

Executive Summary

Introduction

This document is the Executive Summary (forming Volume 1) of our draft final Water Resources Management Plan (dfWRMP09) which covers the period 2010-2035. It aims to provide background to the plan, the outcome of the Public Inquiry held on our draft Plan in summer 2010 and a summary of the main parts of our Plan including signposts for the reader to relevant sections of other volumes of the Plan for further information.

Background

Thames Water is the UK's largest water and wastewater services company. We serve over 13.5 million customers in London and the Thames Valley, supplying an average of 2,600 million litres of drinking water per day and treating around 2,800 million litres of sewage.

We have a legal duty to provide a secure supply of safe and clean water to our customers and every five years we are required to produce a Water Resources Management Plan (WRMP), which sets out how demand for water is balanced against the available supply over the next 25 years.

This Plan, the draft final Plan, has been developed since 2008 and has been revised several times. The chronological timeline to develop this Plan is set out below.

May 2008 - We published our draft Plan (dWRMP) covering the 25-year period from 2010 to 2035. A public consultation on the dWRMP began on 7 May 2008 and ran for a 16-week period to 27 August 2008.

February 2009 - We produced a Statement of Response (SoR) to comply with Regulation 4 of the Water Resources Management Plan Regulations 2007. The statement identifies and explains:

- the consideration we had given to the representations received as part of the public consultation on the draft Plan;
- the changes made to the draft Plan as a result of the consideration of the representations and the reasons for the changes; and
- where we had not made any changes to the draft Plan as a result of our consideration of the representations, why no change has been made.

August 2009 - The Secretary of State called a Public Inquiry on our draft Plan to examine several issues in more detail.

September 2009 - We published a revised dWRMP (rdWRMP) in September 2009 which consolidated changes as presented in the SoR, feedback from the economic regulator, the Water Services Regulation Authority (Ofwat), in the lead up to the submission of our Final Business Plan (FBP) in April 2009, together with some minor changes to ensure the rdWRMP and the Business Plan were properly aligned. As such, the rdWRMP consolidated information from the dWRMP, SoR and FBP.

June 2010 - A Public Inquiry was held to examine our dWRMP. A number of important issues were discussed at the inquiry.

March 2011 - Publication of the Planning Inspector's recommendations.

May 2011 - Following consultation with the Environment Agency and stakeholders, Defra issued instructions¹ on the amendments we needed to make to the rdWRMP so that it meets the minimum requirements recommended by the Planning Inspector. The Inspector was mindful of the need to secure an approved WRMP as soon as possible and therefore recommended that a '*pragmatic solution*' should be adopted when updating the plan. Defra's instructions to Thames Water reflect this recommendation and they did not require the demographic and demand forecast information in the plan to be updated as these data were considered acceptable at the Public Inquiry.

June - November 2011 - We started the technical work required to amend the rdWRMP in line with Defra's recommendations. We engaged stakeholders at key steps in this process. In July following publication of a draft Work Plan and subsequent stakeholder consultation and comment on it, we formulated and published on our website a Final Work Plan setting out how we intended to amend our revised draft WRMP in accordance with Defra's instructions. We published further technical notes to brief stakeholders and seek their feedback on our approach on key aspects of the Plan, in particular the water resources options, the Strategic Environmental Assessment and the Habitats Regulation Assessment and the programme appraisal to determine the preferred water resources programme.

December 2011 - This document, our draft final WRMP is the output of this process. A seven week public consultation will run from 12 December 2011 to 31 January 2012. We welcome discussions with stakeholders during this period on all aspects of this plan.

February 2012 - At the close of the public consultation, a Statement of Response to representations received will be published, and a final WRMP produced taking account of the responses received and also to explain where comments have not been taken into account, the reasons for this.

Public Inquiry

In August 2009, the Secretary of State called for an inquiry in connection with our dWRMP in accordance with section 5 of the Water Resources Management Plan Regulations 2007. The Inquiry sat for 22 days during the period from 15th June to 18th August 2010. As part of the inquiry process, interested members of the public and organisations made written evidential submissions and where they wished listened to oral evidence given by other parties. Cases from the following organisations and individuals were presented at the Inquiry:

¹ Letter from Carol Skilling, Defra to Martin Baggs, Thames Water 13 May 2011

- Thames Water;
- Environment Agency;
- Vale of White Horse District and Oxfordshire County Councils;
- Group Against Reservoir Development;
- Consumer Council for Water;
- Cotswold Canals Trust;
- Campaign to Protect Rural England;
- Whitewater Valley Preservation Society;
- Action for the River Kennet; and,
- Interested Persons who appeared at the Inquiry.

Having considered the cases for the organisations and individuals listed above, the Inspector recommended that the Secretary of State instruct us to amend our plan because it was not possible to conclude that the secure supply of water maintained by the preferred programme in our rdWRMP would be efficient and economical. The aim of these amendments would be to improve the robustness of the evidence underpinning our water resources options and programme appraisal methodologies, and also to remove consideration of 'long term risk' and all programmes related to it.

In amending our plan to produce this dfWRMP we have complied with the instructions provided by Defra, in consultation with the Environment Agency, pursuant to the Inspector's recommendations, which were sent to us on 13 May 2011. These instructions identified which of the Inspector's recommendations should be addressed within this plan, which should be considered further during subsequent annual reviews, and which should be considered in the preparation and publication of the draft WRMP14 for the period 2015 to 2040. These instructions are available to view on our website www.thameswater.co.uk/wrmp and are summarised in Table 1, along with a cross-reference to where each is now addressed within this Plan.

In addition, Statements of Common Ground (SoCG) were agreed between Thames Water and the Consumer Council for Water (CCW) and Ofwat at the Inquiry.

The SoCG with CCW reflected the need for further consideration in development of the proposed metering strategy of the following issues:

- Affordability and specifically the need to ensure adequate protection of vulnerable and low income households;
- The need for further consultation on tariff design before communal metering of shared supplies is introduced; and
- Ensuring that the measured / unmeasured charge differential is managed and does not penalise households in socially disadvantaged areas where metering is deferred or impracticable.

The SoCG with Ofwat addressed a number of issues including the costs and benefits relating to Thames Water's mains replacement proposals. TW and Ofwat agreed to jointly commission a study to review the performance of the mains replacement programme in London to date and

proposals to reduce leakage in the period to 2020. This work is on-going and is covered in more detail in Volume 2, Section 7.

Following the inquiry, the publication of the Planning Inspector's report and Defra's subsequent instructions to Thames Water on the amendments required to our plan, we have continued to consult with stakeholders during the preparation of this dfWRMP. We have undertaken the following additional consultation:

- Publication of a draft and final Work Plan for the dfWRMP, with comments sought from stakeholders on the draft;
- Publication for comment of our updated approach to the Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA) to statutory authorities. A summary of the information consulted upon, and the statutory consultees to whom it was sent, is provided in Volume 2, Section 7; and,
- Publication for comment of two stakeholder update notes during the production of the dfWRMP, the first associated with the feasible options list and the approach to programme appraisal and the second associated with the initial results from the programme appraisal process. Details of changes made as a result of comments received during consultation on Stakeholder Update Note No. 1 can be found in Volume 2, Section 7; changes resulting from Stakeholder Update Note No. 2 can be found in Volume 2, Section 8.

Table 1: Summary of Defra’s instructions

| Rec. No. | Task | WRMP 09 | 2012 annual review | WRMP 14 | dfWRMP 09 ref. |
|-------------------|--|---------|--------------------|---------|---------------------|
| OPTIONS APPRAISAL | | | | | |
| 1 & 2 | Inclusion of Severn-Thames transfer options in the feasible options list but NOT in the preferred programme due to current uncertainties | ✓ | | | Table 7.2 Section 8 |
| 1 & 2 | On-going technical analysis to confirm feasibility and uncertainty of Severn-Thames transfer options | | ✓ | ✓ | N/A |
| 3 | Summarise current bulk supply arrangements with Veolia Water Central and Essex and Suffolk Water | ✓ | | | Section 4.1.4 |
| 3 | On-going technical analysis to confirm feasibility and uncertainty of options associated with changing bulk supply arrangements | | ✓ | ✓ | N/A |
| 4 | Inclusion of a 50 Mm ³ options for Upper Thames Reservoir (options A & B from Public Inquiry) in feasible options set | ✓ | | | Table 7.2 and 7.3 |
| 4 | Investigations of alternative sites for a 50 Mm ³ reservoir | | | ✓ | N/A |
| 5 | Inclusion of new effluent re-use options in feasible options set including those smaller scale schemes identified by Public Inquiry and a 60 MI/d option at Deephams STW, but <u>all</u> based upon using reverse osmosis technology | ✓ | | | Table 7.2 |
| 5 | Investigations into a greater range of effluent re-use schemes and alternatives to reverse osmosis technology | | ✓ | ✓ | N/A |
| 5 | Update on public perception investigations and effluent re-use trial at Deephams STW | | ✓ | ✓ | N/A |
| 6 | Further breakdown of costs for all options and to support WRSE modelling work | | ✓ | ✓ | N/A |
| 7 | Consideration of how a greater range of feasible options could be provided | ✓ | ✓ | ✓ | Table 7.2 and 7.3 |
| 19 | Include contingency options beyond AMP5 | ✓ | | | Section 10 |
| 19 | Further investigate and review some of the more uncertain contingency options such as aquifer storage and recovery | | ✓ | ✓ | N/A |

| Rec. No. | Task | WRMP 09 | 2012 annual review | WRMP 14 | dfWRMP 09 ref. |
|---|---|---------|--------------------|---------|----------------|
| PROGRAMME APPRAISAL – OVERARCHING CHANGES | | | | | |
| 8 | Provide further explanation of programme appraisal and decision making criteria, but <u>retain existing programme appraisal methodology</u> | ✓ | | | Section 8 |

| Rec. No. | Task | WRMP 09 | 2012 annual review | WRMP 14 | dfWRMP 09 ref. |
|----------|---|---------|--------------------|---------|----------------|
| 9 | Present implications of embodied and operational carbon in choice of preferred programme | ✓ | | | Section 8 |
| 10 & 11 | Clearly explain differences between monetised and non-monetised environmental and social impacts and the use of both in programme appraisal | ✓ | | | Section 8 |
| 10 | Apply new methodology to programme appraisal to identify the Company's preferred strategic programme | | | ✓ | N/A |
| 13 | Re-define objective of alternative programme appraisals | ✓ | | | Section 8 |
| 14 | Avoid excess surplus water in alternative programmes unless that provides most cost effective solution to meeting deficit | ✓ | | | Section 8 |
| 15 | Remove references to 'long term risk' | ✓ | | | Section 4.2.5 |
| 22 | Need to present utilisation based AISC calculations for all alternative programmes | ✓ | | | Section 8 |


| Rec. No. | Task | WRMP 09 | 2012 annual review | WRMP 14 | dfWRMP 09 ref. |
|---|---|---------|--------------------|---------|----------------|
| PROGRAMME APPRAISAL - SENSITIVITY ANALYSIS | | | | | |
| 12 | Consideration of programme sensitivity to cost certainty | ✓ | | ✓ | Section 8 |
| 16 | Consideration of programme sensitivity to TW's key assumptions | ✓ | | | Section 9 |
| 17 | Consideration of programme sensitivity to different potential sustainability reduction scenarios | | | ✓ | N/A |
| 18 | Consideration of programme sensitivity to actual utilisation of schemes | ✓ | | ✓ | Section 8 |
| 18 | Consideration of programme sensitivity to 25 year NPV <u>only</u> | ✓ | | | Section 8 |
| 18 | Consideration of programme sensitivity to 80 year NPV | | | ✓ | N/A |
| 20 | Need to consider sources of uncertainty around scheme yield and timing and the implications of these | ✓ | | | Section 8 |
| 20 | Need to explicitly quantify the probability of the main sources of scheme timing and yield uncertainty and include in target headroom | | ✓ | ✓ | N/A |
| 20 | Revision to target headroom | | | ✓ | N/A |

| Rec. No. | Task | WRMP 09 | 2012 annual review | WRMP 14 | dfWRMP 09 ref. |
|------------------------|--|----------------|---------------------------|----------------|-----------------------|
| TEXTUAL CHANGES | | | | | |
| 21 | Acknowledgement of shortcomings in willingness to pay survey | | ✓ | ✓ | N/A |
| 23 | Text reflects latest agreement between TW and Ofwat (with regard to the independent review of the cost effectiveness of mains replacement for leakage reduction) | ✓ | | | Section 7.3.2 |
| 24 | Text reflects latest agreement between TW and CCW with regard to compulsory metering | ✓ | | | Section 7.3.3 |
| 25 | Text updated to reflect all agreed errata changes from PI | ✓ | | | All |

Structure of the Plan

This document is the Executive Summary of our dfWRMP for the period 2010 to 2035. To fully understand our Plan it should be read in conjunction with the following reports:

- Volume 2 – Main Report
- Volume 3 – Appendices
- Volume 4 – WRP Tables
- Volume 5 – Assessment of Alternative Schemes
- Volume 6 – SEA Environmental Report and Addendum
- Volume 7 – Habitats Regulations Assessment (HRA)

For ease of understanding and given that there are sections of the report that are essentially unchanged from the rdWRMP, at the start of each section in Volume 2 we have added boxed text containing a summary of the main changes since the rdWRMP. We have also highlighted where we have made material textual changes to the plan. Summarised versions of these boxes are also provided in this document. References to other volumes of the dfWRMP are provided using this symbol .

