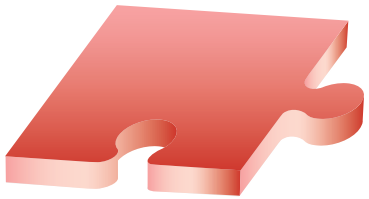


Section 4 : Demand Forecast

In this section we describe the baseline demand for water and how we have forecast future demand from 2015 to 2040

Introduction

4.1 The demand forecast included in WRMP09 was viewed by many stakeholders as being potentially over-cautious, and lacking ambition post 2020 in terms of the scope of future demand savings that might be achieved. At the same time, there was wide acceptance that inherent with adopting a more ambitious future demand savings policy is a higher degree of uncertainty, not least given the lack of robust evidence supporting the sustainable delivery of large water savings. So our approach to the WRMP14 has sought to satisfactorily address both these issues.

4.2 We have been more ambitious in adopting assumptions that reduce the demand for water used by our customers on a daily basis through the continuation of our customer metering programme, and wider use of innovative water efficiency and demand management measures. We have also improved our methods of responding to and managing leakage as explained later in this section. Our improved forecasting methodology has adopted a micro-component analysis approach to forecasting demand for WRMP14. This has given greater transparency and understanding of customer usage, while our customer surveys have also informed and assisted the process in reducing uncertainty in the demand forecast. We have worked with other companies in the WRSE Group to assist in our understanding of customer usage across the whole of the South East of England.

4.3 One of the key aims of the WRMP14 is to evaluate and improve ways of managing customers' demand for water. Our supply area is classified as a 'serious water stressed area' and during the period 2010 to 2015 we secured funding to introduce our customer metering programme, together with a number of water efficiency measures to assist us with reducing demands. We have retained our customer metering programme in WRMP14 on the basis that it meets current Government policy

and the expectations of the Regulators. While we have not sought to fully revisit and re-justify our customer metering programme in this WRMP14 (as we had for WRMP09), we have as a minimum ensured that our original cost benefit analysis that justified the 2010 to 2015 programme remains valid.

Water efficiency

4.4 We will continue to promote and enhance our water efficiency programmes to ensure these raise customer awareness about their water use and the need to use water wisely. In Appendix 4 we have provided more detail about the wide range of programmes we are implementing which include using our website, community and education events, customer focus groups, partnership working and working with commercial customers. We believe the delivery of the programmes outlined in Appendix 4 is critical to achieving the delivery of the ambitious reductions in water use we have built into our baseline demand forecast. We are relying on these programmes to deliver long term changes in customer usage and behaviour to sustain the levels of per capita consumption reductions described later in this section.

4.5 As part of our work preparing this WRMP14 we have considered implementing a number of additional demand management options and this is explained further in Sections 7 and 8. Water efficiency measures have also been tested in two key pieces of customer research – the first explored customers' preferences about the range of water efficiency measures and activities they would be willing to adopt in the home, and then testing these through customer Willingness to Pay surveys. Both have helped improve our understanding of what customers' demand management preferences are.

Preparing the forecast

4.6 In preparing the WRMP14 we have had regard to current Government policy, the Water Resources Management Direction 2012 and the guidelines. We have had regard to the expectation that companies should include lower forecasts of demand in the future, particularly into reducing per capita consumption (PCC) trends. Since October 2011 we have engaged with the Environment Agency and other stakeholders as part of the pre-consultation process, in developing our new approach to demand forecasting.

4.7 We have prepared our demand forecast at WRZ level taking account of the factors shown in Figure 4.1.

4.8 There are two stages to completing the demand forecast for the WRMP14. The first is described in this section, and is termed the 'baseline' forecast. It contains updated information e.g. population and properties, per capita consumption etc., but assumes that the policies adopted in the last plan e.g. around leakage, metering, water efficiency measures, continue unchanged.

