Bristol Water Plc

Draft Water Resource Plan

revised statement of response to stakeholder representations

JANUARY 2009

27/01/2009

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Section 1. Introduction

1.1 Preface

In April 2008, we consulted on our draft long-term Water Resource Plan to maintain secure water supplies in a region impacted by climate change and where housing and population are forecast to grow significantly over the next 30 years.

From July to September 2008, we reviewed the responses from all stakeholders following the consultation period and in October issued our response to those representations. This document detailed how we had considered the representations and what changes we had made or would make as a consequence to our final plan to be released in April 2009.

In November 2008, DEFRA informed all water companies that they had re-interpreted section 4 of the Water Resource Management Plan Regulations 2007 (SI 2007/727). This section prescribes the information to be provided in respect of any changes made to our plan in response to stakeholder representations.

DEFRA has advised that we should re-publish the Statement of Response, providing full details of any changes made to our plan in respect of substantive representations in our statement, rather than in the final plan. In addition, we are also required show the impact of those changes on the final planning scenario in the revised Statement of Response.

We believe that we have now completed this work, which is included in this revised Statement of Response. In this document we have primarily considered the representations in response to the 2008 consultation, but incorporated some minor changes to the overall plan in respect of non-household water use projections. We believe that the Statement of Response covers most of the major changes to be reflected in the final submission of our plan. However, between now and March 2009 we will continue to refine our final Water Resource Plan in to take account of additional regulatory requirements. This means we cannot rule out the possibility of further minor changes to the final outcome of our Water Resources Plan when it is delivered in April 2009.

1.2 Summary

All water companies in England and Wales are required by statute to have a long-term plan for managing water resources in their area of operation. The process by which this plan is developed must now comply with the new regulations of the 2003 Water Act.

The legal requirements are defined in the Water Resource Management Plan Regulations 2007 (SI 2007/727), providing further detail on the process set out in Section 37 of the Water Industry Act 1991.These regulations define the statutory process for consultation, as set our below:

- To consult as widely as possible with the bodies suggested prior to developing the draft plan, particularly with the main statutory consultees.

- To produce a draft Water Resource Management Plan for submission to the Secretary of State, in accordance with the Water Resource Management Plan Directions.

- To consider all formal representations forwarded to us, or the Environment Agency from the Secretary of State after the consultation period.

- To demonstrate how representations have been considered, or taken into account within their plans.

The company's draft Water Resources Management Plan was submitted to DEFRA for formal consultation in April 2008. In addition, all of the stakeholders and wider public were notified by letter of the plan and given details of the consultation period and how to make representations regarding the plan to DEFRA. The draft plan was offered as a paper document, and made available on the company web site.

Over fifty organisations and individuals were formally invited respond during the consultation phase. DEFRA have forwarded representations to us regarding our draft plan from eight organisations, we also had representations from individual members of the public. These are listed below:

- Environment Agency
- Ofwat
- Natural England
- Consumer Council for Water
- Waterwise
- Campaign for the Protection of Rural England (CPRE)
- Avon Wildlife Trust
- The Woodland Trust
- Seven responses from individual members of the public

We are grateful to those organisations and individuals for taking the time to consider the proposals made in our draft Water Resource Plan and welcome their representations.

We have studied the representations and recommendations we have received. We have also considered how these representations will be taken account of either within the context of the statement of response, or as changes to the Water Resource Plan if appropriate.

The representations we have received together with our responses are available on our web site. This response will also be sent to DEFRA for consideration by the Secretary of State (SoS) during the period up to April 2009. The Secretary of State will then advise us if he considers that aspects of our plan should be investigated further at a Public Enquiry.

The key milestones for the remainder of the planning period are as set out below:

- DEFRA will direct water company regarding content of final plan early 2009
- Water Company to submit final plans April 2009
- Water Company to publish and distribute final plans July 2009

1.3 Analysis of representations

Although a relatively small number of representations were received, the quality and detail of the responses was substantial. We were pleased to note the plan attracted a generally positive response from most organisations. However, it is clear that some further work will be needed in order to ensure the final plan meets all stakeholder expectations. In general the responses we received were directed at the following aspects of the draft plan:

- Issues concerning appearance and presentation
- Comments requesting additional information or clarification
- Questions regarding water quality and environmental impact of the plan
- Issues regarding the suitability of the technical approach taken
- Comments relating to Government and other targets

We have focussed our responses on specific issues, information and changing outcomes rather than observations or cosmetic improvements to the published plan. Recommendations or representations concerning technical issues, or the approach used to develop the plan are considered in detail.

Extra information, further analysis and effect of changes are detailed in this response (and will be incorporated in the final submission of our plan). We have also indicated where we will not make modifications or take further action, explaining the reason why.

1.4 Responding to representations.

Our response to each organisations representation has been set out in the individual sections below. The full text of all of the representations received is provided in the appendices. We have aimed to take into account all of the points raised by each organisation. However, for the sake of clarity we may have summarised, or paraphrased the words in the representations in some cases. In addition we may have treated certain issues as related, and grouped them accordingly. This will result in our responses on certain issues not being in exactly the order of the original representations in all cases.

Separate organisations have made representations in regard of similar or even identical issues. Where this has occurred, we have indicated this is the case and made reference to the location of our fully detailed response.

In responding to representations we have, where appropriate, indicated how a particular subject has been considered and whether we have changed our plan in response to a representation.

In some cases this may amount only to provision of additional text or information that will appear in the final version of our plan. In other cases, we have changed fundamental assumptions, or carried out additional analysis that changes the supply demand balance. As a result, the planning scenario required to remove the planning deficit will also have changed. In these cases we have illustrated the changes by means of graphs and tables that may be compared to those in the publicly available version of the draft plan.

1.5 Impact of representations on draft planning outcomes

We have investigated the impact of a number of representations we have adopted on the baseline supply demand balance. The representations that have modified our baseline and final planning scenario are described fully in the individual sections of this document and include:

- **Adopting the Ofwat water efficiency targets**
- **Revised household consumption forecast in line with Future Water**
- **Earlier climate change impacts from 2007/08**
- **Incorporation of the latest housing and population forecasts from the RSS**
- **Outage reduction as part of a catchment management solution**

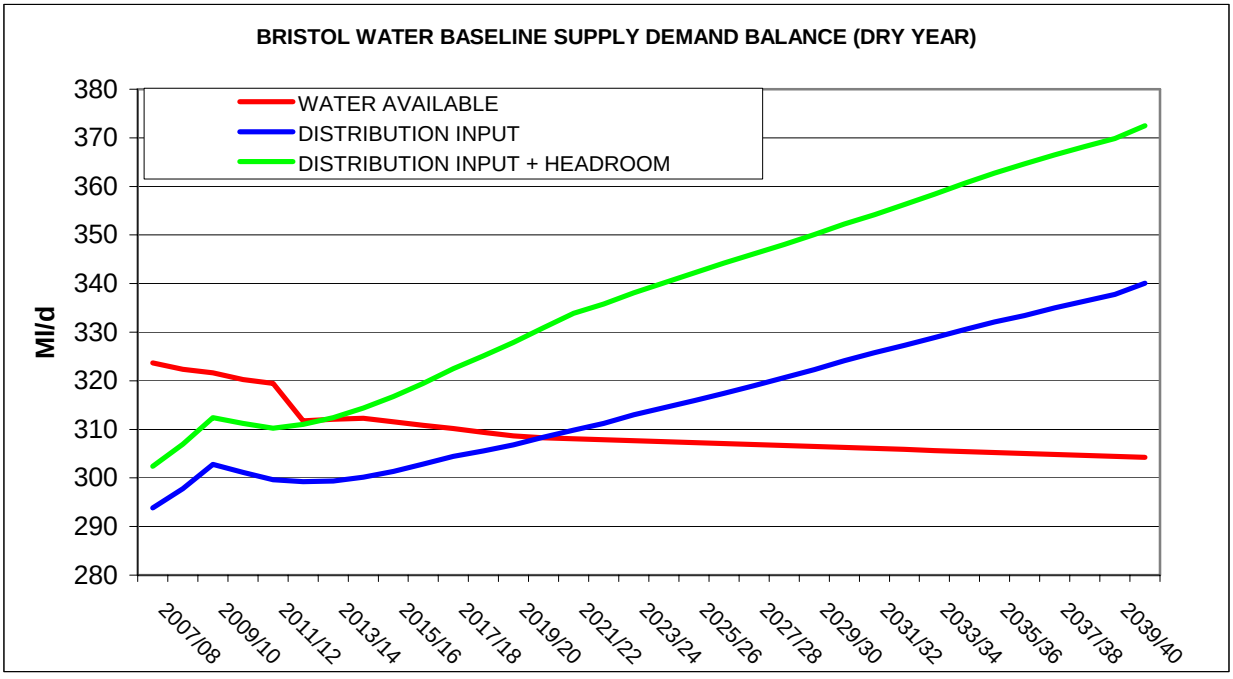
External to representations, we have considered:

Provision of additional non-potable water supplies to industrial customers This directly impacts water available for domestic use from 2012.

A higher rate of optant meter installation peaking at 4% p.a, reflecting the observed increase this year coupled with the combined impact of anticipated price increases.

The impact of our revised baseline forecast on the supply demand position is set out in the graph below.

Water Resource Plan baseline supply demand balance



This can be compared to the graph on page 2 of the draft plan.

To develop the revised optimal cost plan we have investigated the effect of changes resulting from other representations described, including:

- **Increased domestic metering above the baseline level for household customers**
- **Analysis and estimation of ELL in response to latest information on leakage cost**
- **Changes to infrastructure schemes**
- **Effect of timing changes on resource scheme implementation**

The impact of these changes on activity as originally planned in the draft plan is as set out below:

- Extra free repairs to customer leaking supply pipes to cut run time of leaks
- **Programme delayed from 2010 to 2016**

- Establishing 60 new pressure reduction schemes from 2010
- **Programme unchanged**

- Using new leakage technology from 2010 to monitor poorly performing zones
- **Programme unchanged**

- Re developing and refurbishing 7 minor sources in the Mendips in 2016
- **Programme delayed from 2016 to 2019 and yield increase associated with the quality programme included in the baseline forecast for deployable output.**

- Permanent programme of auditing larger non-household customers from 2010
- **Programme unchanged**

- Completing metering of all non-household customers by 2020
- **Programme unchanged**

- Zonal targeting of infrastructure replacement work and meter installation
- **Programme reduced from 6 to 5 zones p.a.**

- Offering subsidised supply pipe replacement when communication pipe replaced
- **Programme delayed from 2010 to 2016**

- Metering of household with large gardens on change of occupier
- **Programme unchanged**

- Undertaking a step change in overall leakage management to 45 Ml/d by 2020
- **Programme unchanged but rate of decrease in early years reduced**

- Planning for an additional major water resource to be constructed by 2025
- **Programme unchanged, probably a reservoir enhancement**

- Planning for an additional water resource to be constructed beyond 2040
- **Additional programme possibly Severn Springs or Avon to Barrow transfer**

- Compulsory metering of all household customers from 2020
- **Programme unchanged**

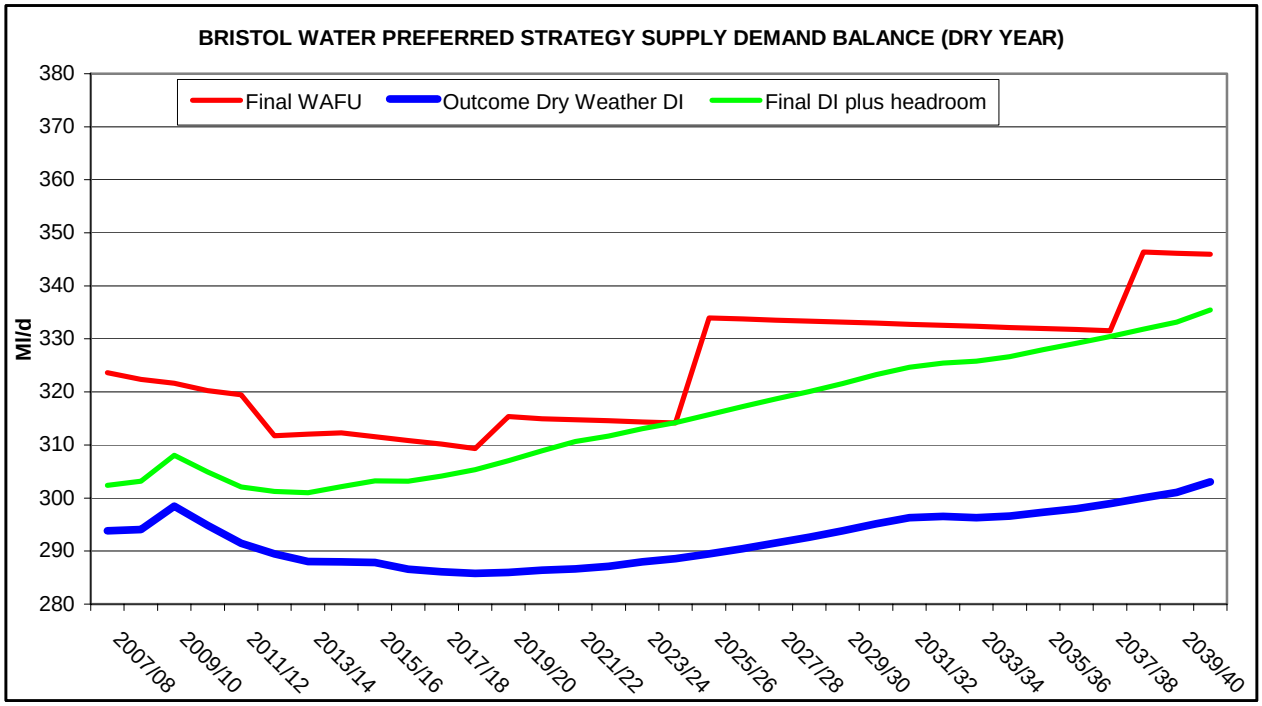
This list can be compared to the original list of options on page 118 of the draft Water Resource Plan. These activities above resulted in the lowest cost NPV outturn for the draft Water Resources Plan.

NPV of total solution	£161 million
NPV of carbon cost	£1 million
NPV of social cost	£-96 million
NPV of total strategy cost	**£ 66 million**

In our plan as modified by the changes from representations the lowest cost NPV outturn was:

NPV of total solution	£159 million
NPV of carbon cost	£1 million
NPV of social cost	£-95 million
NPV of total strategy cost	**£ 65 million**

The impact of our modified preferred scenario on the supply demand position is set out in the graph below.



This graph may be compared to the graph on page 6 of the draft plan

Section 2. Environment Agency

2.1 Breadth of response

The Environment Agency has provided a substantial representation covering a number of detailed technical issues concerning the methodology and approach of the overall plan. Some of the representations require the provision of further or more detailed information for which we do not have full information yet, but will be providing in the revised plan.

2.2 Water supply

2.2.1 Outage

The Environment Agency recommend that we provide further explanation of the method we have used to derive the outage allowance and whether there is any opportunity to reduce the allowance in future.

The outage allowance is to recognise that operational assets such as pumps, treatment works and transmission systems etc. may be temporarily unavailable. The reasons for this include:

- Plant and equipment failures
- Water quality problems, both seasonal and short term
- Maintenance programmes
- Safety works on aqueducts and reservoirs

In our draft plan, the outage allowance of 10.51 Ml/d was based upon the average actual recorded outages at all of our plants over a rolling 5-year period. To produce this figure, SCADA information is collected continuously for all operating sites as part of the daily resources situation analysis. In addition, the daily operational log records when plant fails or is shut down and the reasons for that failure.

As part of the annual reporting requirement, the logged SCADA data is reviewed. For any plant identified as out of service or on reduced output for any period exceeding 24 hours, the loss of deployable output is calculated in the following way:

$$\frac{\text{No. days out of service} \times \text{source deployable output}}{\text{days in year}} = \text{loss of deployable output Ml/d}$$

This analysis is carried out using the SCADA data for all sources, the total loss of deployable output for the year being the summation of all of the individual outages in that year.

The exercise is carried out every year and audited as part of the June Return. A rolling average of outage for a five-year period is calculated, as this will allow a range of climatic and operating conditions to be taken into account. The approach ensures the impact of an unusually large event is not over represented.