This remainder of this Executive Summary is structured as follows:

- Introduction and background information;
- Water resources programme, 2005 to 2010;
- Current and future demand for water;
- Current and future water supply;
- Allowing for risk and uncertainty;
- Baseline supply demand balance;
- Appraisal of supply demand options;
- Programme appraisal;
- Preferred supply demand investment programmes;
- Sensitivity testing; and,
- Summary of the main elements of the preferred programme.

1 Introduction and Background Information

☛ *Volume 2, Section 1*

Volume 2, Section 1 has been amended to include:

- An outline of the Public Inquiry process which was held during the summer of 2010 and the resulting Planning Inspector’s recommendations which the Secretary of State (Defra) has recommended we address in this final draft plan.
- How the dfWRMP relates to previous (and future) submissions.
- The impact of misalignment of water industry planning.
- An overview of the public consultation on the dfWRMP.

1.1 Overview of a Water Resources Management Plan (WRMP)

Thames Water, as a statutory water undertaker, has a duty to maintain the security of water supply. Every five years we are required to produce a Water Resources Management Plan (WRMP), which set outs how we plan to provide water to meet customers’ needs while protecting the environment over a 25-year period. The WRMP follows the Water Resources Planning Guideline (WRPG) set down by the Environment Agency (EA)². The main steps are shown in Figure 1.

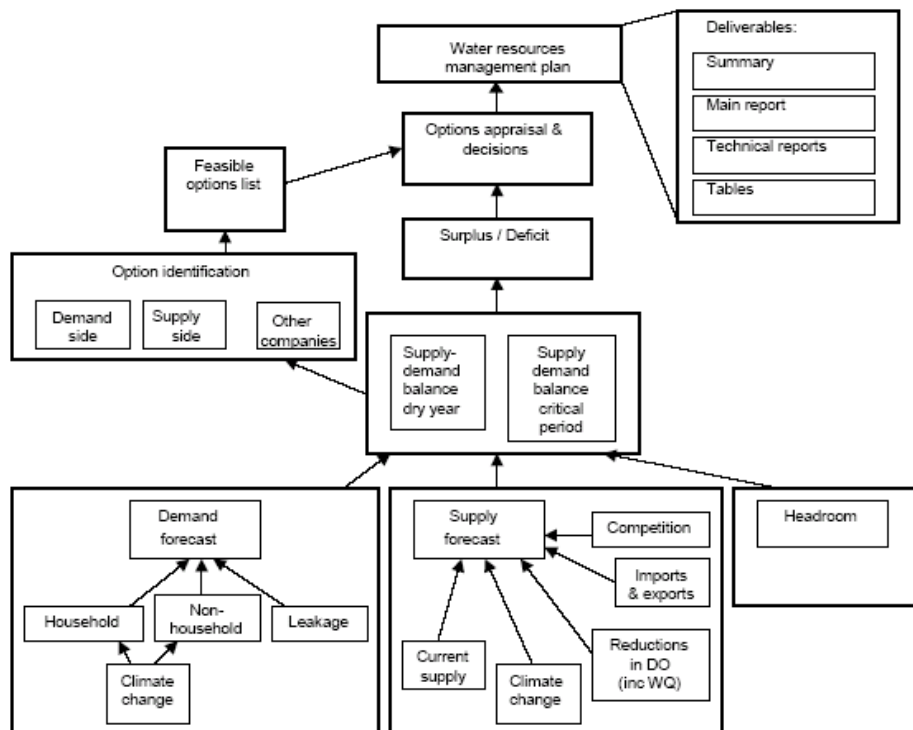


Figure 1: Components of a WRMP (EA WRPG, 2007)

☛ *Volume 2, Section 1.2*

² EA, Water Resources Planning Guideline, April 2007

Understanding the expectations and preferences of our stakeholders is important in developing our plans. In preparing the draft WRMP, we sought the views of stakeholders and regulatory bodies through detailed research, customer surveys, regular meetings, and public consultation on *Taking Care of Water*, our Strategic Direction Statement, which set out the company’s strategic direction from 2010 to 2035.

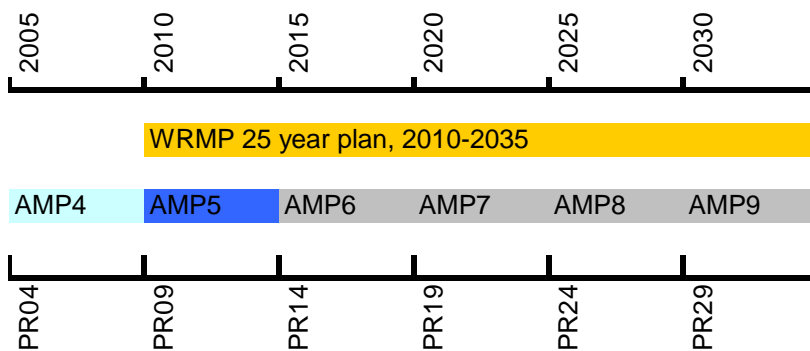
The key areas of interest with respect to water resources were the need to maintain security of water supply, wide support for continued investment to achieve further reductions in leakage and support for greater efforts to manage demand through the promotion of water efficiency and metering. There was also a general acceptance of the need for new resources if all existing options have been fully utilised. We have taken these comments into account in developing our WRMP.

☛ *Volume 2, Section 1.3*

Our dWRMP was submitted to the Secretary of State for the Environment (Defra), who worked closely with the Environment Agency (EA) and Water Services Regulation Authority (Ofwat) to review our submission.

The EA has a statutory duty for long-term water resource planning and is a statutory consultee in the development of WRMPs. The EA reviewed the draft WRMP and made representations to the Secretary of State.

The WRMP also forms the supply demand component of our Business Plan (BP). The BP covers a 5-year period. The BP is submitted to, and reviewed by Ofwat to set price limits for the next 5 years. This process is known as the Price Review. The next Price Review is PR14 and covers the period 2015/16 to 2019/20.



WRMP provides the supply demand component of the Strategic Business Plan (SBP)
 The SBP is submitted to Ofwat in 2009 to inform the 5 yearly Price Review for 2010-2015 (PR09)
 When PR09 is agreed, the 5 year funded programme is called Asset Management Plan 5 (AMP5)

Figure 2: Illustration of the interrelationship between the WRMP, the BP and the Price Review

Figure 3 illustrates how these documents are inter-connected; the first 5 years of the WRMP forms the supply demand balance section of the BP. In addition, every year, water companies are required to produce an annual report, called the June Return. This covers all business activities and provides regulatory bodies and the public with an up-to-date picture of the company’s performance and progress against regulatory targets. In theory these plans and reports are prepared in sequence and are aligned as shown in Figure 2.

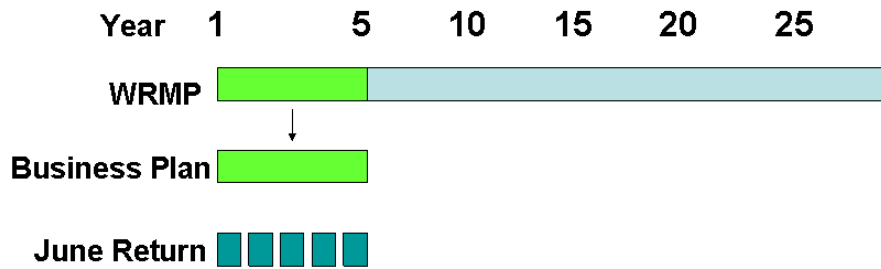


Figure 3: Inter-relationship of reports and the time horizon covered by each.

However in practice, this sequential process does not always occur and the outputs are therefore not completely aligned. In this period, our WRMP09 was referred to Public Inquiry in August 2009 and as a result of the outcome of the inquiry, amendments are required to be made to the plan. In the intervening period, Ofwat’s determination on the Company’s BP, confirming regulatory outputs and funding for activities over the period 2010-2015 was published. The annual June Returns for 2009/10 and 2010/11 have been published, as shown in Figure 4.

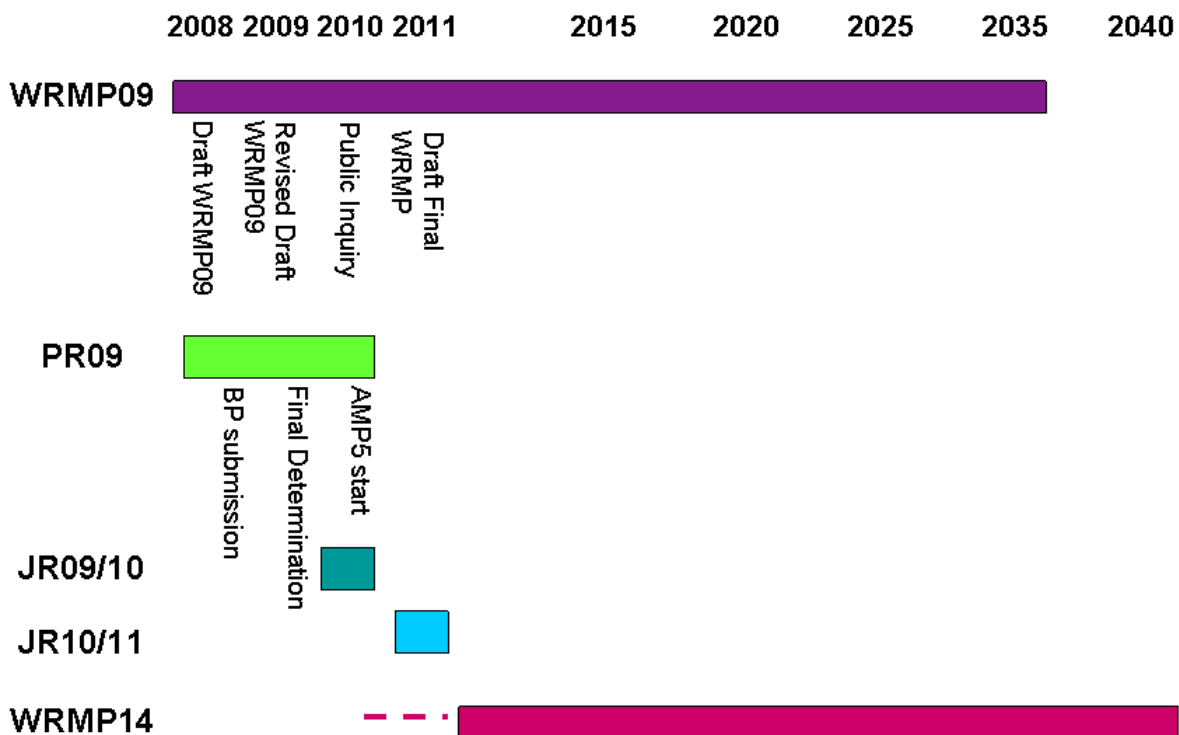


Figure 4: Relationship between the outputs prepared by Thames Water

The misalignment of the plans and reports has resulted in some discrepancies in the plans; the main differences are outlined below:

- **Base Year:** The dfWRMP09 utilises 2007/08 as the base year for the plan. This is in line with the Inspector’s recommendation that the demand forecast does not require

amendment. The supply demand balance has been reassessed in 2008/09 and 2009/10 and reported in the respective June Returns. Due to several factors, such as the delay in approval of our WRMP09, the Company's selective metering programme has not commenced when originally planned. The supply demand balance is now different to the original forecast in the short term.

- **Climate change:** The dfWRMP09 incorporates UKCIP02 climate change projections in line with the EA WRPG requirements. Due to the publication of updated climate change scenarios, UKCP09, in the summer of 2009, Ofwat excluded any climate change related investment in their determination of the Company's BP and instead included a mechanism for us to resubmit our climate change investment case in AMP5 using the new UKCP09 scenarios through a notified item. We are currently assessing the revised projections to understand the potential impact on the supply demand balance and security of supply which will inform our decision on the submission of a notified item. A consequence of this is that the water resources programme presented in the dfWRMP09 does not align with the funded programme of activity in Ofwat's Final Determination.
- **AMP5 Outputs:** In view of the different treatment of climate change in the WRMP and the BP as outlined above, the activities funded in Ofwat's Final Determination in AMP5 do not align with the outputs as set out in this dfWRMP09. This is summarised in Table 2.

| Option | Activity | dfWRMP Output | Final Business Plan Output | Final Determination Output |
|-----------------------------|---|---------------|----------------------------|----------------------------|
| Leakage Reduction | Mains replacement | 1000 | 400 | 0 |
| | Reduction at 80% confidence level | 73 | 28 | 2 |
| Metering | Optant meters (No) | 139,000 | 139,000 | 139,000 |
| | Selective meters – Compulsory Targeted (No) | 365,193 | 211,043 | 85,660 |
| Water Efficiency | Baseline (Ml/d) | 17.25 | 17.25 | 17.25 |
| | SELWE (Ml/d) | 4.85 | 4.85 | 4.85 |
| Water Resources Development | Goring Gap 1 (Ml/d) | 4.5 | 4.5 | 4.5 |
| | SWOX NC1 (Ml/d) | 1 | 1 | 1 |
| | SWOX NC2 (Ml/d) | 0.3 | 0.3 | 0.3 |
| | Ashdown Park (Ml/d) | 0.9 | 0.9 | 0.9 |
| | SWOX NC3 (Ml/d) | 2 | 2 | 2 |
| | SWOX NC4 (Ml/d) | 1 | 1 | 1 |
| | SWOX NC5 (Ml/d) | 0.3 | 0.3 | 0.3 |
| | Goring Gap3 (Ml/d) | 10 | 10 | 10 |
| | SWOX NC5 (Ml/d) | 2.1 | 2.1 | 2.1 |
| Sustainability Reductions | Goring Gap2 (Ml/d) | 5.8 | 5.8 | 5.8 |
| | Delivery (No) | 3 | 3 | 2 |
| SD Investigations | Options Appraisal (No) | 9 | 9 | 0 |
| | Studies (No) | 13 | 13 | 2 |
| Infrastructure enhancement | Growth, Mains and Storage Schemes (No) | 11 | 11 | 11 |

Table 2: AMP5 output comparison

The misalignment between these reports and consequent discrepancies in the data are understood by the Environment Agency and Ofwat. Work is underway to prepare the next WRMP (WRMP14) covering the period 2015-2040 and the regulators and water companies are working closely together to ensure better alignment as part of this process.