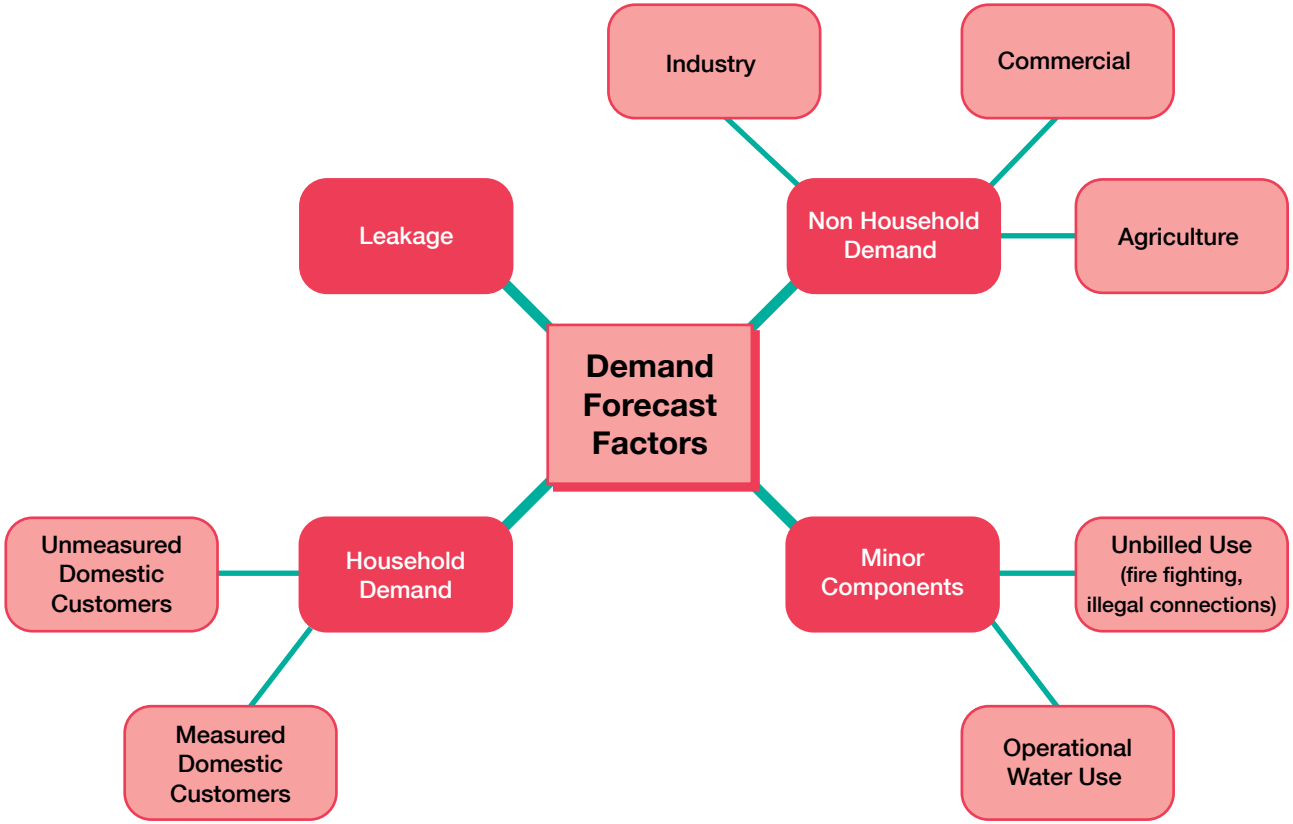
4.9 Once the options assessment and preferred plan are complete, then any new demand management options and/or changes to demand policies are incorporated into the starting 'baseline' forecast to produce our 'final' forecast.

4.10 Our assessment of the baseline demand forecast is explained in the following paragraphs. More detailed technical evidence prepared to meet the guidelines can be found in Appendix 4.

Our starting point

4.11 As with the supply forecasts explained in Section 3, our work to define the demand forecast comprises our understanding of the starting position in the 'base year' of the plan, and then looking forward to understand how and why the forecast for future demand will change. Whilst the new plan covers the period 2015 to 2040, the guidelines expect the starting year for the demand forecast to reconcile with the Company's last Annual Review (AR12), which represents the period April 2011 to March 2012. Adjustments have then been made to determine a normal

Figure 4.1 : Demand forecast factors



(average) year demand forecast and a dry year (1 in 10 year) demand forecast - 1 in 10 year demands representing the demand up to the point when the Company may need to impose restrictions.

4.12 It is typically demand during the hotter dry year periods which leads to the need to invest in new water resources and demand management options. We therefore look to meet demand for two key periods in a dry year - the 'dry year annual average' daily demand, and also the maximum usage over a 7 day period, referred to as the Critical Period or Summer Peak Demand. This typically occurs between May and August. In addition, as required, we have produced a normal year forecast and a weighted average year forecast. Both are important for the least cost modelling exercise described in Sections 8 and 9.