We consider that using historic actual operating experience of outage is robust indicator of future reliability. We do not consider that using Monte-Carlo simulation tools in lieu of good

quality data (UKWIR 1995 methodology) will produce a planning figure for outage that has a higher level of confidence.

Our current outage figure represents the sum total of data for over ten years operating experience, during which annual outage has varied between 6 Ml/d to 19 Ml/d.

We believe that in future years the circumstances that may reduce outage will be balanced by changes that increase outage. These are summarised below.

Increasing outage from

ageing assets and infrastructure
reduced investment
climate change and water quality impacts
diffuse pollution and raw water deterioration
changes to water quality standards

Reducing outage by

increased capital maintenance and investment (if SBP is funded in full)
improved technologies
increasing operating costs
Water Framework Directive programme of measures

In our plan we have updated the outage allowance using the method described above to 11.2 Ml/d to reflect the impact of the base year 2007/08.

Over 80% of reported outage is due to failures in water quality caused by external events. As part of the DWI supported water quality schemes, we plan to implement a programme of catchment management in an attempt to reduce or control the damaging and costly effects of diffuse agricultural pollution. However, our experience with work we have done to date indicates that in general, agricultural operators comply with legal and best practice guidelines. Despite this, pollution events still regularly occur. In consequence, we will not plan any significant outage reductions until we have observed how effective the catchment management programmes is over the next five years.

Subsequent to submission of the draft plan, the DWI has approved a proposal to blend water to reduce the groundwater nitrate content in the Frome area. As a consequence of implementing this scheme, there will be a reduction in outage of 0.4 Ml/d at this source from 2014

In our plan we have reduced the outage allowance using the method described above to 10.8 Ml/d from 2014.

2.3 Water consumption and water efficiency

2.3.1 Household consumption

The Environment Agency have recommended the following:

That we devise a strategy to achieve the Government aspiration to reduce domestic household consumption toward 130 litres per capita per day.

That we investigate whether new resource developments will be required if the Government's aspiration to reduce domestic household consumption to 130 l per capita per day was achieved.

We believe that the current regulatory regime a strategy to reduce water demand to 130 per capita for all household customers will be difficult and expensive to achieve in practice. The main reason for this is difficulty in driving down the consumption within the customer base of the legacy housing stock However, we have made changes to our planning assumptions and increased water efficiency activity in order aimed at reducing overall per capita consumption in future.

In our plan we have made the positive assumption that all new housing will meet the Government target 125 litre per capita whole house design standard (although there is little evidence so far to indicate this is actually happening).

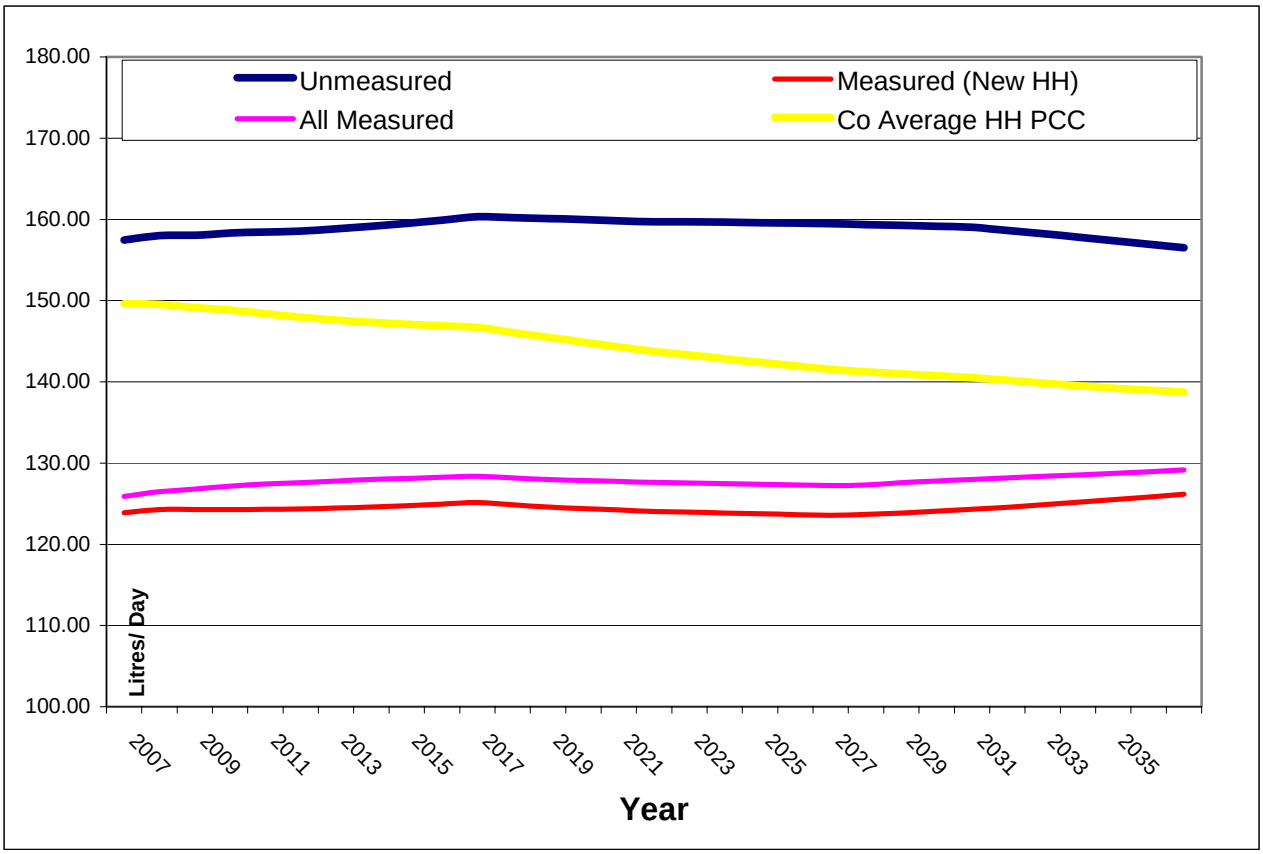
In our plan we have revised our estimates of water consumption based upon the results from work done for the Market Transformation Programme on water used for personal use (i.e. a reduction in both bath and shower consumption due to the use of low flow fittings).

In taking this view, we believe we have taken a substantial planning risk. The type of reductions in device consumption required to drive down the personal use of water to the required level may only be achieved when the Government takes a fittings based approach to water efficiency. This would also require a full review of the Water Fittings Regulations (limiting the flows and pressures of certain fittings). In addition, we note there is no inspection regime proposed to enforce the standards and regulations.

In our plan, our domestic consumption forecast takes account of the significant impact of customer led water efficiency measures. These include continual replacement of the existing less efficient water using fittings (washing machines, WC cisterns, etc.)

The effect of all of these changes as applied to the baseline household net consumption position in our plan is indicated in the plot below and may be compared with the graph on page 50 of our draft plan.

Baseline forecast of net PCC for customer categories



In the baseline consumption forecast, we have assumed that there will be a customer driven efficiency reduction in consumption. This equates to of a saving of 1 litre per property per day in average climatic conditions, accumulating each year to 2035. This is based upon the following marketing trends and other assumptions:

- WC cisterns replaced with low volume dual flush units after 15 years
- Declining personal water use for bathing, showering after 2015
- No retrofit of high consumption devices in new housing permitted
- Improved white goods current technology efficiency to maximum by 2020

There are other issues to be addressed in the model of domestic water consumption considered within Future Water:

The government's strategy provides a reasonable view of what might be achieved with new housing developments when all additional legislative tools are in place, but fails to take into account the following:

The impact of the legacy housing stock, which even by 2035 still represents nearly 80% of the total housing stock. This will limit the ability to use rainwater or grey-water systems as advocated in Future Water, to reduce water demand as these are not economic to retrofit at current cost and technology.

There is no allowance for the fact that the falling household occupancy acts to reduce the decline of per capita consumption.

It is not clear if the scenario of household water use presented within Future Water takes into account the discretionary use of water. All water consumption figures produced by water companies include this component within 150 litres per capita per day. This discretionary use component, from garden watering and car washing is between 5 and 10 litre per capita in an average year (WRC report P6832 Domestic Water Use Data for Demand Management).

In our baseline forecast, we have assumed that all changes to Building Regulations, Fittings Regulations and other regulatory support and enforcement will be provided in the manner detailed in Future Water. If these regulations are fully implemented and enthusiastically adopted by customers, it would be theoretically possible to achieve a forecast reduction in average per capita consumption to 140 litres capita day by 2030. In order to compare our consumption forecast with the Future Water scenario, a deduction of a further 5 to 10 litres per capita per day is required representing the amount of external discretionary use of water This then brings our baseline consumption forecast very close to the130 litres capita day advocated in Future Water (net of discretionary use).

We believe that even when using the Governments own assessment of the impact of regulation on housing and fittings design on all new and existing housing, it will be unlikely that an average water consumption of exactly 130 litres per capita per day for all households will be reached by 2030 in our area. To achieve this, retro-fitting of options such as greywater re-cycling to the legacy housing stock would be required. At its present state of development, this technology would be economically inefficient to apply.

While we acknowledge the concept of water neutrality, we believe that it is not a realistic proposition at the level of growth forecast for this region. Overall neutrality in domestic water consumption would require consumption in our supply area to be cut to 110 litres per capita by 2030.

We have investigated the impact of representations we have adopted on the baseline supply demand balance. The representations that have modified our baseline and final planning scenario are described fully in the individual sections of this document and include:

- **Adopting the Ofwat water efficiency targets**
- **Revised household consumption forecast in line with Future Water**
- **Earlier climate change impacts from 2007/08**
- **Incorporation of the latest housing and population forecasts from the RSS**
- **Outage reduction as part of a catchment management solution**

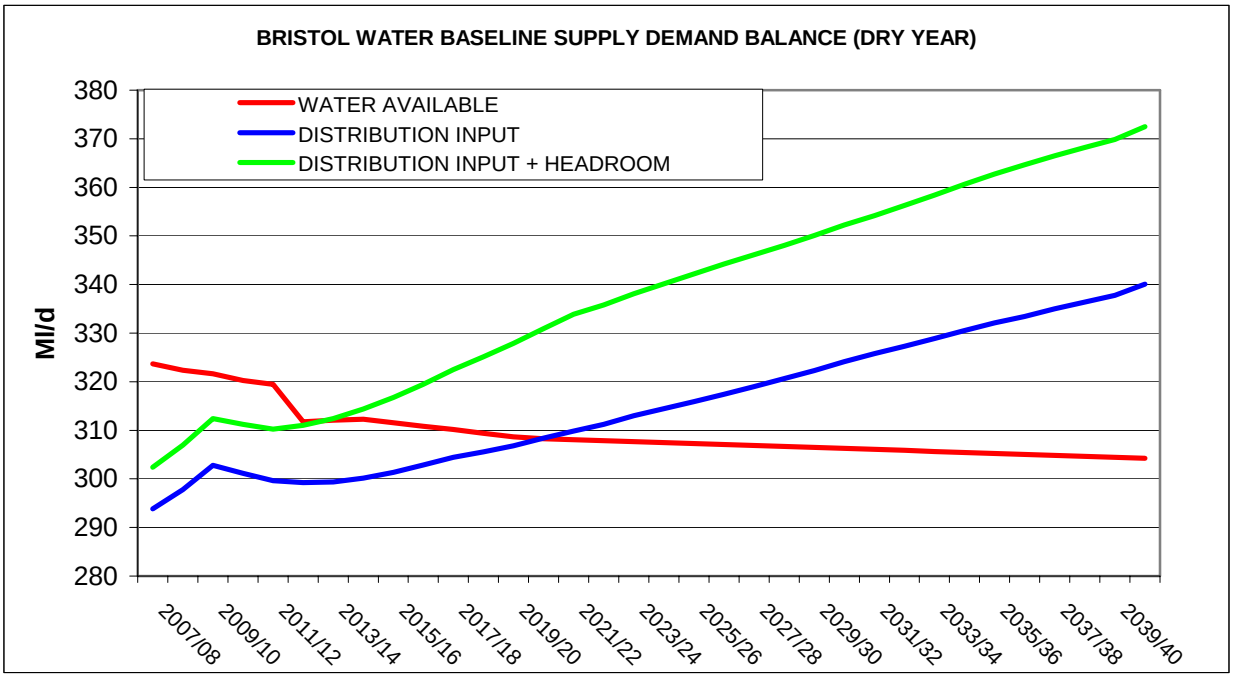
External to representations, we have had to consider:

Provision of additional non-potable water supplies to industrial customers This directly impacts water available for domestic use from 2012.

A higher rate of optant meter installation of 4% p.a, reflecting the observed increase this year coupled with the combined impact of any price rises during the economic recession acting to drive households to consider cost savings from metering.

The impact of our revised baseline forecast on the supply demand position is set out in the graph below.

Water Resource Plan baseline supply demand balance



2.3.2 Non-household consumption

The Environment Agency has stated that they expect further options to reduce non-household demand beyond 2015.

We have forecast that non-household demand will continue to decline rapidly in the near future partly as a consequence of economic conditions improving the propensity for water efficiency (particularly in the public sector). In addition, we have proposed a programme of water efficiency measures that are cost effective when compared with other options within an optimum cost water resources plan. We will also maintain our current baseline activity of water efficiency advice and other work detailed in our Water Efficiency Plan for commercial customers through the BusinessCare division.

As part of our proposals, we expect to continue the metering programme for non-households beyond 2015, so that all non-household customers including agricultural troughs will be fully metered by 2020.

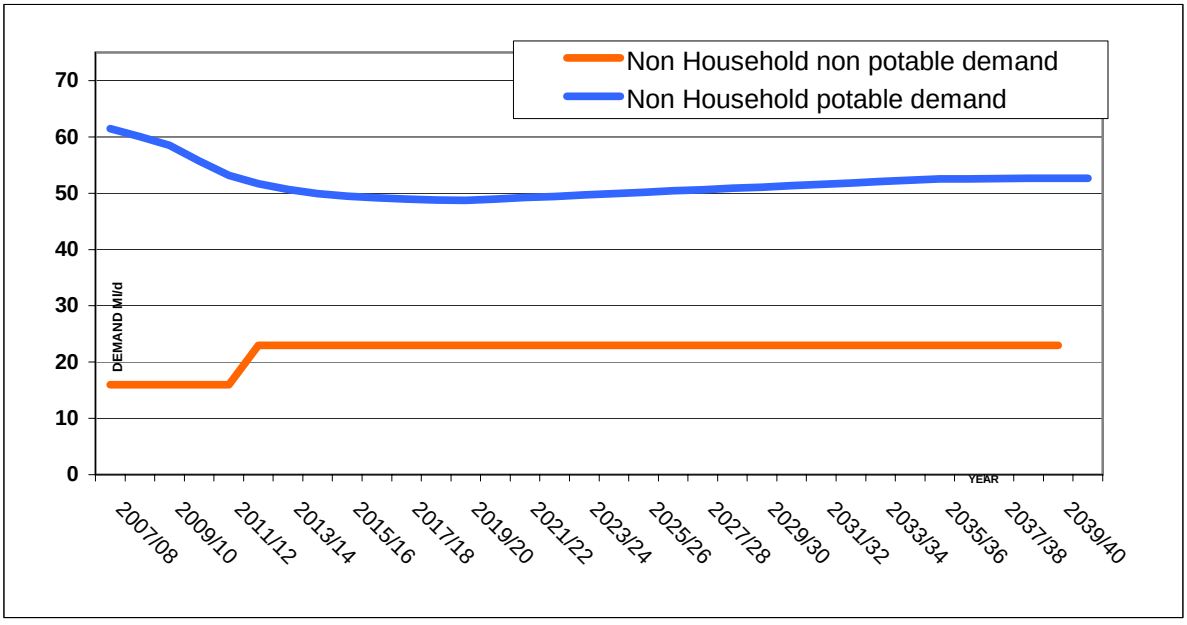
In our plan, we propose a programme of water audits for larger non-household customers over the AMP 5 period. We propose to continue this programme for the duration of the plan

beyond 2015 to maintain the projected efficiency savings of 1.5 Ml/d. However, the RSS projects large increases in population that will need to be supported by a corresponding increase in commercial and industrial business growth. We have built in an efficiency assumption of neutrality in water demand in the non-household demand as old industries decline and new, more water efficient operations take their place. Beyond 2020 the growth in consumption in the non-household sector is set by the underlying growth of 0.5% in population as an economic driver.

