Thames Water
Annual Review 2013-14

Environment Agency Annual Review

June 2014

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Environment Agency Data - Annual Average Out-turns

				Guildford	Henley	Kennet Valley	London	Slough / Wycombe / Aylesbury	SWOX	Total
Supply										
Resources										
1	Raw water abstracted	Ml/d	2dp	51.78	12.07	110.03	2,257.29	138.45	274.12	2,843.75
2	Raw water imported	Ml/d	2dp	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Potable water imports	Ml/d	2dp	0.00	0.00	0.00	0.00	0.00	0.79	0.79
4	Raw water losses & operational use	Ml/d	2dp	0.07	-0.01	0.86	3.44	0.12	0.02	4.50
5	Raw water exported	Ml/d	2dp	0.00	0.00	0.00	81.07	0.00	0.00	81.07
5.1	Non potable water supplied	Ml/d	2dp	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Potable water exports	Ml/d	2dp	1.93	0.00	0.00	0.38	0.75	0.00	3.07
7	Deployable output	Ml/d	2dp	65.01	25.65	137.06	2,150.00	181.08	314.65	2,873.45
Process losses										
9	Treatment works losses & operational use	Ml/d	2dp	0.65	-0.11	7.82	158.36	1.70	0.14	168.56
10	Outage experienced	Ml/d	2dp	0.81	0.00	1.81	65.79	13.84	4.18	86.43
Demand										
11	Distribution input	Ml/d	2dp	48.02	12.01	99.31	2,013.47	134.75	259.61	2,567.17
Consumption										
19	Measured non household water delivered	Ml/d	2dp	8.62	1.71	20.16	380.16	22.28	59.48	492.40
20	Unmeasured non-household water delivered	Ml/d	2dp	0.20	0.04	0.27	16.52	0.29	0.73	18.05
21	Measured household water delivered	Ml/d	2dp	9.62	3.90	22.26	257.63	28.69	69.99	392.09
22	Unmeasured household water delivered	Ml/d	2dp	16.87	3.72	37.49	958.99	54.84	79.87	1,151.77
23	Measured non household - consumption	Ml/d	2dp	8.39	1.66	19.87	375.43	21.83	58.52	485.69
24	Unmeasured non household - consumption	Ml/d	2dp	0.17	0.04	0.24	14.54	0.25	0.64	15.87
25	Measured household - consumption	Ml/d	2dp	8.61	3.59	20.67	241.89	26.44	64.76	365.95
26	Unmeasured household - consumption	Ml/d	2dp	13.72	3.16	32.78	843.44	47.49	69.57	1,010.15
29	Measured household - pcc	Ml/d	2dp	142.58	143.41	129.74	140.33	137.45	126.21	136.86
30	Unmeasured household - pcc	l/h/d	2dp	160.46	149.29	150.40	166.55	158.70	154.17	164.54
31	Average household - pcc	Ml/d	2dp	153.06	146.10	141.67	159.89	150.39	139.29	156.14
32	Water taken unbilled	Ml/d	2dp	0.84	0.16	1.43	30.23	1.73	5.05	39.43
33	Distribution system operational use	Ml/d	2dp	0.21	0.03	0.25	5.92	0.38	0.76	7.56
Leakage										
34	Measured non household - uspl	Ml/d	2dp	0.23	0.05	0.29	4.73	0.46	0.96	6.72
35	Unmeasured non-household - uspl	Ml/d	2dp	0.03	0.01	0.03	1.97	0.04	0.09	2.18
36	Measured household - uspl	Ml/d	2dp	1.01	0.31	1.59	15.75	2.24	5.24	26.14
37	Unmeasured household - uspl	Ml/d	2dp	3.15	0.56	4.72	115.55	7.35	10.30	141.62
38	Void properties - uspl	Ml/d	2dp	0.14	0.03	0.20	4.43	0.30	0.52	5.62
39	Total mains and trunk mains leakage (Distribution losses)	Ml/d	2dp	11.67	2.45	17.45	364.02	26.55	43.72	465.86
40	Total leakage	Ml/d	2dp	16.23	3.40	24.28	506.46	36.94	60.83	648.14
41	Total leakage	l/prop/d	2dp	256.03	162.49	150.63	179.44	178.26	147.53	175.77
Customers										
Properties										
43	Unmeasured household - properties	000's	3dp	30.816	7.589	77.674	1,884.939	104.289	158.081	2,263.388
42	Measured household - properties	000's	3dp	27.018	11.734	71.767	703.144	87.173	220.059	1,120.895
46	Unmeasured non household - properties	000's	3dp	0.341	0.093	0.575	32.214	0.595	1.349	35.168
45	Measured non household - properties	000's	3dp	3.843	1.107	7.911	129.827	10.947	24.777	178.413
44	Void household - properties	000's	3dp	0.996	0.319	2.458	54.710	3.129	6.250	67.862
47	Void non households - properties	000's	3dp	0.384	0.101	0.816	17.573	1.090	1.791	21.757
48	Total properties	000's	3dp	63.397	20.943	161.201	2,822.408	207.223	412.308	3,687.481
Population										
50	Unmeasured household - population	000's	3dp	85.492	21.161	217.932	5,064.052	299.240	451.271	6,139.149
49	Measured household - population	000's	3dp	60.370	25.009	159.295	1,723.747	192.380	513.076	2,673.877
52	Unmeasured non household population	000's	3dp	0.000	0.000	0.000	0.000	0.000	0.000	0.000
51	Measured non household - population	000's	3dp	7.431	2.352	19.218	345.805	25.046	49.129	448.981
53	Total population	000's	3dp	153.292	48.523	396.445	7,133.605	516.667	1,013.476	9,262.007
Occupancy										
55	Unmeasured household - occupancy rate	h/pr	2dp	2.77	2.79	2.81	2.69	2.87	2.85	2.71
54	Measured household - occupancy rate	h/pr	2dp	2.23	2.13	2.22	2.45	2.21	2.33	2.39
Metering										
56	Total Household Metering penetration (excl voids)	%	2dp	46.72%	60.72%	48.02%	27.17%	45.53%	58.20%	33.12%
57	Total Household Metering penetration (incl voids)	%	2dp	45.93%	59.74%	47.25%	26.61%	44.80%	57.25%	32.47%