4.13 Table 4.1 shows the demand forecasts for the years 2009 and 2015 from WRMP09, and the actual demand (outturn data) for the period 2009 to 2012. The starting point for our new demand forecast is given for 2013 to 2015 for both the Dry Year and the Normal Year. It can be seen in Table 4.1 that outturn figures have been consistently above the Normal Year forecasts, with the exception of the very wet 2012/13 year, and in 2010/11 the outturn figure was marginally higher than the Dry Year forecast figures for our last Plan. This has confirmed that the forecast included in our last plan underestimated actual demands. As a result, for WRMP14 we have rebased our Normal Year and Dry Year demand forecast starting point, as shown in Table 4.1.

4.14 The increases in actual demand over WRMP09 relate primarily to measured household consumption being higher than originally forecast, and some movement in unmeasured figures too. This accounts for the difference of +8.5 l/h/d in the 2012 Base Year as shown in block three of Table 4.2.

4.15 Another contributing factor to the differences between the actual figures and previous household forecasts has been the delay in the customer metering programme and the phasing of tariffs for that programme.

4.16 Summer Peak demands for the Normal Year and Dry Year have been determined by applying peak factors to the components of Normal Year and Dry Year Annual Average Demands. These peak factors are described further and later on in this section.

The base year starting position

4.17 Our demand forecast uses 2011/12 as our base year. Hydrologically 2011/12 was an unusual year with very little increase in demand in Summer because of wet weather; but with the preceding Spring, Winter and Autumn all being dry.

4.18 We have undertaken further assessment of our historical records to confirm that demand in 2011/12 was approximately equivalent to that expected in a normal year. Applying the same long term historical record analysis dry year values equivalent to requiring a temporary use restriction every 10 years, we have derived a demand level for the Dry Year and Summer Peak values.

4.19 For WRMP14 we have assessed the actual impact of our compulsory metering programme on domestic customer water usage, using data from the latest Annual Review 2013 and from the metering programme (this was data not available for inclusion in dWRMP14).

Table 4.1 Previous WRMP09, actual outturn and new WRMP14 demands

	Average Day Demands (Ml/d)						
	2009	2010	2011	2012	2013	2014	2015
WRMP09 Dry Year	557.0	557.9	559.6	560.8	562.1	563.5	564.9
WRMP09 Normal Year	535.8	536.4	537.7	538.5	539.4	540.4	541.5
Actual Demand	545.7	552.5	559.8	548.7	520.0		
WRMP14 Dry Year				583.2	578.7	576.3	574.4
WRMP14 Normal				548.8	544.9	542.9	540.9
	Summer Peak Demands (Ml/d)						
	2009	2010	2011	2012	2013	2014	2015
WRMP09 Dry Year	679.1	680.3	682.9	685.4	688.1	690.8	693.7
Actual Demand	624.0	668.7	671.3	617.7	552.1		
WRMP14 Dry Year				706.6	701.6	699.2	697.5

4.20 The results of our assessment remain preliminary at this stage because: they are based upon a limited data set; and, they represent data from one of the wettest years on record (as seen in Table 4.1), and consequently are not likely to represent directly the impact which would be expected to see in a dry year. However the data does indicate actual reductions have been achieved in the order of 18% at property level. This compares with reductions of 15% at property level assumed in WRMP14 in a dry year.

4.21 We have shared our assessment with the Consumer Council for Water, and this is included in Appendix 4E.

Population and properties

Growth forecast prepared by Experian

4.22 Future forecast of population and property numbers have been provided by expert demographic consultants, Experian, who are also working with a number of neighbouring water companies. They engaged directly with all 33 Local Planning Authorities (LPAs) served by our supply area to understand the growth expectations across the region.

4.23 Three sets of forecasts have been produced using the approach prescribed by the Environment Agency (Environment Agency 'Methods of Estimating Population and Household Projections) as follows:

- Plan based, using information provided by the LPA where available (which we have used in accordance with guidelines);
- Trend based, using the latest information from official statistics and other relevant sources; and
- Most likely, Experian's best view on likely outcomes based on the best information available.

4.24 Experian collected information from each of the local authorities using a data collection template developed as part of the Environment Agency Methodology report, in addition to a large amount of information from other sources, including the 2011 Census. Where information was not supplied direct from the LPA, it was collected from alternative sources according to a hierarchical system:

1. Directly from each LPA
2. Directly from County Councils
3. From Local Authority Plans, Core Strategies, Local Development Frameworks or Annual Monitoring Plans.