The company is obliged to support the continued economic growth of the region by making available commercial and industrial water supplies as required. Two industrial customers have approached us to contract non-potable water supplies during the AMP 5 period. We expect that one of the existing raw water reservations will be taken up shortly with an additional supply made available in 2013.

We have modified our plan to take account of the impact of the changed forecast of non-baseline household consumption. This is illustrated in the graph below, and can be compared with the similar plot on page 62 of the draft plan.

Final plan baseline forecast of non-household consumption



2.3.3 Unmeasured household consumption

The Environment Agency has requested we provide full details of how our consumption monitor is used to derive the per capita consumption of unmeasured customers.

In their representation, Ofwat has also asked for this information to be provided in the draft plan.

The consumption monitor is a technique used to arrive at the consumption of non-measured household customers after allowing for leakage and non-household consumption. Our

consumption monitor is reviewed and externally audited annually as part of our water balance report in the June Return.

Our plan now includes the detailed text description of our consumption monitor as provided below.

Consumption Monitoring Areas (CMAs)
The Per Capita Consumption (PCC) for unmeasured household properties is estimated using data from the company's Consumption Monitoring Areas (CMAs). A total of 60 potential contributing CMAs have been set up within the Bristol Water network although due to reasons such as operational restrictions, equipment faults and meter under registration not all areas are used annually in the PCC estimation. For the reporting year 2007/08, 50 areas contributed towards the PCC estimation.

The CMA are small discreet areas established specifically to monitor unmeasured households and chosen because they have few (if any) non-household customers, a large proportion of unmeasured households and are of a similar Water Use Class.

CMAs are monitored closely and flow and pressure into each area recorded continuously at fifteen minute intervals using a data logger. The information is downloaded to a host computer every day via the PSTN or GSM system

A detailed leakage analysis based on logged flow and pressure data is carried out in the CAMMS software for each CMA. The software follows similar theories and concepts used for the higher-level leakage calculations. Where available an area specific value for household night use is also used where a specialised high frequency data analyser is deployed for household night use studies, making the leakage analysis highly accurate.

Data Processing and Evaluation
The CAMMS (Consumption Areas Monitor and Management System) software is used to calculate the PCC for each of the CMAs, and allows the calculation of PCC on a financial year basis. The software requires 15 minute logged flow values to be imported for each of the CMAs. In order to calculate the PCC for each CMA correctly, the following elements need to be identified:

1. **Households**
   The number of households will be determined using information from the company's Data WareHouse (DWH) which contains the latest updates from the RAPID Billing system (property information) and Geographical Information System (GIS, CMA area configuration) and will be run for each area.

2. **Occupancy Rate**
   Populations in CMAs are determined from National Census 2001 data which is provided at ED level (Enumerator District level) by CACI Ltd. The population and occupancy data for each CMA is updated annually using forecast data provided by CACI Ltd. Where the CMA crosses a number of ED boundaries the weighted mean occupancy rate will be used.

$$CMA Occupancy Rate = \frac{(Occ.Rate ED1 \times Properties ED1) + (Occ.Rate ED2 \times Properties ED2)}{Total Properties in CMA}$$

To improve on the assessment of occupancy levels a number of occupancy surveys have been conducted by Bristol Water to measure the occupancy levels in 28 CMAs. The measured occupancy for these CMAs has been used in the estimation of the PCC.

3. **Non-household Consumption**

Although the key to the selection for the location of CMAs was domestic areas, it is however inevitable that some non-household users are apparent within some of the CMAs. Non-household users will be identified and levels of usage will be taken from the RAPID Billing System. Such usage will be deducted from the areas demand flow. Non-household properties are individually metered and have meter readings taken mostly every six months.

4. **Metered Households**

Since the CMAs are required to produce a PCC for unmeasured domestic usage, any metered household use will again be identified and subtracted from the areas demand flow. Metered households have meter readings taken six monthly and are stored within the RAPID Billing System.

CAMMS uses this data to calculate consumption, minimum night flow and night leakage for each CMA. Once a PCC is calculated for each Water Use class, a final company-wide figure can be calculated.

5. **Per Capita Consumption estimation**

Bristol Water use the statistical analysis methodology of Linear Regression to obtain unmeasured domestic PCC. To assess if a CMA is suitable to be used in the company PCC calculation for a given period, the overall suitability of the CMA is assessed by considering a number of suitability parameters, including % unmeasured household use of distribution input, % measured household use of distribution input, % non household use of distribution input, valid days contributing toward the reporting year and meter under registration status.

Per capita consumption at company level is determined by aggregation of the results obtained at CMA level. The basis of the aggregation is Water Use Class, which is a stratification of users by socio economic factors. The use of Water Use Class over other strata has been determined as most relevant by regression testing of CMA data. Statistical results for Water Use Class consistently show higher agreement than stratification by ACORN class, by house type, or by number of cars owned, for the data set at Bristol Water.

Work to improve the methodology of PCC assessment continues and the use of Water Classes for PCC stratification, as recommended by a consultant, is now being implemented. A comprehensive review of the PCC estimation within Bristol Water has been undertaken. The main elements of this review covered regression methodologies, CMA suitability parameters and improvements to the total number of contributing CMAs. For the base year 2007-08 the CMA level estimate of unmeasured household Per Capita Consumption is set out in the tables below.

CAMMS PCC Results for FY 2007/2008

Acorn Class	CMA Name	Use Class	Popn	Occy	PCC (l/person/day)
D27	1023 Sherston	3	539	2.29	203
B14	1133 Frampton Cotterell	2	495	2.38	145
B14	1138: Winterbourne	2	421	2.39	143
A04	1146: Frampton Cotterell	1	724	2.44	143
D30	2089 Bridgeyate	3	405	2.33	173
B11	2097: Longwell Green	3	423	1.92	161
B15	2131: Little Stoke	3	576	2.41	179
D26	2132: Patchway	1	1465	2.30	177
B10	2178 Thornbury	2	1624	2.52	146
D31	2246: Henbury	3	276	2.04	186
D31	2268: Ashley Down	3	390	1.96	224
E34	2275: Eastville	5	1091	2.47	168
E38	2277: St Werburghs	3	820	2.13	140
F42	2332: Hillfields	5	1589	2.40	162
E33	3019: Highridge	5	897	2.32	161
B14	3029: Whitchurch	2	1046	2.58	136
E33	3039: Whitchurch	5	1161	2.19	176
E33	3044: Stockwood PRV	5	2016	2.13	142
D28	3048: Stockwood	2	808	2.34	146
A03	3055 Keynsham	1	2159	2.36	174
F42	3101: Knowle	5	2072	2.65	152
E37	3102: Knowle	3	1636	2.35	116
E37	3112: Totterdown	3	1122	1.94	159
F48	3154 Bedminster	6	287	1.47	158
D31	3172: Bedminster	3	1868	2.06	142
A53	3294 Easton	6	665	2.13	120
C21	3306: Cotham	4	1131	2.33	139
E34	3399: Shirehampton	5	695	2.08	154
F43	3414: Shirehampton	6	1287	2.18	139
F43	3416: Lawrence Weston	6	1098	2.36	136
B10	4022: Portishead	2	411	2.82	133
A09	4036: Clevedon	4	625	2.19	175
A01	4045 Tickenham	1	289	2.39	219
D26	6076 Weston Super Mare	1	687	2.16	170
A03	7022 Bishop Sutton	1	411	2.08	227
B13	8304: Yatton	2	306	2.33	165
A04	8305: Longwell Green	1	855	2.52	166
B11	8310: Weston Super Mare	3	155	1.94	174
C21	8311: Hotwells	4	269	2.54	122
D28	8312: Hengrove	2	346	2.17	172
D27	8313: Clutton	3	241	2.51	140
D31	8314: Horfield	3	446	2.28	143
E34	8315: Frenchay	5	406	1.63	159
D30	8316: Downend	3	224	2.46	205
D31	8317: Bedminster	3	482	2.18	139
D31	8318: Shirehampton	3	597	2.09	137
E33	8319: Hartcliffe	5	281	2.58	158
E34	8321: Shirehampton	5	427	2.18	154
E37	8322: Bedminster	3	482	2.12	148
F40	8323: Shirehampton	6	793	1.88	186

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.5327
R Square	0.2838
Adjusted R Square	0.2533
Standard Error	53.693
Observations	50

ANOVA

	Df	*SS*	*MS*	*F*	*sig F*
Regression	2	53696	26848	9.31	0.00039
Residual	47	135501	2883		
Total	49	189197			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Uppr 95.0%*
Intercept	120.06	69.665	1.7235	0.091	-20.080	260.21	-20.080	260.2
X Variable 1	101.99	30.949	3.2955	0.001	39.733	164.25	39.733	164.2
X Variable 2	66.440	28.564	2.3260	0.024	8.9772	123.90	8.9772	123.9

Occupancy of unmeasured Household of Whole Company Area	2.49
Proportion of Households in Water Use Class 1 in the Whole Company Area	0.220
Regression Calculation	388.65

95% confidence bands (random sampling error) = + or - 15.4 litres/hh/day

Annual Company PCC l/p/day	**156.09**

95% confidence bands (random sampling error) = + or 6.2 litres/capita/day

2.3.4 Water efficiency assumptions and targets

The Environment Agency has requested the following:

Provide further information regarding the level of water savings achieved from existing water efficiency measures, and whether these can be sustained over time.

Build in the Ofwat water efficiency targets to be detailed in autumn 2008 into our demand forecast for the draft plan.

We already carry out a full range of water efficiency promotional activity that complies with the Ofwat 'Best Practice Guidelines'.

For the work carried out in 2007/08, we have achieved the following water savings from efficiency activity in 2007/08.

- 0.47 Ml/d Supply pipe leakage activity
- 0.08 Ml/d 6000 Optant meter installations
- 0.0 293 Cistern devices
- 0.06 Ml/d 25615 Water Audit packs at 25% uptake for customer initiated

In the past, the annual return of data has shown that efficiency savings can be maintained close to this level in most years.

Under the Ofwat guidance, we do not assume any efficiency impact form the extensive range of targeted educational and informational activities that we already carry out and comprises the greatest part of our effort and cost in this area.

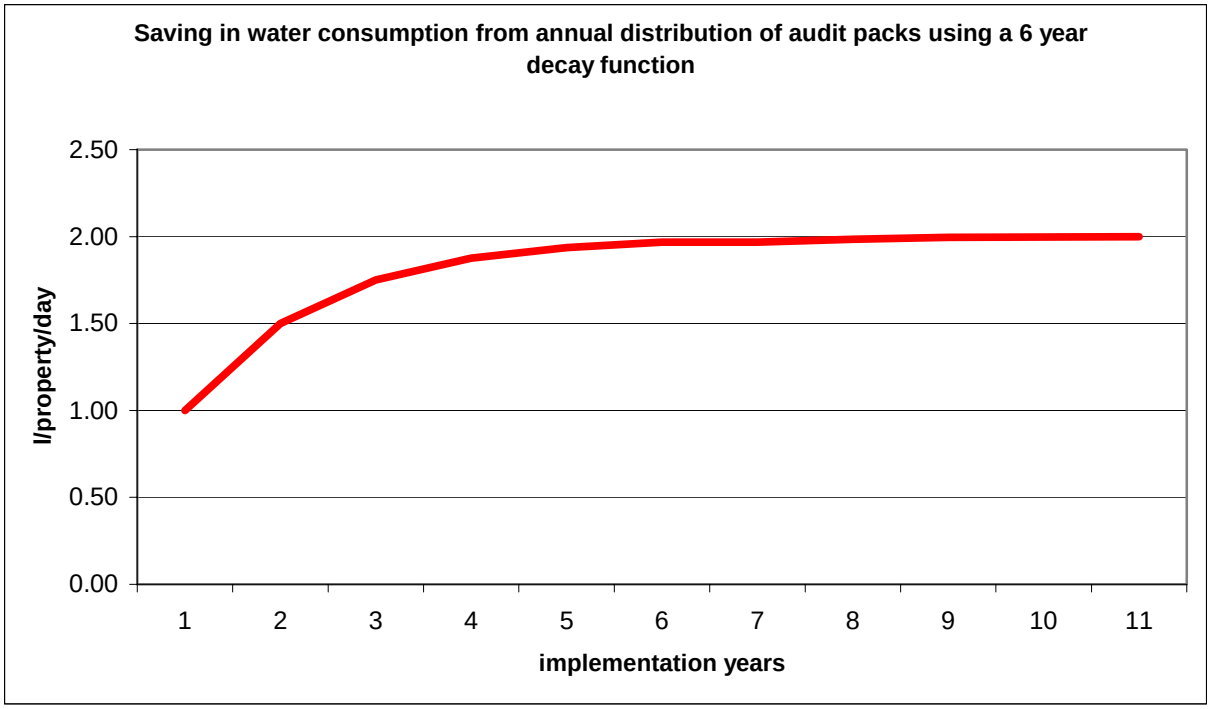
From December 2009, Ofwat have provided new rules relating to measures that count towards water efficiency activity. From 2010, reductions in supply pipe leakage will no longer count as water efficiency activity. Ofwat has set the company a baseline water efficiency target of 1 litre per property per day reduction in household consumption.

The company intends to achieve this target initially by the widespread distribution of water audit packs, including information and instructions, cistern displacement devices and tap flow optimisers. Information provided by Ofwat indicates that the distribution of approximately 500,000 audit packs will be sufficient to reduce overall household consumption by the required 1 litre per property per day from 2010.

We anticipate that once the packs and information had been acted upon, the efficiency savings would effectively decay to zero within 6 years if no further activity was undertaken. To maintain the saving at the required level, the company will repeat the distribution of packs every year so that the maximum baseline efficiency saving after 6 years will be sustained at 2 litres per property per day for the duration of the plan. The indirect cost to customers will be approximately £0.5 million in each year for the duration of the plan.

As directed, we have included the Ofwat efficiency target in our plan. The water savings projected from this activity is based on the assumptions provided by Ofwat. As a consequence there is some uncertainty regarding the actual savings that can be achieved.

Customer water savings from Ofwat water efficiency target



2.4 Property and population forecast

The Environment Agency has requested that we use the latest growth forecast in the revision of our draft plan. They also requested further information regarding the profile of growth over the period of the plan:

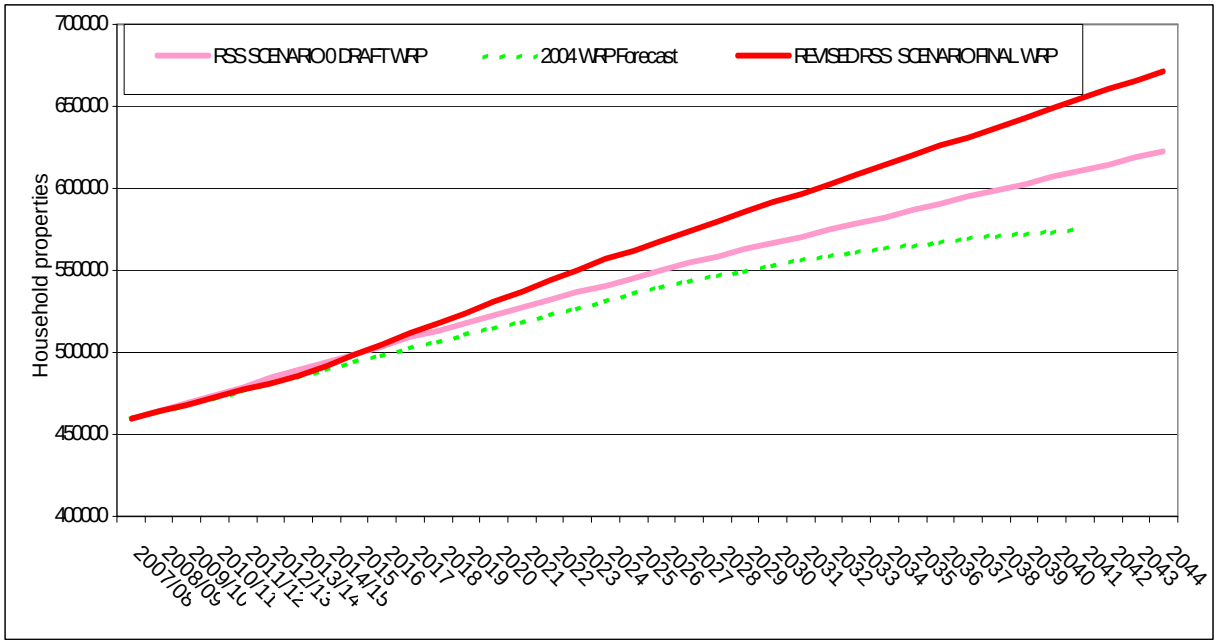
In our draft plan, we used the draft Regional Spatial Strategy (RSS) forecast of property and population growth provided for public consultation on the South-West Regional Assembly web site (SWRA).