1.2 Introduction to Thames Water’s Supply Area

Our water supply area covers around 8,000 square km. The area is divided into six independent water resource zones (WRZs) as shown in Figure 5. A WRZ is defined as an area within which all water resources can be shared and therefore customers experience the same level of service. Water resources are planned at a WRZ level.

The largest WRZ (by population) in Thames Water’s area is London, which covers the Greater London area. The other five WRZs, SWOX (Swindon, North and South Oxfordshire), Kennet Valley, Henley, SWA (Slough, Wycombe and Aylesbury), and Guildford are collectively called the Thames Valley WRZs.

➡ *Volume 2, Section 1.7*

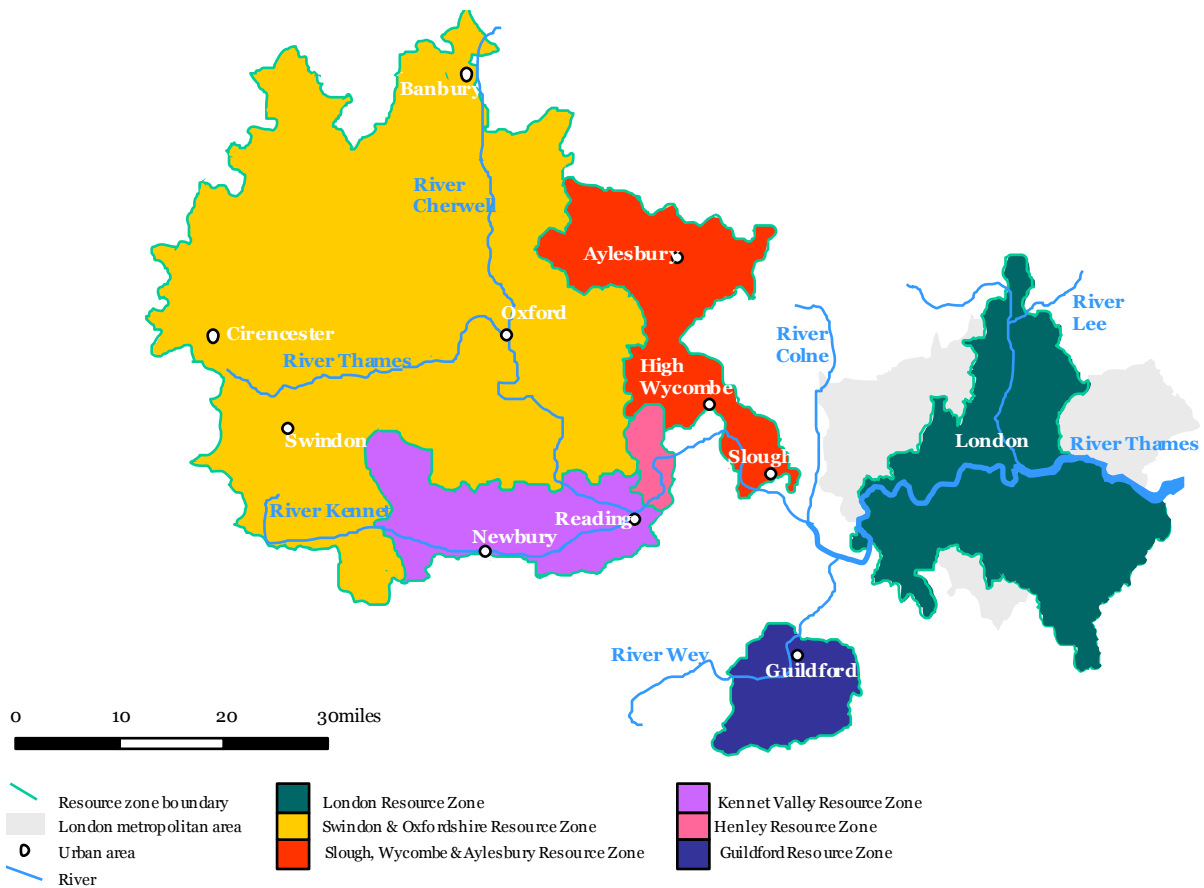


Figure 5: Water Resource Zones in the Thames Water Supply Area

1.3 Levels of Service

In planning future water resources we work to agreed levels of service for our customers. The levels of service state the frequency with which we can impose different types of water use restrictions during periods of water shortage and are agreed with Ofwat and the EA. Figure 6 shows the levels of service and the different types of action we will take in drought situations. As the severity of a drought increases, the actions we take have an increased impact on both the amount of water available to customers and that taken from the environment. In the most serious situations, this can include restricting customers' water use.






| Level | Action | Frequency (drought severity) |
|---|--|------------------------------|
|  | Media campaigns, additional water efficiency campaign, enhanced activity and restrictions to reduce risk to water supply | One in five years |
|  | Enhanced media campaign, customer choice/voluntary constraint, sprinkler ban | One in 10 years |
|  | Hosepipe ban, non-essential use ban, drought order | One in 20 years |
|  | Severe water rationing | Never |

Figure 6: Levels of Service

We have conducted customer research to understand customer preferences in relation to levels of service. The main findings were that customers wish to avoid severe restrictions on water use during droughts but were willing to tolerate occasional hosepipe bans when necessary.

Ofwat assesses whether water companies are meeting their levels of service on the basis of their supply demand balances for each WRZ. These are aggregated into a comparative indicator known as the Security of Supply Index or SoSI. A SoSI score of 100 means that all the WRZs are either in balance in terms of supply and demand or have a surplus. A score less than 100 indicates a supply demand deficit and an increased risk that companies will not be able to meet their agreed levels of service for customers.

 *Volume 2, Section 1.8*

1.4 Drought Plan

Following public consultation on the draft in 2006, the Secretary of State approved our Drought Plan for publication in November 2010. We have recently submitted a further update of our Drought Plan to the Secretary of State, following what we considered to be a material change in circumstances arising from a new statutory provision: the Flood and Water Management Act 2010.

Revisions to the way in which we would plan to impose demand restrictions in our supply area may result in differences in the associated demand savings attributable to each type of restriction. Changes to demand savings may impact upon the Deployable Output (DO) calculations upon which our WRMP is based. We consider that for the purposes of this dfWRMP09, our assessment of supply and demand should remain based upon the DO values used previously. We will review the impact of the draft Drought Plan 2011, and any representations received during the public consultation on it, as we prepare our WRMP14.

1.5 Lower Thames Operating Agreement (LTOA)

London's principal source of water is the Lower River Thames upstream of Teddington Weir. The Lower Thames Operating Agreement (LTOA) in combination with our abstraction licences help to determine how much water can be abstracted from the Lower Thames. Historically, the LTOA has informed the introduction of water use restrictions in London during a drought. A similar set of rules also trigger restrictions for the SWOX WRZ.

The drought of 2005 and 2006 tested the effectiveness of the LTOA as a tool to manage the drought. During 2006, the EA formally requested a review of the Agreement. The review will impact both on the WRMP and the Company's Drought Plan and there are a number of significant issues, the two principal ones being the ecological impact on the water environment of the Lower Thames abstractions and the correct application of the most up-to-date assumptions on demand savings during drought periods.

To address the ecological impact of abstraction, a major investigation on the flows and ecology of the Lower River Thames freshwater reaches and the Upper Thames estuary is underway for AMP5. The outputs from this study will be used to inform the review of the LTOA in readiness for the start of AMP6 planning in 2012/13.

The 2005/2006 drought and the measures introduced therein provided the Company with the opportunity to review and revise the original assumptions on the savings that can be achieved during droughts. The level of demand during a drought influences the rate at which water in storage is used and therefore the amount available for the duration of the drought (deployable output). Because the updated savings are about 30% of the original savings, the true water resource availability in terms of deployable output values for both London and SWOX WRZs is significantly lower than previously assumed. This has revealed an ongoing supply demand deficit in these zones and therefore a risk that levels of service will not be met, represented by a reduction in the company Security of Supply Index. The LTOA savings assumption therefore has important implications for the size of the predicted supply demand deficits in these zones and the amount of additional investment on demand management and new resources required.

☛ *Volume 2, Section 1.9*

2 Water Resources Programme, 2005 to 2010

☛ Volume 2, Section 2

Volume 2, Section 2 has not been amended significantly since the revised dWRMP, as it relates to our AMP4 (2005-2010) water resources programme, which was not the subject of the Public Inquiry.

Our current programme of supply demand activity for the 5-year period from 2005/06 to 2009/10 (called AMP4) was agreed with Ofwat as part of the Price Review process undertaken in 2004 (PR04). There have been modifications to the AMP4 programme in response to developments such as the “Section 19” undertaking. The Section 19 (s19) undertaking is a legal agreement with Ofwat in response to our failure to achieve our leakage targets in 2005/06. Key aspects of the AMP4 programme are summarised below.

2.1 Leakage Reduction

Leakage reduction remains our highest priority. The leakage control programme has three strands: Victorian Mains Replacement (VMR) in London; Active Leakage Control (ALC) which includes the location and repair of leaks, pressure management and zonal reconfiguration; and customer side leakage (CSL) reduction. Our current programme will reduce leakage to 685MI/d (million litres per day) by 2010 and replace 2,041km (around 12%) of water mains in London.

We have assumed an additional 300km of VMR in London in 2009/10. This is because it is required to restore security of supply in London as quickly as possible and it will be more cost effective for customers if we maintain VMR activity at the current level rather than reducing in 2009/10 only to increase activity again in AMP5.

☛ Volume 2, Section 2.2.1

2.2 Metering

There are two elements to our AMP4 metering programme, meter optants, customers who request a meter, and selective metering, installation of a meter when a property changes occupancy.

- The AMP4 target is 62,770 meter optants by 2010. We had already exceeded this target in the first three years of AMP4, April 2005 – March 2008. This is believed to be due to increased customer awareness created by the prolonged drought of 2005/06, local and national press coverage of metering and increasing customer bills.
- The AMP4 target for selective meter installation on change of occupancy is 49,282. Initially two change of occupancy metering trial areas (Chigwell and Swindon) were selected, however the geographical area was expanded throughout 2006/07 to secure the delivery of the target. The areas now included in the trial are Oxfordshire, Twickenham, Kingston, Croydon, Dartford, Bromley, Tonbridge and the VMR areas.

Despite expanding the areas for the trial, we are experiencing a slow down in activity as a result of the economic downturn and reduction in the number of property moves.

Customer access and complex supplies remain an ongoing problem in relation to metering, particularly in flats, with successful installation (conversion) rates remaining lower than expected at 40% for these properties. As a result, we do not consider the change of occupier approach to be a cost effective method of installing meters when compared with 'street by street' compulsory metering.

☛ *Volume 2, Section 2.2.2*

2.3 Water Efficiency

In response to the ongoing pressures on water resources, commitments given in discussions relating to the s19 undertaking and higher expectations of our regulators and the wider stakeholder community, the baseline water efficiency programme has been strengthened from that agreed at the beginning of AMP4. The enhanced programme targets both domestic and commercial customers through water audits and self audit questionnaires, promotion of water efficient devices and education projects.

☛ *Volume 2, Section 2.2.3*

2.4 Water Resources Development

New water resource schemes are being developed in London, SWOX and Kennet Valley WRZs. By the end of AMP4, we have added to London's deployable output (DO) through the delivery of small-scale groundwater schemes and a desalination plant at Beckton. In SWOX, an increase in DO is provided by a combination of water treatment works upgrades and network improvements. The Kennet Valley WRZ has also benefitted from an upgrade to the water treatment works to enable more water to be treated.

☛ *Volume 2, Section 2.3*

Work on the feasibility of effluent re-use continues into AMP5, with further work ongoing on the options for re-use at various sites across our supply area. Details of this work have been published by Thames Water, within our work plan for WRMP14 under Work Programme 18. At the Public Inquiry there was challenge on the level of treatment required for effluent reuse, public acceptability and whether sufficient site-specific environmental studies had been undertaken. Work programme 18 will complete the AMP4 pilot plant study on effluent re-use using reverse osmosis at Deephams Sewage Treatment Works (STW) and will include:

- Complete operation of the pilot plant and report findings;
- Review of treatment technology options;
- Assess environmental impact on Salmons and Pymmes Brooks and River Lee;
- Undertake public perception work;
- Consult with regulators specifically the Drinking Water Inspectorate; and,
- Independent panel review.