Annual Return 2013/14

Environment Agency Data - Critical Period Out-turns

				Guildford	Henley	Kennet Valley	London	Slough / Wycombe / Aylesbury	SWOX	Total
Supply										
Resources										
1	Raw water abstracted	Ml/d	2dp	63.68	17.04	133.90	2,257.29	171.94	347.37	2,991.23
2	Raw water imported	Ml/d	2dp	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Potable water imports	Ml/d	2dp	0.00	0.00	0.00	0.00	0.00	0.86	0.86
4	Raw water losses & operational use	Ml/d	2dp	-0.17	-0.09	0.96	3.44	-0.05	0.51	4.60
5	Raw water exported	Ml/d	2dp	0.00	0.00	0.00	81.07	0.00	0.00	81.07
5.1	Non potable water supplied	Ml/d	2dp	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Potable water exports	Ml/d	2dp	2.45	0.00	0.00	0.38	0.80	0.00	3.63
7	Deployable output	Ml/d	2dp	71.20	26.30	160.08	2,150.00	210.97	369.01	2,987.56
Process losses										
9	Treatment works losses & operational use	Ml/d	2dp	-1.54	-0.85	8.80	158.36	0.15	4.61	169.52
10	Outage experienced	Ml/d	2dp	0.81	0.00	1.81	65.79	13.84	4.18	86.43
Demand										
11	Distribution input	Ml/d	2dp	62.71	17.81	122.33	2,013.47	170.15	327.56	2,714.03
Consumption										
19	Measured non household water delivered	Ml/d	2dp	14.93	4.95	19.06	380.16	25.33	64.98	509.40
20	Unmeasured non-household water delivered	Ml/d	2dp	0.33	0.12	0.26	16.52	0.32	0.79	18.33
21	Measured household water delivered	Ml/d	2dp	12.41	5.09	30.71	257.63	39.16	97.09	442.10
22	Unmeasured household water delivered	Ml/d	2dp	22.25	5.02	53.31	958.99	76.90	114.76	1,231.22
23	Measured non household - consumption	Ml/d	2dp	14.69	4.90	18.77	375.43	24.87	64.02	502.68
24	Unmeasured non household - consumption	Ml/d	2dp	0.29	0.11	0.23	14.54	0.28	0.70	16.15
25	Measured household - consumption	Ml/d	2dp	11.40	4.78	29.11	241.89	36.92	91.85	415.95
26	Unmeasured household - consumption	Ml/d	2dp	19.10	4.46	48.59	843.44	69.55	104.47	1,089.60
29	Measured household - pcc	Ml/d	2dp	188.92	191.14	182.77	140.33	191.90	179.02	155.56
30	Unmeasured household - pcc	l/h/d	2dp	223.41	210.80	222.96	166.55	232.42	231.49	177.48
31	Average household - pcc	Ml/d	2dp	209.13	200.15	205.99	159.89	216.56	203.57	170.83
32	Water taken unbilled	Ml/d	2dp	1.00	0.19	1.67	30.23	2.03	6.29	41.41
33	Distribution system operational use	Ml/d	2dp	0.21	0.03	0.25	5.92	0.38	0.76	7.56
Leakage										
34	Measured non household - uspl	Ml/d	2dp	0.23	0.05	0.29	4.73	0.46	0.96	6.72
35	Unmeasured non-household - uspl	Ml/d	2dp	0.03	0.01	0.03	1.97	0.04	0.09	2.18
36	Measured household - uspl	Ml/d	2dp	1.01	0.31	1.59	15.75	2.24	5.24	26.14
37	Unmeasured household - uspl	Ml/d	2dp	3.15	0.56	4.72	115.55	7.35	10.30	141.62
38	Void properties - uspl	Ml/d	2dp	0.14	0.03	0.20	4.43	0.30	0.52	5.62
39	Total mains and trunk mains leakage (Distribution losses)	Ml/d	2dp	11.59	2.41	17.07	364.02	26.04	42.89	464.01