We are now aware that the Secretary of State has made recommendations that have resulted in a 25% increase the housing and population projections compared to the RSS scenario used in our draft plan. This revised RSS forecast for 5 year periods and the effect on annualised growth is set out below for comparison with the previous forecasts. For comparison purposes with SWRA tables, only the West of England Partnership area is shown.

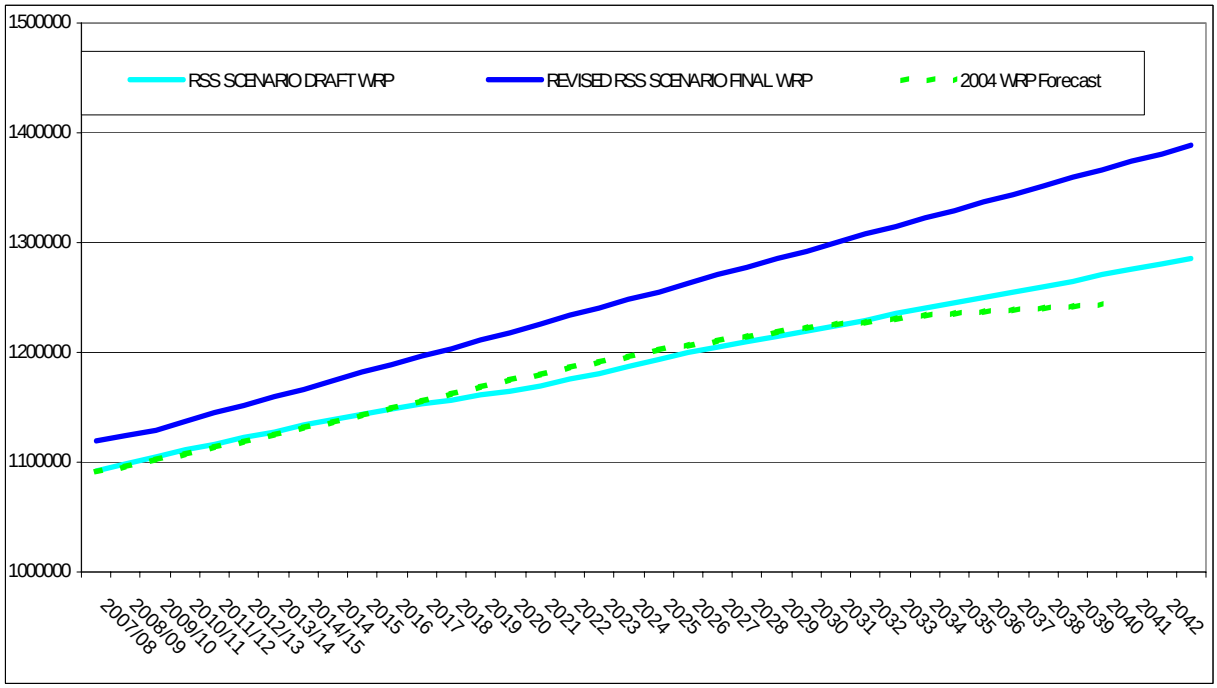
RSS SoS PROPOSED CHANGES RECOMMENDED GROWTH IN HOUSING (source SWRA Website Oct 2008)						
	2006	**2011**	**2016**	**2021**	**2026**	**TOTAL**
BATH & NE SOMERSET	74508	79833	85158	90483	95808	**21300**
BRISTOL	178255	187380	196505	205630	214755	**36500**
N SOMERSET	88580	95280	101980	108680	115380	**26800**
S GLOUCESTER	104880	113080	121280	129480	137680	**32800**
Annualised growth		*2006-11*	*2011-16*	*2016-21*	*2021-26*	
		5870	**5870**	**5870**	**5870**	**117400**

The revised RSS forecasts for housing and population for the company area compared to the original RSS and previous forecasts are set out for comparison purposes in the graphs below.

SoS revised RSS forecast of housing growth used for Final WRP



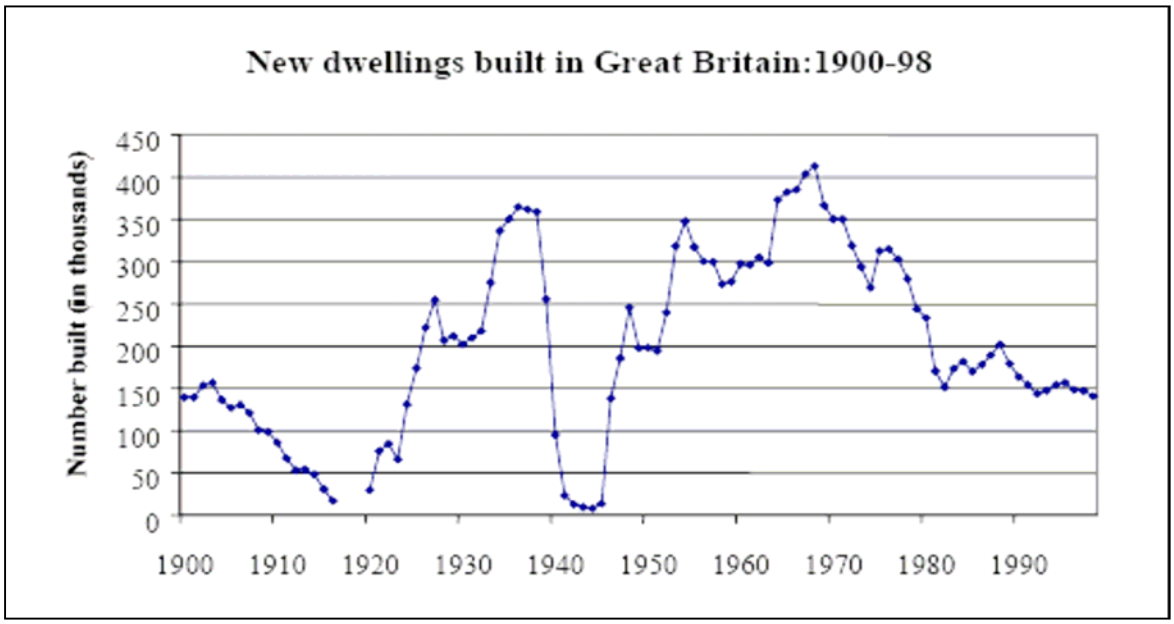
SoS revised RSS forecast of population growth used for Final WRP



In our plan, we have used the exact profile of population growth that results from the revision of the RSS following the Secretary of States recommendations. For the revised RSS housing forecast, the profile of growth was modified to take account of the probable effects of the

2008 economic collapse on housing construction. Over the period 2010 to 2014, we reduced the forecast housing starts from 5752 by 25% to 4314. The difference between the reduced forecast and the RSS forecast was redistributed over the 10 years from 2015 to 2025. After 2025, the forecast of growth in housing reverts to the RSS value for the remainder of the planning period.

We have based our 25% reduction in housing growth in economic recessions on national data. This indicates falls of approximately this magnitude followed by recovery during most of the historic recessions since 1920, as indicated below.



2.5 Metering of household customers

The Environment Agency have suggested that we consider use of 'smart meters' to allow the use of variable tariffs reduce both water consumption and customers supply pipe leakage

The company final WRP has a target meter penetration of 85% for household customers by 2035. This includes the assumption that compulsory metering will be permitted from 2020 onwards on the basis that it will politically acceptable to move to a fully metered charging base when the average meter penetration approaches 50%.

In our plan, we have been considering an additional metering option to switch to intelligent meter network installations for all new and optant properties with retro-fitting of aging meters in the replacement cycle

These devices we plan to install would allow:

- Storage of consumption data with remote processing/downloading
- Supply pipe leakage alarm with remote indication
- Zonal leakage alarm indications

The benefits anticipated include:

- Rapid and lower cost consumption readings and less carbon from vehicle use
- Reduced cost data handling and ease of analysis
- Rapid supply pipe repair leading to a 50% reduction of supply pipe leakage
- Use of innovative tariffs to force down water consumption

The disadvantages include:

- The risk of stranded investments due to premature implementation
- The higher cost of installation resulting in higher water bills
- The public perception of 'intrusiveness' from the higher data density

We consider that the cost estimates of installation of such networks are between £100 and £150 per meter. This is too broad a range to establish a robust plan in time to change the draft plan.

With substantial benefits from reductions in supply pipe leakage, reading and data handling, analysis indicates that intelligent metering options are very close to being cost beneficial at the lower end of the cost range. Due to the relative lack of evidence and uncertainty regarding costs at this stage, we have not included any addition of intelligent metering our draft plan. However, we are refining our estimates of costs and benefits and our final plan may include proposals for intelligent metering schemes.

If intelligent metering is not included as a cost beneficial option in our final plan, we will seek additional funding for a large-scale trial, possibly combined with tariff trials in part of the company area. Although not directly part of a Water Resource Plan, the data from the study will be used to contribute to the water efficiency evidence base in future plans.

Until the company approaches a point of full metering for household customers, we believe that political issues of 'fairness' would make it unpopular to permit a piecemeal implementation of variable tariff structures to part of the customer base. Because of this, we have not factored in any reduction in water consumption due to variable tariff structures.

2.6 Options Assessment

The Environment Agency have indicated that our draft plan would benefit from further information and description regarding the options we have considered for managing the supply demand balance. In particular more information on the following is required:

- **Feasibility**
- **Environmental and social impacts**
- **Risks**
- **Effect that reducing per capita consumption may have on selection of options**

When developing our draft plan, we used the Strategic Environmental Assessment (SEA) process to inform the development and selection of options. A significant part of this work was directed at understanding the environmental and social impacts of various options. We made the SEA available to all consultees to ensure that this would be read in conjunction with our draft plan. The SEA covers issues of feasibility and environmental and social impacts as well as the associated risks of the options.

We do not intend to change the information on options provided in the draft plan. We believe there is sufficient detail within the supporting SEA regarding feasibility, social or environmental impacts and risk for those interested in reviewing individual options in depth. In any subsequent public version of our plan, we will again ensure that full reference is made to the SEA where the majority of points raised are fully covered. We will provide further information on plan risks and scenario analysis if we have been able to complete these in time for the submission of our final plan.

2.7 Data explanation

The Environment Agency require us to provide further information in respect of the following:

- **How we have used the Minimum Likelihood Estimation (MLE) in calculating the water balance and level of leakage in the base year**
- **How the increase in unmeasured water consumption due to dry weather was assessed and whether the balance between increases in household and personal consumption are still valid**
- **What our forecast metered savings in respect of compulsory metering options is based upon**
- **How the all of the options we have assessed such as leakage control, metering and demand reduction link to overall national strategies**

The MLE adjustment

In our final Water Resource Plan we have included the following description of the MLE adjustment

The Minimum Likelihood Estimation (MLE) is calculated and audited every year as part of the annual return the company makes to Ofwat (June Return). The final plan is based on the 2007/08 year. The MLE carried out in support of the water balance for that year set out below and is now incorporated in our plan.

The MLE adjustment re-assigns any difference there may exist between the water balance determination of total leakage from distribution input (top down), and the estimate of leakage from component analysis of DMA nightlines (bottom up). Where a difference exists it is re-distributed among the components of the water balance based on the confidence intervals associated with each component.

The reconciliation between Net Consumption (including losses) and Distribution Input was only 2.88 Ml/d in 2007/08, representing a balancing item of 1% to be re-distributed. Confidence intervals are based around the expected accuracy of each component and reflect the likely error range associated with each component.

Using a 95% Confidence interval method to weight the errors, the reconciliation value has been redistributed according to the following table, where the initial component estimates are on the left and the MLE adjusted components are on the right.

MLE table of adjusted components

Water Balance:Maximum Likelihood Estimate

(Based on NERA/UKWIR report & spreadsheet)

YEAR :	Estimate Ml/d	95%Conf. Interval	Confidence Range Ml/d	% of Total	Adjustment Ml/d		2007/2008 Balanced estimate
Meas.non household	64.08	3	3.84	5.90	0.17	Meas.non household	64.251
Meas.household	36.11	3	2.17	3.33	0.10	Meas.household	36.207
Unmeas.household	133.92	10	26.78	41.11	1.19	Unmeas.household	135.101
Unmeas.non household	3.88	30	2.33	3.57	0.10	Unmeas.non household	3.983
Operational use	1.72	10	0.34	0.53	0.02	Operational use	1.735
Legal unbilled	0.83	50	0.83	1.28	0.04	Legal unbilled	0.870
Illegal unbilled	0.28	50	0.28	0.42	0.01	Illegal unbilled	0.288
Distribution Losses	38.96	30	23.38	35.88	1.03	Distribution Losses	39.995
						Total Leakage	52.87
Net Consumption	279.78						
Distribution Input	282.66	0.9	5.20	7.98	0.23		282.43
Reconcilliation Item	**2.88**		65.15	100.00			
Errors in Water Balance						Per Capita unmeas	157.56
% error balance						Per Capita measured	125.43
-1.02							

Total leakage

52.87 Ml/day

The leakage target for Bristol Water for reporting period 2007-08 is 54 Ml/d. Following MLE adjustment the level of leakage for the same period is reported as 52.87 Ml/d.

The difference seen in the water balance was 2.89 Ml/d, which represents –1.02 **%** error across the balance. This is an improvement in water balance reconciliation item compared with the 2006-07 submission when the error in the water balance was –1.12%

Assessment of dry year demand

From 1994 to 1997 the company experienced a continuous sequence of three minor single season droughts. However, winter recharge in each of the years was adequate and prevented the situation deteriorating into a more serious two-season drought.

The year 1995/96 was warmer and drier than the other two years and demand for water generated the highest peak in seasonal water demand above the baseline. The company continues to use this year as our benchmark 'dry year' as we have not experienced a more significant event. During that year, it was recognised that the climatic conditions were the driver for the observed increase in water put into supply. Because of this, an effort was made to capture water demand data and understand what components of demand could be attributed to dry/warm weather effects.

In our Water Resource Plan we have included the following description of the method used in 1995/96 to estimate the portion of extra household water demand due to hot and dry weather.

A sample of residential district meter areas was logged during 1995 summer periods when water demand was high and the daily demand profile exhibited a clear evening peak in

demand during a four-hour period from 18:00 to 22:00 (specifically where evening peaks were greater than the morning peaks). This evening peak in demand was assumed to be indicative of significant external water use.

Logged data for the same sample districts was analysed for a baseline demand period in the same year, typically during October and November to be free of both winter leakage and warm weather effects. Diurnal profiles and nightlines were checked to ensure similar values in both periods to eliminate districts impacted by leakage and re-zoning influences.

The data from the sample districts was reduced to represent the average of seven days consumption, expressed in terms of l/p/d for the sample of districts for both summer and base demand conditions.

For the sample of districts, the calculation of the average water demand per property during summer when extra discretionary use took place was 790 l/p/d

For the sample of districts, the calculation of the average water demand per property during base demand periods with no discretionary use was 408 l/p/d

To disaggregate the two components of demand, the water consumed during the 4-hour evening peak from 18:00 to 22:00 was compared between the summer and base period demand plots. The average extra volume of water use in the evening period was 260 l over four hours. This volume was assigned initially only to external household use

The average difference in total daily demand for 24 hours from base period to summer period was 382 l/p/d (790 l/p/d – 408 l/p/d).

