in the FBP). A summary of the position is as follows:

- Upgrade of GAC contactor capacity at Bough Beech TW – I agree that this will enhance capability in removing pesticides (excluding metaldehyde); this is included as part of the upgrading of Bough Beech TW under supply/demand and capital maintenance (and does not form part of the Part B4 tables)
• Metaldehyde – catchment management proposals to reduce risk of metaldehyde; B4 opex costs only
• Internal corrosion of unlined iron pipes – excluded from the FBP (had been in the DBP Part B6)
• Increasing levels of security – works under Part B4 in response to Defra security advice notes
• National Environment Programme – two environmental studies required by the Environment Agency (EA) – expenditure allocated to Part B4 opex only.

B4.2.2 Water quality drivers

Details of the four water quality drivers listed above are described in the following sections.

B4.2.3 Statement of obligations

The Company has referred to the Water Supply (Water Quality) Regulations 2000 (Amendment) Regulations 2007 and the following three particular drivers:

• The introduction of a risk based approach to the management of drinking water quality using Water Safety Plan methodology
• A requirement to carry out associated regulatory raw water monitoring at the point of abstraction
• The development of alternative strategies in order to comply with the future new standard for lead.

As with the DBP, the Company has listed no specific new obligation outputs related to Water Safety Plans (WSP) or regulatory monitoring at abstraction points. For the FBP, the Company has pointed out that its planned measures for mitigating the occurrence of metaldehyde at its Bough Beech source were assessed using the WSP methodology. It has again included development of its lead strategy, to take account of the new 10ug/l standard, under a Lead communication pipe rehabilitation programme; since the DBP, the Company has received DWI support for the programme.

It has also stated that the raw water monitoring has resulted in a small increase in operational costs. I note that these costs have been included as special operating expenditure in Part B3.

B4.2.4 Deteriorating water quality

The Company has referred to the following instances of deteriorating raw water quality which impact on its AMP5 business plan:

• The pesticide Metaldehyde at Bough Beech impounding reservoir/treatment works; in the DBP, the Company anticipated this being dealt with as an authorised departure and subsequently
submitted an application to the DWI. The DWI responded by letter of 24 March 2009 (the letter is included as supporting information in the Company’s FBP) agreeing to the Company’s catchment management proposals but stating that they should be re-submitted as an Undertaking rather than an authorised departure; formal agreement of the metaldehyde programme was included in the DWI’s letter of 31 December 2009 (see Appendix B4B to the Company’s commentary).

- Concern over contamination of borehole sites at The Clears, Buckland and Cliftons Lane; no work is planned during the AMP5 period but the catchment for these sources is covered by a study required by the Environment Agency as part of the National Environmental Programme (see below).

The Company has also made reference to identification of two pesticides (propyzamide and mecoprop) in samples taken in 2007 from Bough Beech reservoir. The Company states that its upgrading at Bough Beech TW includes enhanced GAC filtration capacity but it has not sought to include this as Quality expenditure. I have not made reference to other water quality issues described by the Company but for which no AMP5 outputs are proposed or required.

### B4.2.5 Distribution system renovation

The Company has referred to its historic programme for renovation to unlined iron mains where high iron levels occur. This work was originally covered by Section 19 Undertakings and then during AMP4 as a capital maintenance activity. For AMP5, an assessment was undertaken as part of the infrastructure capital maintenance study and expenditure again planned in the DBP as capital maintenance. In the FBP, this has been excluded as justification has not been made.

### B4.2.6 Lead communication pipe rehabilitation

The Company has referred to the new lead standard of 10ug/l, which will come into effect on 25 December 2013, and pointed out that its current orthophosphoric acid dosing results in few failures of this standard. Its programme is for continuation of its current policies, unchanged from the DBP, as follows:

- replacing connected lead communication pipes when renewing the adjacent water mains (as it does with old communication pipes of other materials) under its capital maintenance programme
- replacing lead communication pipes at properties where routine tap samples have failed the 10ug/l lead standard; the Company has allocated these replacements as Quality expenditure in the AMP4 period and previously although there was not explicit support. The number of lead communication pipes replaced during the first three years of the AMP4 period under this policy was 19. This number related to the current 25ug/l standard; in response to my challenge
for the DBP, the Company confirmed that it estimated an annual number of 35 on the 10ug/l standard

- actively encourage more customers to take up its free lead pipe replacement offer where the customer is replacing his/her supply pipe. For the DBP, I challenged the Company on how this would be achieved and the impact and was informed it would publicise the free-lead pipe facility through plumbers/builders and via company newsletters. It confirmed that it had estimated an additional 100 communication pipes per annum would be laid; this has been included in the Quality programme

- replace all lead communication pipes at schools (and other premises associated with more vulnerable groups) and work with schools to encourage replacement of all lead pipework within each premises

- target advice to stakeholders and plumbers to raise awareness of the risks of lead.

I confirm that, since the DBP, the Company has received a letter of support from the DWI for the proposed programme of work (the letter dated 12 February 2009 is included as Appendix B4A of the Company’s commentary).

B4.2.7 Environmental impact of water abstractions

The Company has listed two schemes classified as ‘certain’ in the final National Environment Programme (NEP) as issued to the Company by the Environment Agency (EA) with the letter of 28 November 2008 as follows:

- Reigate Heath, investigation into whether the Company’s abstractions at Buckland, The Clears and Clifton Lane are having a significant impact on groundwater levels in the vicinity and consequently are detrimentally affecting the wet features of the adjacent Reigate Heath Site of Special Scientific Interest (SSSI)

- River Wandle – investigation into whether the Company’s abstractions are identified as potentially contributing to the ecological potential of the River Wandle.

I note that the EA’s letter states that Ministers will approve final River Basin Management Plans in December 2009 and that the Final Programme of Measures may change. The EA also states that companies should only include schemes identified as certain in the NEP but that other schemes could be added subsequently.

For the DBP, I reviewed the EA’s letter of 10 June 2008 and noted that it included a draft scope for the Reigate Heath study but that the EA had not concluded detailed requirements for the other scheme. Since the DBP, the Company has received the following investigation stage plans from the Environment Agency (EA) from which the Company has had proposals produced by consultants for undertaking the studies:
The Company has obtained priced proposals from consultants for the two schemes. I challenged the Company as to whether it proposed to challenge the EA on the need and scope for the investigations. It stated that it believed it was the responsibility of the regulators to agree on the scope for Government required schemes.

**B4.2.8 Security and Emergency Measures Direction**

- Restoring Sustainable Abstraction Investigation Stage Plan – Thames River Basin District - Reigate Heath and Reigate Lower Greensand (GB40601G602000)
B4.2.9 Water UK’s Standard for Security Arrangements for Operational Assets (SSAOA)
**B4.3 The expenditure implications of the quality enhancement programme**

**B4.3.1 Introduction**

The Company’s expenditure summary is reproduced below. Lines 1, 3, 4 and 5 are identical to the DBP. Line 2 is a more recent advice note; the final two lines are additions following receipt of the EA’s scope of works for the National Environment Programme:

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Cost (£k)</th>
<th>Anticipated start date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead strategy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advice Note AN/07 – Storage of toxic gases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advice Note AN/10 – Security of AMC</td>
<td></td>
<td></td>
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<tr>
<td>Advice Note AN/12 – Protection of Boreholes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water UK Standard for Security Arrangements for Operational Assets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEP</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>Metaldehyde</td>
<td>Ongoing*</td>
<td></td>
</tr>
</tbody>
</table>

* Stated as ongoing by the Company but implementation of the catchment monitoring plan will commence in 2010.

**B4.3.2 Lead strategy**

The Company has allowed for replacing the following lead communication pipes:

- 275 lead communication pipe replacements supplying schools
- 175 lead communication pipe replacements where routine sampling failures occur and 500 pipes in response to publicising the free lead pipe replacement programme when customers replace their supply pipes.

The Company has also proposed operational expenditure of **£50,000** for an enhanced education programme for vulnerable groups. I challenged the Company on this expenditure and was informed that it covered: notifying vulnerable customers about general and specific risks posed by lead pipes; includes leaflets, presentations, and other engagement with the relevant health / welfare professionals; advice to maintenance staff where appropriate including the use of leaded solder on new pipework.
B4.3.3  Advice note AN/07

B4.3.4  Advice note AN/10

B4.3.5  Advice note AN/12

B4.3.6  Water UK Standard for Security Arrangements for Operational Assets
B4.3.7 National Environment Programme

I confirm that I viewed the preliminary scheme costs submitted by consultants and noted that a number of assumptions are made which will require confirmation before the studies are implemented.

B4.3.8 Metaldehyde

I challenged the Company on the operational expenditure estimate of £264k for the AMP5 period and was provided with a breakdown from a comprehensive submission to the DWI; I considered the level of detail appropriate.

B4.4 Shortfalls and logging up/logging down

The Company has made no claim for logging up and does not expect any logging down.

B4.5 Table commentaries

Table B4.1

Line 10 – the number of lead communication pipes comprises: 55 p.a. from schools; 35 from properties where lead sample failures occur and an assumed number of 100 per annum from increased demand from customers replacing their supply pipes in response to enhanced publicity.

Table B4.3
B4.6 Summary conclusions in relation to Ofwat guidance

From my scrutiny of Company documents, I confirm my view that the Company

- The Company has endeavoured to provide a consistent interpretation of legal obligations and relevant guidance given by the Secretary of State. The scope of studies required by the EA for the National Environment Programme have not been challenged by the Company.

- In relation to security, I consider that the Company has reviewed options and considered efficient and cost effective solutions on the basis of whole-life cost.

- I do not believe that the Company has taken a lower risk approach for Quality schemes to that applied elsewhere.

- I confirm that appropriate cost benefit analyses have been undertaken as reported in Part C8.

- Other than the lead pipe replacement project and security works for Advice Note 07, the various costs have been estimated by consultants; I consider that those costs and the costs estimated by the Company are reasonable. The derivation of costs for Quality schemes have been undertaken from supplier quotes, company estimates and consultants estimates. I agree that the approach is broadly consistent with the Company’s cost base methodology; the lead pipe replacement scheme is based directly on Company cost data.

- I would suggest that the capital cost estimates are within ±25%. A similar figure for the other schemes. I do not believe the costs are biased. Unit costs for the lead pipe replacement scheme are from a current contract. All other costs are in my view pragmatic: many have included quotes from material suppliers plus consultant generic estimates for various activities (e.g. concrete construction rates).

- The Company has proposed no proportional allocation of expenditure. I consider this is appropriate for most of the expenditure but needs review for security works at Bough Beech where a major supply demand and capital maintenance project is proposed.

- Expenditure under the Quality programme has been justified and I do not consider that the Company has been too risk averse; each
scheme has been described fully and I am satisfied that it would not have been undertaken under a ‘business as usual’ approach.

With regard to Ofwat generic guidance on the lead pipe replacement programme, I confirm the following:

- the Company has not included any expenditure for replacing customer supply pipes and that no work is planned on the customer side of the boundary box
- the Company has defined vulnerable groups in the context of its lead pipe replacement programme as school children
- no expenditure has been included for promoting replacement of lead pipes with consumers as the Company does not believe the costs will be material
- unit costs are derived from actual AMP4 costs and are in my view robust.

I confirm that the information in the Tables reconciles with that included in the C5-W database.
B5  Maintaining the Supply Demand Balance

B5.1  Introduction

B5.1.1  Objective

The Company sets out its intentions for Chapter B5 in line with Ofwat’s guidance.

B5.1.2  Link to the Company's WRMP

The Company submitted their Final Draft WRMP to Defra in February 2009 with their Statement of Response.

I have identified small differences between the supply/demand plots in the FBP and those in the Final Draft WRMP. I have queried this with the Company and have been informed that this is due to minor corrections to target headroom and the inclusion of actual numbers of new meters and amended forecasts of meters in 2009/10. I confirm that these changes have no impact on the final planning solution.

I understand that the Company plans to submit WRMP tables fully consistent with the FBP once the Company is directed by Defra to finalise their WRMP.

B5.1.3  Water Resource Management Plan

The Company submitted their Draft WRMP to Defra in March 2008 which was followed by a period of consultation.

The DWRMP included a number of revised key components including revisions of the Outage and Headroom assessments and the yield of Bough Beech Reservoir as well as an updated ELL assessment. I commented to the Company on a number of aspects of these inputs. However no changes were made to these inputs in the draft BP as the Company wished to consider all the feedback from the consultation process first, which actually ended on 12th August.

The Company responded to the consultation process with a Statement of Response accompanied by a Final Draft WRMP, as noted above.

The principal changes from the Draft WRMP/DBP relate to Level of Service (customers were not prepared to pay more for a 1 in 40 year standard for non-essential use bans) and a revised metering programme (with no compulsory metering).
B5.2 Overview of the Company’s water resources strategy

B5.2.1 Summary

The Company submitted their Draft WRMP to Defra in March 2008 which was followed by a period of consultation.

The Company’s position is that they have, currently, a deficit in both resource zones in the critical period (peak week) but no shortage at annual average demand. It should be noted here that the plan does not make good that shortfall until 2013/14 but the Company is clear that there is no quick fix.

The PR04 WRMP showed a surplus in the East Surrey zone which was shared with the Sutton zone which had a deficit. Since then the EA has permitted the Smitham groundwater licence to be moved from the Kenley group in the East Surrey zone to the Woodmansterne Group in the Sutton zone. This has the effect that the East Surrey zone would now experience a deficit even without an explicit transfer to Sutton. The licence variation has additional benefits in overall abstractable amounts.

When seeking a solution to the supply/demand deficit in the DWRMP/DBP, the Company considered only resources schemes and proposed to develop additional peak treatment capacity at Bough Beech Reservoir as their only definitive resources scheme. The Company also made no explicit allowance for water efficiency savings and included water metering at a greater rate than in the previous quinquennium without identifying the necessary works as an independent supply/demand project.

In the FBP, the Company presents a twin track approach which resolves the problems identified with the DBP. The Company makes allowance for meeting Ofwat’s water efficiency target and proposes water efficiency schemes, an ambitious long term leakage reduction programme and a manageable ongoing programme for water metering in addition to the Bough Beech scheme.

B5.2.2 AMP5 Period

During AMP5, the Company proposes to increase Bough Beech works capacity to 70ML/day, maintain their current level of leakage, maintain their current metering policy (new properties, optants, plus change of occupancy in selected areas) and achieve water efficiency in excess of Ofwat’s target. Their critical period SOSI will reach 100 on completion of Bough Beech in 2013.