4.25 Experian's household and population calculations for each of the WRZ areas were carried out using Alteryx and Micromarketer, two spatial analysis programmes. The methodology follows the Environment Agency guidance and Office for National Statistics postcode best fit approach to producing small area estimates.

4.26 Three inputs were fed into the calculations:

- WRZ GIS boundaries;
- Output Area boundaries; and
- Current year population and area (in sq km) for each Output Area and postcode

4.27 The Alteryx programme first identifies which output areas are located entirely within each boundary of a given WRZ. The sum of the total population of all of these output areas can then be derived and will account for the majority of each WRZ's total population. A proportion of output area population using Census postcode area level data is calculated for areas which do not contain any complete output areas but are made up of elements of a number output areas (the remainder of the output area falling into another WRZ or falling outside each water companies total area).

4.28 Appendix 4 explains the methodology used by Experian to prepare the growth forecasts for WRMP14.

Local Planning Authority growth forecasts

4.29 The revocation of the Regional Spatial Strategy (RSS) – also known as the South East Plan - has removed the only statutory link between water resources planning and spatial planning. The RSS established growth levels across the region and also provided the policy context for cross district water infrastructure.

4.30 'Water For Life' advocates close dialogue and collaboration between LPAs and water companies and seeks to promote development planning and water planning frameworks that are mutually supporting. It notes that WRMPs should be based upon robust data that draws on Local Plans and the latest housing and demographic projections.

4.31 As part of the pre-consultation to WRMP14, we organised three workshops with local authorities across our supply area (one each covering the western supply area (Hampshire), east eastern supply area (Kent) and west eastern supply area (Sussex)). In preparing WRMP14 we have sought to verify forecasts for growth prepared by Experian with the individual LPAs as part of their own Local Plan process although we recognise that the plans of many authorities are still in draft stages as well. We have valued the responses from LPAs which, in general, are consistent with the Experian figures, although some variations have been acknowledged.

Coping with uncertainty

4.32 Experian completed a final report (June 2013) that took account of the most recent population and property data from all the LPAs and the 2011 Census. Further details of how we have managed uncertainty around the final population and property projections as part of our assessment of target headroom is included in Section 5.

4.33 From a starting position of 2.09 million population in 2012 the population is forecast to increase by a further 400,000 (19%) to 2040. From a property base of 887,900 properties in 2012, property numbers are expected to increase by a further 217,200 (24%) by 2040.

4.34 Overall there is some concern that the current economic slowdown may delay the delivery of new properties in the short term, but the population growth is not reported as being affected by the economy, so population forecasts (at least in the short term) are likely to be robust. It is this population in any case that is driving demand, rather than property numbers.

4.35 Our consideration of the impacts that changes to population and property forecast numbers might have on our preferred plan is described later in Sections 8 and 9.

Per capita consumption (PCC)

4.36 The WRMP14 has carefully considered and reflected the Government's current position with regard to expected future reductions in demand.

4.37 The evidence from the industry is that most, if not all, water companies now forecast per capita consumption forecasts that reduce over time. Micro component forecasts support reduced household consumption in the future because existing appliances are generally being replaced with more efficient ones; new properties are being fitted with the latest, water efficient models and there are policies and programmes in place supporting behaviour changes that are leading to more efficient water use practices.

4.38 Appendix 4 provides full details of how we developed our micro-component analysis model in accordance with the guidelines. A brief summary is provided here.

4.39 During 2012 we contacted 40,000 customers to survey water usage within their properties, (including personal washing, clothes washing, toilet flushing, kitchen use and outdoor use), using a stratified sample to capture metered and unmetered customers as well as other customer profiles. Approximately 10,700 responses (27%) were received and the data has provided a representative response across the WRZs. The survey allowed us to capture a range of water use components, while the occupancy data has assisted with allocating population between measured and unmeasured households and property groups.

4.40 The Company has also participated in a variety of industry surveys on water use within the home, the most useful recent survey being carried

Figure 4.2 : Calculating household demand

out by Water Research centre (WRc) in September 2012. This data has also been used, along with a variety of other sources including the previous surveys by ourselves and other companies, to project the current patterns of ownership and usage to provide future consumptions.

4.41 The micro-component analysis model has been developed in line with the guidelines to provide a robust approach to forecasting household PCC by:

- Measured households;
- Unmeasured households; and
- Void households.