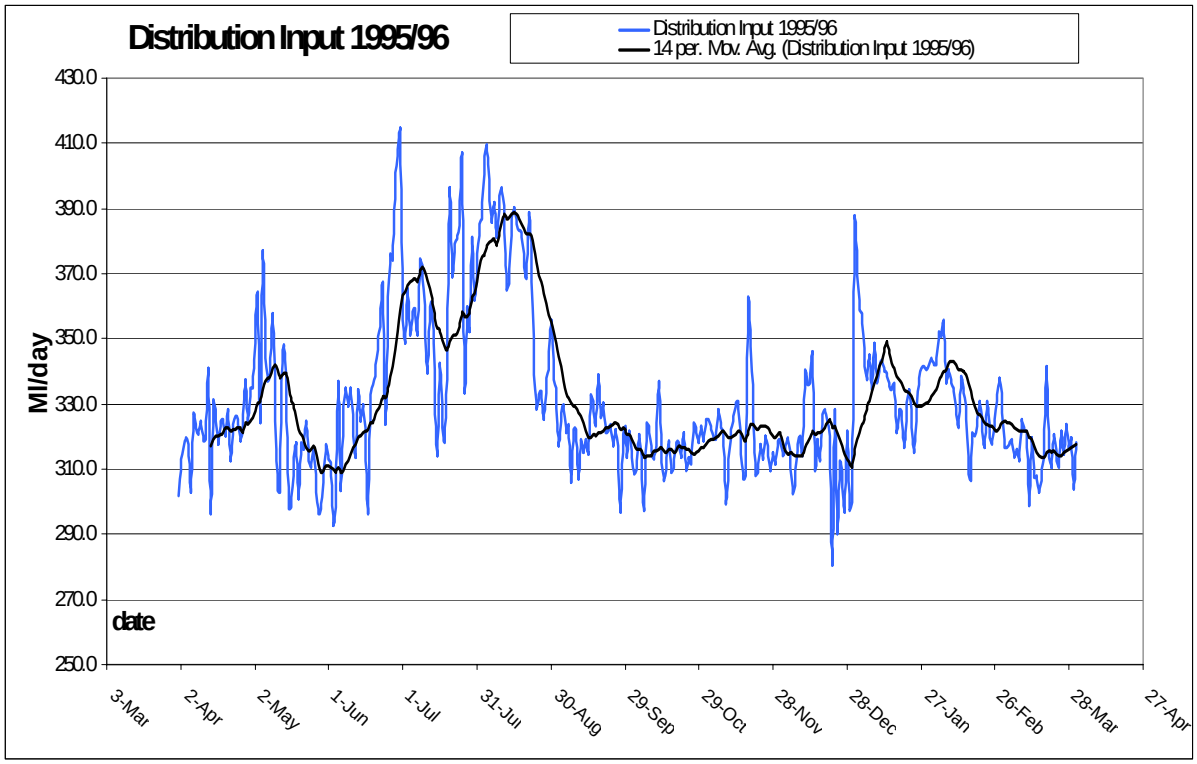
As the external household component was assessed as 260 l/p/d, the remainder of the increased demand over the day was attributed to increased personal consumption and was calculated to be 122 l/p/d (382 l/p/d – 260 l/p/d).

This district-based analysis is of a biased sample, but is only used to estimate the proportion of component consumption for those customers exhibiting significant extra discretional use during dry periods. From this we initially concluded that the:

- Proportion of the extra dry weather demand due to external household consumption was 68% (260/382)

- Proportion of the extra dry weather demand due to internal personal consumption was 32% (122/382)

The analysis does not provide information regarding the actual use of these customers in sampled districts over a complete year. For this we used the recorded daily distribution input (DI) data for 1995/96, as set out below.



The average daily distribution input for the period April to September was calculated and taken to represent the summer period of climate induced discretionary demand.

The average daily distribution input for the period October and November was calculated and taken to represent the baseline period when there would be minimal climate induced discretionary demand or increased leakage.

For the purposes of the analysis, leakage and non-household demand is assumed to be constant for the two periods (we have not identified any significant seasonal or climatic variation in non household demand, however leakage can increase significantly during December and January in a cold winter).

The baseline average daily DI of 318 Mld was subtracted from the summer period average daily DI of 343 Mld and multiplied by the 153 summer days to give the total extra consumption attributed to summer ‘dry weather’ (approximately 3770 Ml).

The summer period total consumption was converted back to Mld averaged over the year and divided by the number of domestic households for 1995/97 to give a value of approximately 25 l/p/d additional demand due to dry weather.

This value of 25 l/p/d reconciled with the recorded increase in per capita consumption in 1995/96 of approximately 10 l/c/d overall compared to the reference ‘normal climatic’ years of 1993/94 and 1997/98.

Using the proportions calculated for external and personal water consumption from the zonal analysis detailed above, the extra component demands expressed per property were:

- Extra dry weather consumption external use 17 l/p/d as a daily average over the year
- Extra dry weather consumption personal use 8 l/p/d as a daily average over the year

It was subsequently considered that the attributing all of the water consumed during the period 18:00 to 22:00 hours to external use only was probably an over-estimate. Some of the water consumed during this period would be likely to have been used for other purposes. To avoid overestimating external discretionary water use, the values were simplified to give:

- Extra dry weather consumption external use 15 l/p/d as a daily average over the year
- Extra dry weather consumption personal use 10 l/p/d as a daily average over the year

The simplification is not unreasonable given the range of uncertainties. The key point is that the total of 25 l/p/d remains consistent with the overall increase in demand due to dry weather identified form the distribution input.

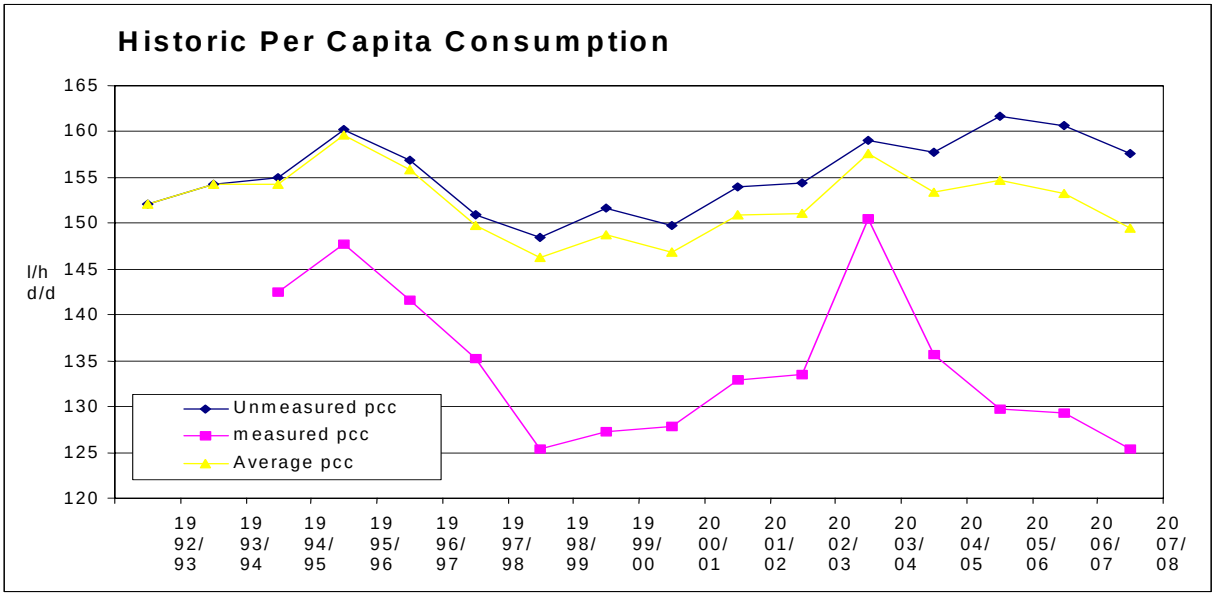
In 1995/97, the average occupancy was very close to 2.5 persons per property, so dividing 10 l/p/d by 2.5 results in the per person discretionary consumption due to dry weather of 4 l/c/d, so that:

- Extra dry weather consumption external use 15 l/p/d as a daily average over the year
- Extra dry weather consumption personal use 4 l/c/d as a daily average over the year

Behaviour of measured household customers

Since 1995 we have applied this factor to both measured and unmeasured households to estimate the extra demand due to dry weather. In 2003/04 we experienced a relatively dry year including a hot summer (but nowhere near as extreme in its effect as 1995/96).

During 2003, the company began running a low level campaign to encourage customers to 'use water wisely'. However, on analysis of the consumption data for the year, unmeasured consumption expressed as per capita consumption displayed a small increase compared to other years. However, the measured per capita consumption increased quite significantly, as illustrated below.



This effect had been observed in 1995/96, however it was considered at the time that the number of metered household customers may not have been sufficient for the result to be reliable (due to timing of readings and level of estimated readings). As the effect has occurred twice during the two warmer than average summers, we should now take this effect into consideration as being indicative of the way metered household customers expect to use water.

The current baseline per capita consumption during 'average' climatic years for measured household customers approximates to 130 l/c/d. In 2003/04, the measured PCC increased to 150 l/c/d. If measured households behaved in the same manner as the unmeasured households, we may have expected the PCC to increase to approximately 140 l/c/d (equivalent to an extra 20 l/p/d, a reasonable figure given that 2003/04 was not as dry as 1995/96). The extra 10 l/c/d increase above 140 l/c/d implies that metered customers may have a propensity to consume twice the amount of discretionary water use per property in response to dry conditions, or 50 l/p/d.

If this were the case, the extra dry weather consumption for measures households would be:

- Extra dry weather consumption external use 30 l/p/d as a daily average over the year
- Extra dry weather consumption personal use 10 l/c/d as a daily average over the year

The data supports the fact that metered customers make use of more water when they consider conditions require. In addition, the 30 l/p/d of external water use represents a total of 11m3 of water. If this takes place over 25 weeks, it would only amount to a weekly average of less than 0.5 of a cubic metre of water at a cost of £0.50 per week.

It is probable that bi-annual meter readings may give rise to some lag effects such as demand being transferred to following years etc. In order to allow for these effects, we assume only half of the observed increase in measured consumption above that of unmeasured customers as a planning allowance until we have better information.

Therefore, our plan now assumes that in response to dry weather, measured customers demand will increase by an extra 12 l/p/d above that of unmeasured customers to 37 l/p/d (25 l/p/d plus 12 l/p/d, instead of 25 l/p/d plus the observed extra 25 l/p/d).

Based on the current average occupancy of two, for measured households, this consumption is apportioned in the following manner:

- Extra dry weather consumption external use 20 l/p/d as a daily average over the year
- Extra dry weather consumption personal use 8 l/c/d as a daily average over the year

We have adopted a reduced external consumption to allow for the fact that many new, metered properties may have less opportunity for significant external water due to the relaxation of planning controls on maximum housing density.

Assumptions regarding the impact of metering

In our draft plan assumptions that were made regarding the impact of metering customers are as follows

- Compulsory/selective household metering reduction of water demand of 7% and reduction of supply pipe leakage of 15%

- Compulsory/selective household metering (large gardens) reduction of water demand of 15% and reduction of supply pipe leakage of 15%(but from a higher consumption base than houses with normal/small gardens

- Optant household metering reduction of water demand of 7% and reduction of supply pipe leakage of 15% (but from a lower consumption base than selective households)

- Compulsory/selective non-household metering reduction of water demand of 7% and reduction of supply pipe leakage of 15%

National strategies
The following text linking national strategies to company activity is now part of our plan

The Government's water strategy for England is set out in the document 'Future Water'. The aspirations and strategies for change in this paper are driven by the government's requirement to reduce national carbon emissions and ensure compliance with European regulations aimed at improving habitats and avoiding or mitigating environmental damage.

Against this background, other Government policies are aimed at significantly increasing population and accelerating the domestic building programme to meet the demand for new housing in future.

These two conflicting objectives have the likely effect of reducing the water that can be taken from the environment for human consumption, while simultaneously increasing the national demand for water (if no action was taken).

The Government proposes to balance these competing objectives by a series of strategies aimed at reducing individuals demand for water from the current national average of 150 l per capita per day to 130 l per capita per day.

Some of these strategies are being driven through legislation while others are voluntary, but all are aimed at reducing the demand for water and improving the efficiency of water supply.

The key national strategies from Future Water are outlined below together with Bristol Waters response:

- Improve water quality in the environment preventing ecological damage and reducing quantity of energy and chemicals needed to treat water.

- Water industry contribution to the national emission reduction targets by reducing losses and water demand.

- The loss of water from leaks to be reduced and maintained at the socially and economically acceptable minimum.

- Increasing the percentage of metered households from the present low level of 30% and bring this in line with meter penetration in the rest of Europe.

- Recognition that charges for water based on metering represents the fairest way to pay and metering helps to reduce demand for water as well as allowing consumption reducing tariffs (i.e. rising block charges or seasonal charges).

- Companies helping customers reduce demand for water by promoting a sustainable level of water efficiency to help in reducing demand towards the aspiration of 130 l per capita.

In our Water Resource Plan, we have responded to these national strategies by seeking the funding for the following actions:

- Proposed a series of catchment management schemes working with farmers and landowners to reduce the sources of diffuse pollution of phosphorous nitrates, and metaldehyde in four major catchments at a cost of over £1millon over five years.

- Embedded the cost of carbon in our strategic planning process so that options we have selected will result in an overall 15% reduction in carbon emissions together with the consideration of wind turbine generation to allow a further 10% reduction in emissions.

- Planned for 60 new pressure reduction zones to cut leaks and bursts, doubled the number of free repairs to customers leaking supply pipes and invested in a step change to substantially reduce leakage by approximately 20% by 2015.

- Allowed for a programme of metering aimed at achieving at least 100% commercial metering by 2020 and 85% domestic meter penetration by 2035 that will reduce demand for water and will facilitate differing ways of charging for water to promote customer efficiency through price signals.

- Proposed a specific programme of customer water efficiency, initially at a general level through the use of water audits and audit packs to meet the Ofwat efficiency targets, but later to select specific groups of customers for whom replacement of water consuming fittings may be appropriate.

2.8 Strategic Environmental Assessment

The Environment Agency has indicated a number of points where our SEA could be improved. These include:

- **Development of a timescale, targets and indicators to be provided in support of objectives**

- **The need to monitor international legislation through other routes than the Regional Spatial Strategy**

- **The need to ensure that developments in the Environment Agency's Restoring Sustainable Abstraction Programme are taken into account**

We note the representation in respect of the SEA. In our view, the monitoring of legislation and impacts of the RSA programme are issues that are adequately contained within the normal company planning process and arrangements for management of water resources. We are not convinced that these need to be re-stated explicitly in the SEA or final plan.

We do not anticipate re-writing our full SEA report for the final plan. However, we do intend to produce an updated summary addendum after submission of the final plan that will include a monitoring plan, detailing indicators and targets to ensure the objectives identified are taken account of over the five-year life of the final Water Resources Management Plan.

Section 3. Ofwat

3.1 Breadth of Ofwat response

Ofwat have made representations regarding aspects of our plan in relation to consumption forecasts and the inclusion of their water efficiency targets, many of which are similar to issues raised by the Environment Agency.

There have also been requests for further clarification regarding our consumption monitor for unmeasured households, our plan for compulsory metering of customers, the treatment of climate change and customers willingness to pay for significant leakage reductions.

3.2 Water supply - outage

Ofwat have indicated that we have not considered the risk of flooding as part of the outage assessment.

We have detailed our method of calculation outage in section 2, above. Flooding has not led to a source outage greater than 24 hours over the last 10 years. As a consequence of our method of outage calculation from historic events, flooding would not be included as a component of outage. We are aware of the relatively minor occurrence of flood risks to our major and minor sources. We would not expect to consider major flood risks, with their long return periods, to be considered within the outage calculation. Instead, we have considered these risks within the assessment of headroom. We have recently conducted a full flood risk analysis for vulnerable sites.