B5.2.3 Beyond 2015

The Company aims to reduce leakage further in the long term alongside a continuing metering program with a target of 90% penetration by 2025 and continuing demand management activity.
B5.2.4 Supply/Demand Balance

The Company shows their planned overall position graphically demonstrating the continuing surplus at average demand and their current shortfall in headroom which is resolved by 2013. It may be noted here that the effect of the non-essential use restrictions put in place in the 2004/2006 drought period demonstrated that the Company can achieve substantial reductions in demand when necessary mitigating the apparent risk presented by the current shortfall.

B5.2.5 Demand Management

Leakage

The Company sets out their approach to leakage control. They have reassessed their Economic Level of Leakage following Ofwat’s Sustainable ELL guidance and continue to operate below the assessed SELL.

The Company plans a long term reduction in leakage from approximately 15% of distribution input in 2015, as at present, down to 12.5% by 2035. They recognise that this is an ambitious target which will require significant investment and may be difficult to justify on cost benefit terms alone.

Metering

The proposed rate of meter installation has been reduced from that put forward in the DBP in response, in part, to concerns over the impact on customers' bills. The current metering strategy of 32,000 meters in 2010 to 2015 is believed to be deliverable with the current policy of optants plus change of occupancy metering. I understand that the current downturn in property sales has had an impact on metering rates due to change of occupancy but the Company has significant flexibility in their approach – only about 50% of potential meter optants currently are currently found to be suitable for meter installation and the change of occupancy scheme has only been applied in selected areas to date.

Costs quoted for meter installation are based presently on the average cost of actual meter installations in the area in question.

The Company has referred to using encoded meters, where readings can be taken electronically by contact with a disc attached to the meter, and radio meters in certain circumstances. Ofwat queried the economics of using these more expensive meters but the Company did not, to my knowledge, provide a direct response. The Company’s figures show that installation costs are higher in the urban areas of Sutton and Croydon where more of the encoded meters are said to be used. I asked the Company for more information on the meter costs to see how much the type of meter influenced these. I found that only about half the extra cost was due to the type of meter – the rest was due to meters being predominantly in paved surfaces and to the extra costs incurred where internal meters were unavoidable.

Levels of service for meter reading mean that internal meters must be installed with remote reading devices accessible when no one is available to allow meter
readers access. This means that encoded meters with remote read discs must be used at minimum. The Company has explained that radio meters allow cheaper overall installation costs in these particular circumstances.

I challenged the Company on the benefits of the encoded meters. They confirmed that they have not undertaken a fully quantified economic justification but suggested a 20% time saving per meter in a dense urban area. I can see particular benefits in accuracy and speed and, particularly in areas where meters are installed in rows outside blocks of flats, correct allocation of meter to customer as the meter ID is returned along with the reading.

**Water Efficiency**

The Company has carried out a comprehensive study of water efficiency options. The schools retrofit scheme has been identified as an economically viable option to be pursued and fits well with the Company’s long term emphasis on education as an effective way of getting the water efficiency message across.

**Price Signals**

The Company had hoped to be able to meter a selected area so as to be able to carry out tariff trials. In the short term, however, this cannot be done effectively without universal compulsory metering. They still intend to carry trials once meter penetration in an appropriate area reaches 70% or, perhaps, where a new estate is 100% metered.

**New Developments**

All new properties will continue to be metered. Properties built in accordance with the Code for Sustainable Homes might be an appropriate target for some form of rising block tariff as they should be well placed to meet demand targets.

**B5.2.6 Resource Development**

The Company has a deficit at peak but not at average. It is therefore sensible for them to investigate means of increasing output from existing sources. Groundwater source development has a significant degree of uncertainty in that it is not usually possible to predict accurately the output of a new or modified source.

The required increased peak available abstraction can be achieved from the existing Bough Beech reservoir just by upgrading the associated infrastructure and with no additional impacts on river flows. The Company needs to upgrade the treatment works in any case so the costs are shared between capital maintenance and supply demand drivers. The EA has already licensed this abstraction subject to works being completed so as to be able to treat 50MI/day by 2015.

The supply demand assessments show that it is likely that the Company will need to be looking for further resources beyond the planning period. They
identify the proposed Upper Thames Reservoir as a preferred source at this timescale and would like to have part ownership if possible.

B5.2.7 Supporting information

The Company refers to supporting information on the economics of leakage control and metering in Section C4 of this FBP. It appears to me that the economics of metering is actually addressed in detail in Section C8.

B5.2.8 Expenditure projections

I confirm that the Company has included costs for the Bough Beech uprating from 45 Ml/d to 70 Ml/d, which is split between uprating the treatment works and distribution system works, and costs for the metering programme.

B5.2.9 Water Resources in the South East

I confirm that the Company is an active member of the WRSE group. This has been a useful forum for observing how the Company’s position fits with their neighbours. The WRSE modelling supports Bough Beech and demonstrates how a future Upper Thames Reservoir could be used. I note that the company has initiated discussions regarding UTR.

B5.2.10 Shared Resources in the South East

I note the Company’s view that more reservoir storage should be developed in the South East as a strategic reserve. They are concerned that there is a danger on relying too much on the uncertain savings from demand management, in particular metering and water efficiency, in preference to what the Company sees as low risk proposals such as reservoirs. I support their view in principle but note that environmental issues are making promotion of new resource developments more difficult.

B5.3 Changes made since submission of the DBP

The Company has received feedback from various sources which are collected in the Supporting Information to their Statement of Response of February 2009.

The Company has tabulated the main changes since submission of the DBP. These relate to metering numbers, assumed savings resulting from metering, population growth, leakage strategy, target headroom, levels of service, sensitivity analysis, cost benefit analysis and customers’ willingness to pay for service improvements.

The combined effect of the changes to the DPP is small. Bough Beech is still required at the earliest possible date.

B5.4 Ofwat’s comments on the DBP

The Company’s commentary deals at length with the comments made by Ofwat and reports numerous adjustments made to bring the Company’s assessment
in line with Ofwat’s requirements. In particular the Company has looked further at programming options for Bough Beech and have carried out Net Present Value assessments of alternative supply/demand strategies which provide support for their preferred strategy.

**B5.5 Water resource strategy**

**B5.5.1 General**

The Company sets out the detail behind the development of their water resources strategy. I have noted above that there are differences in detail between the FBP and the Draft Final WRMP. The Company will issue a Final WRMP when directed by Defra. There is no guarantee that this will be fully compliant with the FBP as it depends on the direction given.

**B5.5.2 Water available for use**

*Deployable Output*  
The Company has a continuous programme of upgrading of Deployable Output assessments and improvement of infrastructure for its groundwater resource assets.

This continuing process, alongside the reassessment of outage and headroom requirements, makes tracking the Company’s resource position across several years complex.

I have compared the Company’s intentions as set out in 2004 with their current DO (at March 2009) as set out below. This assessment suggests that, overall, the Company is currently a little short of the overall peak target DO but this will be dealt with by the Bough Beech upgrading by March 2010.

The current DWRMP includes an increase in the peak DO at Bough Beech from 36 to 45Ml/day in 2009/10 which has been referred to as Bough Beech Phase 1. This is an AMP4 scheme but was developed since 2004 WRP. The changes in the East Surrey surface water DO shown below relate to reassessment of the yield only.

<table>
<thead>
<tr>
<th>Average DO Ml/d</th>
<th>Peak DO Ml/d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average DO Ml/d</td>
</tr>
<tr>
<td>Sutton WRZ Total</td>
<td>70.42   76.12</td>
</tr>
<tr>
<td>East Surrey WRZ Groundwater</td>
<td>102.81 109.01</td>
</tr>
<tr>
<td>East Surrey WRZ Surface Water</td>
<td>27.40 29.90</td>
</tr>
<tr>
<td>Company Total</td>
<td>200.63 215.03</td>
</tr>
</tbody>
</table>
**Sustainability Reductions**

I note that no allowances are required for sustainability but that the EA has indicated that two schemes under the National Environment Programme (NEP) fall within the Company’s area. The Company has allowed for costs connected with these schemes. Sensitivity analysis has considered the impact of 5% reductions in output from potentially affected sources as agreed with the EA.

**Raw Water and Treatment Works Losses**

I note that the Company has instigated studies into losses. I have previously identified inconsistencies between losses quoted in different contexts and consider that the true raw water losses may be more than reported as they suggest.

**Bulk Supplies**

I note the changes to the reporting of transfers within the Company. These have no effect on the overall water balance. I agree that the Thames Water bulk supply should not be included in the supply/demand balance as it is not available in a drought – it has been used to assist in drought recovery however.

**Outage**

When reporting on the DWRMP, I reviewed the outage calculations and noted that the assessment had been compiled from the experience of operational staff who were interviewed by consultants for the Company. I concluded that the process appeared to have considered the risks at every source although the value arrived at from this process appeared on the low side compared with the size of a typical source.

I note that the Company has now reviewed the outage assessment with the interviews being repeated. They note that the figures have gone up a little but are still low in comparison with other companies. They believe the figures to be reasonably robust, however, and see no need to change them further. I consider their approach to be reasonable.

**B5.2.3 Demand forecast**

**Property numbers**

The Experian forecast of property numbers is central to the forecast and has been updated to take account of the current status of the London and South East plans. This update has resulted in significant increases in the numbers of properties predicted. The Company has based their forecasts on Experian’s present “most likely” projection, rebased to conform to the JR2008 figures for population and property numbers.

The Company initially treated Experian’s alternative ‘policy-driven’ and ‘trend based’ lines as upper and lower bounds for the target headroom assessment. This was considered to have an excessive effect on the headroom calculation and the FBP headroom assessment assumes a plus or minus 10% error in the population growth by the end of the planning period. I queried the precise interpretation of the error band application (linear change in error size or linear change in error percentage) and accept that this makes little difference to the conclusions.
The Company has carried out sensitivity tests to see what effect current economic conditions might have on their plans and has concluded that any effect would be small. This seems most reasonable as the Company has a deficit already anyway.

Non-household properties
The Company assumes these will remain constant over the planning horizon. I consider that this is reasonable in the short term but that new development will be likely to have a proportion of non-households, perhaps at the same rate as existing development. The June Return figures show a reasonably small but steady number of new metered non-household properties as well as a number of existing properties converting to metered status. I consider that the forecasts could reasonably show some increase in total numbers and a continuing decline in the number remaining un-metered but note that it would not be material to the demand line.

Occupancy
The Company makes assumptions about occupancy rates when assessing the effects of meter optancy. It is a reasonable assumption that in the earlier stages of the meter optancy programme the typical occupancy for optant properties would be lower than average. The Company assumes, reasonably, that this rate will increase as meter penetration rises converging on the average at the planning horizon.

Normalisation of base year data
The Company considers that the demand in 2007/08 was below average due partly to weather and partly being drought related (most SE companies experienced the same low demand and agree on the reasons). I agree that it is reasonable to suggest that some residual effects from the drought period remained. The Company has therefore replaced the 2007/08 demand with the average demand, after correction for leakage variations and population growth, in non-drought years since 1995. I consider this approach to be reasonable.

Household demand
Household demand is based on micro-component analysis.

New properties have been assumed to meet Government pcc targets by 2020 with social housing being built to higher standards than average. This is a change from the DBP.

Non-household demand
Non-household demand is held at current levels for the plan period. This is a reasonable approach in my view.

Other components of the supply-demand balance
The Company has two small treated water bulk exports to adjacent water companies which are actually supplies to small areas of housing. No changes are planned.

I note above that the Company is continuing to improve its estimates of treatment works and other losses. The 1.0ML/day at average and 1.2ML/day at
peak are significantly less than the allowances in the DBP and are not now of great significance to the water balance.

Compensation water requirements at Carshalton, Ewell and Fetcham are not expected to change.

Other minor components, including water taken unbilled and operational use, are expected to remain constant.

**B5.5.4 Demand management**

The Company puts significant effort into leakage management and has increased its domestic meter installation rate by adding metering on change of occupancy to its meter optant programme. Their SELL assessment is considered further in section C4 along with aspects of the metering programme.

The supply/demand baseline assessment is now consistent with the guidance and includes only meter optancy and current assumptions about leakage etc.

I note that the Company has now identified possible water efficiency projects and acknowledged the Ofwat base target.

**B5.5.5 Dry year and critical period demand**

The Company’s systems are driven by peak demand in hot dry summers. Their only surface water resource is Bough Beech Reservoir and the planned and proposed enhancements to the treatment works and infrastructure are directed towards increased dependence on using it to meet peak demands rather than as a continuous supply.

The Company’s dry year factor has been derived from recent annual average demand data. They distinguish between the Sutton and East Surrey zones, which is reasonable.

The Company has based its peaking factors on maxima since 1992, rather than the Peak Demand Forecasting Methodology. These were recorded in 1995/96 which was a period of high demand in the South East when demand restrictions were avoided. The next highest peaking factors were recorded in the preceding year.

I have reviewed the peaking factor assessment and consider that the pragmatic selection of the 1995/96 factor is reasonable and consistent with the Company’s level of service for hosepipe bans of 1 in 10 years. Although it is the highest in 16 years, three of those years had either sprinkler/hosepipe bans and/or non-essential use bans in place and would have been likely to have even higher peaking factors than 1995/96 if that had not been the case.
B5.5.6 Demand Growth

Demand growth has been reassessed taking account of the revised population growth projections and the revised final planning solution including updated assumptions about the demand from new properties.

B5.5.7 Sensitivity analysis

A range of possible changes in the Company’s assumptions has been tested to see what effect they would have on the Company’s plans. Most of the changes considered affected demand by less than 5%. Only depending on meter optants alone had an effect in excess of 5%. This seems to confirm the need for a proactive metering programme, though the savings obtained through metering can only be assumptions.

B5.5.8 Climate change

The possible effects of climate change on yield and demand have been incorporated in the Company’s headroom assessment and not in the base DO and demand figures. The possible yield impacts have been assessed as part of the Company’s yield reassessment programme. I note that the assessments will be updated when the UKCIP 2009 update becomes available. I believe that the assessments provided are consistent with the Deployable Output methodology for each type of source.

B5.5.9 Target Headroom

The Company has reassessed their Target Headroom since the DBP both in terms of the uncertainties applied to key components and in terms of the way the figures to be used in the supply/demand balance are derived. In my view the Company has revised their calculation appropriately in line with the comments made to them during the draft WRMP consultation period.

It is useful to see the effect of climate change on headroom identified clearly. It is clear that climate change does not affect the requirement for additional resources in the short term.