Work on the feasibility of the Upper Thames Reservoir (UTR) continues into AMP5, with further work ongoing on the various options for the site, including different sized reservoirs and phased

reservoirs. This analysis will inform the options appraisal process for WRMP14. Additionally, studies will also be undertaken to investigate alternative sizes/yields of surface water storage reservoirs, along with water re-use and desalination options, as strategic resource development schemes in the Thames catchment.

☛ *Volume 2, Section 2.4*

3 Current and Future Demand For Water

Volume 2, Section 3

Volume 2, Section 3 remains largely unchanged as the baseline and final planning demand forecast from the revised dWRMP were accepted by the Inspector at the Public Inquiry. It therefore only contains minor textual updates.

To plan water resources effectively in the future we need to forecast the amount of water that we will need to distribute. This is called “demand”. Demand describes the amount of water entering the distribution network and comprises domestic or household consumption, commercial or non-household consumption and leakage or losses from the distribution network and customers’ supply pipes.

In our supply area, in 2007/08 (the base year), household consumption accounted for 49% of demand, non-household consumption 21% and unbilled and operational use 2%. Leakage accounted for 28% of demand; split into 20% distribution losses and 8% customer supply pipe leakage.

We follow the industry best practice demand forecasting methodology. Three types of demand forecast are produced:

- Normal year annual average day (NYAA) – this means the average daily demand experienced in a normal year;
- Dry year annual average day (DYAA) – this means the average daily demand experienced in a dry year; and,
- Dry year critical period: Average day peak week (ADPW) – this means the average daily demand experienced in a peak week of a dry year.

Peak week demand forecasts are only required where they are understood to be a driver for investment (i.e. the conditions under which levels of service cannot be met without additional investment).

A peak week forecast is not produced for London as the large surface water storage capacity in the zone ensures that the peak demand can be met. In London, the focus is on the dry year annual average day demand forecast. In the Thames Valley WRZs, the average day peak week supply demand balance is the principal investment driver.

A ‘Baseline’ supply demand balance is produced for each demand forecast scenario. This shows if a WRZ is forecast to have a supply demand deficit under either DYAA or ADPW conditions or both.

A ‘Preferred programme’ supply demand balance shows the supply and demand position when we deliver the proposed programme of demand management and resource development to eliminate the deficit.

3.1 How Will Demand Change in the Future?

3.1.1 Demographics

The forecasts of future population and properties are based on underlying source data from Government census data (the latest being the 2001 Census), Regional Spatial Strategies (RSS), past trends and local authorities’ forecasts of future population and household numbers. We base our forecasts on a combination of these sources together with an expert external consultant’s view of the most likely scenarios for population growth.

Assessment of population growth for the total company supply area indicates that there will be a rise from 8.5 million in 2007/08 to 10.2 million by 2034/35. This increase is made up of 1.3 million in the London WRZ and 0.4 million in the remaining five zones (Thames Valley). We have added an additional allowance of 282,000 for the clandestine (‘unaccounted’) population and 110,000 short-term migrant population in our forecasts as we believe the official statistics underestimate these sub-groups.

Approximately 94% of the population of the London WRZ is within Greater London, the remainder being divided between Essex and Hertfordshire in the East of England region and Kent and Surrey in the South East region. Projections are therefore dominated by assumptions about growth in Greater London, though a high growth rate is also expected in the Dartford area, which forms part of Kent Thames Gateway. These population rises will be accompanied by increases in new households and we have estimated that there will be about 26,700³ new households per year in London.

Our rdWRMP household and population forecasts included allowances for the economic downturn based on a study⁴ commissioned by Thames Water from economic and demographic experts Cambridge Econometrics.

☛ *Volume 2, Section 3.2.1*

3.1.2 Household Consumption

Water use per person (or per capita consumption – PCC) is affected by several factors, the principal ones being: household occupancy; water use of appliances, fixtures and fittings within the property; householders’ water use behaviour; garden use and whether the property is metered. In line with industry best practice, we have assessed household demand and PCC at the ‘microcomponent’ level, examining the ownership, frequency of use and volume per use of a range of water-using appliances. Figure 7 shows the components of household water use as a percentage of the total consumption.

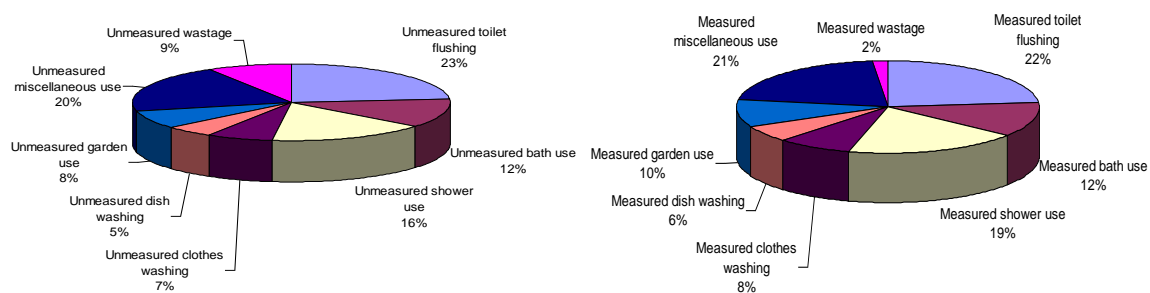


Figure 7: Typical Micro-Component Breakdown of Measured and Unmeasured Household PCC – 2007/08

³ Note that this is an average for the planning period. The figure is lower due to the impact of the economic downturn in AMP5-6 and higher in AMP7-9.

⁴ Cambridge Econometrics - Assessment of Economic Downturn on Planned Properties and Population Growth – A Report for Thames Water Utilities Ltd, December 2008

Over the planning period to 2035 underlying PCC (before demand management) is forecasted to rise from the current position of 157 l/h/d. Reductions in the short term in reaction to natural replacement of inefficient goods with newer more efficient appliances will be counterbalanced in the medium to long term due to increased ownership of power showers.

☛ *Volume 2, Section 3.2.2*

Water usage in new households has been the subject of widespread national debate in recent years and Government has outlined policies and measures that will reduce domestic consumption in new properties through the introduction of new building regulations for fixtures and fittings. We have assumed that usage in new properties will reduce to the Government's target of 125 l/h/d by 2015. This will allow for a period of bedding-in and confirmation that the standards are being achieved. We believe this is a challenging target, particularly with reducing occupancy, but we support the Government's action in this area.

In the Government's water strategy for England entitled '*Future Water*', Defra also set out their aspirations for water usage in existing households. It is stated that as a result of demand management measures, PCC in existing properties could be reduced to an average of 130 l/h/d by 2030, with the hope of further reduction to 120 l/h/d with the impact of future innovation and technology.

We have made a detailed assessment, in line with industry best practice methodologies, of future demand based on the individual components of water use and consider that reaching 130 l/h/d in existing properties within the Thames Water supply area is unlikely. Our assessment includes an allowance for the impact of reducing household size and increased garden watering due to the impact of climate change on demand.

When considering this target it is also important to note that natural variability in PCC across the country results in higher PCCs in the South East of England. Over the last 6 years, Thames Water has reported PCCs on average 12 l/h/d higher than the national average for water and sewerage companies.

We strongly support the aspiration to reduce individual water use through demand management and our plans include implementation of all of the measures referred to in the strategy, with significant programmes of metering, exploration of different tariff options and water efficiency.

However, given our detailed predictions of the amount of water which our customers will need in the future, and the fact that the required change in the culture of water use is to the greater extent outside of the control of the company, we believe that planning to a level of 130 l/h/d would be a high risk strategy which could jeopardise future security of supplies to our customers.

We have therefore planned on the basis of our own detailed water use predictions. The demand forecast includes a prediction of a reduction in average household PCC from 157 l/h/d (2007/08) to 135 l/h/d (2034/35), when accounting for preferred plan demand management activities, which we believe is in line the aspirational target given a reasonable adjustment for demonstrably higher PCC in our operational region.

Since publication of our rdWRMP, Ofwat has confirmed the predetermined uptake and savings rates for water efficiency activities; however, these were not available in time for preparation of our rdWRMP. As a result our baseline programme remains as presented in the dWRMP.

☛ *Volume 2, Section 9.1*

Our non-household demand forecasts are based on an assessment of the historical relationship between demand and factors such as industrial output and employment. They also include an allowance for the impact of the economic downturn. Based on consultations with some of our largest commercial customers we have included a further 5% reduction in demand maintained over the planning period.

☛ *Volume 2, Section 3.2.3*

4 Current and Future Water Supply

☛ Volume 2, Section 4

Volume 2, Section 4 remains largely unchanged as the baseline supply forecast for the dfWRMP was broadly accepted at the Public Inquiry. However, following Defra's recommendations we have changed our approach to sustainability reductions beyond AMP5.

To understand the amount of water that is available to use for water supply, we use a measure called Water Available For Use (WAFU). WAFU is calculated according to the following relationship:

$$\text{WAFU} = \text{Deployable Output (DO)} - \text{Sustainability Reductions} - \text{Network Constraints} - \text{Outage} + \text{Bulk Supply imports} - \text{Bulk Supply exports}$$

Where:-

DO is the measure of a WRZ's supply capability and is assessed on the basis of the water resources that will be available to meet demand to our specified levels of service during prolonged dry periods.

☛ Volume 2, Section 4.1.1

Sustainability reductions are reductions in DO caused by the full or partial revocation of abstraction licences by the EA. Many abstraction licences have been in place for many years and in accordance with new environmental requirements have been reviewed to ensure protection of the environment. Further information on the investigations undertaken in this period (2005-2010) is described in the Volume 2, Section 2.5.

In AMP5 we have included reductions required at three sites in the SWOX and Kennet Valley WRZs.

In accordance with Defra's instructions, reflecting the Planning Inspector's recommendations following the Public Inquiry on our dWRMP, we have removed any reference to the potential for sustainability reductions beyond AMP5 from our supply demand balance and from the sensitivity analysis around the preferred planning solution of our dfWRMP09.

Whilst we consider that it is important to account for long-term risk, including analysis of the impacts of potential future sustainability reductions in long-term water resource planning, we have removed any allowance, in accordance with Defra's instructions. The Inspector in her recommendations concluded that it is essential that the Environment Agency carries out this work with some urgency and produces a more conclusive programme of requirements. As a result, the Environment Agency has committed to provide us with a view on the licences affected and extent of any further sustainability reductions in spring 2013, with indicative information in advance of this, to enable us to take account of their requirements in WRMP14. We will work with the Environment Agency to agree how these should be incorporated into the sensitivity analysis in our draft WRMP14.

In accordance with the Planning Inspector's Recommendation 17 we have removed the sensitivity analysis which examined the potential impacts on the plan of further sustainability reductions.

☛ *Volume 2, Section 4.2*

Network constraints arise when the configuration of the distribution network pipes does not allow the total treated water output from a given source to be fully utilised in the WRZ.

☛ *Volume 2, Section 4.1.2*

Outage is a temporary loss of supply capability caused by a variety of planned and unplanned events such as maintenance of reservoirs, pollution to raw water quality and pump failure. It is estimated on the basis of our historical records. Our outage figures are unchanged from the rdWRMP.

☛ *Volume 2, Section 4.1.3*

Bulk supplies are the transfer of untreated or treated water into or out of a WRZ, either within a Company's area or between companies.

☛ *Volume 2, Section 4.1.4*

5 Allowing for Risk and Uncertainty

Volume 2, Section 5

Volume 2, Section 5 remains largely unchanged with our headroom assessment remaining as per our rdWRMP. However, with reference to the Planning Inspector's Recommendation Number 20, we have explored the sensitivity of the least cost programme to risk and uncertainty; this analysis is presented further in Volume 2, Section 8.

Almost all the components of supply and demand together with their associated planning assumptions are subject to uncertainty. Therefore, how uncertainty is allowed for is of fundamental importance in supply demand planning.

The approach taken follows the latest water industry methodology, which uses a margin of safety termed 'Target Headroom' (TH) as a buffer between supply and demand. TH is added to demand and the need for new additional water management options is triggered when TH and demand exceed supply capability.

There is a strict industry standard procedure for calculating TH made up of all the key components of supply and demand.

On the supply side, the main components are:

- vulnerable surface water and groundwater abstraction licences;
- bulk imports;
- gradual pollution of sources causing a reduction in abstraction;
- accuracy of supply side data;
- uncertainty of impact of climate change on source yields; and,
- uncertainty of output from new resources.

In the draft WRMP we also included an allowance for the possible revocation of vulnerable time limited licences. This was removed for the rdWRMP, resulting in a minor reduction in TH.

On the demand side, the main components are:

- population;
- uncertainty on measured and unmeasured household PCC;
- uncertainty in measured and unmeasured non-household use;
- uncertain output from demand management measures (excludes leakage);
- uncertainty over peaking factors;
- uncertainty of impact of climate change; and,
- uncertainty in 'bounceback' of demand following drought events.

The uncertainty associated with leakage control has been separately evaluated. The most significant factor driving leakage uncertainty is the level of active leakage recurrence of the network. This is driven by weather in the short-term and can only be addressed by the Company in the longer-term through further mains replacement associated with water infrastructure maintenance.