In our plan, we do not expect to change the value of outage to take account of the impact of flooding risk, as this is dealt with by other methods as discussed above. We have reviewed the flood risk for a number of sites within the company area and concluded that it does not materially change the headroom allowance we have used.

3.3 Water consumption and water efficiency

Ofwat have stated that we will need to into account their efficiency targets in the draft plan when they become available (in late 2008). In addition, Ofwat have indicated they require further detail regarding:

- **Our overall per-capita consumption from 1997 (which Ofwat consider to be static)**
- **How we have taken into account Government initiatives such as the code for sustainable homes**
- **Consideration of other water efficiency approaches**
- **Provide a table of assumptions of efficiency savings for aspects of our Water Efficiency Policy**

Per capita consumption

Ofwat have expressed surprise at our historic per capita consumption since 1997. This figure for the overall average household per capita consumption from the June Return is reproduced in the table below. Note the influence of slightly above average warmer and drier weather on

the consumption of metered customers in 2003, as well as the slight upward trend in average per capita consumption.

Household per capita consumption litres/day (source Bristol Water June returns)									
YEAR	1998	1999	2000	2001	2002	2003	2004	2005	2006
HH TOTAL PCC	147.5	149.0	148.6	152.3	151.1	157.6	153.4	154.6	153.3
HH UNMETRD PCC	148.5	150.1	149.8	154.0	154.3	159.1	157.7	161.6	160.6
HH METRD PCC	138.2	140.8	140.6	141.9	133.9	150.5	135.6	129.7	129.3

We have provided this table and the associated graphs in our draft plan as evidence that the per capita consumption has not been static over the past 10 years.

Code for sustainable homes and Future Water
As stated in our draft plan, our consumption forecasts assumes from that 2010, the Government will enforce a 100% implementation their target Code 2 for Sustainable Homes based on a whole building standard of 125 liters per capita per day (excluding discretionary use). In our plan, all new housing is assumed to have a base water demand of less than 125 liters per capita per day.

We have also assumed that the review of Water Fittings Regulations will take place shortly and the changes made by 2010 will act to reduce demand for water in the legacy housing stock (although there is no evidence for this at present). The results of this new analysis within the final plan have been detailed in the graphs in section 2, above.

Ofwat water efficiency targets
When developing our draft plan, the assumptions for potential savings for each type of efficiency and final water efficiency targets had not been formally provided.

In our plan we have now included the impact of the Ofwat water efficiency target for our company, using the Ofwat guideline for water assumed water savings. The individual impact of efficiency savings is set out in section 2. We have also replaced current assumptions on existing efficiency based water savings with those provided by Ofwat, in their document, Future Water Efficiency Targets 2008.

It is our view that achieving the proposed target will not be cost beneficial. We are concerned that in developing these targets, Ofwat may not have fully considered the following:

- Cost benefit implications and high incremental costs of the water saved
- The validity of assumptions of water savings from the various activities
- The sustainability of any water savings (particularly in dry years)
- The long-term implications on customer water bills

The impact of these changes on the final planning scenario, together with other regulatory modifications covered in this document is illustrated in the graphs in section 1.

3.4 Metering

3.4.1 Compulsory metering

Ofwat have questioned the basis for compulsory metering from 2020 onwards.

In Future Water, the Government has signaled that they expect water companies to increase meter penetration in line with the strategies identified below:

- Increasing the percentage of metered households from the present low level of 30% and bring this in line with meter penetration in the rest of Europe.

- Recognition that charges for water based on metering represents the fairest way to pay and metering helps to reduce demand for water as well as allowing consumption reducing tariffs (i.e. rising block charges or seasonal charges).

In our draft plan we have opted initially for selective metering of households with large gardens in order to maximise the benefit to 2020. Despite this approach, the proposed programme is only marginally beneficial and relatively high risk compared to other schemes.

If housing growth and population increases at the rate forecast, the company water stress status will deteriorate at some point. This will allow Bristol Water to undertake compulsory metering. In our draft plan we have assumed that this occurs by 2020 when meter penetration is at about 50%.

Given that the Government wishes to move to a fully metered basis for domestic customers, that the company area will become water stressed and that compulsory metering is lowest cost approach to increasing meter penetration, we see no reason to change our view for the following reasons:

- company water stress status will be at high by 2020
- Political expectation to move to complete metering as rapidly as possible from 2020
- Delay of imminent resource schemes will mean selective metering is cost beneficial at that time

We intend to retain the programme for the compulsory metering of all domestic customers from 2020 in our plan.

3.5 Climate change

Ofwat have noted some omissions within our approach to the treatment of climate change and have asked us to modify or clarify the following:

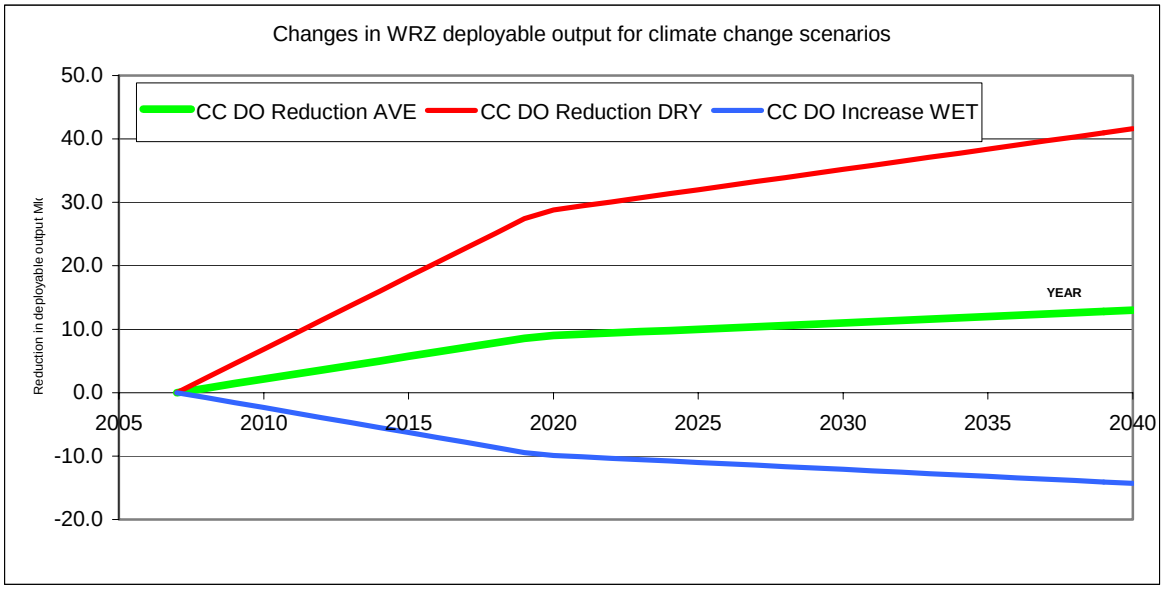
- **To model the impact of climate change from the base year rather than 2012**
- **State if Reynard and Young study used to quantify climate change impact**
- **To use the 5^{th} and 95^{th} percentiles of run off variations**

In our plan, climate change impacts on both water resources and consumption now start from base year and are calculated using the methodology set out in the Water Resource Planning Guidelines, November 2008, using the process, planning tools and spreadsheet provided in UKWIR report 06/CL/04/8. This is based upon earlier studies for UKWIR carried out by

Reynard and Young and Arnell. We have used the 5th and 95th percentiles for run-off variation as generated by the modeling spreadsheet provided for UKWIR 06/CL/04/8

The revised forecast of the climate change impact on deployable output used in our plan is presented in the graph below for the medium, wet and dry scenarios an may be compared with the graph on page 77 of the draft plan.

Climate change impacts on deployable output



3.6 Population and property forecast

Ofwat request that we use the latest government forecasts of population and property growth for our region.

We have provided the revised RSS forecast for housing and population following the Secretary of States recommendations in our response to the Environment Agency submission. The latest forecast predicts an increase in housing and population growth of 25% above the figures forecast in our draft plan.

The RSS forecast predicts a linear growth pattern. In the light of the current economic difficulties and after consulting the with the Environment Agency and local planners, we believe the rate of housing growth may be less than predicted by a forecast generated in 2007. To allow for the impact of the recession we have decreased the RSS forecast of housing growth in the period 2010 to 2015 by 25%, but increased it in the following years so that the overall total remains unchanged. This is detailed in section 2.

We have investigated the effect of our revised consumption forecast on the baseline supply demand balance. Other changes resulting from the representations described elsewhere in this document have also been incorporated, including:

- **Adopting the Ofwat water efficiency targets**
- **Earlier climate change impacts from 2007/08**
- **Incorporation of the latest housing and population forecasts from the RSS**

- **Revised forecast of non-household consumption**

The overall impact of our revised baseline forecast on the supply demand position is set out at the end of section 1.

3.7 Options assessment

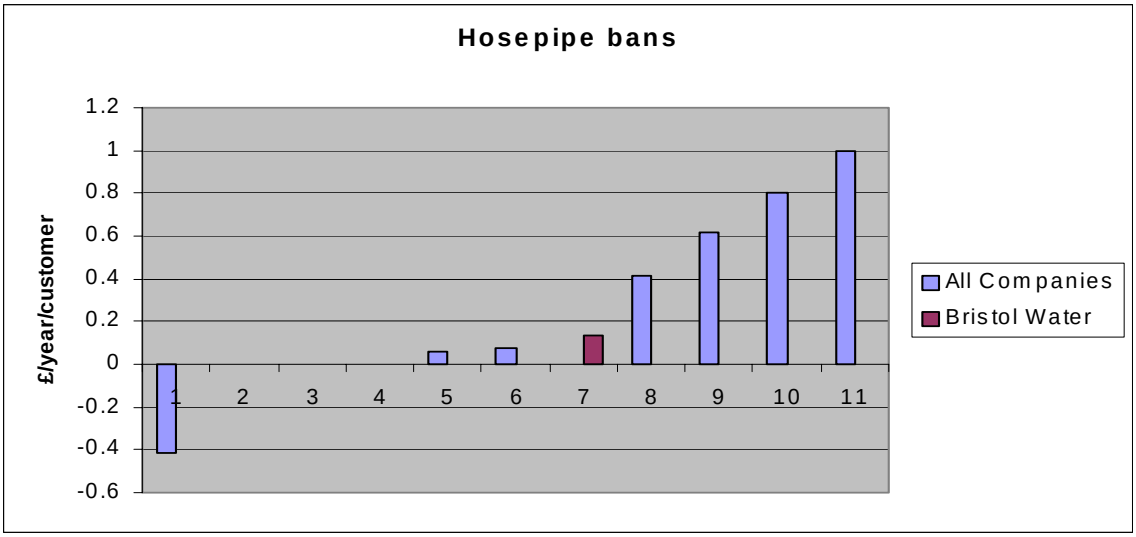
Ofwat are concerned that in seeking our customer's views on leakage, we have overstated the customer's willingness to pay for leakage reduction below the economic level. Ofwat seek further information to justify our approach.

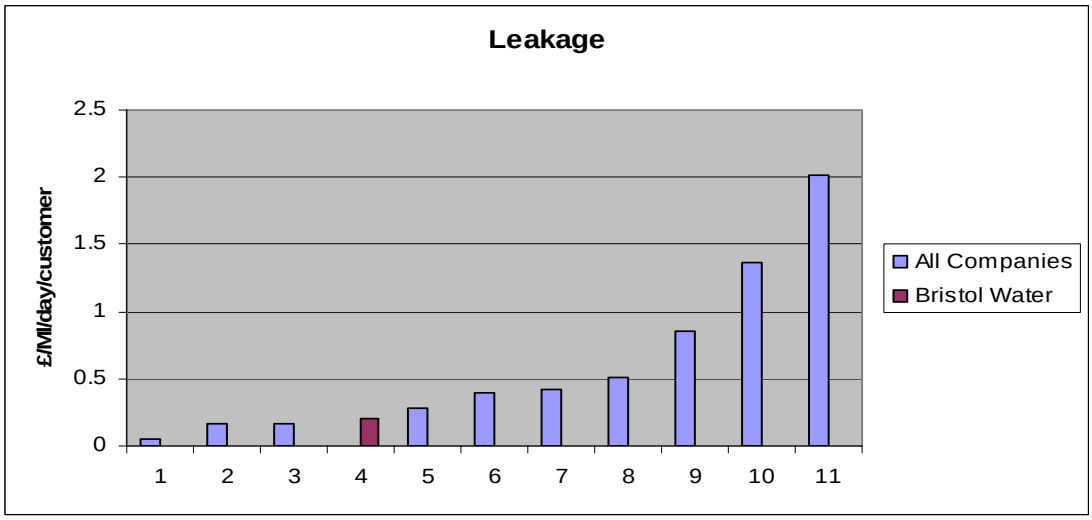
In our customer focus groups, two clear messages emerged:

- Customers attach a high value to security of supply
- Customers consider that leakage is wasteful and environmentally damaging

We believe that the approach we used to solicit willingness to pay from customers was robust and has accurately measured their preferences.

The graphs below compare the willingness to pay values obtained through our survey for reducing leakage and reducing the frequency of hosepipe bans with those obtained by other water companies.

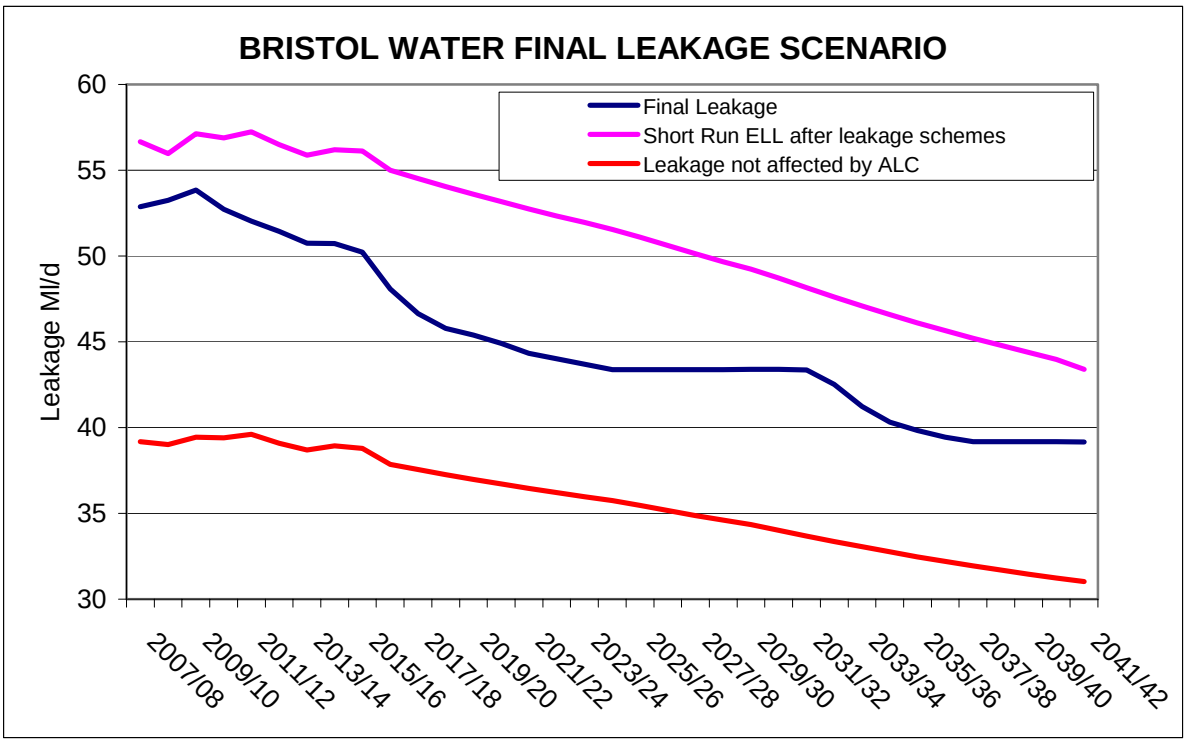




The graphs show that the willingness to pay values obtained are within the range obtained by other companies, and for leakage are at the low end of the range of values obtained.

This provides us with confidence that the values we have obtained are robust. Our customers clearly value our proposals to reduce leakage, at moderate cost and in line with the policy direction in Future Water.