The Company has now adopted a reducing percentile from the headroom calculation from 85% at the beginning to 65% at the planning horizon for the critical period in place of a constant 65%. The combined effect of all the changes is to give a headroom rising to a maximum of about 12.5% of WAFU. This gives a total operating margin of about 15% of WAFU when outage is included which would appear to be a reasonable target.

B5.5.10 Baseline supply-demand balance

The Company demonstrates no problem in meeting average demand throughout the planning period. However an immediate deficit is indicated at peak demand. At a Company level, available headroom falls below zero for peak demand by the planning horizon.
B5.5.11 Options appraisal

Demand-side options are now considered explicitly, though only leakage reduction and metering can provide significant contributions to meeting the deficit. No attempt has been made to present a full solution to the deficit within the quinquennium as the sole selected scheme, Bough Beech upgrade from 45ML/day to 70ML/day, could not be completed in time. This has the effect of reducing the level of service for a short period which will be offset by the period of surplus which will follow the completion of Bough Beech works.

A major driver for the Company’s plans is the EA’s requirement that the treatment works capacity at Bough Beech be upgraded to at least 50ML/day by 2015 or the 70ML/day licence already granted will lapse. When reporting on the DBP, I asked the Company whether it would be feasible to meet this requirement by a relatively small extension to their present plans – a works able to output 45ML/day reliably may be able to achieve 50ML/day if operated optimally, subject to some upgrading of pump capacities etc. The Company has taken account of this possibility in their solution identification process but has explained that whilst the works enhancement may, in principle, be staged, the age of the works means that a low cost scheme would not be feasible. The Company has also carried out NPV calculations and CBA which show that it is better value to carry out the uprating of Bough Beech in one stage rather than two.

The Company has identified a range of improvements to small existing sources which might be implemented as resource options. I suggested at the DBP stage that, as these schemes make use of existing infrastructure and/or licences, they may be justifiable as quality schemes or just as maintenance. The Company confirmed that the sources in question have each been allocated zero Deployable Output and any works to bring them back into use would have to be treated as supply/demand expenditure.

A bulk supply from Upper Thames Reservoir appears as an option which cannot be carried out within the next quinquennium and is unlikely to be available for use before 2027 according to Thames Water.

B5.6 Expenditure implications of maintaining the supply demand balance

B5.6.1 Economic Analysis

The AISC assessments have been updated from the DBP and include carbon costs, social and environmental costs and are assessed with regard to the time period required for the full utilisation of the scheme.

B5.6.2 NPV Analysis

The NPV assessment considers seven alternative solutions to the supply demand deficit. The solutions are each evaluated over a 60 year period, including operating and maintenance costs using Green Book rates. The
precise method of analysis differs from the EA’s guideline so NPVs in the Final WRMP may be different to those in the FBP.

The results are presented in graphical form. The Company has confirmed to me that alternative headroom assessments are used at this stage where necessitated by different choices of component.

The options presented fairly represent the practical alternatives available.

**B5.6.3 CBA**

Cost benefit assessments have been carried out as required by Ofwat for metering and principal options to demonstrate that they are individually justifiable.

**B5.6.4 Social and Environmental Costs**

The EA’s Benefit Assessment Guidance was used, though only parts of the guidance are relevant.

**B5.6.5 Carbon costing**

All relevant schemes have been assessed for their carbon cost.

**B5.6.6 Company carbon footprint**

The Company has had its present and future carbon footprint assessed. This proves to be predominantly due to electricity usage.

**B5.6.7 Strategic Environmental Assessment (SEA)**

The Company notes that their SEA requires some further work to meet all of the EA’s requirements. A final SEA will be produced to accompany the final WRMP.

**B5.6.8 Habitats Regulation Assessment (HRA)**

The Company notes that their SEA requires some further work to meet all of the EA’s requirements. A final SEA will be produced to accompany the final WRMP.

**B5.6.9 Environmental protection**

The Company notes that environmental issues are not likely to have a significant effect on their preferred plan.

The Company has been requested by the EA to carry out two investigations as part of the National Environment Programme.
B5.6.10  Final water resources strategy

The Company has summarised its final plan.

B5.6.11  Alternative Planning Solution

The Company, in order to meet the requirements of the EA, presents an alternative solution without Bough Beech uprating. I agree that the approach presented is a high risk solution and is theoretical as there is no reason why Bough Beech should not proceed.

B5.6.12  Sensitivity

The Company reviews the results of the sensitivity assessment.

B5.4  Conclusion

The Company's final plan is centred on the Bough Beech upgrade which seem to have no significant drawbacks and many benefits. Demand management measures are an explicit part of the final plan. I support the Company’s comments regarding the need for increased reservoir storage to provide security of supply for extended droughts. I note the Company’s comments regarding the risk of over-reliance on demand-management measures. I agree that there may be concerns over this where the constraint is on annual average demands but the range of recorded peaking factors in the Company’s area and the clear linkage between garden watering and peak demand makes it clear that the potential benefit of demand-management measures to the Company is substantial.

B5.8  Table B5.1 Water Service Demand Forecasts

B5.8.1  Section A – Properties

The numbers quoted are consistent with the Company’s description. As noted above, I would have expected to see some continuing reduction in unmetered non-household numbers with a matching increase in metered. The constant total number of non-households over the period to 2015 is however a reasonable assumption. I note that this does not have a material effect on the forecast of DI.

The large number of voids persisting across the period is consistent with the projections being relative to 2007-08 numbers. It seems likely from past investigations that this number does not necessarily represent properties standing empty for extended periods but includes rented property between tenants. Voids may be seen as a further source of demand uncertainty. They may also be a source of unaccounted for demand – potentially “water taken illegally” as in the June Return tables – through squatters, or simply new tenants who are slow to register for a water supply.
B5.8.2 Section B – Population

Household population is based on the Experian study and 2007-08 figures as reported. The Company distinguishes between the occupancy of metered and un-metered properties. As the number of compulsorily metered properties increases, and the significance of meter optants with assumed low occupancy falls away, the justification for doing this decreases. The occupancy assumed for un-measured, non-household properties is a nominal allowance reflecting demand estimates based on the consumption of small metered non-household properties. The occupancy of measured non-households is an average for all types and takes account of Experian’s figures for residents of institutions etc.

B5.8.3 Section C - Water delivered – volume

2007/08 figures are consistent with the June Return. Forecast figures are intended to be adjusted for an average year. The Company states that non-household figures are based on 2005-06, this being an average year. I believe that this commentary statement may be incorrect. This seems incorrect as 2005-06 was a period with continuous sprinkler bans.

B5.8.4 Section D - Water service output measures

The SOSI values quoted are consistent with the supply deficits quoted. The precise values arrived at for the critical period SOSI depend on the way in which the deficit is split between the resource zones – different numbers would be obtained if one zone is left in balance or the deficit is split evenly. Under normal conditions, the values quoted indicate a theoretical deficit rather than a real shortfall in supply. The total leakage allowance is the target amount over the AMP5 period which is assumed to be constant.

The water savings reported relate to achievements in excess of Ofwat’s target i.e, 0.11ML/day/year for the “schools scheme”.

B5.9 Table B5.2 - Supply demand balance expenditure projections and service output measures
B5.10 Table B5.3 – Water service supply demand balance (dry year annual average)

B5.10.1 Section A – Baseline supply forecasts.

The quoted figures are consistent with those presented elsewhere for dry year annual average conditions. There have been small adjustments since the Draft Final WRMP was submitted.

B5.10.2 Section B – Baseline demand forecast (dry year)

The base figures have been adjusted from JR2008. There have been small adjustments since the Draft Final WRMP was submitted.

B5.10.3 Section C – Baseline supply demand balance (dry year)

The annual average analysis shows a surplus throughout the period.

B5.10.4 Section D – Final planning solution

The scheme outputs reported are for average conditions only.

I note that the baseline strategy refers to meter optants; the enhanced programme refers to change of occupancy in addition to optants.

The demand management gains (line 13) include gains from metering as well as water efficiency activity. In addition, the savings from metering are said to include reductions in supply pipe leakage which I thought would appear in line 14. The Company has confirmed that the zero entry in line 14 is because they are not altering their leakage target so there is no net leakage benefit from metering.

The resource management figures (line 16) show a reduction because the shift of emphasis at Bough Beech to peak output reduces the reliable yield under normal conditions.

B5.10.5 Section E – Final planning supply demand balance

The supply-demand balance shows a clear surplus.
B5.11  Table B5.3a – Water service supply demand balance (critical period)

B5.11.1  General

The Company indicates that their critical period is “peak week”. This is unchanged from previous years.

B5.11.2  Section A – Baseline supply forecasts.

The quoted figures are consistent with those presented elsewhere for dry year annual average conditions. There have been small adjustments since the Draft Final WRMP was submitted.

B5.11.3  Section B – Baseline demand balance (dry year)

The demand remains below the baseline WAFU throughout the period.

B5.11.4  Section C – Baseline supply demand balance (dry year)

A deficit is shown throughout the period.

B5.11.5  Section D – Final planning solution

I note that the baseline strategy refers to meter optants; the enhanced programme refers to change of occupancy in addition to optants.

The demand management gains (line 13) include gains from metering as well as water efficiency activity. In addition, the savings from metering are said to include reductions in supply pipe leakage which I thought would appear in line 14. The Company has confirmed that the zero entry in line 14 is because they are not altering their leakage target so there is no net leakage benefit from metering.

The increase in output of Bough Beech at phase 2 completion only is shown.

B5.11.6  Section E – Final planning supply demand balance

Line 19, target headroom, has been updated.

The supply demand balance shows an apparent deficit until Bough Beech phase 2 is implemented in 2012. Throughout this period there is no deficit until target headroom is considered.
B6 Customer Service Strategy and changes in Service

B6.1 Introduction

The Company has included the following in its FBP as customer service improvement schemes:

- Flood resilience measures at three treatment works.

Expenditure on flood resilience was included in Part B4 - Quality for the DBP.

The following proposals included in the DBP have been excluded from the FBP:

- Water mains network improvements – reduce unplanned interruptions to supply from 10,900 to 9,750
- Water mains network improvements – reduce discoloration contacts from 110 to 100.

The water efficiency proposal at schools (making savings of an additional 0.11 Ml/d per annum) included in the DBP as a customer service enhancement has been correctly transferred to Part B5 - Supply Demand for the FBP.

I confirm that I support the changes made by the Company from the DBP submission.

B6.2 Customer service strategy

The Company has stated that its overall customer service strategy is to maintain the service levels achieved by 2010 except where customers have indicated otherwise. It confirms that it is not proposing to enhance any levels of service as it has been unable to justify the investment.

B6.3 Proposed water service enhancements

B6.3.1 General

The Company has described results from its WTP survey undertaken in 2007/08 with the conclusion that customers were willing to pay for a number of service enhancements although these could not be converted into justifiable schemes.

B6.3.2 Flood resilience

Prior to the DBP, the Company appointed consultants to assess the need to reduce risk of flooding at its sites following publication of the Pitt report. Five sites were identified as being at high/medium risk of flooding following which outline feasibility assessments were undertaken. The studies concluded that flood protection works should be undertaken at each site to a total value of
£1.40M; this sum was included in the DBP. The flood risk assessment was carried out prior to issue of Ofwat’s *Asset resilience to flood hazards: development of an analytical framework* guidance document (known as the Service Risk Framework or SRF). Since the DBP, the Company’s consultants have undertaken further assessment based on the SRF.

The consultants’ assessment methodology comprised the three stages prescribed by the Ofwat guidance, namely risk screening, risk analysis and risk management. At the screening stage, flooding potential at sites identified by the Company as being at risk was assessed using the fluvial flood maps from the Environment Agency’s website and local knowledge of each site from the Company. All 12 infrastructure sites and 87 non-infrastructure sites were covered by the screening.

The conclusions of the risk screening phase were that four infrastructure sites and four non-infrastructure were in the high risk strategy, and eight infrastructure and four non-infrastructure were in the moderate risk strategy. The assessment considered the impact of flooding at return periods of 1 in 75 or more frequent (described as significant risk), between 1 in 75 and 1 in 200 (described as moderate risk) and 1 in 200 or less frequent (described as low risk). The assessment included water treatment works, pumping stations, major pipelines, boreholes, reservoirs, water towers and river intakes.

The report on the screening process concluded that the eight high risk sites should be subject to more detailed risk analysis and that the moderate sites should be reviewed in five to ten years’ time. I consider that the screening process was covered in an appropriate manner making use of Company knowledge and EA flood maps.

The risk analysis phase of the study (Stage 2 of the SRF) was undertaken on the eight sites recommended from the screening report. Modelling to produce site specific flood mapping was undertaken for the non-infrastructure sites but was not considered necessary for the non-infrastructure sites where flood extents from the EA’s website were considered sufficient. For the risk management phase (Stage 3 of the SRF), scheme options to reduce flood risk were developed and then subjected to cost benefit analysis.

The risk modelling was undertaken using a sub-contractor who obtained fluvial flood modelling data from the EA where available. The sub-contractor also utilised his own software to assess the pluvial flooding potential. I met with the Company and consultants during the studies and was appraised of the methodology and work proposed. I consider that the methodology used for the assessment of flooding resilience, including screening, risk analysis and risk management was sound.

My conclusions in relation to the three sites where the Company is proposing works are as follows:

- **Bough Beech River Intake** – the pumping station itself is not at risk of flooding although the surrounding land is including the area where the surge vessel is sited. I have visited the site and noted that the
access road is within the flood plain. The risks to the Company are that the surge vessel ancillaries could be damaged by flooding and that access to the site may be prevented during the flood event; I agree that operation of the surge vessel should secured but considered that the loss of access would probably be for a matter of days rather than a more prolonged period. I therefore challenged the Company on whether flooding of the access road would actually pose a significant risk to the Company; the Company replied that it did not want to take the risk of loss of pumping to refill the reservoir as Bough Beech was a strategic site supplying 15% of the supply area; it considered that the value provided by the scheme was worth the relatively small investment.

- **Kenley TW** – I am aware that the site has experienced flooding in the past and that a scheme was implemented jointly by the local authority and the Company to construct a flood alleviation storage lagoon to deal with the 1 in 100 year fluvial event. I have visited the site and confirmed that it is located in the bottom of a chalk valley. I agree that it is at risk from pluvial flooding

- **Woodmansterne TW** – I have visited the site and noted that, like Kenley, it is in the bottom of what is normally a dry chalk valley; I again agree that it is at risk from pluvial flooding

- The Company’s assessments have concluded that Kenley and Woodmansterne are at risk from pluvial events of a greater magnitude than the 1 in 75 year event; I have no reason to doubt this figure.