☛ *Volume 2, Section 7.3.2.6*

The TH methodology requires that a risk level be chosen over the planning period. We have adopted what we consider to be a pragmatic risk profile starting with 5% in AMP4, reflecting the need for low risk in the short-term, but stepping up by 5% in each subsequent 5-year AMP period, to reach 30% in AMP9. We believe this is a sensible approach, given the increasing uncertainty over time and the number of opportunities afforded by the planning cycle to review the risk, and is in line with other companies' assumptions at PR04.

5.1 Climate Change

By far the biggest uncertainty factor is the impact of climate change, which affects both supply and demand. For example, reduced or extreme variation in annual rainfall rates may mean that the yields from river or groundwater sources could be reduced and household water use could increase through increased garden watering and increased frequency of bathing and showering.

To calculate the supply-side impacts, Thames Water has adopted the UKWIR06 methodology as recommended in the EA's WRPG. Factors from six global climate models have been used to produce rainfall and evaporation data to feed into our Water Resources Management System (WARMS). In addition the impacts of climate change on groundwater sources have been reviewed following the new methodology.

Our best estimates of climate change on demand are based on the CC:DeW study which indicates an increase of around ~1% of PCC, with an uncertainty profile added to headroom.

The UKCP09 climate change scenarios were published on 18th June 2009, analysis is underway to understand the impact of these on our plan, but we do not anticipate these scenarios to be significantly different from those previously published.

☛ *Volume 2, Section 5.1.1*

6 Baseline Supply Demand Balance

Volume 2, Section 6

Volume 2, Section 6 remains largely unchanged from the rdWRMP.

To understand if we have sufficient water to meet customers' needs over the planning period, we compare water that is available for use (WAFU) against demand and TH. This assessment produces the baseline supply demand balance for each WRZ and shows whether there is sufficient water to meet customers' needs or if there is a gap or deficit.

The baseline supply demand balance assumes that there will be no activity beyond 2009/10 other than that required to maintain leakage or required by law. In practice, this means a continuation of optant metering, water efficiency activity and planned maintenance (capital maintenance) of our mains and active leakage control to maintain leakage at 2009/10 levels.

Volume 2, Section 3.3

Table 3 shows that both London and SWOX WRZs are predicted to have supply demand deficits. The London WRZ falls into deficit in 2012/13, with the supply demand balance deteriorating from a surplus of 1% in 2009/10 to a deficit of 15% by the end of the planning period. The predicted deficit for the SWOX WRZ increases from 5% to 14% of demand plus TH.

The escalating deficits are driven by growth in demand and the uncertainty allowances made, especially for climate change. An additional factor is the reduction in deployable output resulting from the reduced demand savings demonstrated during the management of the 2005/06 drought and associated with the LTOA Review.

In contrast, Slough/Wycombe/Aylesbury, Kennet Valley, Guildford and Henley WRZs all maintain a surplus over the planning period. In AMP4 and AMP5 these zones show a healthy surplus of between 11% and 30%, which gradually declines as demand grows and the planning uncertainties increase.

Table 3: Baseline Supply Demand Balance in all WRZs 2009/10-2034/35

| Baseline Supply Demand Balance (% of surplus/deficit over Demand + Target Headroom) | | | | | | |
|--|---------|---------|---------|---------|---------|---------|
| WRZ | 2009-10 | 2014-15 | 2019-20 | 2024-25 | 2029-30 | 2034-35 |
| London | 1% | -4% | -10% | -13% | -14% | -15% |
| SWOX* | -5% | -8% | -12% | -14% | -14% | -14% |
| SWA* | 18% | 18% | 15% | 12% | 11% | 11% |
| Kennet Valley* | 25% | 18% | 13% | 10% | 8% | 7% |
| Guildford* | 11% | 11% | 8% | 6% | 4% | 3% |
| Henley* | 30% | 30% | 27% | 24% | 21% | 19% |

*Critical period 'ADPW' driver rather than DYAA

7 Appraisal of Supply Demand Options

Volume 2, Section 7

Volume 2, Section 7 has been updated as follows:

- Several new water resource options have been added to the dfWRMP analyses; some of those included in the rdWRMP have since been excluded. The assumptions and costs for a number of options have been amended.
- We have undertaken further consultation with statutory bodies on the Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA) for this dfWRMP and further detail is provided in Volumes 6 and 7 respectively.
- Demand management options are unchanged from those considered in the revised dWRMP.

We have identified that in London and SWOX WRZs there will be insufficient water available to meet planned levels of service. We therefore need to review the different options available to us and determine which combination of options, or programmes, is the best in terms of meeting the supply demand deficit, maintaining low costs for customers and minimising environmental and social impacts.

We follow the “twin track approach” in balancing supply and demand. This means demand management programmes of leakage reduction, metering and water efficiency are considered alongside water resource scheme options to provide a twin track solution to the planning problem. In recognition of wider sustainability considerations, the preferences of our stakeholders and the Company’s Strategic Direction Statement demand reduction was prioritised in developing programmes.

A full range of supply and demand options were investigated to identify potential solutions to the supply demand deficits. As set out in the EA’s WRP, the identification and selection of options is a three-stage process: a ‘generic’ options list (a high-level list of potential options by type); an ‘unconstrained’ options list (a full list of potential options that could be developed under each of the generic options); and a ‘feasible’ list – the schemes considered to be suitable for development. At the generic and unconstrained stages, each option is considered and assessed for suitability against a range of criteria including:

- Applicability – Is the option within water company control?
- Technological feasibility – Is the technology available to realise the option?
- Environmental impact – Are there known environmental issues?
- Social impact – Are there known social issues?
- Relevance to investment driver – Does this scheme help to achieve the supply demand balance?

The demand management and water supply scheme options included in the feasible list are then scoped and assessed for cost, environmental and social impact (including carbon) before

undergoing comparative econometric assessment against demand-side options as set out in the industry approved Economics of Balancing Supply and Demand (EBS) methodology⁵.

The detailed environmental and social assessment of demand management and supply schemes is reported in Volume 5.

☛ *Volume 2, Section 7.1.2*

☛ *Volume 5 (Assessment of Alternative Schemes)*

7.1 SEA/HRA

We have consulted statutory consultees on key aspects of our approach to SEA and HRA, including Natural England, the Countryside Council for Wales, English Heritage, SEPA, Scottish Natural Heritage, Historic Scotland and the Environment Agency.

☛ *Volumes 6 and 7*

Additional consultation, with both statutory authorities and the public, on our approach to SEA and HRA will be undertaken as part of the consultation on the dfWRMP09.

In direct accordance with Defra's instructions and the Planning Inspector's recommendations, we have also sought to explain how we have avoided double-counting in our assessment of environmental and social impacts.

☛ *Volume 2, Section 7.1.2*

7.2 Water Resource Schemes

In total, 96 water resource schemes (11 of which were multi-zone reservoir or transfer schemes) were identified in the feasible list of options and included a range of traditional schemes such as groundwater and reservoir development through to innovative schemes such as Aquifer Storage and Recovery (ASR), desalination and effluent re-use.

As a result of the discussions within the Public Inquiry and Defra's subsequent recommendations, a number of additional water resource schemes have been added to the unconstrained and feasible options list. In addition, some water resource schemes have been removed from further consideration in this draft final WRMP. These changes are summarised in Table 4.

⁵ UKWIR (2002) *The Economics of Balancing Supply and Demand (EBS) Guidelines*. Report Ref: No. 02/WR/27/4. UKWIR. London

Table 4: Summary of changes to the options lists for the draft final WRMP

| Generic Options | Unconstrained options | Feasible options | Defra Recommendation | |
|--|---|------------------|------------------------------------|------------------|
| No changes to the list published in the revised draft WRMP09 | New options: | | | |
| | Unsupported Severn Thames Transfer - Pipeline (300 MI/d transfer) | | Recommendation 1 | |
| | Unsupported Severn Thames Transfer - Cotswold Canal (3 options) | | Recommendation 2 | |
| | Reservoir - Abingdon 50 Mm ³ | | Recommendation 4 | |
| | Deephams STW Reuse - 60 MI/d | | Recommendations 5 & 7 | |
| | Supported Severn-Thames Transfer - Longdon Marsh Case B (Abingdon 100 Mm ³ equivalent) | | Recommendation 7 | |
| | Beckton STW Reuse – 50 and 150 MI/d | | Recommendation 7 | |
| | Estuary South Desalination - 100 MI/d | | Recommendation 7 | |
| | Hogsmill STW Reuse (3 separate options) | | Hogsmill STW Reuse (Option 3 only) | Recommendation 7 |
| | Options screened out from further consideration: | | | |
| | Columbus transfer | | | |
| | Craig Goch transfer | | | |
| | Oxford re-use | | | |
| | Hogsmill B Sewage transfer | | | |
| | Hogsmill STW Reuse - Options 1 and 2 | | | |

We consulted stakeholders on the feasible options list and programme appraisal approach for the draft final WRMP09 and following feedback we have undertaken additional analysis regarding the sensitivity to cost and yield within the programme appraisal (Volume 2, Section 8). We also carried out a re-assessment of cultural heritage impacts of feasible schemes following further consultation on the SEA/HRA.

It should be noted that there is uncertainty with the cost information for individual schemes. For the purposes of long-term planning schemes are developed in outline and costed on this basis. The uncertainty for individual scheme costs may vary depending on the type of scheme and the status of the design work on the scheme, as schemes are progressed and further design work is undertaken, the uncertainty linked to the scheme cost is reduced. This is acknowledged by the EA and other stakeholders.

A number of comments were raised on individual options that will be taken into consideration in the work undertaken to inform WRMP14.

4

☛ *Volume 2, Section 7.2*

For the purposes of water resource planning in the South East of England a joint forum, the Water Resources in the South East (WRSE) group, has been set up to consider opportunities to optimise the selection of water resource solutions amongst water companies in the South East. A regional model has been set up to assess options for transfer of resources between company supply areas.

Based on draft WRMP data the WRSE modelling suggests that there is potential for further inter-company transfers. An update of the model using rdWRMP data is underway.

☛ *Volume 2, Section 4.3*

7.3 Demand management

Volume 2, Section 7.3

Demand management measures, primarily leakage reduction, metering and water efficiency are traditionally viewed in isolation from each other. In reality, all the options are inherently linked and in the draft WRMP we have proposed an integrated approach to Demand Management, called the IDM approach.

IDM is defined as:

“The integration of demand management activities including leakage reductions, metering and water efficiency programmes to produce a single, efficient PR09 demand management strategy.”

For example, in an area where we replace mains, we would also install meters and promote water efficiency activity at the same time.

This approach draws on the synergies and overlaps between the separate elements of the demand management strategy to maximise demand savings whilst minimising duplication of activity and therefore cost. We will align our demand management programmes using the District Metering Area (DMA) as the fundamental unit of study and will build upon that already used to target DMAs in which we undertake mains replacement. Outside of London, where leakage is already low and reduction is not such a driver for investment, metering and water efficiency will be carried out in tandem.

We believe that an IDM approach is the most sustainable and economic way to undertake significant programmes of demand management work. The scale of the programme included in our rdWRMP has been informed by the priorities of our customers, economic and sustainability principles and considered within the context of the 25-year Company Strategic Direction Statement.

Volume 2, Section 7.3.1

The main demand management activities are outlined below.

7.3.1 Leakage Reduction

Ongoing mains replacement and active leakage control are required to hold leakage at the current level. In particular, mains replacement, undertaken as part of our capital maintenance programme, is required to offset deterioration of the aging supply infrastructure. Action in addition to this ‘steady state’ level is required to reduce leakage.

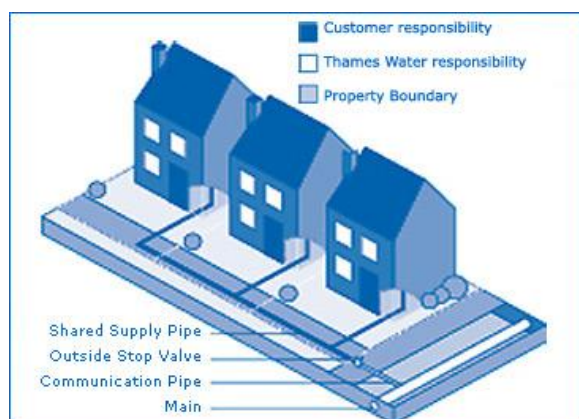
The results of our customer research for PR09 showed that customers want us to reduce leakage beyond the economic level⁶ to between 15% and 20% of distribution input, this will bring our performance in line with the rest of the industry. The options available are mains replacement, Active Leakage Control (ALC) comprising ‘Find and Fix’, pressure management/zonal reconfiguration, and customer supply-pipe leakage reduction.

In London, it has been demonstrated that maximum benefits are gained when all the old iron mains within a DMA are replaced. To date, the mains replacement programme has completed construction in 90 DMAs across London. Detailed information is being recorded on techniques

⁶ The Economic Level of Leakage is the level at which it would cost more to make further reductions in leakage than to produce the water from another source.

used, production rates, costs, proportion of mains abandoned and leakage outputs. We analyse these assessments to understand the performance of the network before and after replacement in order to inform future leakage strategy.

The mains replacement programme has included the replacement of communication pipes as shown in Figure 8 and installation of meters at the boundary of properties to allow targeting of customer side leakage. We have also developed in-house technology, the *Leakfrog*, to improve our ability to identify customer-side leakage and wastage.



Thames Water is responsible for both the Main and Communication pipes.

Figure 8: Typical Pipe Layout for Domestic Customers

The areas that we have already upgraded, all show a marked performance improvement with repair rates falling to almost zero and almost no response to weather conditions. Consequently, operating costs are also markedly reduced in these upgraded areas.