In our plan, we have not changed our proposals to reduce leakage below a narrow economic level, bearing in mind that the level of leakage we propose takes into account the 'Social' component of the Sustainable Level of Leakage as recommended in the 2006 Selborne report on Water Management.



Section 4. Natural England

4.1 Breadth of Natural England response

Natural England has provided a lengthy and detailed response, setting out its position in respect of our draft plan in relation to the various statutory instruments and other designations protecting the natural environment.

Within the detail of the response, the following main points emerge:

- Concern that per capita consumption is not forecast to decline
- Requirement for further consideration of water efficiency measures
- The need to consider water quality issues
- Impact of the draft plan on carbon footprint
- Draft plan effect on landscape, habitats and wildlife in designated areas

4.2 Water consumption and water efficiency

4.2.1 Household consumption

Natural England advise that we set a target for declining per capita consumption in accordance with the target (*sic*.) advocated in the Governments strategy Future Water.

The Government have set out an aspiration rather than a target, to achieve a particular level of household water consumption. It is not yet clear what this level of consumption actually represents, or whether it allows for discretionary or dry weather water use.

In our baseline forecast, we have assumed that all changes to Building Regulations, Fittings Regulations and other regulatory support and enforcement will be provided in the manner detailed in Future Water. If implemented, it would be theoretically possible to achieve a forecast reduction in average per capita consumption to 140 litres capita day by 2030. For comparison with the Future Water scenario, a deduction of a further 5 to 10 litres per capita per day is required representing the amount of external discretionary use of water This then brings our baseline consumption forecast very close to the130 litres capita day advocated in Future Water (net of discretionary use).

While we acknowledge the concept of water neutrality, we believe that it is not a realistic proposition at the level of growth forecast for this region. Overall neutrality in domestic water consumption would require per capita consumption in our supply area to be reduced to 110 litres per capita by 2030.

In our plan, we have modified forecasts of household component consumption to better reflect data from the Market Transformation Programme and to take account of assumptions contained in Future Water (without evidence in support of their efficacy). In our plan, we forecast a reduction in per capita consumption as detailed in section 2 above.

4.2.2 Water efficiency assumptions and targets

Natural England consider that our draft plan should impact more on water efficiency in order to achieve a declining per capita consumption.

In our plan we have incorporated the Ofwat activity based water efficiency targets that reduce household demand by 1 Ml/d over the AMP 5 period, as set out in section 2. We also expect to apply the Ofwat forecast of efficiency savings for the baseline activity we already carry out under the current water efficiency strategy.

We have investigated the use of intelligent metering sufficiently to recognize it could be cost beneficial if the installation costs are low. We have not been able to gather robust evidence from national experience at this stage. Our final plan may contain additional policies using smart meters aimed at reducing supply pipe leakage and investigating the impact of price signals to reduce demand for water as detailed in section 2.

Our plan contains a proposal for a programme of non-household water audits that reduce demand for water by 1.5 Ml/d over the period

4.3 Water quality and water resource protection

Natural England recommend that our draft plan provides further emphasis on the need to protect the quality of natural water resources through catchment management.

The draft plan has focused largely on the issue of the availability of water. Where declining quality is an issue, the measures to mitigate highlighted in the plan have been based on blending or other treatment solutions.

In our plan we have allocated a million pounds over the AMP 5 period for the purposes of catchment management, including recruitment of staff and legal support. This will be focused on four main catchment areas:

- Chew Reservoir
- Blagdon Reservoir
- Cam Frome and Sharpness canal
- Frome groundwater

The aim will be to prevent further deterioration and hopefully reverse the trends in rising levels and occurrences of:
Nitrates
Phosphorous
Methaldehyde

This will allow us to build on the work we currently carry out with the Environment Agency, FWAG, NFU, local wildlife groups and others to reduce the impact of this type of diffuse pollution.

We would prefer to reduce the risk of pollution at source rather than use of ‘end of pipe’ treatment solutions. However, we note that we have limited powers to control development or reduce these impacts in other ways. We look to further support and action under Article 7 of the Water Framework directive in the current drafts of River Basin Management Plans to assist in our catchment management objectives.

Even though we plan to increase the level of activity for catchment management, we have to consider the desired outcomes as uncertain until some evidence of improvement has been recorded.

In our final plan, we have allowed for a reduction of outage of 0.4 Ml/d from 2014 as a result of DWI approved water quality improvement schemes, but no further reductions from catchment management work until we have seen the results from the programme over the AMP 5 period.

4.4 Carbon footprint

Natural England considers the company carbon footprint reduction to be trivial.

The draft water resources plan considers mainly the impact of activity within the narrow remit of the supply demand balance. In determining the optimum blend of activity for maintaining the supply demand balance, schemes that result in a comparatively high-energy demand and carbon emissions have been excluded. Those that are selected are the ones from the basket of options having the lowest comparative carbon footprint. Some of these options may be excluded later in the optimisation process on grounds of cost.

By 2020, we will have reduced the emission of carbon dioxide by approximately 5% due primarily to reductions in leakage and metering associated with the need to balance supply and demand. This is a considerable achievement considering the rate of housing and population growth forecast over the period. This represents only the component attributed to activity related to restore the supply demand balance.

In other areas of our overall Strategic Business Plan we propose an additional large-scale maintenance scheme to replace the least efficient pumps and intensify energy management so that by 2015, the total reduction in carbon emissions will be 10%

To further reinforce our commitment to carbon reduction, we are considering the installation of wind turbine generation of approximately 2 MW at our Purton water treatment plant by 2013. This will reduce carbon emissions by a further 10%, resulting in a carbon reduction of 20% by 2016 in addition to activity driven by the Water Resource Plan.

Overall, these are not trivial emissions reductions, but represent the maximum we consider achievable with current technology and broadly in line with the current targets.

No changes will be made to our plan in respect of this representation.

4.5 Landscape, habitat and wildlife

English Nature have recognised that the options within our draft plan avoid significant effect on any European designated sites. However, they recommend that the robustness of the plan could be increased by:

- **Including mitigation proposals for reservoir development by restoring the modified grazing marsh in the vicinity of the reservoir**

- **By providing a habitats regulations assessment**

We anticipate that any plan for a new reservoir will need to include a substantial number of environmental studies and propose a range of mitigation conditions before any planning consents or land use plans are advanced.

We consider it is premature at this stage to carry out the appropriate assessments for the purposes of a draft plan. We do not know what, if any aspect of our plan will be funded post 2010 or if the plans will develop or currently favoured options change or in future. As we don't know whether our initial proposals for Cheddar will be accepted or how they may be modified, it would be inappropriate to consider mitigation proposals at this stage. All of the required studies and assessment will have to be provide in support any initial planning application (if at some future date we do proceed).

We have taken legal advice a to whether an appropriate assessment is required at this early stage of proposals. The advice is that these assessments are only required at the stage of a planning application for a change in land use. A Water Resource Management Plan does not contain and is not intended to contain, detailed proposals for the carrying out of specific projects. As such, a WRMP does not authorise directly or indirectly the carrying out of specific projects or changes in land use and is not subject to the need for an appropriate assessment under the Habitats Directive.

A copy of this legal opinion is included in the appendices. We do not intend to carry out an appropriate assessment at this stage in the planning process.

Section 5. Consumer Council for Water (CCW)

5.1 Breadth of CCW response

The response of CCW has focussed primarily on water consumption and water efficiency and their desire to see further metering of household customers. We broadly welcome CCW support for our consultation with customers regarding the willingness to pay for a leakage reduction programme

5.2 Water consumption and water efficiency

5.2.1 Household consumption

CCW state that the company should consider further work in order to reduce household demand for water.

The majority of responses have indicated a desire to see measures aimed at reducing per capita consumption.

In our plan, we have modified forecasts of household component consumption to better reflect data from the Market Transformation Programme and to take account of assumptions contained in Future Water (which have little evidence in support of their efficacy). The company final plan predicts a falling per capita consumption as detailed in section 2 above.

In our plan we have incorporated the Ofwat water efficiency targets that reduce household demand by 1 Ml/d over the AMP 5 period. We also intend to apply the Ofwat forecast of efficiency savings for the activity we carry out under the current water efficiency strategy. This has been documented in the responses to Ofwat and the Environment Agency)

5.2.2 Non-household consumption

CCW have expressed concern over the estimate of 650 'illegal' farm troughs in our area.

We have similar concerns, however as it is not possible to know where these troughs are or how much water is being used (it is thought to be less than 0.5% of total water put into supply). Our regime of Byelaws inspections are proportional to the scale of the problem and may be expected to reduce this number in future.

5.3 Metering of household customers

CCW have indicated that the company should consider the metering of household customers on change of occupier.

The company plans to achieve meter penetration of 85% by 2035. This includes the assumption that compulsory metering will be permitted from 2020 onwards on the basis that it becomes politically acceptable to move to a fully metered charging base.

In our draft plan, a full cost benefit analysis for metering on change of occupier was carried out. The comparative cost of this option was over £2.4 per cubic metre (including the social costs and benefits). This is three to four times the cost of alternative schemes that would be cost beneficial to progress and so was not selected as part of the optimum cost package of measures for the final planning scenario for the AMP 5 period due to the immediate impact on water bills.

Instead, we have chosen to target the metering of households with large gardens on the assumption that discretionary water use is greater and therefore the benefits would be much greater, helping to reduce the cost closer to £0.60 per cubic metre.

We have investigated the use of intelligent metering sufficiently to recognize it could be cost beneficial if the installation costs are low. We have not been able to gather robust evidence from national experience at this stage. Our final plan may contain additional policies using smart meters aimed at reducing supply pipe leakage and investigating the impact of price signals to reduce demand for water as detailed in section 2.

5.4 Property and population forecast

CCW have indicated has requested that we discuss with them the implication of the changes to the RSS reflecting the higher growth strategy.

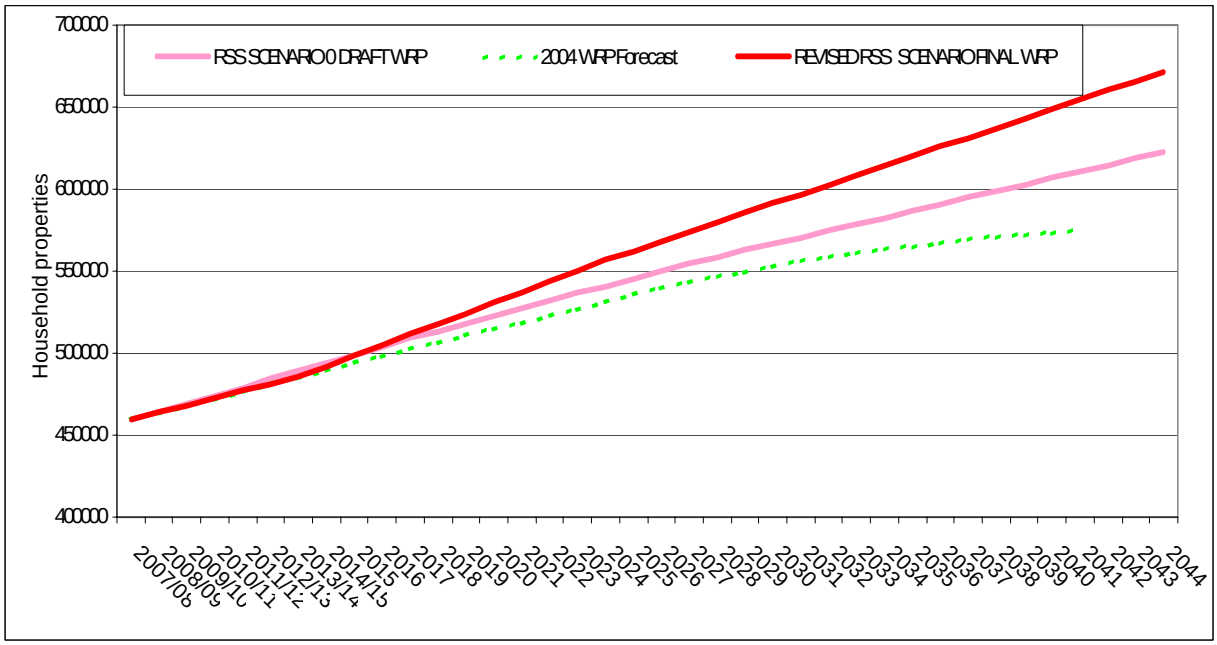
In our draft plan, we used the draft Regional Spatial Strategy (RSS) forecast of property and population growth provided for public consultation on the South-West Regional Assembly web site (SWRA).

We are now aware that the Secretary of State has made recommendations that have resulted in a 25% increase the housing and population projections compared to the RSS scenario used in our draft plan. This revised RSS forecast of 5 year period and annualised growth is set out below for comparison with the previous forecasts for the indicative West of England Partnership area.

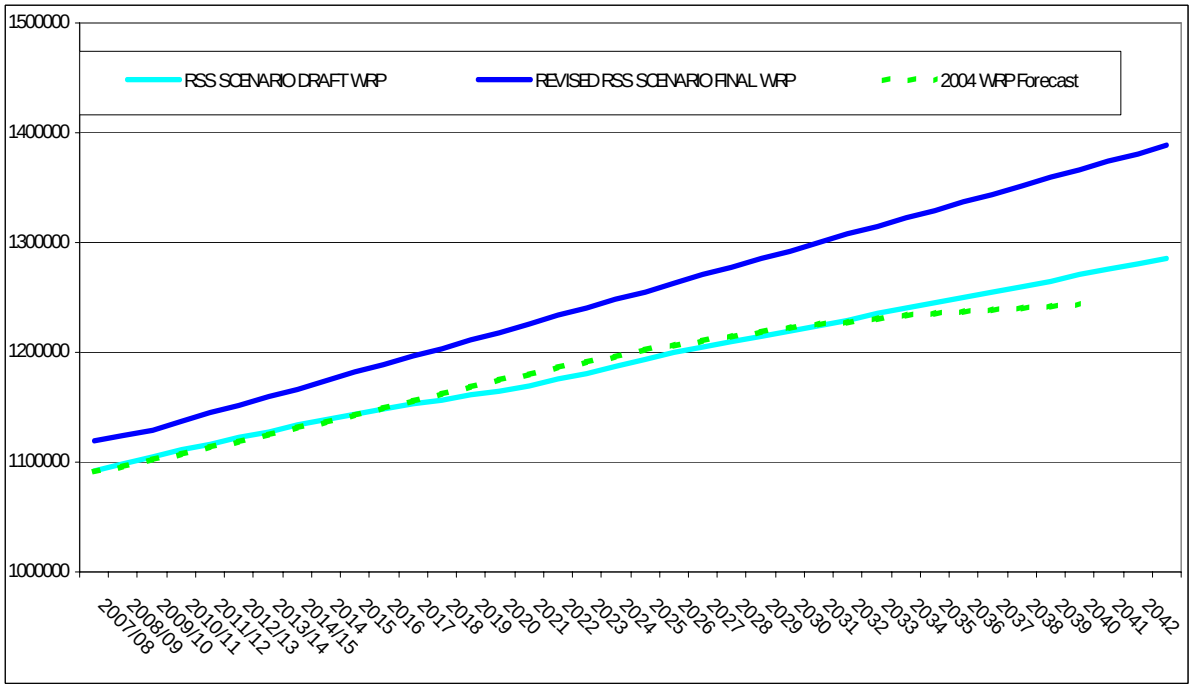
RSS SoS PROPOSED CHANGES RECOMMENDED GROWTH IN HOUSING (source SWRA Website Oct 2008)						
	2006	**2011**	**2016**	**2021**	**2026**	**TOTAL**
BATH & NE SOMERSET	74508	79833	85158	90483	95808	**21300**
BRISTOL	178255	187380	196505	205630	214755	**36500**
N SOMERSET	88580	95280	101980	108680	115380	**26800**
S GLOUCESTER	104880	113080	121280	129480	137680	**32800**
Annualised growth		*2006-11*	*2011-16*	*2016-21*	*2021-26*	
		5870	**5870**	**5870**	**5870**	**117400**

The revised RSS forecasts for housing and population for the company area compared to the original RSS and previous forecasts are set out for comparison purposes in the graphs below.