My comments on the actual schemes proposed, which have a total value of £1.92M are as follows (the consultants undertaking the study reported that costs estimates should be ±30%; I consider that to be reasonable):

- **Bough Beech access road** (proposed capex £360k) – raising of the access road is the obvious solution to the problem if works are needed; it is possible that the Environment Agency (EA) could require compensatory storage in respect of the volume of the embankment constructed to raise the road; this would be a normal response and could result in an increase in cost to the scheme

- **Kenley and Woodmansterne TW** (proposed capex £876k and £683k respectively) – in both cases, construction of a low perimeter wall is proposed along with drainage works within each site. I believe that further work will be required to assess whether the perimeter walls may result in worsening of flood risk to the properties upstream. In practice, I consider that the Company will need to look at a diversion route for pluvial flows to lead the water downstream; this could change the costs. I suggest that the schemes may undergo significant revision from those that have been costed

- **Total cost** – I note that the Company acknowledges the potential cost uncertainty in its commentary and has stated that it is ‘fully prepared for it to be logged down should it not be spent’. I believe that further work is required to develop the designs for the three sites.
I believe the assumptions on the nature, scale and timing of outputs are reasonable. I do not consider that the Company’s proposals would represent a step change in resilience but they are justified by the cost benefit assessment undertaken (see Part C8).

There are no service enhancements requiring the Company to cross reference to Table A2.

**Table commentaries**

**Table B6.1**

Line 9 – The Company has entered the reason for the three flood resilience schemes indicating as existing flood risk of more frequent than 1 in 75 years. The

**Table B6.3**
The Company has the following non-tariff basket supplies:

- Special Agreement supply of treated water to Gatwick Airport and a small new supply to Sunlight Services
- Two small bulk supplies to South East Water and Southern Water respectively both of which are charged at tariff rates
- Six large users (being supplied with between 50 and 100 Ml/year).

I confirm that the revenue from the Gatwick supply and the six large users has been forecast on the basis of the same volume and revenue as actually reported for 2007/08. The annual increase in revenue has therefore been assumed to match RPI.

The Company has assumed a fall in rechargeable works from the 2007/08 figure as a result of the current economic climate.

Other sources – the Company has explained its case for changes in rental income at its head office and for other rental income to continue unchanged.

I consider the assumptions above to be reasonable.
B9 Overlap Programme

I note that the Company is not planning an overlap programme.
I note that the Company has no projects meeting the definition of large projects.
I confirm that the Company has provided the required overview of how its final business plan reconciles to its draft business plan.

I confirm that the Company has correctly entered the expenditure figures from its DBP and FBP and from Ofwat’s draft baseline capital incentive scheme (CIS). It has also clearly explained in its commentary the changes made between the DBP and the FBP. I confirm that the relevant figures have been entered post-efficiency although some pre-efficiency figures have been quoted in the commentary.

I confirm that the Company is not planning any additional income.
I confirm that the Company’s description of its research into customer views and the conclusions drawn can be traced back to the three primary identified research sources as follows:

C3 Asset Inventory

C3.1 General

I confirm that I have scrutinised the Company’s asset inventory submission and undertaken audits to verify the Company’s methodology and to form an opinion on the accuracy of the data and table entries.

The Company’s Final Business Plan summarises the latest investigations and assessment of asset stock as at the 31 March 2008, including the condition, performance and age of operational and management and general assets.

For asset Groups 1-4 the Company engaged consultants to carry out a full survey of the entire asset stock within these groups and to update the asset inventory and condition profile. For the DBP, the Company commissioned quantity surveying consultants to undertake the MEA revaluation of non-infrastructure assets. Prior to the FBP, the engineering consultants who had undertaken the site condition surveys were employed to review the MEA figures produced by the quantity surveyors; the Company had noted that there were some deficiencies in the DBP figures (e.g. insufficient security fencing on some sites). In addition Bough Beech Dam had not been revalued in time for the DBP.

For Group 5 – water mains, the asset inventory, condition profile and asset valuation has been based on the data held in the GIS and studies carried out by Company staff. For the DBP, as for previous periodic reviews, the Company produced reports from its GIS to assign lengths against condition grade for Table C3.1. For the FBP, the Company has rigorously followed the grading methodology from the Ofwat Guidance in completing Table C3.1 and the new table C3.1a.

For Group 6 – Management and General, I confirm that the Condition Grades were assessed by Company staff.

C3.2 Material assumptions

The Company has summarised its latest investigations and audits of its asset stock as at the 31 March 2008 including the condition, performance and remaining life of assets.

I consider that the Company has complied with its general duty as a water undertaker to maintain the capability of its assets and hence serviceability to customers.

Significant Areas of Disagreement

There are no significant areas of disagreement with the Company.
Quality Assurance Procedures

The Company commissioned consultants to undertake MEA revaluations and consultants to carry out asset surveys and updating the non-infrastructure asset inventory groups 1 to 4. The consultants followed their own Quality Assurance procedures and their deliverables were reviewed by the Company. The Company commissioned a peer review of the non-infrastructure MEA revaluations using the engineering consultants who had undertaken the site asset condition surveys. The review included addition of site specific information which had not been taken account of in the DBP revaluation undertaken by quantity surveyors. The Company also ensured that issues were addressed which it had identified when undertaking its own review of the DBP work. For the FBP I consider the quality assurance procedures for the asset survey work to support the tables in Section C3 to be good.

The quality assurance procedures used by the Company for calculating and reporting entries for Group 5 – water mains comprised checking by a senior member of staff of work undertaken in-house. Compiling the mains cohort information used output from the infrastructure modelling undertaken for Part B3 of the business plan. A large majority of the base data has been obtained from the GIS, which is considered to provide robust information on the Company’s mains network. This approach is consistent with that adopted at PR04.

Accuracy and Reliability of Data

I have commented on the accuracy and reliability of data submitted by the Company and on the confidence grade entries under the appropriate table commentaries.

Material assumptions

I do not believe that there have been any material omissions nor any unexplained material assumptions which would significantly increase or decrease the Company projections of capital expenditure or a significant change in the allocations to size or asset type band. Infrastructure condition grading values changed since the DBP because of the change in the Company’s methodology.

C3.3 Company management information systems

I believe that the Company’s underground asset management information systems are consistent with the requirements of Condition L of the Instrument of Appointment and have enabled the Company to maintain the capability of its assets and hence serviceability to customers.

The Company’s methodology being used to maintain and update asset management information systems for all distribution mains for quality purposes are soundly based, satisfactory and accord with Bill Emery’s letter of the 1 February 1996 and the DWI information letter 5/98. The Company has a distribution operational management strategy (DOMS) and has been proactive
in monitoring the network for high iron levels, the predominant water quality issue within the network.

The Company’s GIS (covering infrastructure only) is used effectively in determining the condition and performance of the mains network and supporting the Common Framework. The Company has not derived summary information on a statistical basis: the information included in the Company’s final business plan is based on data for all their infrastructure and non-infrastructure assets.

For surface assets, as explained by the Company, it has recently set up a Computerised Maintenance Management System (CMMS – AGILITY) which will hold all the data on non-infrastructure assets. This now holds all the asset information from the surveys carried out by Atkins in 2007, and is being used to schedule and record preventative and reactive maintenance activities and their associated costs. The system has been demonstrated to me and I consider it to be a sound investment that will considerably improve the management of the Company’s non-infrastructure assets and aid targeting of expenditure for PR14 and beyond. The Company does not use a GIS for its surface assets; I consider this is not unreasonable as it is a relatively small geographic area and contains a relatively small number of assets. I believe that the Company operational staff, including at Director level, are well able to maintain up to date knowledge of their surface assets.

In summary, I consider that the Company’s information systems are adequate for the purposes of efficient management and operation of its assets.

C3.4 Summary asset inventory, condition and, for underground assets, age

C3.4.1 Asset Groups 1 to 4 – General

The Company engaged consultants, Atkins, to carry out a survey, during early 2007, of all assets in Groups 1 to 4 and to update the asset inventory and condition profile carried out for PR04. Atkins had also carried out the survey for PR04, so consistency may be expected with the asset grading procedures used for the compilation of tables C11 and C13 of the 2004 business plan. Company staff provided assistance as required and reviewed the outputs produced by the consultants.

Essentially the consultants’ work comprised reviewing the AMP4 asset inventory surveys and visiting all the Company’s operational water resource water treatment, storage and pumping station assets. All sites were visited at least once, with some 8310 assets being tagged (giving a unique asset number for linking to the new Agility database) and graded in accordance with Ofwat guidance. The use of statistical techniques for these groups of assets was therefore not necessary. The only equipment assets not inspected were borehole pumps where the grading was done from Company records of age and usage etc. An overall condition grade for a site was allocated from an assessment of the grades for the individual components of the site, weighted in proportion to the proportion of assets at the site. Performance grades were also assessed but these do not now form part business plan submissions.
AMP5 summary sheets were then prepared. In most cases this involved updating the 2003 survey sheets, but in the case of new assets then an additional survey sheet was incorporated. A list of remedial works at each site was prepared together with cost estimates but this was not used in the derivation of the capital maintenance programme.

The results were entered into a MS Access database within a seven-level hierarchical structure. I have reviewed the database containing information on all the assets surveyed and consider it to be quite comprehensive, including items such as the date built, date of last refurbishment, design life and dimensions as well as current and previous condition and performance grades.

The consultants informed the Company of any works identified that they considered required immediate attention.

The list of assets from the asset condition studies was used in the common framework modelling for non-infrastructure assets. Tynemarch, the consultants undertaking the modelling, advised on the asset condition studies and the way in which the results were presented. They also carried out independent checks for completeness and consistency before the data was imported into CMMS – Agility.

I visited four of the Company’s eight treatment works sites and verified that the condition grades for various assets were reasonable and that the assets had been labelled with tags consistent with the new AGILITY asset database.

### C.3.4.2 Asset Group 5 – Water Mains

The Company has based the mains asset inventory on data downloaded from the GIS as at 31 March 2008. For the FBP, the condition profile of the Company’s infrastructure assets has been developed in accordance with the reporting grading methodology from the UKWIR report number 08/RG/05/22 Volume 2. I viewed the spreadsheet used to create the mains cohorts and discussed the approach with the Engineer who had carried out the work. No statistical techniques have been used in preparation of the information.

Asset valuation has been determined by multiplying the appropriate unit costs by the length of main in any particular size band and surface type.

I have reviewed the Company’s methodology for the infrastructure asset inventory and condition profile and consider that it is appropriate and in accordance with the reporting guidelines.

The Company has based the communication pipe asset inventory and condition profile on an AMP3 study carried out by Atkins to identify the number of lead pipes.

The asset life and age profile information has been correctly calculated from the updated asset stock and valuation data.
C.3.4.2 Asset Group 6 – Management and general

The M&G assessment has been undertaken using unit rates applied to building floor areas.

C3.5 Changes in asset lives

For the DBP analysis of CCD, the Company assumed an additional life of 10 years for non-infrastructure assets still in use but previously fully depreciated. For the FBP assets written down but still in use have been given a remaining asset life and a corresponding net MEA value. I confirmed that such assets were not being included in the CCD calculations. No other changes to asset lives have been made.

C3.6 Changes in asset condition since 31 March 1998

The Company has provided commentary on the change in asset condition since 31 March 1998. It points out that the anomaly in the gross cost per asset line in their DBP has been rectified and I am satisfied with the changes made.

From my site visits, I considered that the asset condition assessments were fair and reasonable.

I have no reason to doubt the changes listed in the Company’s commentary. Further details are discussed in the table commentaries.

C3.7 Modern equivalent asset valuation

C.3.7.1 Non-infrastructure assets

The Company employed quantity surveying consultants F&G to revalue non-infrastructure operational assets using the asset data collected by Atkins. The values were calculated using the consultants own database of unit costs. Each of the larger sites was valued independently with the smaller sites (including service reservoirs and boreholes) valued from cost curves developed for a range of sizes. Prior to the FBP, the engineering consultants who had undertaken the site condition surveys were employed to review the MEA figures produced by the quantity surveyors; the Company had noted that there were some deficiencies in the DBP figures (e.g. insufficient security fencing on some sites). In addition Bough Beech Dam had not been revalued in time for the DBP. For the FBP all assets have been revalued. I noted that adits had previously been omitted from the Company’s asset database. They were valued for the DBP but the values were identified by the Company as being very high (the original construction by mining would arguably not be acceptable under modern health and safety regulations); the Company therefore revalued the assets as boreholes at a lower value.

Land costs were revalued by external land agents.
C.3.7.2 Infrastructure assets

The infrastructure assets were revalued by the Company using mains data from its GIS and unit rates from actual costs since 2006. The actual costs are based on the Company’s current period mainlaying contract which was also used for developing standard costs for the Cost Base submission. The unit costs for the MEA revaluation are the same as those used for the capital maintenance programme.

C.3.7.3 Assessment

Non-infrastructure - I consider that the methodology used by the Company is performing the modern equivalent asset valuation is reasonable. In the DBP, I noted that none of the non-infrastructure values had been validated against actual company scheme costs. For the FBP, as described above, the values have been reviewed and linked to recent Company prices where available and inclusion of all the appropriate assets on each site have been checked.

Infrastructure – I consider that the approach using current contract rates is the most appropriate methodology.

General – I consider that the methodologies described have been used consistently across the asset base. No sampling has been undertaken in valuation except where a group of assets have been valued and the costs curves then used for similar assets within the same size ranges (e.g. service reservoirs and boreholes). I believe that the Company’s assumptions have been disclosed as referred to above.

Differences from PR04 - Houses and depots were not included in the PR04 tables (but were included in the Company’s asset databases). Adits had not been included in Company databases nor in previous periodic review tables.

Table C3.1 - Asset stock and condition profile

Line Commentaries

Block A – Group 1, Water Resources

A review of the entries for dams and impounding reservoirs and raw water aqueducts was checked and found to be consistent with the PR04 figures and the additions made to the asset base since. The Company has only one dam, Bough Beech.

The length of raw water aqueducts has been obtained from the GIS database downloaded as of the 31 March 2008.
Confidence Grades

The Company in my view, has correctly reported a Confidence Grade of A1 for the asset stock in line 1 and A2 for line 2. The entries of B3 and A2 for lines 1 and 2 respectively under asset condition are also appropriate. The grade of A2 is consistent with other data derived from the GIS.

Block B – Group 2, Water Treatment Works

The main change in methodology since PR04 is that the condition grades have been allocated to reflect the condition of individual process units (e.g. filters, clarifiers, softening, etc) rather than using one overall condition grade for a treatment works. I consider this to be a significant improvement as recommended at PR04.