A range of mains replacement options in London were tested in our modelling work and the performance of the associated supply demand programmes appraised. Leakage reduction profiles were reviewed against programme cost and wider impacts to develop a sustainable level of leakage profile.

7.3.2 Mains Replacement Programme Independent Review

Following evidence submitted by Ofwat to the Public Inquiry into the dWRMP, the Mains Replacement Programme Independent Review (MRPIR) has commenced. In its evidence, Ofwat stated that in its view, Thames Water had not demonstrated in its plan that it has taken sufficient account of the performance of the mains replacement programme in London in its proposals to reduce leakage in the period to 2020, or that the proposed work represents part of a best value solution to balance supply with demand. Ofwat's concerns relate to the costs and benefits relating to Thames Water's mains replacement proposals. Whilst Ofwat believe that a large scale mains replacement programme was the right course of action in AMP4 because of the deteriorating water infrastructure network in London, it has concerns that a large scale ongoing programme may not be the most appropriate solution for the future.

As a result, Ofwat and Thames Water agreed to a jointly commissioned independent third party expert review of the whole life costs and benefits of the mains replacement programme in London over the period up to 2020, the MRPIR. The review commenced in May 2011 and is due to complete in March 2012. It will critically review and assess the evidence on the whole life costs and benefits of the mains replacement programme carried out in London to date,

drawing on the information collected from the company's mains renewal programme that began in 2002/03. The outcome of this work will inform our next Plan, WRMP14.

☛ *Volume 2, Section 7.3.2*

7.3.3 Metering

The Company's preferred method of charging for water is to charge customers via a metered tariff, as we believe it is the fairest way to pay for water. Metering is supported by the UK Government's recently published water strategy, 'Future Water', which highlighted increasing meter penetration as an important goal. In addition, changes to secondary legislation enable a water company, if identified as being in an area of serious water stress (as is the case for Thames Water), to gain approval from the Secretary of State to adopt a compulsory targeted metering policy.

There are two alternative options to increase the level of metering penetration, firstly metering on change of occupancy and secondly, compulsory metering. Our experience from change of occupancy metering trials undertaken since 2005 has shown that introducing metering in this way is an expensive approach to increase the level of metering and tends to focus on the lower end of the housing portfolio where the majority of house moves occur.

We are therefore proposing a 15-year progressive programme of targeted compulsory metering of households starting in 2010. This will enable metering to be delivered in a targeted manner, which we believe will be more cost effective and will result in minimum or deferred impact on vulnerable groups.

We will continue to install meters on new or converted properties, plus properties where a swimming pool is owned or sprinkler is used, or when a customer request a meter (optant).

☛ *Volume 2, Section 7.3.3*

7.3.4 Tariffs/Automatic Meter Reading/Affordability

Increasing the extent of metering across our supply area means enables us to consider the use of more sophisticated tariffs in order to manage affordability issues and further reduce demand, particularly at peak times, for example, during the summer months. Consequently we have proposed the introduction of sophisticated tariffs from 2017/18 when the level of meter penetration is considered sufficiently high to make this option effective. For modelling purposes a 5% reduction in PCC has been assumed when more sophisticated tariffs are in place. This is in addition to the reduction in PCC assumed when a property is metered.

At the Public Inquiry Thames Water and the Consumer Council for Water (CCW) agreed a Statement of Common Ground to reflect the need to see consideration of affordability and adequate protection of vulnerable customers.

7.3.5 Affordability

We recognise affordability is a critical issue. Compulsory metering will have potentially adverse consequences particularly for larger households in low rateable value property, and could produce significant increases in water and sewerage bills even where household pcc is below 130 litres per day. Thames Water will work with DEFRA, the Consumer Council for Water and Ofwat to develop the terms of a social package to mitigate these impacts at an acceptable level of cost to other consumers. In CCW's view, protection for vulnerable and low income customers should be in place before the compulsory metering programme begins, although it accepts that early metering trials with suitable safeguards would help with tariff design. Thames Water has

agreed to develop a quantification of distributional impacts which shows the scale of adverse impacts, and how far these can be mitigated by the proposed social tariff.

7.3.6 Communal metering

There will need to be further consultation on tariff design before communal metering of shared supplies is introduced. Protection of single occupants who would benefit from individual metering, especially pensioners, will be needed.

7.3.7 Measured/Unmeasured differentials

Both parties recognise the risk that average unmeasured charges can rise sharply as meter penetration increases beyond 60%, and are committed to work with Ofwat to ensure that the measured/unmeasured differential is managed, subject to regulatory constraints, and does not penalise households in socially disadvantaged areas where metering is deferred or impracticable.

☛ Volume 2, Section 7.3.3.3

However, more fieldwork is required to better understand the most effective tariff options in association with Automatic Meter Reading (AMR). For example, we are aware that moving to a tariff based primarily on volumetric usage, whilst being a fairer way to pay, may adversely impact large families on low incomes. In this respect, tariffs can also be used to mitigate the effect of metering on those least able to pay.

☛ Volume 2, Section 7.3.3.4

We therefore propose to undertake a set of large-scale tariff trials during AMP5 (2010/11 to 2014/15) to refine our policy for the use of more sophisticated tariffs, with a view to rolling out company wide changes to our charges scheme from 2017/18. The trials are likely to be in London and SWOX given their higher level of meter penetration and supply demand position.

In the meantime, we will continue to track progress with tariff developments across the industry and abroad, working closely with the EA, Greater London Authority (GLA) and other companies to understand the practicalities and advantages of tariff change.

7.3.8 Water Efficiency

There is widespread support for water companies to do more to promote and facilitate water efficiency. Recent consultations with our customers have revealed a strong customer preference to see more water efficiency education and for us to help our customers make greater use of water efficient technologies. Ofwat has stated that it wants to see more sophisticated water efficiency activities that exhibit good value for money. The EA has stressed the importance it places on water efficiency.

Our current (or baseline) water efficiency programme includes wider communication, promotions of cistern displacement devices and water butts, an education programme targeting schools and higher education institutions, and partnership activities to continue to effectively promote the water efficiency message. This baseline programme is designed to achieve the new regulatory target in place from 2010.

In addition to the baseline programme, an enhanced water efficiency programme has been developed supported by the clear stakeholder preference for us to do more. This programme includes the dovetailing of domestic audits with a compulsory metering programme, to offer customers the opportunity to save water when metering provides a financial incentive for doing

so. Commercial properties will also be targeted through a commercial audit programme and subsidised activity.

☛ *Volume 2, Section 7.3.4*

8 Programme Appraisal

Volume 2, Section 8

Volume 2, Section 8 has been amended in accordance with instructions from Defra following the Public Inquiry. It takes account of changes to and presents additional material explaining the judgements leading to the preferred plan. It comprises the following components:

- Removal of references to “long-term risk”, particularly regarding potential future sustainability reductions.
- Supply side schemes to address the reduced planning problem. In the London WRZ the supply demand deficit to be addressed in the programme appraisal is 80 MI/d from 2020. In the SWOX WRZ the supply demand deficit, after inclusion of the AMP5 demand management measures and small supply schemes, to be addressed is 1 MI/d at the end of the 25 year planning period.
- As a result, the schemes included within the preferred programmes to meet the revised planning problem differ significantly from those outlined in our rdWRMP.
- A revised programme appraisal has been carried out on potential alternative programmes to identify the preferred programme that meets the objectives set out in managing our supply-demand balance to 2030.
- A clearer explanation of our approach and decision-making process is also provided.

Where there is a supply demand deficit in a WRZ, a planning solution needs to be identified which will restore and then maintain security of supply over the planning period. The solution also needs to satisfy a range of other considerations such as cost, environmental and social impact, programme risk and alignment with company strategic direction and customer preferences.

In accordance with the EA WRPG, the ‘Economics of Balancing Supply and Demand’ (EBS) methodology in combination with the Strategic Environmental Assessment⁷ (SEA) process was used to identify a least cost ‘sustainable’ programme of options, which best satisfies the full range of considerations. The framework used is based on UKWIR EBS and SEA guidelines

The primary measure in the assessment of programmes is financial cost; the objective being to optimise the programme to close the gap between supply and demand at the lowest overall total cost. One of the programmes is therefore an economically optimised least-cost plan.

⁷ UKWIR (2007). Strategic Environmental Assessment – Guidance for Water Resources Management Plans and Drought Plans (07/WR/02/5). Available at <http://www.ukwir.org/ukwirlibrary/91912>

In building up the least cost programme, we have given consideration to technical feasibility, monetisable environmental and social impacts, risk and deliverability in the selection of options. However, the least cost programme may not necessarily drive the lowest carbon or the programme of least environmental impact. We have therefore considered a range of alternative programmes as part of the programme appraisal process to inform the final planning solution and to provide alternative baselines against which the least cost programme can be compared.

The basis of the programme appraisal process is to identify the least cost solution first and then to investigate alternatives to this to try to improve upon it, taking account of five key performance criteria, namely cost, environmental and social impact, security of supply, and alignment with our Strategic Direction Statement and customer willingness to pay information.

☛ *Volume 2, Section 8, EBSD Stage 13*

Comparing the least cost and alternative programmes against the key performance criteria enabled us to identify a flexible and robust preferred planning solution, which provides the best balance of both monetisable and non-monetisable impacts.

9 Preferred Supply Demand Investment Programmes

Volume 2, Section 9

The baseline and final planning demand forecast is unchanged from the revised dWRMP, as accepted by the Defra.

Volume 2, Section 9 has been amended to reflect:

- Changes to our proposed resource development programmes for London and SWOX WRZs post-2020, resulting from the reduced supply demand deficit to be resolved following the removal of long-term risk, in line with Defra's instructions.
- The UTR is no longer part of the preferred programme due to the high yield (110 MI/d) of the smallest (50 Mm³) scheme relative to the supply-demand deficit for London WRZ by the end of the 25 year planning period.
- None of the Severn-Thames transfer schemes are chosen in the preferred programme due to the on-going assessments on environmental impact and resource availability.
- The least cost programme is selected as the preferred final planning programme for the London WRZ. This programme comprises a number of small groundwater schemes, two aquifer recharge schemes and three aquifer storage and recovery schemes, the reuse scheme at Hogsmill sewage treatment works (STW) and the 25 MI/d reuse scheme at Deephams STW.
- Consistent with Defra's instructions to us, the preferred final planning programme for the SWOX WRZ comprises the same resource development schemes in AMP5 (2010-15) as the rdWRMP. The raw water transfer from Culham to Farmoor WTW is selected to address the supply demand deficit beyond 2015.
- The remaining zones are unchanged and remain in surplus throughout the planning horizon.

Resource development is required in both London and SWOX in order to balance supply and demand, despite the major demand management programmes in both zones in AMPs 5 and 6. The deficits to be met by supply side schemes, after demand management measures are taken into account, are 80 MI/d from 2020⁸ in London and 1 MI/d from 2025⁹ in SWOX. The preferred programmes for each WRZ are described below with the supply demand balances associated with the preferred programmes for each water resource zone given in Table 5, figures are presented DYAA for London and ADPW for Thames Valley zones.

⁸ 58 MI/d deficit specified in the Inspector's Report; in addition to this a further 22 MI/d is linked to the three schemes identified in the revised dWRMP scheduled in AMP7 (2020-2025)

⁹ Removal of the UTR from the preferred programme as set out in our rdWRMP would result in the SWOX WRZ falling into deficit in 2025. Therefore, the remaining planning problem would be to close this supply/demand gap which, after inclusion of the demand management measures and small supply schemes of the current preferred programme, would amount to a deficit of 1 MI/d in the SWOX WRZ at the end of the period. [Planning Inspector's recommendation 14.3.2]

The major demand management programmes in the SWOX zone significantly mitigate baseline supply demand deficits, but are not able to restore security of supply at the start of AMP5. There is a lack of supply options that can be delivered within these timescales.

Table 5: Supply Demand Balances for Preferred Programmes

| WRZ | Volume (Ml/d) | | | | | | | | |
|----------------|---------------|---------|---------|---------|---------|----------|----------|----------|----------|
| | AMP5 | | | | | End AMP6 | End AMP7 | End AMP8 | End AMP9 |
| | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2019-20 | 2024-25 | 2029-30 | 2034-35 |
| London | 27.1 | 26.4 | 19.3 | 13.1 | 6.8 | 1.6 | 0.8 | 8.6 | 1.4 |
| SWOX* | -7.8 | -5.1 | 2.9 | 2.9 | 0.9 | 1.7 | 3.3 | 2.3 | 3.2 |
| Kennet Valley* | 35 | 35 | 28 | 28 | 26 | 21 | 23 | 22 | 21 |
| SWA* | 34 | 34 | 34 | 33 | 32 | 30 | 35 | 34 | 34 |
| Guildford* | 8 | 8 | 8 | 8 | 8 | 7 | 10 | 10 | 9 |
| Henley* | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |

*Critical period 'ADPW' driver rather than DYAA

☛ *Volume 2, Section 9.3*

9.1 Components of the Preferred Programmes

☛ *Volume 2, Section 9.2*

9.1.1 Demand Management

A progressive targeted compulsory metering programme in combination with an enhanced programme of water efficiency activities forms part of the preferred programme for each WRZ. This is consistent with the company's commitment to sustainable development, the Strategic Direction Statement and in recognition of the wider benefits of demand management. This activity will be delivered over a 15-year programme and will be prioritised to those WRZs with greatest need. Water efficiency activity is undertaken on a rolling basis and continues to the end of the planning period.