40	Total leakage	Ml/d	2dp	16.15	3.36	23.90	506.46	36.43	60.00	646.30
41	Total leakage	l/prop/d	2dp	254.75	160.61	148.23	179.44	175.81	145.51	175.27
Customers										
Properties										
43	Unmeasured household - properties	000's	3dp	30.816	7.589	77.674	1,884.939	104.289	158.081	2,263.388
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Occupancy										
55	Unmeasured household - occupancy rate	h/pr	2dp	2.77	2.79	2.81	2.69	2.87	2.85	2.71
54	Measured household - occupancy rate	h/pr	2dp	2.23	2.13	2.22	2.45	2.21	2.33	2.39
Metering										
56	Total Household Metering penetration (excl voids)	%	2dp	46.72%	60.72%	48.02%	27.17%	45.53%	58.20%	33.12%
57	Total Household Metering penetration (incl voids)	%	2dp	45.93%	59.74%	47.25%	26.61%	44.80%	57.25%	32.47%

1. Executive Summary

1.1 Overview of Actual Performance for Reporting Year

The water resources programme from 2010 to 2015 (AMP5) was agreed with Ofwat as a part of the Price Review process undertaken in 2009 and is defined within Ofwat's Final Determination (FD09). This report presents progress against the FD09 unless otherwise stated.

Due to the publication of updated climate change scenarios, UKCP09, in summer 2009, Ofwat removed climate change related investment in its determination of the Company's Business Plan and directed Thames Water instead to resubmit its climate change investment case during AMP5 using the new scenarios. The regulatory targets for AMP5 therefore do not include an allowance for this factor and the assessment of the supply demand position presented in this report has climate change impacts removed from WAFU and target headroom.

Security of Supply

Security of Supply Index (SoSI) for 'annual average' (AA) conditions remains at 100 with all water resource zones in surplus.

For 'critical period' (CP) conditions SoSI has dropped to 99. This is due to a shortfall of 1 Ml/d in our Guildford WRZ. Although we have achieved our company level leakage targets in recent years, leakage in Guildford has been increasing. This coupled with the exceptionally high customer demands experienced in July meant we had to pump hard and reconfigure the network to ensure customers were kept in supply. This activity caused more leakage and bursts to breakout, which has taken time to locate and repair. These increases during the summer have now been fully recovered. However, because the SoSI calculation is calculated over the period of April 2013 to March 2014, the increases in leakage experienced over the summer are still reflected in our end of year SoSI number. We are now reducing leakage further in Guildford to avoid this sequence of events happening again.

The Thames Water region values for SoSI, annual average and critical period, are presented below along with targets for the AMP5 period.