I note that 23.6% of gross MEA in line 6 is allocated to condition grade 5. This is for the Pains Hill spring source which is not currently in use.

Confidence Grades

I consider the confidence grades of A1 for asset stock and B3 for asset condition in Table C3.1 to be reasonable. The Company’s commentary refers to a confidence grade of A4 for the MEA valuation which I also consider to be reasonable.

Block C – Group 3, Water Storage

A review of the data entries confirmed that the number of service reservoirs and water towers in Table C3.1 lines 12 and 13 are the same as stated in AMP4 Table C11, lines 11 and 12.

Confidence Grades

I consider the confidence grades of A1 for asset stock and B3 for asset condition to be reasonable. The Company’s commentary refers to a confidence grade of B4 for the MEA valuation which I also consider to be reasonable.

Block D – Group 4, Pumping Stations

A comparison with the entries in Table C11 in AMP4 shows that there is one more source pumping station (line 17) and one more booster pumping station (line 18). These changes are due to the Dorking WTW changing to become one booster PS and one source PS (water is now pumped for treatment to Elmer and returned for distribution).

Confidence Grades

I consider the confidence grades of A1 for asset stock and B3 for asset condition to be reasonable. The Company’s commentary refers to a confidence grade of A4 for the MEA valuation which I also consider to be reasonable.
Block E – Group 5, Water Mains.

The length of potable mains has been obtained from the GIS database downloaded as of 31 March 2008. It is consistent with entries in table C11 in PR04 and Table 11 in JR08.

For the DBP the condition grades of the mains were determined from a mathematical model supported by the GIS and burst mains records. For the FBP, the grades are based on the cohorts analysis as undertaken for Table 3.1a.

All of the ancillaries (communication pipes and household meters) have been given an asset condition grade of 2. At AMP4, communication pipes and meters were allocated to Condition grades 2 and 4 respectively. I consider this appropriate as the Company now has a meter replacement policy so that those meters having been subject to the highest total volumes are replaced.

Confidence Grades

I consider that the Company’s confidence grades are generally appropriate. A grade of A2 has been used consistently for data from the GIS.

Block F – Group 6, Management and General.

I have reviewed the table and confirm that the entries are reasonably consistent with those submitted at PR04.

Confidence Grades

I consider that the confidence grades entered by the Company are appropriate.

Block G – Water Mains

I confirm that the total length of mains in line 38 of 3,445.03km is consistent with the sum of lengths of main in lines 21, 22 and 23.

I confirm that the Company has correctly identified the construction date in line with the Ofwat guidance where the pipe has been relined.

Confidence Grade

I consider the confidence grade of A2 for line 38 to be reasonable as the Company’s GIS contains robust records of the dates of installation of all its mains.
Table C3.1a - Water Service – Condition grading based on mains length

I consider that the Company has closely followed the condition grading by length methodology and that the bursts reported in the analysis reconcile with June Returns. I confirm that the Company has included a graph of cumulative annual average bursts versus cumulative mains length in its commentary.

Line Commentaries

The lengths of mains in line 1 have been obtained from the Company’s GIS. The derivation of the bursts reported in lines 2 and 3 is given in Table C3-3 in the Company’s commentary. The total number of bursts for 2004-2008 inclusive of 1721 is consistent with burst figures included in June returns.

Line 4 – the Company has entered an average of 2 from the data showing that 11 bursts have occurred in mains laid since 2003. I believe that the intention of this line was to enter the number on mains abandoned in which case the annual average would be 63.

The total length of mains in line 6 is consistent with line 21 of Table C3.1.

Confidence Grades

I consider the confidence grade of A2 for this table to be reasonable as the Company’s GIS contains robust records of all the mains, and this confidence grade has been consistently applied for data obtained from the GIS.

Table C3.2 – Trends in condition and expenditure

Line Commentaries

Block A – Group 1, Water Resources

I have reviewed Table C3.2 on changes and trends in asset condition and comment as follows:

Group 1, Water Resources – there has been a significant improvement in asset condition of the raw water aqueducts since PR04 with 95.2% of assets now being in condition grade 1 as opposed to 74% five years ago. This appears to be due to a reduction in the number of bursts.

Groups 2, 3 and 4 - The Company’s assessment of asset condition shows a deterioration in line 11 (water towers) with the percentage in condition grade 4 having increased from 22.2% in 2003 to 59.6% in 2008. I have no reason to dispute the surveys and assessments carried out by consultants.

Group 5, Water mains - The Company’s assessment is that the infrastructure assets have remained in a stable condition. Having reviewed and audited the
Company’s analysis for changes in the condition of potable water mains I am satisfied that the assessment has been carried out in a consistent manner and is auditable. I note that all the ‘other mains’ in line 18 are now all in condition grade 1, up from 50.9% in 2003.

Group 6, Management and General – there are no longer any assets in condition grades 4 or 5 (in 2003, 12% of depots and workshops were in condition grade 4.

From my review of this table the following significant trends have been observed:

- Deterioration in condition of water storage assets with 59.6% of water towers in condition grade 4
- Improvement in condition of source and booster pumping stations
- Change in the condition of potable mains, with 86.3% now in Condition Grade 1: this change is explained by the change in methodology using the cohort approach and change in definitions. The Company shows in its commentary that, using its old assessment method, the percentage in Grade 1 would have been similar at PR04 and PR09.
C4.1 Introduction

C4.1.1 Objectives

This section contains further information on the Company’s Supply-Demand assessment.

C4.1.2 Draft Water Resource Management Plan (WRMP)

The draft WRMP was published for public consultation in May 2008.

C4.1.3 Draft Business Plan

Errors identified in the draft WRMP input were corrected in the DBP. Additionally, 2007/08 base year data was updated to conform to JR08. The DBP was based otherwise on the draft WRMP as the consultation feedback was not available in time for it to be taken into account.

C4.1.4 Final Draft Water Resources Management Plan

The Company submitted a Draft Final WRMP with their Statement of Response following the consultation process on the Draft WRMP. Some small changes have since been made to the figures though these are not material to the conclusions.

C4.1.5 Final Business Plan

The FBP is mainly consistent with the Draft Final WRMP. The Final WRMP should be fully consistent with the FBP.

C4.1.6 Changes made since submission of the Draft Business Plan

The Company repeats the description of the changes made following the DBP as set out in Section B5.

C4.2 Economic Leakage appraisal

The Company presents an updated Economic Level of Leakage (ELL) assessment now following sustainability guidance and described as SELL. The Company shows itself to be operating below the SELL as has been the case for some time.
C4.3 Metering

The Company sets out its approach to metering as set out in the table commentary below and in Section B5.

C4.4 Water efficiency targets

The Company sets out its approach to meeting Ofwat’s efficiency target and in addition explains the “schools scheme”, a water efficiency initiative in schools which the Company has justified by CBA.

C4.5 Table C4.1 – Forecasts of new connections and metering programme

C4.5.1 General

2007/08 figures are as in JR08. Some small changes have been made since submission of the Draft Final WRMP. The final issue of the WRMP should be wholly consistent with the FBP subject to any changes directed by Defra, and any issues arising out of Ofwat’s query process and determinations.

C4.5.2 Section A – Properties connected during the year

New household numbers are based on Experian’s “most likely” scenario. No net growth in non-households is expected. Most years actually show around 100 new non-household connections but the number of active customers changes little over time.

C4.5.3 Section B – Metering programme

The Company sets out its preferred metering programme. This shows a total of 6,400 meters being installed at the Company’s expense each year. It is assumed that an average of 1680 optants will still come forward each year. The balance will be metered on change of occupancy.

The current downturn may cause difficulties with rates of change of occupancy but the Company has scope to vary the meter installation rate before imposing compulsory metering as it’s AMP4 policy has been not to meter around half the change of occupancy properties on cost and/or technical grounds. An increasing rate of installation of change of occupancy meters would be likely to lead to an increasing number of internal meters. I note however that the Company indicates only a nominal number of internal meters in line 5, a change from the DBP where compulsory metering was proposed.

A proportion of the meters installed are in existing boundary boxes which have been placed as part of the Company’s mains renewal programme. This represents a cost saving over having to install new boundary boxes for all
meters for existing customers and has the further advantage that the communication pipes have been renewed fairly recently.
C5 Supplementary Information on Proposed Work Programmes and Expenditure Projections – the PR09 Projects Database

C5.1 Projects database

I have listed the schemes from the Company database in the following table together with my comments. Unless I have commented otherwise, I can confirm that:

- the company has justified the inclusion of the investment proposals in its plan;

- the company has elicited whether the proposal is cost-beneficial, and if not has stated why it has included the proposal;

- for quality enhancement projects, where applicable, the company has included the correct legal status of the project;

- the company has derived its information on costs and benefits, in line with the methodology for cost-benefit analysis which is explained in section C8; the data acquisition from WTP surveys has been peer reviewed;

- the company has reviewed the options open to meet the new obligation and has chosen an efficient and cost-effective solution;

- the work is/was required to be carried out in accordance with the phasing and timetable as set out by the company;

- I have verified the basis of the cost estimates, and confirm the methodology is consistent with that used by the company in compiling the cost base information also included in the supporting information;

- the operating costs are only the net additional costs of an augmented works;

- suitable cost drivers have been allocated to each scheme.
<table>
<thead>
<tr>
<th>Ref Scheme</th>
<th>Total AMP5 Capex (£M)</th>
<th>Total AMP5 Opex (£M)</th>
<th>Cost Drivers</th>
<th>Reporter comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) RGM (1) General Maintenance NI</td>
<td>1.739</td>
<td>CM:*CM07-100% Ongoing refurbishment at boreholes.</td>
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</tr>
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<td>(10) CGM (10) Cheam TW General Maintenance NI</td>
<td>1.332</td>
<td>CM:*CM07-100% General maintenance at Cheam WTW to keep works in satisfactory condition.</td>
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<tr>
<td>(11) CLGM (11) Cliftons Lane TW - General Maintenance NI</td>
<td>0.257</td>
<td>CM:*CM07-100% General maintenance at Cliftons Lane WTW to keep works in satisfactory condition.</td>
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<td></td>
</tr>
<tr>
<td>(12) EGM (12) Elmer TW - General Maintenance NI</td>
<td>3.827</td>
<td>CM:*CM07-100% General maintenance at Elmer WTW to keep works in satisfactory condition.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(13) EL (13) Elmer treatment works lime plant</td>
<td>0.761</td>
<td>CM:*CM07-100% Replacement of lime plant to maintain works in operable condition.</td>
<td></td>
<td></td>
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<tr>
<td>(14) GGM (14) Godstone TW - General Maintenance NI</td>
<td>0.861</td>
<td>CM:*CM07-100% General maintenance at Godstone WTW to keep works in satisfactory condition.</td>
<td></td>
<td></td>
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<td>(15) KGM (15) Kenley TW - General Maintenance NI</td>
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<td>CM:*CM07-100% General maintenance at Kenley WTW to keep works in satisfactory condition.</td>
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<td>(16) WWGM (16) Westwood TW - General Maintenance NI</td>
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<td>(17) WMGM (17) Woodmansterne TW - General Maintenance NI</td>
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<td>(19) DISMR (19) District metering system</td>
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<td>(2) RGMI (2) General Maintenance Inf</td>
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<td>CM:*CM01-100% Ongoing maintenance of raw water infrastructure.</td>
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<tr>
<td>Ref Scheme</td>
<td>Total</td>
<td>AMP 5 Opex (£M)</td>
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<td></td>
</tr>
<tr>
<td>------------</td>
<td>-------</td>
<td>----------------</td>
<td></td>
<td></td>
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<tr>
<td>(20) DISM-DG2</td>
<td>0.94</td>
<td>CM:*CM01-100%</td>
<td>SD:*SDB3-100%</td>
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<td>(21) DM</td>
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<td>CM:*CM07-100%</td>
<td>SD:*SDB4-88%; SDB7-4%; SDB9-8%</td>
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<td>(22) DISM-A&amp;C</td>
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<td>CM:*CM01-100%</td>
<td>SD:*SDB3-100%</td>
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<td>(23) LCOM</td>
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<td>CM:*CM01-100%</td>
<td>Q:*5WA10-100%</td>
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<td>ESL:*ESL04-100%</td>
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<td>(28) SEMD</td>
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<td>Q:*5WA13-100%</td>
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<td>(3) PSGM</td>
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<td>(4) PSBLD</td>
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<td>SD:*SDB1-100%</td>
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<tr>
<td>Ref</td>
<td>Scheme</td>
<td>Total</td>
<td>AMP 5 Opex (£M)</td>
<td>Cost Drivers</td>
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<td>PSOUT</td>
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<td>SD:*SDB1-100%</td>
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<td>(6)</td>
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<td>CM:*CM07-100%</td>
<td>General maintenance of service reservoirs to maintain them in satisfactory condition.</td>
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<td>(7)</td>
<td>BBGM</td>
<td>0.921</td>
<td>CM:*CM07-100%</td>
<td>General maintenance at Bough Beech WTW to keep works in satisfactory condition.</td>
</tr>
<tr>
<td>(8)</td>
<td>BBP2</td>
<td>28.638</td>
<td>0.699</td>
<td>CM:*CM07-100%</td>
</tr>
<tr>
<td>(9)</td>
<td>DIST</td>
<td>17.21</td>
<td>CM:*CM01-100%</td>
<td>Infrastructure works associated with the upgrading of Bough Beech WTW. SD:*SDB3-100%</td>
</tr>
<tr>
<td>(29)</td>
<td>WTWRFB</td>
<td>3.05</td>
<td>CM:*CM07-100%</td>
<td>No details entered in SES database to improve the filtration at Woodmansterne WTW in order to ensure that the Company is able to achieve both the turbidity standard as well as its obligation for softening. No cost/benefit analysis has been done.</td>
</tr>
<tr>
<td>Scheme</td>
<td>Total Opex (£M)</td>
<td>Reporter comments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>----------------</td>
<td>----------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RGT (NEP) Reigate Heath &amp; Reigate lower greensand (NEP)</td>
<td>0.575 Q: *WFwg3–33% lw1–34%; lw3–33%</td>
<td>NEP scheme to investigate whether the SES abstractions at Buckland, The Clears and Cliftons Lane are having an impact on groundwater levels.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WAN (NEP) River Wandle Investigation (NEP)</td>
<td>0.737 Q: *WFwp3–100% NEP</td>
<td>scheme to investigate the effect that the Company's abstractions could be having on the River Wandle.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WATEFF Water Efficiencies</td>
<td>0.565 SD: *S DB6–100% Demand</td>
<td>management in school buildings.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>METCM Metaldehyde Catchment Management Scheme</td>
<td>0.265 Q: *5WA14–100% DWI approved investigations into pesticides found in Bough Beech Reservoir.</td>
<td>No cost/benefit analysis carried out.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
C5.2 Cost estimating overall approach

General - I confirm that the Company has good records of actual costs on historic projects retained on its NaVision management accounting database.