4.42 We then classified the data on measured households to forecast the PCC by:

- New properties built in the year;
- Meter optants;
- Compulsory metered properties; and
- Other changes to the existing metering base.

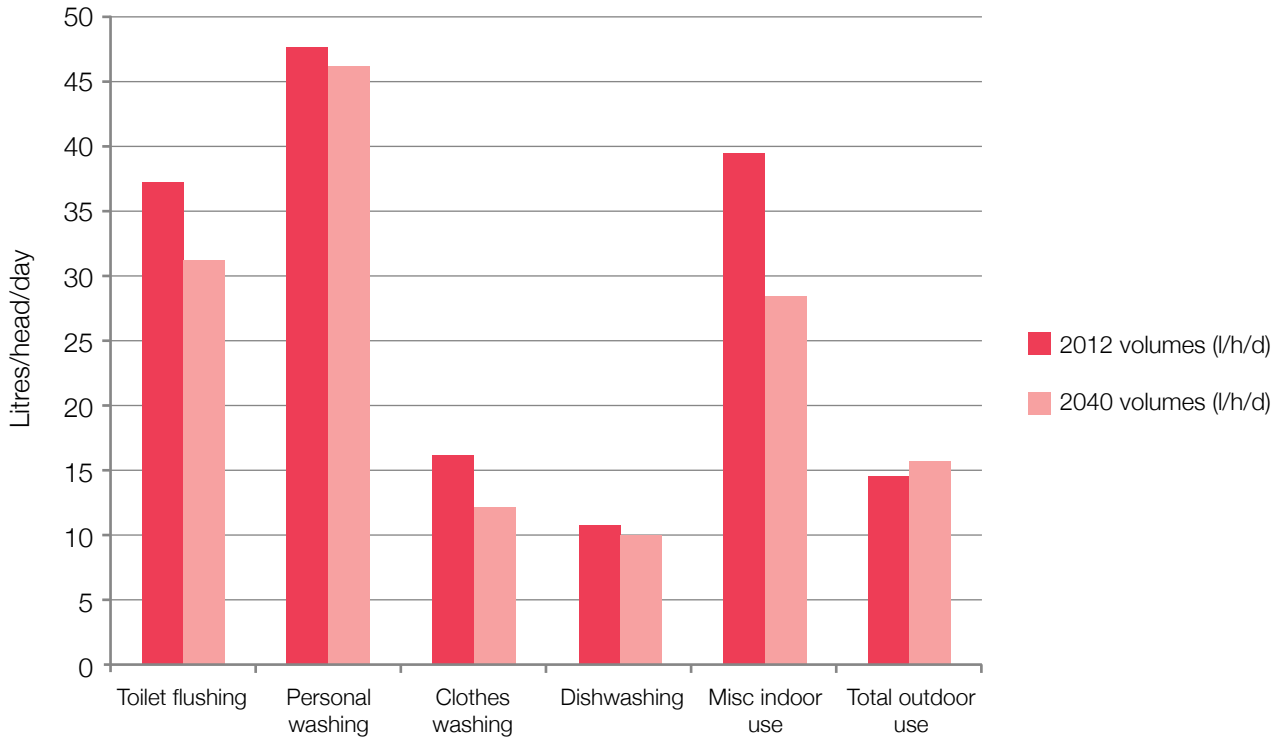
4.43 To take account of how socio-economic and geographical factors influence the pattern of water use across our water supply area, we applied a further level of stratification of property type using information from the Office for National Statistics and Experian:

- Detached;
- Semi-detached;
- Terraced;
- Bungalows; and
- Flats.

4.44 A full discussion on the PCC forecast is included in Appendix 4. Our household demand forecast models were set up to include five primary metering type categories and 15 property types. For each of the categories and for each of the eight WRZs, we have estimated:

- Total number of properties;
- Occupancy rate using a set of assumptions;
- Calculated population; and
- Forecast PCC for each of the categories built on a micro-component analysis of the water use in a household.

Figure 4.3 : Reductions in PCC



4.45 Adopting the micro-component approach results in PCC declining from 173 l/h/d in the base year to 149 l/h/d by 2040 (see Table 4.2) for a Dry Year. The modelling shows reductions in volumes used from 2015 - 2040 for toilet flushing (37.2 to 31.2 l/h/d), clothes washing (16.1 to 12.1 l/h/d) and miscellaneous usage (42.5 to 30.6 l/h/d).