Although the SWA, Kennet Valley, Guildford and Henley WRZs are in surplus, we have extended the metering and water efficiency programmes to include these zones. We have chosen to do so as it aligns with our strategic vision and the Government's water strategy to increase meter penetration and water efficiency awareness across the whole supply area. Increasing metering will also allow our customers to pay for the water they use, which is a fairer way of charging provided that there is adequate protection of vulnerable and low income households through tariff policy and effective management of the transition towards full metering. We also feel that it is vital that our approach is seen to be consistent across the company when the whole supply area has been designated as seriously water stressed.

Additionally, it is a recommendation of the Environmental Report (Volume 6) that demand management measures should be maximised to provide sustainability benefits associated with reduced demand.

☛ *Volume 2, Section 9.2.2*

Leakage reduction is proposed in both London and SWOX WRZs. In London, a mains replacement policy of an average of 200km per annum in AMP5 and 400km per annum in AMP6 was found to be the preferred strategy¹⁰. The programme will address the AMP5 deficits and associated security of supply risk. This mains replacement policy is in addition to that included in the capital maintenance programme to mitigate asset deterioration; the synergies between the two programmes have been fully explored to ensure optimum cost benefit.

Studies are planned for AMP5 to inform the best strategy for further leakage reduction in the long-term, which could include, for instance, the targeting of leakage in trunk mains. The diminishing benefit of mains replacement over time (due to the preferential targeting of DMAs with best cost benefit) is recognised.

In addition, leakage reduction through extra active leakage control activity is planned in AMP5 for both London and SWOX. This activity is required to reduce the timescales over which security of supply is restored in both zones. Mains replacement is not a preferred policy in SWOX due to the poor cost benefit associated with the low leakage rates per kilometre in this zone.

In London the preferred leakage profile is considered to be the ‘sustainable level of leakage’, whereby reductions have been determined based on our Company aspiration to deliver lower levels of leakage in a sustainable manner. A major programme of mains replacement principally delivers these reductions. Customer preference studies indicate that customers are willing to pay for leakage to achieve levels below the economic level as defined in accordance with existing industry best practice methodologies. Thames Valley WRZs leakage levels are already in line with the industry average.

To achieve such significant reductions in leakage it is critically important that sufficient funding is allocated to manage recurrence in those parts of the network where it is not cost beneficial to undertake mains replacement for supply demand purposes.

The resulting leakage profiles are presented in Table 6 and Table 7¹¹. The leakage programmes in this dfWRMP09 remain the same as those included in the rdWRMP.

Leakage programmes are developed then assessed for leakage uncertainty before being considered within the overall supply demand planning process, Confidence levels of 80% have been selected for the AMP5 period. This assessment takes account not only of the delivery of the leakage target within a single year, which can be impacted by immediate leakage control performance and weather, but also the fact that with further leakage reductions throughout AMP5, failure to deliver the target in one year make the next years target more difficult to achieve. The confidence of delivery of the leakage target assumes that capital maintenance investment will maintain the condition and performance of the network. For leakage management, this needs to consider bursts (mains, fittings and service pipes), network operation, pressure management and leakage itself and without it leakage targets will not be met.

¹⁰ See Section 7.3.2 Mains Replacement Programme Independent Review

¹¹ See Section 7.3.2 Mains Replacement Programme Independent Review

Table 6: Annual Average Leakage Targets by WRZ (MI/d)

| Resource Zone | End AMP4 | End AMP5 | End AMP6 | End AMP7 | End AMP8 | End AMP9 |
|---------------------|------------|------------|------------|------------|------------|------------|
| | 2009-10 | 2014-15 | 2019-20 | 2024-25 | 2029-30 | 2034-35 |
| London | 563 | 481 | 406 | 394 | 394 | 394 |
| SWOX | 55 | 52 | 52 | 52 | 52 | 52 |
| SWA | 32 | 32 | 32 | 32 | 32 | 32 |
| Kennet Valley | 25 | 25 | 25 | 24 | 24 | 24 |
| Guildford | 9 | 9 | 9 | 9 | 9 | 9 |
| Henley | 3 | 3 | 3 | 3 | 3 | 3 |
| Thames Water | 688 | 602 | 527 | 514 | 514 | 514 |

Table 7: Annual Average Leakage Targets by WRZ (l/prop/day)

| Resource Zone | End AMP4 | End AMP5 | End AMP6 | End AMP7 | End AMP8 | End AMP 9 |
|---------------------|------------|------------|------------|------------|------------|------------|
| | 2009-10 | 2014-15 | 2019-20 | 2024-25 | 2029-30 | 2034-35 |
| London | 204 | 168 | 133 | 123 | 118 | 114 |
| SWOX | 133 | 118 | 110 | 104 | 99 | 95 |
| SWA | 162 | 155 | 147 | 137 | 132 | 128 |
| Kennet Valley | 160 | 152 | 144 | 135 | 129 | 125 |
| Guildford | 145 | 141 | 135 | 127 | 122 | 118 |
| Henley | 161 | 158 | 151 | 141 | 137 | 134 |
| Thames Water | 190 | 160 | 132 | 122 | 117 | 113 |

Volume 2, Section 9.2.3

9.1.2 Water Resource Schemes

Resource development is required in both London and SWOX in order to balance supply and demand, despite the major demand management programmes in both zones. The deficits to be met by supply side schemes, after demand management measures are taken into account, are 80 MI/d from 2020¹² in London and 1 MI/d from 2025¹³ in SWOX.

Resource schemes have been selected based on an overall sustainability assessment, which takes into account cost, wider environmental and social impacts and risk.

For London, the preferred programme is also the least cost solution; whilst for SWOX the preferred programme is the 'optimal least cost solution', which delivers the maximum benefit at the minimum cost. In deriving both solutions, the benefits considered include environmental and social benefits (and minimisation of impacts), and synergies with other performance objectives such as the capital maintenance programme and risks potentially posed to security of supply. The cost effectiveness of our demand management strategy is maximised through our integrated demand management approach, and remains the same as presented in our rdWRMP, consistent with Defra's instructions.

¹² 58 MI/d deficit specified in the Inspector's Report; in addition to this a further 22 MI/d is linked to the three schemes identified in the revised dWRMP scheduled in AMP7 (2020-2025)

¹³ Removal of the UTR from the preferred programme as set out in our rdWRMP would result in the SWOX WRZ falling into deficit in 2025. Therefore, the remaining planning problem would be to close this supply/demand gap which, after inclusion of the demand management measures and small supply schemes of the current preferred programme, would amount to a deficit of 1 MI/d in the SWOX WRZ at the end of the period. [Planning Inspector's recommendation 14.3.2]

- The preferred final planning programme for the London WRZ comprises a number of small groundwater schemes, two aquifer recharge schemes, three aquifer storage and recovery schemes, the reuse scheme at Hogsmill sewage treatment works (STW) and the 25 Ml/d reuse scheme at Deephams STW. The Abingdon reservoir scheme is not selected by least cost programme due to the high yield (110 Ml/d) of the smallest (50 Mm³) scheme relative to the supply-demand deficit by the end of the 25-year planning period. Similarly, the Severn-Thames transfer schemes are not selected.
- The preferred final planning programme for the SWOX WRZ comprises the same resource development schemes in AMP5 (2010-15) as contained in the rdWRMP. The raw water transfer from Culham to Farmoor Water Treatment Works (WTW) is selected to address the supply demand deficit of 1 Ml/d beyond 2024/25.

There are a number of risks and uncertainties associated with the supply demand plans for each water resource zone. The target headroom approach has been used to account for known risks; however, pragmatism has also been applied with other uncertainties being taken into account when developing a preferred programme to ensure that the mix of options is feasible and represents a balance of the inherent risks.

We intend to continue our current research and development programme into effluent re-use, particularly in London where treated effluent is discharged to the tideway and also innovative groundwater options such as Aquifer Storage and Recovery (ASR).

9.2 Discussion by Water Resource Zone

9.2.1 London WRZ

London has a growing deficit (dry year annual average in the baseline scenario from 2012/13. A substantial demand management programme is required in the preferred programme (Figure 9) to maintain a surplus to headroom from 2013/14 through AMP6. Resource development in the medium- to long-term is also required to meet the supply demand deficit and potentially to offset risks associated with a strategy that is heavily dependent on demand management. Artificial recharge and aquifer storage and recovery schemes are to be commissioned during AMP7 and in the long term, small groundwater schemes and two medium-sized reuse schemes are proposed.

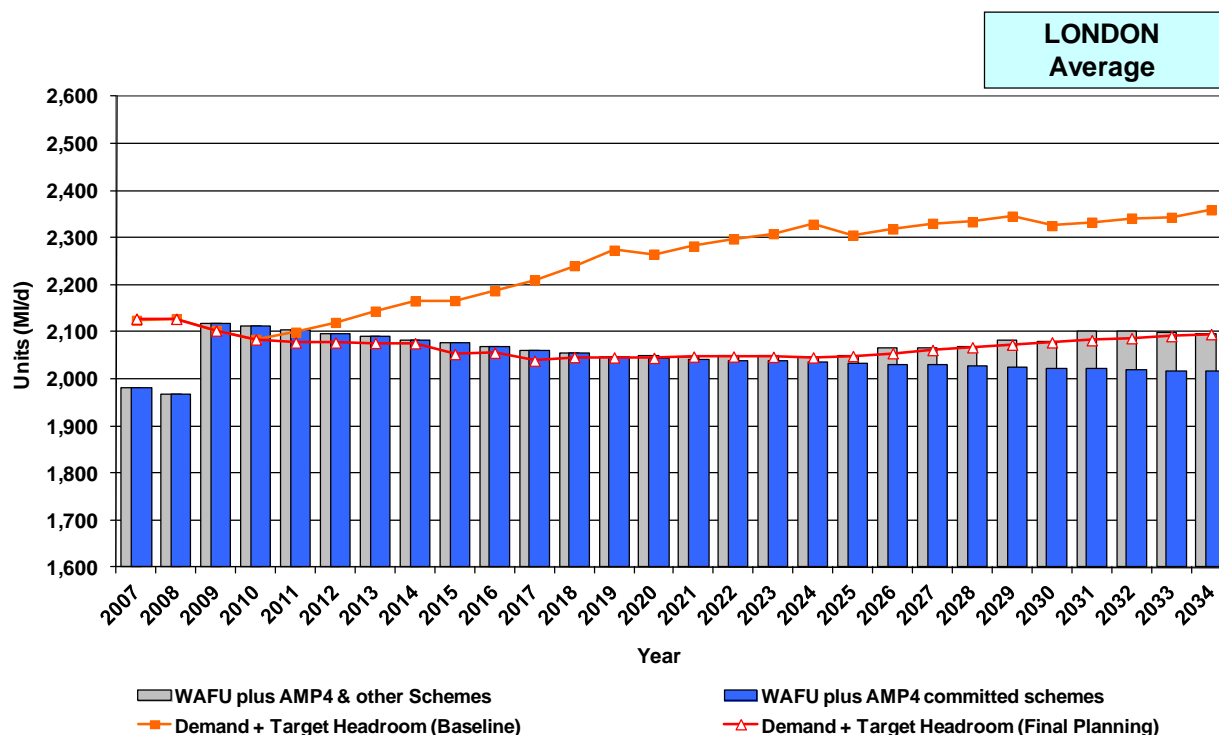


Figure 9: Preferred Programme – London DYAA

Building on the AMP4 baseline programme, the key elements of the preferred programme are as follows (Table 8):

Table 8: London WRZ Preferred Programme

| Option | | DYAA Yield (MI/d) ¹⁴ | Delivery year(s) |
|--------|---|---------------------------------|------------------|
| Demand | Leakage saving (mains replacement, enhanced ALC and metering programme) | 159 | 2010-2025 |
| | Consumption saving (Metering, water efficiency and tariffs) | 70 | 2010-2025 |
| Supply | AR – Kidbrooke | 5.0 | 2020/21 |
| | ASR – South East London | 1.5 | 2021/22 |
| | ASR – Darent Valley 3 | 5.0 | 2022/23 |
| | ASR – Darent Valley 2 | 5.0 | 2025/26 |
| | AR – SLARS | 19.0 | 2026/27 |
| | East Croydon | 1.5 | 2028/29 |
| | Northern New River 1 | 1.76 | 2028/29 |
| | ELRED | 1.0 | 2028/29 |
| | Southwark | 1.48 | 2028/29 |
| | Hogsmill STW Reuse – Option 3 | 15.0 | 2029/30 |
| | Deephams STW Reuse – 25 MI/d | 25.0 | 2031/32 |

¹⁴ For demand management options yield quoted is saving in 2020

Leakage reduction forms a key component of the plan, with leakage levels in London reduced by more than a quarter in absolute terms by 2020. This is achieved by an ongoing mains replacement programme of 200km per annum in AMP5 and 400km per annum in AMP6, in combination with enhanced find and fix activity in the short term.

Targeted compulsory metering and water efficiency are also significant elements of the preferred programme, with metering delivered over a 15-year programme and enhanced water efficiency ongoing until the end of the planning period. A metering penetration level of 77% of individual properties is achieved in London by 2025, with a meter fitted to all supplies over the same period.