Infrastructure - In the case of infrastructure, costs for any schemes can be derived from the period mainlaying contract for which unit rates are available from a bill of quantities. The contract includes installation of mains, communication pipes and fittings and surface reinstatement. The Company has used this contract for preparing cost base rates and unit rates for DBP schemes.

Non-infrastructure – Although the Company has good records of overall project costs, these are not usually broken down into sub-assets e.g. it will know the civil costs of refurbishing a treatment works but will not have a breakdown of the cost for individual elements e.g. filters or clarifiers. As mentioned in the Company’s commentary and in Part B3, the Company installed an asset database (CMMS Agility) in 2007 which is now being used to store maintenance costs against each sub-asset and in future will be populated with construction/installation costs. This will facilitate development of more comprehensive and reliable Company standard and unit costs.

Where the Company does not have representative historic cost data, its normal approach is to employ consultants to develop project proposals including cost estimates or at a more detailed stage to seek contractor quotes. I consider this to be a pragmatic approach which is generally more reliable than using an industry database (for which the scope of works is often interpreted differently by the companies contributing data to the database). Where this approach has been applied, the Company has relied on the consultants cost estimates without validation (although I note that a second opinion was obtained for the major works proposed at Bough Beech).

For its non-infrastructure capital maintenance modelling, the Company provided to it consultants unit costs based on expert judgement in the absence of recorded historic data. Such an approach is unlikely to have taken account of synergies where projects at the same site can be combined.

The Company has generally used COPI for updating historic costs to the 2007/08 price base.

The Company has not undertaken a formal risk assessment approach to evaluating project uncertainties but generally simply includes a contingency.

As referred to in other parts of their commentary, the Company generally splits projects into purpose categories and creates proportional elements within its capital programme. Proportional allocation between capital maintenance and supply/demand has been undertaken for the major AMP5 works at Bough Beech. I believe that the Company’s approach to proportional allocation for the AMP5 plan is consistent with its approach used in practice over the AMP4 period.
The Company has not referred to any synergies in its programme other than in relation to its programme to replace lead pipes in schools and to initiate water efficiency schemes in the same schools. I am aware that the Company is planning to aggregate all the capital maintenance elements for Bough Beech reservoir works and treatment works from the capital maintenance modelling into a combined project with the proposed upgrade for supply/demand outputs. I would also expect, from previous experience, for it to plan works at each site into a single project where cost beneficial.

The Company has completed the scorecard for the 12 schemes listed in their commentary in accordance with the guidance. I consider that the scores are reasonable, based on the comments made by the Company in the database and my knowledge of the status of each scheme.

C5.3 Logging up/down

I note that the Company has not proposed any logging up or logging down. In their commentary they have referred to five areas where they have incurred additional costs since the PR04 determination which could have been considered for logging up.
Reporter Summary

I confirm that I have reviewed the Company’s commentary and raised queries where necessary. I have confirmed their calculations by reviewing their spreadsheets and carrying out spot-checks.

The Company has conducted an appropriate choice experiment Willingness to Pay (WTP) survey to quantify benefits and has made use of external environmental and social valuation data where required. It has also carried out a second WTP survey following the Draft Business Plan (DBP), specifically in relation to support for schemes in the Plan.

Cost Benefit Analysis (CBA) has been applied to the following elements of the programme:

- Base Service: via application of the Common Framework; Woodmansterne filter via costs of water hardness
- Enhanced Service Levels: flood resilience via WTP
- Supply-Demand Balance: metering; Bough Beech capacity; and water efficiency all via WTP
- Quality Enhancements: lead communication pipes; Security and Emergency Measures Directive (SEMD); and National Environment Programme (NEP) all via WTP (also with reference to DWI support and Government guidelines where applicable).

The Company has evaluated both direct and indirect GHG emissions, relating to both embodied and operational carbon.

The commentary below follows the numbering sequence of the Company commentary.

C8.1 Introduction

No commentary required.

C8.2 The Company’s approach to Cost Benefit Analysis (CBA)

C8.2.1 Overview

The Company’s approach has been to identify alternative intervention options and to evaluate the costs (i.e. net financial outcome) and benefits (net non-financial impact). The Company has applied a bottom-up and top-down approach to CBA.

The Willingness to Pay (WTP) survey and the formulation of the CBA model have been peer reviewed by a Senior Associate at Frontier Economics. The output of this review is presented as supporting information C8-2. (I note that
This peer review found that in general the survey and modelling followed the appropriate guidance, with the following key observations:

- The second WTP survey (described further below) is less robust than the first but provides relevant evidence of the scale of customer benefits.
- There is a marked increase in the marginal WTP figures derived for increasing levels of meter penetration, for which there is no intuitive explanation.
- The option value for innovative tariffs associated with high meter penetration is highly dependent on the assumed probability of a future demand ‘shock’. (This option value was prepared by Frontier Economics.)

C8.2.2 Assessment of Benefits

C8.2.2.1 Willingness to pay surveys

April 2008 Study

Customer focus groups were used to direct the original customer WTP survey. The survey followed an appropriate stated preference choice experiment approach, and covered the following measures:

- Leakage
- Discolouration
- Interruptions
- Water efficiency (expressed as expenditure)
- Supply levels of service (hosepipe bans, standpipes and non-essential use bans)
- Climate change (carbon) (NB these results have not been used in favour of the Defra guidance)
- Household metering (percentage coverage).

February 2009 Study

A second phase of customer WTP research has been carried out following the DBP. Rather than a stated preference choice experiment, this took the form of presenting the expected bill impact associated with each of eight specific schemes (listed in the Company commentary), and then seeking approval for this expenditure according to the following scale:
In order to derive a WTP figure from this response, the survey team has made the following assumption:

<table>
<thead>
<tr>
<th>Assumption scenario</th>
<th>Strongly in favour</th>
<th>Quite in favour</th>
<th>Neither in favour nor against</th>
<th>Not really in favour</th>
<th>Not at all in favour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1.50</td>
<td>1.25</td>
<td>0.75</td>
<td>0.25</td>
<td>0</td>
</tr>
<tr>
<td>Central</td>
<td>1.50</td>
<td>1.25</td>
<td>1.00</td>
<td>0.50</td>
<td>0</td>
</tr>
<tr>
<td>High</td>
<td>2.00</td>
<td>1.50</td>
<td>1.00</td>
<td>0.50</td>
<td>0</td>
</tr>
</tbody>
</table>

It is important to recognise that these multiplier factors are assumptions made by the survey team: they are not elicited from customer opinion. In my view this is a significant weakness of the approach: I would have preferred the choice to have been explicit, for example offering the five alternative levels of bill impact and determining the maximum the customer would accept. The Company’s analysis recognises the ambiguity this introduces by proposing the three alternative assumption scenarios shown above.

It is my view that this second survey does not strictly demonstrate customer WTP beyond the following, although it would certainly be expected that greater WTP does exist to an unknown extent:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Strongly in favour</th>
<th>Quite in favour</th>
<th>Neither in favour nor against</th>
<th>Not really in favour</th>
<th>Not at all in favour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrated</td>
<td>1</td>
<td>1</td>
<td>0.5</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The relative impact of these alternative scenarios varies between schemes according to the split of responses between the different levels. I provide this comparison where each scheme is discussed further below.

It is also noted that the bill impact indicated to the customer at the time of the survey is less than that of the final scheme presented in the Final Business Plan (FBP). Again, this is noted where each scheme is discussed further below.
C8.2.2.2 Assessing net non-financial impacts relating to social and environmental issues

Assessing the carbon impact of the investment programme

The Company has used Defra’s shadow price of carbon, considering both embodied and operational emissions. For the purposes of the CBA the long-term value (0.43kgCO$_2$/kWh) has been used, corresponding to the long-term analysis horizon.

In accordance with the guidance, it should be noted that indirect emissions associated with embodied carbon have been included in the Table.

Assessing possible impacts of noise pollution and traffic disruption

The Company has used benefit transfer to quantify the monetised impacts of traffic disruption and noise, the analysis being carried out by Frontier Economics.

For the range of interventions considered, it was found that the monetised impact of noise was negligible.

The monetised value of traffic disruption was found to be significant for infrastructure interventions but negligible for non-infrastructure.

C8.2.2.3 Assessment of costs

CBA has been applied over a 40 year horizon.

I requested details of the calculation of the NPV of costs and was provided with the spreadsheets used. The calculation for annual cost to customers is as follows:

- Annual depreciation charge (cumulative sum of annual capex divided by asset life)
  
  plus

- Allowable return on capital (cumulative sum of annual capex multiplied by the cost of capital (4.5% for WRMP, 6.1% elsewhere))
  
  plus

- Annual opex (e.g. meter reading less electricity saving)
  
  minus

- Annual value of deferred schemes (see detailed discussion of metering).
It is therefore noted that this method of calculation makes an allowance for depreciation of assets and effectively their residual value at the end of the time horizon considered. Inclusion of this residual value will result in a lower NPV of net costs than would otherwise be the case, which the Company would argue is more fairly comparable to the benefits over a finite time horizon.

The contribution to customers' average bills has been calculated as the annual cost to customers (as described above) in 2014/15 divided by the total number of customers.

The NPV of costs is calculated from the annual costs derived as above, according to the social time preference discount rate recommended by the HM Treasury Green Book, i.e. 3.5% for years 1 to 30 and 3% for years 31 to 40. When calculating the compounded discount rate for expenditure in year 40 I would have expected 30 years of discounting at the 3.5% rate followed by 10 years at 3%. However, in examining the calculation spreadsheet it is apparent that for years 31 to 40 the compounded rate is based entirely on the 3% rate: thus the compounded rate jumps upwards at year 31 before declining again. I have examined the impact of this using the example of the Woodmansterne WTW filtration scheme, as follows:

<table>
<thead>
<tr>
<th></th>
<th>Company calculation</th>
<th>Revised calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPV Costs (£m)</td>
<td>3.92</td>
<td>3.90</td>
</tr>
<tr>
<td>NPV Benefits (£m)</td>
<td>4.35</td>
<td>4.26</td>
</tr>
<tr>
<td>Benefit to Cost Ratio</td>
<td>1.11</td>
<td>1.09</td>
</tr>
</tbody>
</table>

The impact on the NPVs is very small, as it relates only to the last quarter of the time horizon, which is highly discounted. The impact is greater on the NPV of benefits than on that of costs as the benefits continue each year but the allowable return on capital charge reduces with time. As a result the benefit to cost ratio in the revised calculation is slightly lower than that stated by the Company; however as the benefit to cost ratio is significantly greater than one for each of the schemes in the FBP this should not affect the outcome of the CBAs.

There is no effect on the bill impact calculated for 2014/15.

**C8.3 Table C8.1 – Water service - Summary of costs and benefits the plan will deliver**

**C8.3.1 General**

No commentary required.

**C8.3.2 A) Water service – commentary by line**

It has been confirmed that the NPV costs in column 3 are those derived from social time preference rate discounting of the bill impact, and are therefore directly comparable to the NPV benefits in column 4.
Due to an issue with the data capture system the bill impact is omitted from lines 23 and 32 (but not the block totals), and several project counts are omitted. The Company has provided the following information:

### C8.3.3 B) Base service – commentary by line

No entries have been made in Block B of the table.

**Common Framework – Cost-effectiveness Objective**

Maintenance of current levels of service (line 3) has been justified via application of the Common Framework, other than for Management and General items.

As in the DBP, the Company commentary includes a discussion of costs versus benefits for interventions within this element of the programme. As application of the Common Framework meets the requirements for CBA I do not regard this analysis as necessary for justification. I also note that non-infrastructure interventions are assigned negative costs (i.e. net NPV cost savings over the period), according to averted opex costs outweighing the initial capex cost. This stems from a comparison to a ‘do nothing’ scenario in which assets are never renewed, and will in my opinion be highly sensitive to the assumptions made about future failure rates at asset ages of which there is no experience.

**Common Framework – Cost-benefit Objective**

The Company has made the strategic decision not to include enhancements to the interruptions and discolouration service measures in its Final Business Plan (FBP) programme, with affordability of the overall programme in mind.

---

<table>
<thead>
<tr>
<th>Line description</th>
<th>NPV of costs</th>
<th>NPV of benefits</th>
<th>Contribution to customers’ average bills in 2014-15</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 A - Water service - All planned changes to service</td>
<td>£112.52</td>
<td>£152.67</td>
<td>£152.67</td>
</tr>
<tr>
<td>2 B - Base service - All planned changes to service</td>
<td>£89.00</td>
<td>£117.78</td>
<td>£117.78</td>
</tr>
<tr>
<td>3 Maintaining current service in terms of key serviceability indicators</td>
<td>£87.00</td>
<td>£115.76</td>
<td>£115.76</td>
</tr>
<tr>
<td>C - Enhanced service levels</td>
<td>£2.60</td>
<td>£3.78</td>
<td>£0.56</td>
</tr>
<tr>
<td>D - Supply/demand balance - All planned changes to service</td>
<td>£104.63</td>
<td>£142.87</td>
<td>£142.87</td>
</tr>
<tr>
<td>E - Quality enhancements</td>
<td>£6.29</td>
<td>£8.02</td>
<td>£2.55</td>
</tr>
<tr>
<td>F - Individual large projects</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

---
Standalone Cost Benefit Analysis

There is a further scheme to increase capacity of Woodmansterne WTW filtration in order to address serviceability issues. The Company has identified this as a standalone capital maintenance scheme, justified by cost-benefit analysis.

The benefit evaluated is avoidance of water being supplied at times of high demand which has not been fully softened. The calculation is as follows.

The Company estimates that in the absence of this scheme water is fully softened only 60% of the time and is partially softened the remaining 40% of the time. It estimates that at times of partial softening two-thirds of the benefits of softening are delivered.

The benefit of softening is presented in the Company commentary, by calculation of a reduced requirement for detergents and soaps. Whilst the calculation relating to ‘other soaps’ has not been seen, that for clothes washing appears reasonable, as does the overall conclusion that a household spends approximately £2.70 per week on detergents of all kinds in the total absence of water softening and that this is reduced by 25% when the softening process is fully operational.