4.46 Assumptions regarding the appliances installed in new properties results in them having a PCC which is 20% below current older average metered properties. This aligns with the assumptions included within the Code for Sustainable Homes standards, and influences the reduction in overall PCC.

4.47 The first three blocks of data in Table 4.2 show the differences in forecast PCC between the WRMP14 and the last plan WRMP09.

4.48 The impact on water delivered is provided in the fourth block of data. The impacts of the changes to Water Delivered on the overall supply demand balance are presented in Section 6.

Our customer metering programme

4.49 We have prepared our demand forecast on the assumption that the customer metering programme continues. This meets with Government and Regulators' expectations and is in accordance with the guidelines. Our original cost benefit analysis undertaken to justify the programme in WRMP09 will be updated.

Table 4.2 Household consumption details (dry year)

	2012	2015	2020	2025	2030	2035	2040
Total household per capita consumption (l/h/d)							
WRMP09	164.8	163.1	161.3	163.6	166.4	169.8	
WRMP14	173.1	165.5	158.6	153.3	151.2	149.8	148.7
Unmeasured households per capita consumption (l/h/d)							
WRMP09	176.8	179.2	183.2	187.5	192.0	196.9	
WRMP14	182.4	178.0	171.1	167.0	166.7	166.3	166.0
Metered households per capita consumption (l/h/d)							
WRMP09	149.3	151.9	156.6	159.4	162.7	166.4	
WRMP14	157.8	157.4	156.8	151.9	149.7	148.3	147.3
Water Delivered to all households (Ml/d)							
WRMP09	347.2	350.6	357.2	374.3	393.2	412.7	
WRMP14	373.1	363.5	358.7	357.8	363.9	371.6	380.7
Difference	25.9	12.9	1.5	-16.5	-29.3	-41.1	

4.50 We began installing meters in August 2011, although charging our customers for the water they use on a metered basis only commenced in April 2012. The customer metering programme provides for over 175,000 properties to be metered by 2015 and a further 180,000 unmeasured properties to 2020 which will result in 90% of customers being metered by 2020.

4.51 We are also installing 'smarter' technology in our area which will eventually enable customers to easily understand their water usage. We intend to explore further trials of tariff options in our next Business Plan, should they be required.

4.52 The demand forecast in this WRMP14 includes for a continuation of customers opting to have a meter installed, whilst it is assumed that these will reduce as the customer metering programme rolls out.

Non-household demand

4.53 We have good historical consumption information on non-household customers as most

are metered. The numbers of new commercial properties has been based on property growth in each WRZ over the past 10 years. This results in an increase of 7,500 commercial properties over the period from 2015 to 2040.

4.54 Our consumption review to derive our forecast has analysed historic usage of our commercial customers against industrial sectors. We found that even with the increase in non-household properties, overall there has been negligible growth in the total water used in most sectors, and we forecast this to remain the case to 2040. We believe this is due to improvements in water use and efficiency that are being adopted.

4.55 However, our studies have found, as supported by other research, that the agriculture and horticultural sector demand is continuing to grow into the future. Following further review, we have included growth for this sector in our forecast, with annual average demand in a dry year rising by 14.6 Ml/d between 2015 to 2040. This is equivalent to a 11% increase in the total non-household demand over the 25 year planning period.