SoS revised RSS forecast of housing growth used for Final WRP



SoS revised RSS forecast of population growth used for Final WRP



We have provided further information on housing and population forecasts in our response to the Environment Agency submission in section 2.

5.5 Leakage control

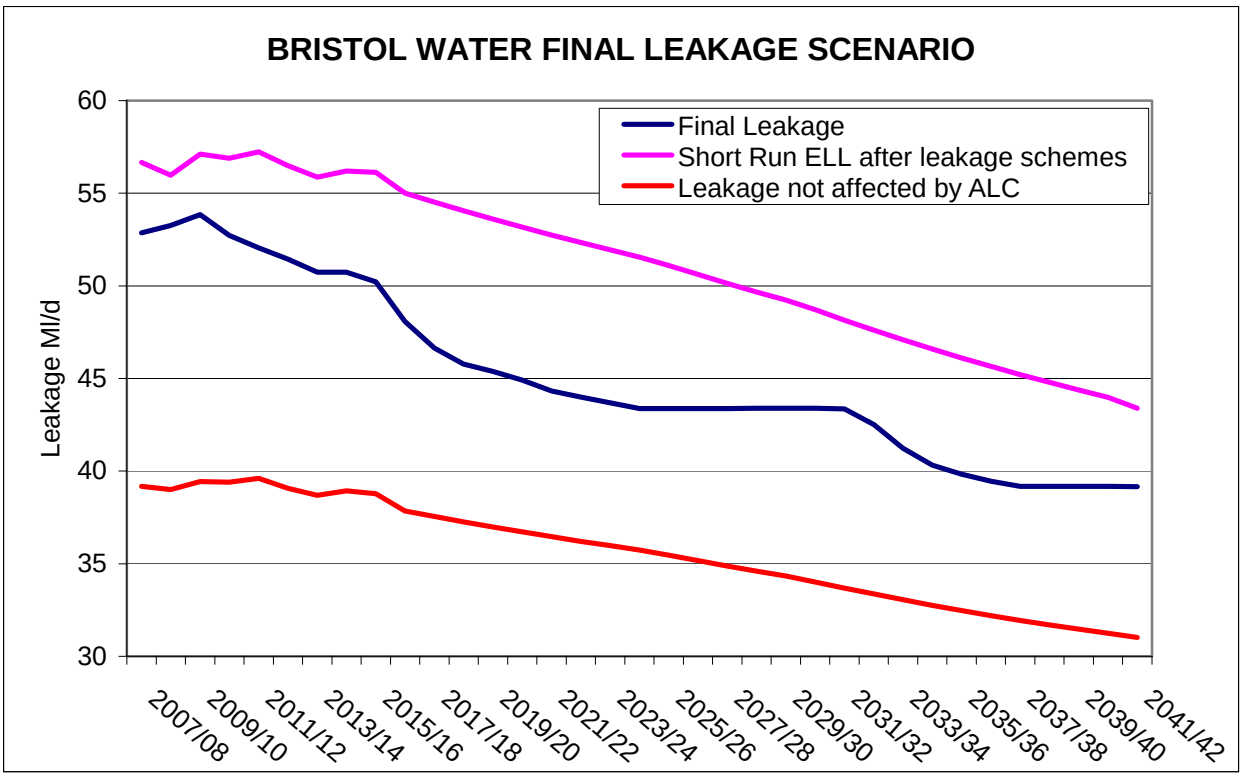
CCW have sought clarification regarding the leakage target proposed for 2020 and whether as a result customers may experience a reduced level of service due to lower system pressures.

In our draft plan, we calculated the optimum leakage target to be 47 by 2015, 42 Ml/d by 2020, falling to 40 Ml/d by 2023, where it remains for a number of years following the proposed development of a major resource (Cheddar reservoir). This analysis was based on an 80% probability that the leakage reductions would be achieved at the stated costs.

In our draft Business Plan, we revised the extent to which leakage could be reduced by 2015, based on a more detailed cost analysis following the submission of the draft Water Resource Plan.

- Our current projection for an optimum cost plan to balance supply and demand is that leakage will fall to 49 Ml/d by 2015 and 43 by 2025, based on new evidence of higher leakage control costs collected during 2008.

- Review of leakage control costs since April 2008 confirms the approach taken for the draft Business Plan



We do not anticipate a reduced level of service due to lower systems pressures arising as a result of proposed pressure reduction schemes.

Before pressure reduction zones are set up, there is a system of investigation and monitoring to ensure that the prospective pressure reduced area is viable hydraulically and customer's

level of service will not be compromised for the usual range of operating conditions. Out of 10 pressure reduction zones established in 2008, there were only a few complaints that were resolved by revised zoning or valve setting.

Customer's level of service with regard to system pressures is monitored under the Ofwat reporting requirements for DG2. Under this procedure, we maintain an awareness of distribution pressures and monitor areas that we suspect have pressures falling below the target level of 10 metres head at a flow of 9 litres per minute (subject to conditions). Investigations are carried out into areas of the network where low pressures are detected, resulting in remedial measures to restore the level of service experienced by customers.

5.6 Option assessment and climate change

CCW request that we closely investigate, review and in future, monitor all options where costs may broadly similar. This is to ensure that the changing circumstances do not commit the company to future action that may become unsuitable, ensuring the long-term flexibility of the plan.

In our plan, we have continued to use the UKCIP 02 estimate of climate change, as new forecast of climate change due in 2008 have not been completed (these will be released in spring or summer 2009 as part of the UKCIP 09 programme)

The Water Resource Management Plan is reviewed every 5 years as part of a statutory process. This means that the plan is constantly maintained in the light of better knowledge and tailored to meet new requirements. It would be unlikely that inappropriate, unviable or low value schemes would be implemented if better ones were available, or became available as a result of better information.

The same general approach applies to issues of climate change. The techniques used to assess and model the effects of climate change are constantly improving and we will always use the latest methods and assumptions when they are made available in an appropriate form. This constant improvement will influence future planning cycles.

As part of its normal business and planning process, the company keeps all data and options under review.

Section 6. Waterwise

6.1 Breadth of Waterwise response

In their representation, Waterwise has provided a broad overview of their thoughts regarding current planning issues and the value of the current process to customers. They have also provided a company specific commentary of key issues in individual plans.

All of the points raised by Waterwise in respect of our plan have been considered in detail elsewhere in this document and include:

- **Concern regarding the fact that per capita consumption is projected to remain unchanged and not decline**
- **Metering strategy, the approach to change of occupier, compulsory metering and issues relating to use of smart metering (intelligent metering).**
- **Approach to water efficiency, targeting and combining of initiatives for maximum effect**

6.2 Water consumption and water efficiency

In our plan we have taken full account of the hoped for efficiency in all new buildings. We have also included the impact of demand reduction from an extended metering programme, achieving over 85% meter penetration by 2035 as appropriate for an area that is not water stressed.

In our plan we have made the assumption that all new housing will meet the Government target 125 litre per capita (although there is little so far evidence to indicate this is actually happening).

In our plan we have revised downwards our estimates of water consumption based upon the projections indicated in work done for the Market Transformation Programme on water used for personal use (i.e. a reduction in both bath and shower device consumption).

In our plan, our domestic consumption forecast takes account of the significant impact of customer led water efficiency measures. These include continual replacement of the existing less efficient water using fittings (washing machines, WC cisterns, etc.)

We have investigated the use of intelligent metering sufficiently to recognize it could be cost beneficial if the installation costs are low. We have not been able to gather robust evidence from national experience at this stage. Our final plan may contain additional policies using smart meters aimed at reducing supply pipe leakage and investigating the impact of price signals to reduce demand for water as detailed in section 2.

In our plan we have incorporated the Ofwat water efficiency targets that reduce household demand by 1 Ml/d over the AMP 5 period. We also intend to apply the Ofwat forecast of efficiency savings for the activity we carry out under the current water efficiency strategy.

Our responses to the Environment Agency sets out in detail our other approach on per capita consumption, metering and water efficiency in section 2.

Section 7. Campaign to Protect Rural England

We thank the CPRE for their representations in respect of our plan. We note their comments in respect of the following issues.

- **Improvements to household awareness of water efficiency and use of metering**
- **Supply pipe leakage in the rented sector**
- **Cooperation with other organisations (wildlife trusts, housing associations and local government)**

7.1 Water consumption and water efficiency

We already carry out a full range of water efficiency activity that complies with the Ofwat 'Best Practice Guidelines' for a company in our water resource position. This includes a significant element of customer communication through public relations and educational work. We also carry out liaison and offer water efficiency advice to commercial organisations.

A full programme of compulsory household metering could also be implemented to achieve the efficiency target. In our draft plan we have demonstrated that this approach may not be the most cost effective solution in the long-term and would not be likely to be funded under current Ofwat guidance.

In our plan we have incorporated the Ofwat water efficiency targets that reduce household demand by 1 Ml/d over the AMP 5 period. We also intend to apply the Ofwat forecast of efficiency savings for the activity we carry out under the current water efficiency strategy.

Our final plan may consider additional policies using smart meters aimed at reducing supply pipe leakage and investigating the impact of price signals to reduce demand for water as detailed in section 2.

7.2 Leakage reduction

Our overall programme of leakage reduction takes account the effect of replacing a significant proportion of supply pipes over time. This will improve the overall performance of this class of asset and is a better long-term solution than a single point repair to ageing pipes.

We believe that customers also have a duty to maintain their property and associated assets and to ensure they are using water wisely. We would consider that providing an unlimited free repair service would not send an appropriate message in this regard.

We treat the owners of rented property as commercial undertakings. We would not be expected to allow household customers to subsidise private businesses by offering a free supply pipe repair service to commercial property. Where we detect leakage on commercial mains and plumbing, we would expect to issue an enforcement notice to ensure a rapid repair or replacement was carried out.

7.3 Communication and cooperation

The development of Water Resource Plans is a prescribed statutory process. We expect to consult all stakeholders regarding our plans at least every 5 years and more frequently if required. In addition to this we engage with a wider range of stakeholders in the normal course of our business. These stakeholders have been contacted as a result of the Water Resource Planning process and are listed in the appendices of our plan. We would advise relevant stakeholders as individual components of the plan are implemented (as we do at present).

Section 8. Avon Wildlife Trust

We thank the Avon Wildlife Trust for their representations in respect of our plan. We note their comments in respect of the following issues.

- **Choice of options and environmental appraisal**
- **The Strategic Environmental Assessment**

8.1 Options assessment

In our options assessment, we have tried to capture all of the possible measures that could restore and maintain the supply demand balance over time. It is clear that some of these could be highly damaging. The SEA and the cost benefit appraisal method take full account of full life social and environmental costs and impacts of the various options.

Although schemes such as desalination and Avon Chew transfer are regarded as technically viable, in cost benefit terms, they are highly unattractive compared to other less damaging, lower cost, lower carbon options. On this basis, they would not be adopted as part of our long- term resources plan.

8.2 Strategic Environmental Assessment

We note the comments in respect of Local Wildlife Sites, as designated in the plans of local authorities. We have investigated our proposals and consider that none of our preferred options impact these sites as currently identified.

Section 9. Woodland Trust

We thank the Woodland Trust for their representations in respect of our plan. We note their comments in respect of the following issues.

- **Choice of options with regard to habitat protection**

9.1 Options assessment

Our plan makes specific proposals for future water supply, including the presentation of a basket of possible options to restore the supply demand balance in response to the projected increase in housing and population growth.

All of our options have been developed in parallel with a Strategic Environmental Assessment, within which the protection of habitats is one of the key objectives. This identifies at a high level any potential impacts on designated areas. At this point options can be modified to minimise impacts, or if not given negative scores in the overall ranking of schemes. In the detailed work carried out for costing the individual options, any local impacts are identified and alternatives sites or routings considered ensuring that any impact on designated areas can be avoided at an early stage.

Section 10. Individual public representations

The overwhelming response to our plan was from regulatory authorities and other publicly funded bodies. It was refreshing to receive seven individual responses from member of the public and we thank them for taking the time to review our plan and present their representations.

We observed some similarity in the style and type of issue referred to in the letters. All of these issues have been covered in some detail in the sections above. Because of this we have provided a condensed response to the public representations in this section.

This group of representations was focused upon the following areas:

- **Water consumption and water efficiency**
- **Water quality and water resource protection**
- **Water resource development options**

10.1.1 Water consumption and water efficiency

In our plan, we have made changes in response to representation on this subject. These are detailed fully in section 2, and referred to in other sections of this response.

10.1.2 Water efficiency assumptions and targets

In our plan, we have made changes in response to representation on this subject. These are detailed fully in section 2, and referred to in other sections of this response.

10.2 Metering of household customers

Some representations made reference to metering, one stating that it was 'ridiculous' to not introduce compulsory metering until 2020.

We fully support the need to meter all customers and our plan includes the installation of 12,000 household meters per annum (excluding all new housing that are metered as a matter of policy). The company plans to achieve meter penetration of 85% by 2035. This includes the assumption that compulsory metering will be permitted from 2020 onwards on the basis that it becomes socially acceptable to move to a fully metered charging base at that time.

Our customers consider metering is the fairest way to pay for water. However, although metering will result in decreased consumption of water to some extent, the cost to customers is relatively high when compared to other options. In general terms, the implementation of a compulsory metering scheme would result in an additional £5 to £6 pounds per annum to customer bills.

The funding process is driven largely by the need to avoid options that would result in higher customer bills, unless there are issues of environmental water stress. However, our environmental water resource status is one of 'low water stress' as calculated by the Environment Agency. This means that it is not legally possible to adopt a programme of compulsory metering at this time. This position will be reviewed in future planning cycles.

In our plan we have not made any changes to the stated programme of compulsory household metering.

We have investigated the use of intelligent metering sufficiently to recognize it could be cost beneficial if the installation costs are low. We have not been able to gather robust evidence from national experience at this stage. Our final plan may contain additional policies using smart meters aimed at reducing supply pipe leakage and investigating the impact of price signals to reduce demand for water as detailed in section 2.

10.3 Water quality and water resource protection

The draft plan has focused largely on the issue of the availability of water. Where declining quality is an issue, the measures to mitigate highlighted in the plan have been based on blending or other treatment solutions.

In our plan we have allocated a million pounds over the AMP 5 period for the purposes of catchment management, including recruitment of staff and legal support. This will be focused on four main catchment areas:

- Chew Reservoir
- Blagdon Reservoir
- Cam Frome and Sharpness canal
- Frome groundwater

The aim will be to prevent further deterioration and hopefully reverse the trends in rising levels and occurrences of:
Nitrates
Phosphorous
Methaldehyde

This will allow us to build on the work we currently carry out with the Environment Agency, FWAG, NFU, local wildlife groups and others to reduce the impact of this type of diffuse pollution.

We would prefer to reduce the risk of pollution at source rather than use of ‘end of pipe’ treatment solutions. However, we note that we have limited powers to control development or reduce these impacts in other ways. We look to further support and action under Article 7 of the Water Framework directive in the current drafts of River Basin Management Plans to assist in our catchment management objectives.

Even though we plan to increase the level of activity for catchment management, we have to consider the desired outcomes as uncertain until some evidence of improvement has been recorded.

In our final plan, we have allowed for a reduction of outage of 0.4 Ml/d as a result of DWI water quality improvement schemes, but no further reductions from catchment management work until we have seen the results from the programme over the AMP 5 period.

10.4 Options assessment

Some public representations indicated that our proposal to increase the storage capacity at the existing cheddar reservoir would be harmful to the environment. However one response recognised that the capturing of water during winter and using it to supplement supplies during the summer would be beneficial.

We are surprised at the automatic assumption that building a reservoir is necessarily damaging to the environment. All of our man made reservoir sites in the Mendips are Sites of Special Scientific Interest (SSSI), assessed as in highly favourable condition and one site is designated a Special Protection Area in respect of its bird populations. It seems inconsistent to consider that the enlargement of an existing reservoir would lead to environmental damage.

We engaged consultants to carry out a Strategic Environmental Assessment of our options when formulating our draft plan. This sets as a key objective the protection of habitats, as well as establishing the relative social and environmental benefits or impacts of proposed options (including reservoir development). This independent analysis attributed considerable environmental and social benefits to an extension of Cheddar reservoir compared to other resource options.