The benefit of this scheme (per household served by Woodmansterne WTW per year) is evaluated as the frequency of undersoftening (40%) times the degree of undersoftening (1/3) times the annual saving in detergent cost due to full softening (25% of detergent cost).

The resultant Benefit to Cost ratio is 111%. On this basis the scheme should be regarded as cost-beneficial, recognising that a number of estimates have been required in order to be able to evaluate the benefits.

Management and General

Maintenance of current levels of service (line 3) in relation to Management and General items has not been subject to CBA. By their nature the benefits associated with these items cannot be evaluated.

C8.3.4 C) Enhanced service levels – commentary by line

Asset Resilience to Flood Hazards

A detailed and rigorous study has been carried out following the methodology in the Ofwat guidance for risk screening, risk analysis and risk management. The study reports are presented as Supporting Information B6-1 and B6-2 to Section B6.

This study has identified three sites at which flood protection works are proposed:
• Bough Beech River Intake – raise existing access road and protect surge vessel
• Kenley WTW – restrict overland flow and provide surface water storage
• Woodmansterne WTW – restrict overland flow and provide surface water storage.

I have challenged the Company in relation to the impact of flooding at these sites in a number of respects, and provide a summary as follows:

• I queried whether raw water quality at Bough Beech would be suitable for abstraction at times of high flooding. The Company responded that the site is designed with this in mind and that sufficient time is available for settlement to take place within the reservoir

• I queried whether raising the access road at Bough Beech would cut off the source of flooding to the surge vessel, which it was indicated would flood from the west. The Company responded that the report should read ‘flood from the east’

• I queried what the consequence would be of the surge vessel at Bough Beech becoming inundated. The Company responded that the telemetry and instrumentation would fail, and that this could cause catastrophic failure of the system.

At Bough Beech the intake pump building itself would not be flooded, but access to it would be cut off. In my view it is unrealistic to assume that one of the four intake pumps would fail during the short duration of flooding of the access road, and require repair. I also note that reservoir storage (which is supplied from the intake) has not been taken into account in the analysis.

The Company commentary presents a CBA based on the second customer WTP survey. My commentary below deals with this and then with the CBA carried out as part of the flood risk assessment study.

CBA presented in Section C8

The general comments made previously about this survey apply (see Section C8.2.2.1).

In the survey, the proposal was expressed to customers as follows:

Ensure customer supplies are not at risk from effects of severe flooding

Current level of service: Increasing storm severity in recent years means that a small number of water treatment works may be subject to flooding therefore increasing the risk of being unable to maintain water supplies.
Proposed level of service: Protect treatment works from effects of severe flooding to ensure water supplies are maintained. This affects 5 water installations.

In my opinion this does not provide the respondent with sufficient information to allow him to make an informed choice: it does not indicate the proportion of customers who would be affected or the frequency with which their supply might be lost.

The bill impact of this scheme in the FBP is significantly greater than that indicated to the customers in the WTP survey, as shown in the table below. The table also shows the impact of the WTP assumption scenario on the outcome of the CBA. Whilst the ‘Demonstrated’ scenario does not prove customer acceptance of the scheme, it must be remembered that it forms only a lower bound on the true WTP amongst customers.

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bill impact in WTP survey (£/yr)</td>
<td>0.27</td>
</tr>
<tr>
<td>Bill impact in FBP (£/yr)</td>
<td>0.56</td>
</tr>
<tr>
<td>NPV costs (£m)</td>
<td>2.599</td>
</tr>
<tr>
<td>NPV benefits using Company ‘Central’ WTP scenario (£m)</td>
<td>3.778</td>
</tr>
<tr>
<td>NPV benefits using ‘Demonstrated’ WTP scenario (£m)</td>
<td>1.434</td>
</tr>
<tr>
<td>Benefit to Cost ratio using ‘Demonstrated’ WTP scenario</td>
<td>55%</td>
</tr>
</tbody>
</table>

CBA presented in Section B6 Appendix 2

The CBA carried out as part of the flood risk assessment study is reported in Section B6 Appendix 2. The key elements of this methodology are discussed below.

Benefit monetisation

The benefit value for avoidance of loss of supply due to flooding is based on the customer WTP value for interruptions due to bursts (determined in the stated preference choice experiment (first) survey). The logic of the calculation (Section 6.2.2 of the study Appendix) appears difficult to follow: from the CBA sheets (Appendix E of the study Appendix) the benefit value per year is taken as £1.50 times the number of occupant-days lost per year.

I present my logic as follows. From the customer WTP survey for interruptions due to bursts, if 867 less properties were interrupted per year then the WTP would be £1.50 per billpayer per year (figures interpolated as per the study Appendix). This corresponds to a total across all billpayers of £1.50*257,233/year for 867 property interruptions, i.e. £1.50*257,233/867 per year per property interruption. If you make the assumption that a flood interruption of a day is equivalent to a burst interruption (a burst interruption having a shorter duration but without bottled water supplied), then the total ‘WTP’ value for flooding would be the number of property-days multiplied by £1.50*257,233/867 per year. Taking the occupancy rate as 2.5 this equates to £1.50*257,233/(867*2.5) per year per occupant-day, = £178 per occupant-day lost per year.
However, if this value were to be used then it is found in the analysis further below that the total WTP valuation may be as much as £77 per property per year. The maximum WTP (for all measures) is £18.51 per property per year, and so the monetisation value may need to be scaled down to 24% of the figure above. This remains considerably greater than the value of £1.50 that appears to have been used in the Company analysis.

*Return period of flooding*

For each site, and where appropriate for each key asset on the site, the flood depth to cause interruption to supply has been assessed. It is then necessary to estimate the return period of flooding to this depth.

It has been found that for the 1 in 100 year flood events the expected depth is significantly greater than that required to cause interruption to supply. It follows that there must be a more frequent flooding event that would just reach the depth required to cause interruption.

The difficulty the Company faces in this analysis is that data (and/or models) do not exist to provide the relationship between the return period of these more frequent flood events and their flood depths. In the absence of these data the Company has used linear interpolation between the most frequent flood event whose inundation depth is known and a nominal ‘zero depth’ event of once in five years. Were the ‘zero depth’ event to be taken as once in ten years then a different return period for interruptions would be calculated.

The impact of this on the evaluation of benefits is that they will be approximately inversely proportional to this nominal return period for a ‘zero depth’ event (given that this return period is significantly shorter than the 1 in 100 year event from which the interpolation is made).

*Duration of flooding*

In the Failure Modes and Effects Analysis (FMEA) an assessment has been made of the likely duration of loss of function, as 1, 2, 3 or 7 days according to the type of asset and situation.

*Resilience*

No account has been taken of resilience in the system, whereby another site may be able to supply customers whilst the flooded site is inoperable. Similarly, no account has been taken of reservoir storage.

It may be noted in this respect that the sites concerned represent a sizeable proportion of customers (Bough Beech; Kenley; Woodmansterne out of a total population of 645,000).

*Analysis and Conclusion*

Using the Company’s figures for the number of occupant-days of interruption per year, and taking the ‘WTP’ value I calculate above (£178 per occupant-day
lost per year), the total monetised benefit value would be £77 per property per year. The maximum WTP (for all measures) is £18.51 per property per year, i.e. 24% of this figure.

Using this maximum WTP cap, the annual monetised benefits compare to the capital expenditure for each scheme as follows:

<table>
<thead>
<tr>
<th>Site</th>
<th>Occupant-days lost per year</th>
<th>Benefit (£/year)</th>
<th>Capex (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bough Beech</td>
<td>2,034</td>
<td>86,919</td>
<td>360,000</td>
</tr>
<tr>
<td>Kenley WTW</td>
<td>62,788</td>
<td>2,683,136</td>
<td>876,000</td>
</tr>
<tr>
<td>Woodmansterne WTW</td>
<td>46,599</td>
<td>1,991,327</td>
<td>683,000</td>
</tr>
</tbody>
</table>

Whilst I have not carried out a full CBA with discounted costs and benefits, these figures suggest that for the latter two schemes the estimated benefits in the first year alone exceed the costs. However, it must also be noted that there are significant uncertainties in the Company’s assessment of the number of occupant-days lost per year. These uncertainties arise from the estimation of the return period of a flood event of sufficient depth, and from not taking into account system resilience.

Treating the whole of the maximum WTP cap as available for justification of the flooding schemes, and given that this cap corresponds to just 24% of the Company’s assessment of flooding risk, the latter assessment may overpredict risk by a factor of four without affecting the benefit valuation. In approximate terms, this would correspond to the ‘zero depth’ flood event having a return period of 1 in 20 years rather than 1 in 5.

It should also be noted that the Company’s capital costs are estimated within a margin of ± 30%. Notwithstanding these uncertainties, it would appear that the schemes for Kenley WTW and Woodmansterne WTW can be judged to be cost-beneficial.

However, for the scheme at Bough Beech River Intake in my view it is unrealistic to assume that one of the four intake pumps would fail during the short duration of flooding of the access road, and require repair. The Company’s assessment of the risk at this site is therefore a gross overestimate and I do not view the access road scheme as cost-beneficial. The extent of the benefits associated with remaining element of work proposed at this site, construction of a wall around the surge vessel, is also unclear given the presence of the raw water storage reservoir.

C8.3.5 D) Supply / demand balance – commentary by line

There is no programme required in relation to maintaining the current level of security of supply for expected demand (line 22).

Three schemes are included in the programme in relation to critical/peak demand: metering; Bough Beech capacity; and water efficiency.
Metering Programme

The Company commentary gives the context of their concerns and strategy regarding future movements in both supply and demand. It sees demand management by metering as a key pillar of this strategy, including the longer-term possibility of greater demand management driven by tariff structures that are dependent on high meter penetration.

The Company commentary provides figures for two programmes: the baseline programme of meter optants and the final metering programme which includes both optants and selective metering. As the Company is required to carry out optant metering, in my analysis below I have considered the baseline programme to be the ‘do nothing’ scenario and have calculated the net impact of the final metering programme relative to this. If this is not done, and the stated benefits of the final metering programme are compared to its stated costs, then the cost of the Thames transfer scheme being implemented in 2039/40 is included as a penalty. In reality this is a deferral of the scheme from implementation in 2027/28 in the absence of reduced demand and leakage associated with the selective metering programme, and should be considered a cost saving (in NPV terms).

**Metering Programme – Costs**

The elements of financial cost included in the Company’s CBA are tabulated below (in order of descending cost significance), together with my commentary.

<table>
<thead>
<tr>
<th>Cost Element (relative to baseline)</th>
<th>NPV (£m)</th>
<th>Reporter Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>31.1</td>
<td>This includes meter renewal costs every 15 years</td>
</tr>
<tr>
<td>Deferral of expenditure on water resources</td>
<td>-14.9</td>
<td>The WRMP indicates that the Thames Transfer scheme will be required in 2039/40 in the absence of the final metering scheme, or beyond the CBA time horizon with the metering scheme in place. The cost of this scheme is with annual opex of : the difference in NPV shown is the result of deferral to a later year.</td>
</tr>
<tr>
<td>Water production (demand &amp; leakage)</td>
<td>-6.5</td>
<td>This is taken as the reduction in electricity costs to the Company associated with the reduced demand (assumed to be 10%) and supply pipe leakage (assumed to be 20l/prop/day via improved detectability).</td>
</tr>
<tr>
<td>Reading</td>
<td>4.9</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14.5</strong></td>
<td></td>
</tr>
</tbody>
</table>

I view these cost elements to be appropriate for inclusion in the CBA.
**Metering Programme – Benefits**

The elements of benefit included in the Company’s CBA are tabulated below (in order of descending significance), together with my commentary.

<table>
<thead>
<tr>
<th>Benefit Element (relative to baseline)</th>
<th>NPV (£m)</th>
<th>Reporter Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic energy bill savings as a result of less water heated</td>
<td>41.9</td>
<td>The Company has calculated a saving in customers’ electricity bills associated with a reduction in the volume of water heated. The assumption is made that demand is reduced by 10%, and of this a certain proportion would have been heated. This is discussed further below.</td>
</tr>
<tr>
<td>Carbon savings from less domestic energy consumption</td>
<td>4.7</td>
<td>This relates to reduced water heating.</td>
</tr>
<tr>
<td>Option value</td>
<td>4.0</td>
<td>The Company argues that there is a value of high meter penetration associated with being able to use innovative tariffs in order to influence demand under ‘shock’ conditions. This is discussed further below.</td>
</tr>
<tr>
<td>Customer valuation of increased meter penetration (based on willingness to pay)</td>
<td>3.1</td>
<td>This is monetised according to the WTP figures from the stated preference choice experiment (first) survey. The WTP value for each additional percentage of meter penetration from 54-60% has been halved in recognition of it being significantly greater than the rate from 23-54%. It remains a factor of four greater. No WTP is applied above the highest level of meter penetration offered in the survey (60%).</td>
</tr>
<tr>
<td>Carbon saving from lower energy consumption by the company</td>
<td>0.7</td>
<td>This relates to reduced water production (demand &amp; leakage).</td>
</tr>
<tr>
<td>Embodied carbon</td>
<td>-0.7</td>
<td>This is the disbenefit associated with embodied carbon in meter installation</td>
</tr>
<tr>
<td>Sewerage company operating expenditure savings from treating less water</td>
<td>0.4</td>
<td>This relates to reduced water demand.</td>
</tr>
<tr>
<td>Carbon savings associated with less sewerage works</td>
<td>0.1</td>
<td>This relates to reduced water demand.</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>54.2</strong></td>
<td></td>
</tr>
</tbody>
</table>

I view these benefit elements to be appropriate for inclusion in the CBA; however I provide further commentary on issues arising in the valuation of two of these elements below.
**Metering Programme – Domestic water heating**

As the table of benefits above shows, the vast bulk of the benefits presented are related to customers’ savings in water heating associated with reduced demand. The assessment of the main carbon impact is also related to this reduction in water heating.

The Company’s approach to calculation of this benefit is as follows.

A figure for total water heating has been extracted from a draft Market Transformation Programme (MTP) report (I have been given a copy of this report and confirm that the figure of 7.19kWh/property/day is stated in Table 5.1).

It has been assumed that 75% of the reduction in demand upon selective metering is associated with heated water. The Company notes that 65% of water overall is heated, a figure which is confirmed by Figure 3.2 of the MTP report (if the assumption is made that all water used in washing machines and dishwashers is heated).

A figure for the cost of domestic power has been extracted from the Department of Energy and Climate Change (DECC) report for December 2008. Table 2.2.3 gives the average cost of electricity in London as 11.89p/kWh.