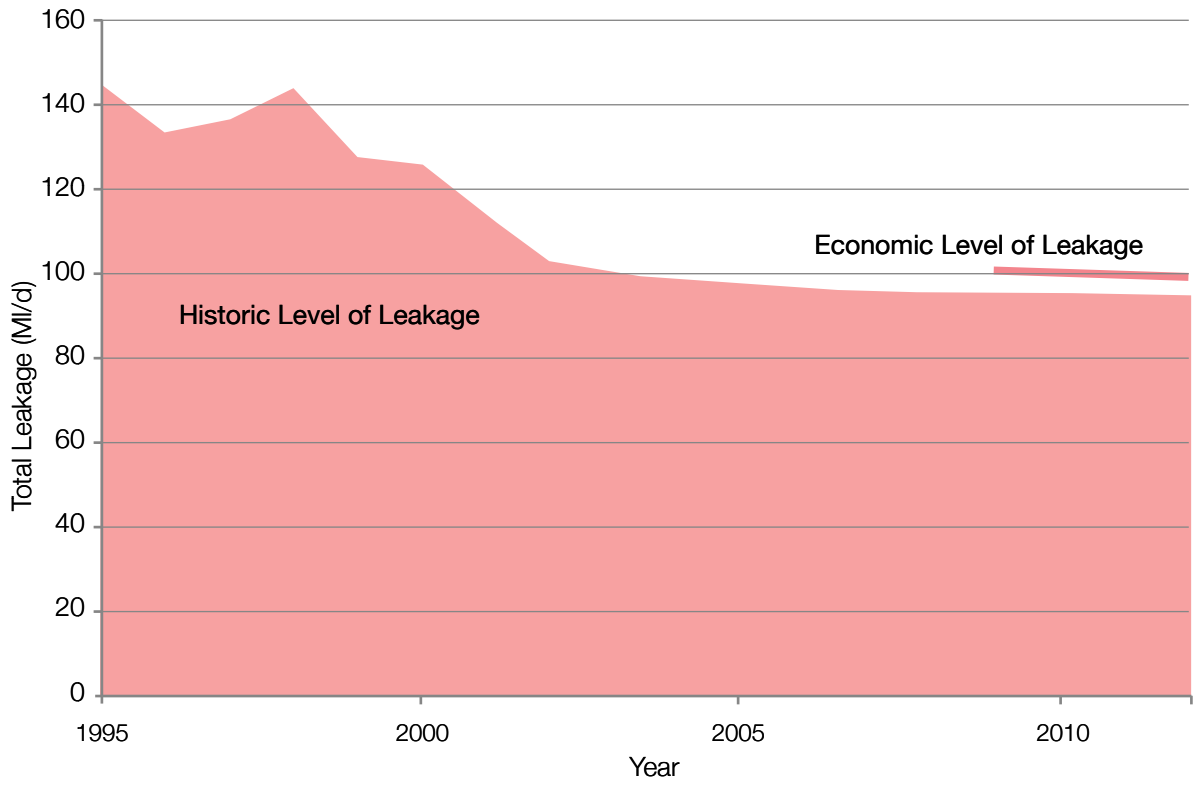
Baseline leakage

4.56 We expect the leakage level agreed with the regulators will be met and maintained in line with our baseline forecast. This is mainly achieved by the customer metering programme which is expected to assist in identifying leakage on private

Table 4.3 Baseline leakage

	2012	2015	2020	2025	2030	2035	2040
Total Leakage (Ml/d)	94.5	93.1	90.6	90.6	90.6	90.6	90.6
As percentage of Demand	16.2%	16.2%	15.8%	15.8%	15.6%	15.3%	15.0%
Leakage as l/property/day	106.5	102.3	95.3	91.7	88.5	85.4	82.3
Company side Leakage (Ml/d)	71.3	71.1	71.1	71.1	70.4	69.7	69.0
As percentage of Demand	12.2%	12.4%	12.4%	12.4%	12.1%	11.8%	11.4%

Figure 4.4 : Historic leakage



supply pipes which will be repaired earlier than otherwise would be expected. Total leakage is expected to fall from 93.1 Ml/d in 2015 to 90.6 Ml/d by 2020, equivalent to 106.5 litres/property/day to 95.3 litres/property/day by 2020 (see Table 4.3).

4.57 We have updated our assessments of the Economic Level of Leakage (ELL) and Sustainable Economic Level of Leakage (SELL) that confirm levels of leakage in our baseline forecast remain reliable and appropriate.

4.58 A new SELL methodology report for the water industry was published in October 2012 that included a revised approach and a range of recommendations which we were not able to fully take account of in WRMP14. In line with the Environment Agency's representation on our dWRMP14, we have committed to incorporating the recommendations and approaches included in the new SELL methodology report, October 2012, in time for our next draft plan dWRMP in 2019. We plan to provide an update on progress made in this regard as part of our Annual Review 2015.

4.59 Table 4.3 shows the reduction in baseline leakage, as a percentage of total demand and in litres per property per day, included in WRMP14.

4.60 For the baseline demand forecast no further leakage reductions are included, although a full range of new leakage options with the potential to reduce leakage further have been evaluated when formulating the Preferred Plan summarised in Section 9.

4.61 Leakage from customers' supply pipes forms a stand-alone part of our Customer Code of Practice 2012. Under this code of practice, we operate a leak detection service to domestic customers, as well as an assisted supply pipe repair scheme. We also offer a subsidised supply pipe replacement scheme.