Due to the exclusion of long-term risk associated with sustainability reductions in our draft Plan in accordance with Defra’s instructions, it can be seen that the major resource, the UTR, we identified in our rdWRMP preferred plan is no longer required. This is because the supply demand deficit is now significantly smaller than that forecast in the rdWRMP.

Uncertainties in the least cost programme include the yield of both the ASR schemes and variants of the Deephams re-use scheme. These uncertainties highlight the need for further feasibility investigations into all of these options. Our programme of current and planned investigations is set out in the rdWRMP.

Volume 2, Section 9.3.1

9.2.2 SWOX WRZ

The preferred programme restores security of supply by 2012/13 for both peak and average conditions and maintains it for the duration of the planning period as shown in Figure 10.

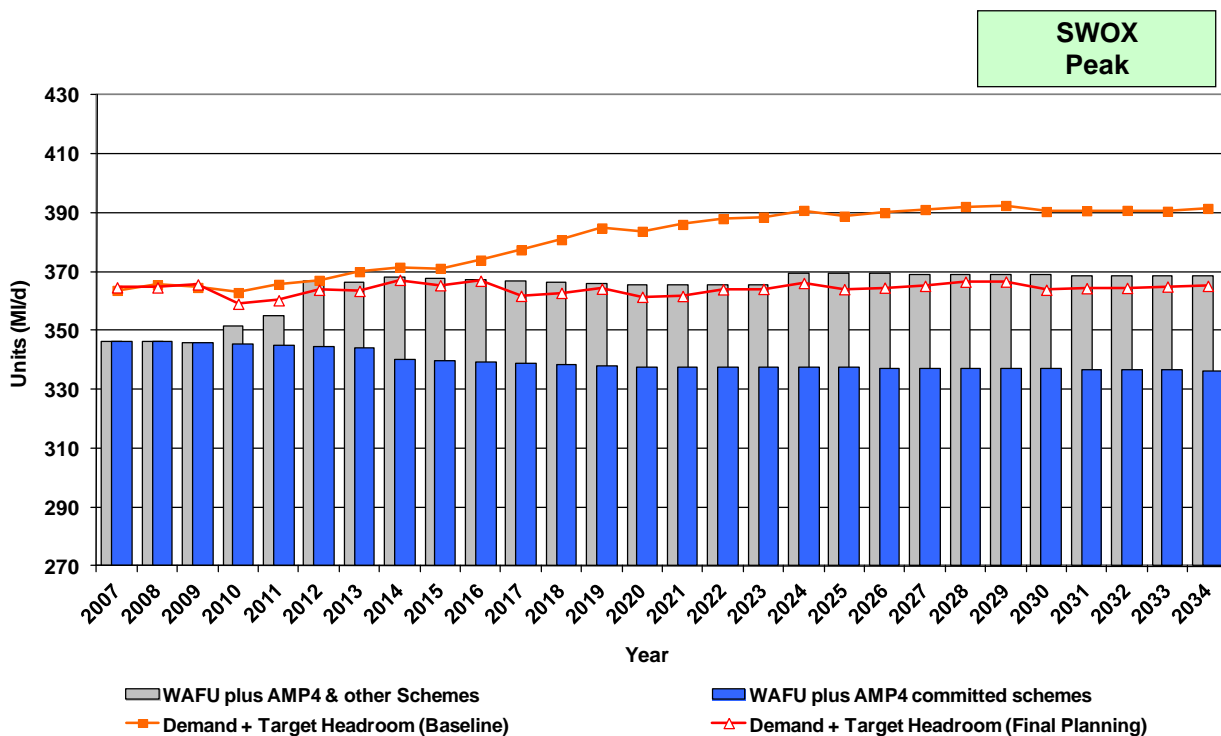


Figure 10: Preferred Programme – SWOX ADPW

A full demand management programme of leakage reduction, metering and water efficiency is included in the preferred programme. The delivery of the metering and water efficiency programme in SWOX will be prioritised over other Thames Valley resource zones in order to reduce AMP5 deficits as quickly as possible. The extent to which demand can be reduced through leakage reduction is limited due to the already low leakage levels in SWOX, which are below average for the industry.

With an optimised demand management programme, the restoration of the supply-demand balance as quickly as possible is then dependent upon the delivery of a series of small-scale groundwater options (Table 9). The Culham raw water transfer to Farmoor is the water resource option selected to meet the 1 MI/d supply demand deficit in the medium to long term, entering the programme in 2024/25. This scheme provides flexibility in that it can be easily downsized to fit the predicted small supply demand deficit remaining by 2024/25.

The tariff trials planned for AMP5 will be undertaken in SWOX, due to the fact that this zone already has a relatively high level of meter penetration (achieved through change of occupancy metering during AMP4) and a clear supply demand driver to accelerate demand management as far as possible. These trials, undertaken as a precursor to the implementation of a company wide tariff structure in AMP6, are likely to reduce the supply demand deficits further in this zone during AMP5.

The programme also allows for a reduction in abstraction at the Axford groundwater source of 3.6 MI/d on peak week supply in 2014/15 and is only achievable once the WRZ is in surplus. This reduction is for sustainability reasons as agreed with the EA.

Table 9: SWOX WRZ Preferred Programme

| Option | | ADPW Yield (MI/d) ¹⁵ | Delivery year(s) |
|--------|---|---------------------------------|------------------|
| Demand | Leakage saving (enhanced ALC and metering programme) | 5 | 2010-2020 |
| | Consumption saving (Metering, water efficiency and tariffs) | 21 | 2010-2020 |
| Supply | Goring Gap 1 | 4.5 | 2010/11 |
| | SWOX NC1 | 1.0 | 2010/11 |
| | SWOX NC2 | 0.3 | 2010/11 |
| | Lambourn Down | 0.9 | 2011/12 |
| | SWOX NC3 | 2.0 | 2011/12 |
| | SWOX NC4 | 1.0 | 2011/12 |
| | SWOX NC5 | 0.3 | 2011/12 |
| | Goring Gap 3 | 10.0 | 2012/13 |
| | SWOX NC6 | 2.1 | 2012/13 |
| | Goring Gap 2 | 5.8 | 2014/15 |
| | Culham raw water transfer to Farmoor | 4.0 | 2025/26 |

☛ *Volume 2, Section 9.3.2*

¹⁵ For demand management options yield quoted is saving in 2020

9.2.3 Kennet Valley, Slough Wycombe and Aylesbury, Guildford and Henley WRZs

No deficit on either unrestrained annual average or peak week conditions is forecast to occur over the planning period in these zones. Therefore, the preferred programmes contain no new investment in either leakage reduction or resource development. The economic level of leakage for these resource zones is therefore the current level of leakage, with an allowance for growth in leakage due to new properties and customer side leakage savings from the metering programme.

With the inclusion of metering and water efficiency activity in the preferred programmes, the solution is not true least financial cost (cost impact shown in sensitivity analysis in Section 8). However, when the overall benefits are taken into account, this strategy is considered to be the preferred and most sustainable solution for these zones.

☛ *Volume 2, Section 9.3.3-9.3.6*

10 Sensitivity Testing

☛ *Volume 2, Section 10*

Volume 2, Section 10 has been updated to include sensitivity tests on the new preferred programme. The demand scenarios comprising the sensitivity tests remain the same as those applied in the rdWRMP.

We have tested the robustness and resilience of the preferred programmes through sensitivity testing. Sensitivity is investigated in two different ways:

- Testing the impact of altered demand scenarios on the surplus / deficit in London and SWOX WRZs under the preferred programme of supply and demand side measures [Section 10.3]; and
- The alternative programmes selected by the EBSD model to balance supply and demand under the altered demand scenarios [Section 10.4].

☛ *Volume 2, Section 10*

The range of potential sensitivity tests is large; the following areas were identified as the most significant in terms of impact on demand and are included in this analysis:

- Population – rate of domestic population and housing growth
- Per Capita Consumption (PCC) – rate of change
- Metering – impact of selective metering savings on domestic consumption
- Economic Downturn – Severity of economic downturn

☛ *Volume 2, Section 10.2*

The London WRZ solution in particular is sensitive to changes in demand side assumptions. This should be expected given the strong focus on demand management in the programme and the fact that the preferred supply side programme comprises small to medium sized supply side schemes; as a result, there is a fine balance in supply and demand and small deviations could quickly tip the balance.

The sensitivity testing supports the development of a programme of contingency options to manage the risk posed by uncertainty around assumptions made in the development of the preferred plan. If additional resources are required, the contingency options outlined in Table 10 are intended to help ensure sufficient water resource options are available to be implemented in the timescales required to maintain supply surplus.

Table 10: Contingency Options

| Option | Type | WRZ |
|---------------------------------|----------------|------------|
| Deephams 60 MI/d | Re-use | London |
| Beckton 50 MI/d | Re-use | London |
| Long Reach Desalination | Desalination | London |
| Shalbourne (option B) | GW development | SWOX |
| Cricklade - Option 1 (Blunsdon) | ASR | SWOX |

| Potential future strategic options (pending further study) | |
|---|--------|
| Reservoirs | Both |
| Supported and unsupported Severn-Thames transfers | Both |
| Wider scale re-use of water | London |
| Other inter-zonal and regional transfers | Both |
| Tariff trials and development | Both |

☛ *Volume 2, Section 10.4.6*

11 Summary of the Main Elements of the Preferred Programme

The key elements of the draft final WRMP are set out below:

- Further significant reductions in leakage through a continuation of the Victorian Mains Replacement (VMR) programme in London and additional active leakage control in London and SWOX. This will result in the reduction in leakage by 23% in absolute terms to 527 MI/d by 2020, with further ongoing reductions thereafter.

☛ *Volume 2, Section 9.2.2*

- A 15-year progressive programme of targeted compulsory metering, with the aim to individually meter all domestic properties where it is cost beneficial to do so. We believe that this will result in an overall individual household meter penetration of around 80% by 2025 and the metering of all connected properties. We recognise in developing this strategy we will need to work with Defra, CCW and Ofwat to ensure that appropriate protection of vulnerable and low income households through tariff policy and effective management of the transition towards full metering.

☛ *Volume 2, Section 9.2.3*

- An enhanced water efficiency programme, whereby we will offer water efficiency activity (advice, technology and audit) to every domestic customer in tandem with our metering programme over the next 15 years.

☛ *Volume 2, Section 9.2.3*

- An Integrated Demand Management (IDM) approach to the planning and delivery of the leakage, metering and water efficiency programmes will be used to maximise the synergies between them. This will optimise the cost benefit and be more sustainable than separate programmes.

☛ *Volume 2, Section 9.2.1*

- The scale of planning problem to be resolved is significantly reduced in line with the Planning Inspector's recommendations following the Public Inquiry and Defra's instructions. The deficits to be met by supply side schemes, after demand management measures are taken into account, are 80 MI/d from 2020¹⁶ in London and 1 MI/d from 2025¹⁷ in SWOX. This has resulted in significant changes to our resource development programmes for London and SWOX WRZs compared to the rdWRMP.

¹⁶ 58 MI/d deficit specified in the Inspector's Report; in addition to this a further 22 MI/d is linked to the three schemes identified in the revised dWRMP scheduled in AMP7 (2020-2025)

¹⁷ Removal of the UTR from the preferred programme as set out in our rdWRMP would result in the SWOX WRZ falling into deficit in 2025. Therefore, the remaining planning problem would be to close this supply/demand gap which, after inclusion of the demand management measures and small supply schemes of the current preferred programme, would amount to a deficit of 1 MI/d in the SWOX WRZ at the end of the period. [Planning Inspector's recommendation 14.3.2]

- The preferred (least cost) programme for London comprises a number of small groundwater schemes, two aquifer recharge schemes and three aquifer storage and recovery schemes, the reuse scheme at Hogsmill sewage treatment works (STW) and the 25 Ml/d re-use scheme at Deephams STW.
- The preferred programme for SWOX comprises the same resource development schemes in AMP5 (2010-15) as the rdWRMP. The raw water transfer from Culham to Farmoor WTW is selected to address the supply-demand deficit beyond 2015.
- Due to the exclusion of long-term risk associated with sustainability reductions in the London WRZ in accordance with Defra's instructions, there is no requirement for a strategic resource and the UTR is not selected within this dfWRMP09.

☛ *Volume 2, Section 9.3.1 and 9.3.2*

- Sensitivity testing of the final programme has highlighted that it is prudent to continue research and development to assess 'contingency options', should anticipated demand management savings not be realised or supply schemes yield less than expected. We have set out a programme of ongoing and planned investigations which includes: further investigation of larger water re-use schemes, particularly in London where treated effluent is discharged to the tideway, innovative groundwater options such as Aquifer Storage and Recovery (ASR) and potential strategic options to meet larger supply-demand requirements including reservoir storage and water transfers.

☛ *Volume 2, Section 10*

Overall, challenging programmes of demand management are required in the short to medium term in order to offset and reduce the underlying increase in demand for water. Demand management alone however is not sufficient to balance supply and demand into the future and water resources schemes, focusing on a number of groundwater developments and water re-use schemes, are required.

A number of risks and uncertainties associated with the supply-demand balance underpinning our preferred plans have been identified. The potential long term impacts of sustainability reductions in licensed abstraction are significant but on the recommendation of the Inspector and the instructions from Defra have been excluded from this dfWRMP09. The Environment Agency has committed to provide us with a view on the licences affected and extent of any further sustainability reductions in sufficient time such that these requirements can be taken into account in WRMP14.