The Company has assumed that all heated water saved is heated electrically. However, Table 5.4 in the MTP report provides the overall breakdown between electricity, gas and oil for heating water as 33%, 62% and 5% respectively. The DECC report gives the cost of gas as 3.18p/kWh. Taking these figures (and using the cost of gas for water heated by oil in the absence of published figures) would give an averaged cost of 6.1p/kWh for water heating, which represents 51% of the figure used in the Company’s CBA. It is my view that this would be a more appropriate figure to use: the impact of this on the outcome of the CBA is considered further below.

It may also be considered that the customer chooses to reduce consumption in order to reduce his water bill, and that part of this decision could similarly be related to the associated reduction in his heating bills. He makes this choice as a trade-off between the total financial saving and the utility he receives (for example length of time under a power shower). The loss of utility associated with reduced consumption is not considered in the CBA, although it may be noted that some elements of demand reduction may not have a corresponding loss of utility, for example where save-a-flush bags are used. (The financial saving on the water bill is counted in the CBA as the saving to the water and sewerage undertakers and is correctly not double-counted as a benefit to the customer.)

**Metering Programme – ‘Option’ value**

As in the DBP, the Company has assessed an option value associated with a hypothetical scenario whereby a ‘shock’ increase in demand in the future may
increase demand beyond supply headroom for a period until additional resources can be commissioned. The proposition is that the high meter penetration resulting from the final metering programme would enable the use of innovative tariffs in order to influence demand and prevent customers losing supply.

The Company has taken a nominal 5% probability of such a ‘shock’ occurring in the year 2022 and continuing for a period of three years until alternative resources are commissioned. It has valued the avoidance of this supply loss at £10 per property per day.

In my view the evaluation of this benefit value is open to question for the following reasons:

- There is no supporting evidence for the assumed likelihood of such a ‘shock’ demand scenario, or for the extent of the shock demand and whether it would cause demand to exceed supply (particularly in view of the Bough Beech scheme further below).
- No assessment has been given of the extent to which any tariff flexibility allowed by increased meter penetration could reduce demand beyond the 10% assumed under normal tariffs.
- Experience suggests that demand is reduced in times of water shortage even amongst unmeasured customers.

The impact that omitting this option value would have on the outcome of the CBA is considered further below.

(Whilst I have reviewed the CBA calculation I have not seen the backing calculations for the option value.)

**Metering Programme – Intangible benefits**

The Company commentary lists a number of potential ‘intangible’ benefits for which it is not possible to derive a monetary valuation. It is my general opinion that of these only one is likely to be of significance: that of improved debt management.

I further note that WTP for reduced leakage has not been calculated as a benefit.

**Metering Programme – Conclusion**

The Company commentary discusses the ‘optimal’ metering programme and concludes that a more rapid introduction of selective metering would be more cost-beneficial (based on timing). However this more rapid programme would involve practical difficulties and have an undesirable impact on customers’ bills. The Company has therefore made a pragmatic choice in its programme.
A sensitivity analysis is also presented, which indicates that the two factors most influential on the outcome of the CBA and whose precise values are uncertain are:

- The assumed proportion of demand that is reduced via metering
- The further assumptions made in the calculation of the cost saving arising from reduced domestic water heating.

I have expressed concerns above regarding the evaluation of the benefits in relation to savings in water heating costs and to the option value for innovative tariffs. In order to demonstrate the impact of these issues, an alternative summation of the benefits can be made as follows:

- Water heating benefit taken as 51% of that stated in the Company analysis
- Carbon benefit associated with water heating similarly taken as 51% of that stated (making the broad assumption that carbon impact is proportional to cost for the different fuel types)
- Option value for innovative tariffs omitted
- All other benefits included as per the Company analysis.

Making these assumptions the NPV of benefits would reduce to £27.4m, compared to the NPV of costs of £14.5m, both taken relative to the baseline metering programme. On this basis the scheme would remain cost-beneficial.

It must be recognised that the benefit valuation is proportional to the assumed demand reduction for selective metering (other than the adverse impact of embedded carbon which is small). Benefits exceed costs providing the demand reduction exceeds 5.5% of consumption.

**Bough Beech**

This scheme is to increase Bough Beech Deployable Output (DO) from 45Ml/d (post AMP4) to 70Ml/d. The works are characterised as being 40 years old and in need of a major overhaul: the overlap with capital maintenance has been accounted for. The scheme also requires duplication of the Bough Beech to Buckland trunk main in order to increase its capacity.

The scheme has been selected within the WRMP, which identified the need for an additional resource to meet peak demands. Whilst it is understood that the formal EBSD methodology has not been used in the WRMP, the approach was based on lowest NPV cost. The Company commentary tabulates the Average Incremental Social Cost (AISC) of nine resource schemes considered; Section B5 shows additional demand-side schemes.

A sub-option at Bough Beech has also been considered, in which the DO increase is delivered in two phases: an increase to 55Ml/d at the start of AMP5 followed by further increase to 70Ml/d when required. This has the advantage of deferring part of the expenditure, but the disadvantage of increasing the total expenditure requirement (and also of lower headroom prior to the second
phase). The analysis showed that with the timing of the second phase required to maintain the supply-demand balance (2020/21), the NPV of costs is greater than that for the single-phase option.

On this basis it is my view that the scheme has been demonstrated to be cost-beneficial.

The Company has also included the scheme in its second customer WTP survey. 80% of customers were either in favour or strongly in favour of the proposal. Making the assumptions described above in relation to this survey, the Company reports that benefits evaluated in this way exceed the costs. The survey also offered a number of options in relation to an increased metering programme and leakage targeting to address demand. It concluded that the timing of the Bough Beech scheme was broadly supported by the survey.

**Water efficiency**

This scheme is to install water efficiency devices in schools and to provide an education opportunity that may result in savings in the home.

The scheme has been selected within the WRMP. The same comments on the methodology used apply as for Bough Beech above.

On this basis it is my view that the scheme has been demonstrated to be cost-beneficial.

The Company commentary also presents a CBA based on customer WTP derived from the first survey. This derived a WTP of £0.76 per customer for every £100k of investment in water expenditure (up to £1m). Multiplying by 270,000 customers gives a benefit to cost ratio of 2.05. It is not clear that the survey respondents were able to assess the scale of benefit achieved in terms of water saving for this expenditure. (The Company also presents a CBA based on the second customer survey. Making the assumptions described above in relation to this survey, the Company reports that benefits evaluated in this way exceed the costs. The general comments made previously about this second survey apply.)

**C8.3.6 E) Quality enhancements – commentary by line**

Three key schemes are included in the programme in relation to quality enhancements: lead communication pipes; Security and Emergency Measures Directive (SEMD); and National Environment Programme (NEP). These are discussed below.

There is one further minor scheme not covered in Section C8, relating to catchment management to address metaldehyde contamination. The DWI has confirmed its support for the Company’s proposals. Further, it is clear that if there would be a future requirement for water treatment which can be averted by these means then this would be highly cost-beneficial.
Lead strategy (communication pipe replacement)

The Company considers that orthophosphoric acid dosing has already been optimised, and that the 10μg/l limit from December 2013 requires an enhanced lead pipe replacement programme.

The Company commentary presents a CBA based on the second customer survey. The general comments made previously about this survey apply (see Section C8.2.2.1).

The bill impact of this scheme in the FBP is greater than that indicated to the customers in the WTP survey, as shown in the table below. The table also shows the impact of the WTP assumption scenario on the outcome of the CBA. Whilst the ‘Demonstrated’ scenario does not prove customer acceptance of the scheme, it must be remembered that it forms only a lower bound on the true WTP amongst customers.

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bill impact in WTP survey (£/yr)</td>
<td>0.49</td>
</tr>
<tr>
<td>Bill impact in FBP (£/yr)</td>
<td>0.58</td>
</tr>
<tr>
<td>NPV costs (£m)</td>
<td>0.709</td>
</tr>
<tr>
<td>NPV benefits using Company ‘Central’ WTP scenario (£m)</td>
<td>0.765</td>
</tr>
<tr>
<td>NPV benefits using ‘Demonstrated’ WTP scenario (£m)</td>
<td>0.539</td>
</tr>
<tr>
<td>Benefit to Cost ratio using ‘Demonstrated’ WTP scenario</td>
<td>76%</td>
</tr>
</tbody>
</table>

It should further be noted that the Company has received a letter of support from the DWI, in recognition of the requirements imposed by the Water Supply (Water Quality) Regulations (2000).

Security and Emergency Measures Directive (SEMD)
National Environmental Programme (NEP)

The Environment Agency advised the Company of four investigations that it would like carried out as part of the National Environment Programme (NEP) for water resources.

The Company commentary presents a CBA based on the second customer survey. The general comments made previously about this survey apply (see Section C8.2.2.1).

The bill impact of this scheme in the FBP is greater than that indicated to the customers in the WTP survey, as shown in the table below. The table also shows the impact of the WTP assumption scenario on the outcome of the CBA. Whilst the ‘Demonstrated’ scenario does not prove customer acceptance of the scheme, it must be remembered that it forms only a lower bound on the true WTP amongst customers. (It may also be noted that the Company’s ‘Central’ scenario gives benefits less than costs for this individual scheme.)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bill impact in WTP survey (£/yr)</td>
<td>0.31</td>
</tr>
<tr>
<td>Bill impact in FBP (£/yr)</td>
<td>0.42</td>
</tr>
<tr>
<td>NPV costs (£m)</td>
<td>0.510</td>
</tr>
<tr>
<td>NPV benefits using Company ‘Central’ WTP scenario (£m)</td>
<td>0.458</td>
</tr>
<tr>
<td>NPV benefits using ‘Demonstrated’ WTP scenario (£m)</td>
<td>0.310</td>
</tr>
<tr>
<td>Benefit to Cost ratio using ‘Demonstrated’ WTP scenario</td>
<td>61%</td>
</tr>
</tbody>
</table>

It should further be noted that the scheme is planned specifically in response to the requirements of the Water Framework Directive.

C8.3.7 F) Individual large projects – commentary by line

There are no individual large projects.

C8.4 Strategic level analysis

The commentary above applies.
### C8.5 Table C8.3 – Summary of carbon and greenhouse gas balance sheet

#### C8.5.1 General

The Company commentary identifies the key assumptions made, which may be summarised for each column as follows.

**Column 4**
Carbon associated with asset disposal and with the supply chain has been excluded. Indirect (transport) emissions associated with construction have been included.

**Column 6**
For the NPC calculations, a 40 year time horizon and 3.5% discount rate have been used.

From a review of the calculations I can confirm that subsequent asset renewals within the time horizon have been included, according to nominal replacement lives. Annual emissions are not included.

**Columns 7 & 8**
Annual emissions associated with all programmes other than supply-demand are regarded as unchanged. For supply-demand the emissions have been calculated from the 2008 June Return emissions table and the expected increase in Deployable Output. Column 7 is based on the CRC figure (for energy use) and column 8 is based on the Defra figure for all emissions less column 7.

**General**
I have been provided with the Company's calculation spreadsheets and have reviewed these and carried out spot-checks. These calculations are highly detailed and demonstrate that significant effort has been applied.

The analysis supports the Strategic Direction Statement's aim that "We will minimise our carbon footprint and CO2 emissions within a framework of increasing demand and existing assets."

#### C8.5.2 A) Water service – commentary by line

I note here that the increase in emissions per Ml (column 5) is zero to three decimal places.

The totals for columns 4 and 6 may be corrected in accordance with the notes for Blocks C and E below, however the overall changes are very small compared to the level of uncertainty intrinsic to the carbon calculations.

#### C8.5.3 B) Base service – commentary by line

The 76% allocation of the Bough Beech to Outwood trunk main accounts for 16.785kt of emissions to build i.e. approximately half the total for line 3. These
emissions have been calculated bottom-up from materials, transport and labour, using manufacturer’s data for the mass of 900mm ductile iron main. The Company believes that this approach more accurately represents the construction activity in particular than the UKWIR guidance does. As a comparison, using the emissions figure from Table 3.11 of the UKWIR guidance gives total emissions 9% greater than those calculated by the Company, for the majority section at 4m depth in a field. In view of the effort taken in the calculations I am satisfied that their approach is appropriate.

Emissions to build related to smaller diameter pipes have been calculated in a similar bottom-up fashion, and the same comments apply. It is also worth noting that many of the diameters required do not appear in the UKWIR guidance.

Emissions to build non-infrastructure assets have been built up for a number of specific activities.

C8.5.4 C) Enhanced service levels – commentary by line

Emissions to build have been built up for the specific schemes.

On review of the calculation spreadsheet I found an error. The Company agrees that the figure in line 12 (Flood Hazards) column 4 should be 0.694kt and in column 6 should be £0.032m. The totals in lines 11 and 1 change correspondingly.

C8.5.5 D) Supply / demand balance – commentary by line

The majority of the emissions to build relates to the Outwood to Buckland trunk main associated with the Bough Beech scheme.

Operational carbon emissions associated with the Deployable Input increase have been calculated as described above in Section 8.5.1.

C8.5.6 E) Quality enhancements – commentary by line

Emissions to build have been built up for the specific schemes.

On review of the calculation spreadsheet I found an error. The Company agrees that the figure in line 32 (SEMD) column 4 should be 2.407kt and in column 6 should be £0.149m. The totals in lines 31 and 1 change correspondingly.

C8.5.7 F) Individual large projects – commentary by line

There are no individual large projects.
The final business plan proposes the following main outputs which I consider are consistently described in both the summary and the main plan:

- Development of an increased peak output from Bough Beech Treatment Works to meet peak water demands from customers
- Renewal and maintenance of existing assets at a level of expenditure similar to that being achieved in the current AMP4 period
- Increased metering of domestic properties with installation rising from the 5814 meters installed in 2007/08 to 6400 per annum during the AMP5 period
- Broadly continuing to target current levels of service.

The Company highlights the rise in input prices especially power costs which are resulting in an increase in operating expenditure.

I have reviewed the Company’s proposals and scrutinised background data used to compile the final business plan and the associated draft final Water Resources Management Plan previously submitted to Defra. I have also checked consistency with the Company’s Strategic Direction Statement published in December 2007.

I have challenged the Company to demonstrate justification for the measures proposed and have been satisfied with the responses.

I confirm that the public domain summary has been prepared by directors of the Company who have also prepared or supervised production of the whole final business plan. I believe that the summary is well founded and consistently supported by the textual and numerical information on the final business plan.

I confirm that I have had very good co-operation from the Company including the directors in gaining access to the company’s data, reports by consultants, workbooks and systems used to develop inputs to the final business plan.

22 April 2009