4.62 Leakage management will continue to form an integral and important part of our water resources strategy. Over the last fifteen years, we have been successful in reducing leakage by over 30 million litres per day. Our long term strategy confirms our commitment to continuing to manage and reduce leakage to a level that is acceptable to our customers (see Figure 4.4).

Peak factors

4.63 As discussed above we have developed a demand forecast for the summer peak period, or critical period, as it is often the case that this period of the year is the driver for the need for new resources. We have created this forecast by applying peak factors to the main components of the Dry Year Annual Average demand: measured and unmeasured households and non-households. The description of the peak factors and the analysis behind them is included in Appendix 4.

4.64 Overall, our peak factors are slightly below WRMP09 as shown in Table 4.4. The current values are supported by analysis of peaks observed over the past 20 years by our customers, including notably high summer peak events that occurred during 1995 and 2003. The reasons for increasing peak factors over the period is attributable to a number of factors including greater variability of weather and higher affluence leading to higher water use at peak periods.

Table 4.4 Peak factors

	Peak Factors						
	2012	2015	2020	2025	2030	2035	2040
WRMP09 Average Peak Factor	1.22	1.23	1.24	1.25	1.27	1.28	
WRMP14 Average Peak Factor	1.21	1.21	1.23	1.24	1.26	1.27	1.28

4.65 Following our dWRMP14 we assessed the actual peak demand period experienced during July 2013, and the analysis showed a peak factor of 1.23.

Overview of demand forecast

4.66 We have produced a demand forecast which accords with the guidelines based upon the micro-component modelling using the best available population, property and consumption information.

4.67 We believe that this forecast is ambitious in terms of reductions in customer water use that we are expecting. We are determined to work with our customers to deliver these reductions and have a comprehensive water efficiency programme which will require a great deal of effort by us, our partners, and Government, to put into place measures that change behaviour and water usage patterns to deliver our baseline demand forecast.

4.68 However, this does result in a higher degree of risk in the delivery of the reduction assumptions which we need to take into account in the overall supply demand balance.

4.69 To take into account the uncertainty in forecasting both supply and demand, a planning allowance is added to the demand forecast to ensure that investment is planned to account for this unavoidable uncertainty. This allowance is called target headroom and is completed for specified forecast components, using methodologies set out in the guidelines. Section 5 explains our work on target headroom.

Table 4.5 Summary of baseline demand forecast

	Dry Year Annual Average (Ml/d)					
Demand Forecast	2015	2020	2025	2030	2035	2040
WRMP14 Household	363.5	358.7	357.8	363.9	371.6	380.7
WRMP14 Non Household	129.8	132.0	134.6	137.6	140.9	144.4
WRMP14 Minor Components	7.8	7.8	7.8	7.8	7.8	7.8
WRMP14 Total Leakage	93.1	90.6	90.6	90.6	90.6	90.6
WRMP14 Total Average	**574.4**	**572.2**	**573.6**	**582.0**	**592.2**	**604.1**
WRMP09	564.9	573.8	592.9	614.2	636.3	
	Summer Peak Period (Ml/d)					
Demand Forecast	2015	2020	2025	2030	2035	2040
WRMP14 Household	454.2	454.7	462.2	477.4	494.8	514.6
WRMP14 Non Household	165.8	168.9	172.5	176.6	181.0	185.8
WRMP14 Minor Components	7.8	7.8	7.8	7.8	7.8	7.8
WRMP14 Total Leakage	88.4	86.1	86.1	86.1	86.1	86.1
WRMP14 Total Peak	**697.5**	**701.4**	**712.1**	**730.7**	**752.0**	**775.8**
WRMP09	693.7	710.3	742.7	778.9	817.0	

Note: Total leakage includes customer leakage which is included in other demand components, as well as company leakage. Figures therefore will not total.

Baseline forecast demand

4.70 Table 4.5 summarises the main components of the baseline demand forecast for the period 2015 - 2040. The comparison with WRMP09 to 2035 shows a marked reduction in future demand in WRMP14 equivalent to 7% on average and 8% on peak. This is due to the reductions in PCC and

lower non-household growth we have included in our forecast.

4.71 In summary during the period 2015 to 2040 we forecast that dry year annual average demand will increase by 30 Ml/d (5%) and at peak will increase by 78 Ml/d (11%).

4.72 More detailed technical evidence of how we assessed our demand forecast can be found in Appendix 4.