SoSI		2010/11	2011/12	2012/13	2013/14	2014/15
SoSI (AA)	Target	100	100	100	100	100
	Actual/*Forecast*	100	100	100	100	*100*
SoSI (CP)	Target	99	99	100	100	100
	Actual/*Forecast*	100	100	100	99	*100*

Drought Update

There have been no drought restrictions imposed during the reporting year.

Water Resource Schemes and Network Constraint Removals

During the year one scheme was delivered in the Swindon and Oxfordshire (SWOX) WRZ. Originally planned for delivery in 2011/12 the Leckhampstead WTW high lift pump replacement was delayed until 2013/14 due to the enhanced delivery at

Gatehampton. The scheme has delivered 1.5 Ml/d AA and 1.4 Ml/d CP benefit.

Sustainability Reductions

All the actions relating to AMP3 (non-statutory) Restoration of Sustainable Abstraction Programme (RSAP) have now been completed, as reported in the AR13 Environment Agency Annual Report.

The AMP4 investigations relating to sustainability reductions were all completed in AMP4, as reported in JR10 Table 10b.

Sustainability reductions or mitigation solutions to address low flow issues are required for two cases in AMP5. These are for Speen groundwater source and tor Thatcham Reedbeds Special Area of Conservation (SCA). These are due for completion in March 2015 and October 2014 respectively.

A licence reduction is also required at the Axford source. Although not funded as part of the FD09, work has commenced on the scheme and Thames Water has committed to undertake detailed design and site investigations to enable scheme construction to commence in summer 2015 with completion scheduled for the end of 2016.

The majority of the AMP5 investigations have been completed and indicative results were used in the rdWRMP14. Three of the options appraisals that were required to be completed in AMP5 are on-going. These are at Childrey Warren, scheduled to be complete by March 2015, at Pann Mill, which is due to be completed in 2014 and at Waddon. This appraisal has been deferred until AMP6 after the Environment Agency identified the requirement for further work to be undertaken.

Distribution Input and Dry Year Demand

Once again the weather in 2013/14 contained some extreme conditions. The rainfall in the summer months was consistently below long term (126 year) average yet the winter rainfall was very much above average. The relatively dry summer, coupled with a very hot period in July lead to a large peak in 7-day rolling average summer demand with actual demand higher than the dry year peak week demand. The wet and relatively mild winter caused little stress to the distribution network and hence there was little seasonal rise in leakage through December, January or February. This partially offset the summer, and although the actual annual average demand was higher than last year, it was still less than the dry year annual average demand.

Water Balance

As was the case last year, the reporting year has been influenced by some unusual weather. The year started with a prolonged winter with below average temperatures and was followed by a drier than average summer with demand in July peaking at “Dry-Year” levels. The year ended with a milder and wetter than average winter. The increase in usage seen in the summer has resulted in an upwards trend in most of the demand components of the water balance. The most significant changes are:

- an increase in distribution input of 41 Ml/d,
- a reduction in unmeasured household demand of 5 Ml/d
- an increase in measured non-household demand of 15 Ml/d

- a small reduction in leakage of 1 Ml/d, and
- an increase in measured household demand of 32 Ml/d.

At Company level the overall water balance discrepancy has widened a little since last year, increasing from 3.6% to 4.4%.

The Water Resource Zone water balance discrepancies (in Ml/d) are shown in the table below:

Water Balance Reconciliation Values 2013/14 (Ml/d)								
Water Balance Component	**Confidence Interval (%)**	**Guildford**	**Henley**	**Kennet Valley**	**London**	**SWA**	**SWOX**	**TWUL**
Distribution Input	2	-0.87	-0.01	-0.22	-19.34	-0.23	-3.72	-24.21
Unmeasured Household Volume	8	0.91	0.01	0.29	30.91	0.31	3.73	36.40
Unmeasured Non-Household Volume	25	0.03	0.00	0.01	1.55	0.01	0.10	1.66
Measured Household Volume	4	0.29	0.00	0.09	4.52	0.09	1.78	6.72
Measured Non-Household Volume	4	0.29	0.00	0.09	7.01	0.07	1.61	8.91
Water taken unbilled	50	0.21	0.00	0.06	4.96	0.06	1.18	6.38
Distribution System Operational use	50	0.06	0.00	0.01	1.14	0.02	0.20	1.43
Leakage	10	1.32	0.01	0.26	22.99	0.31	4.02	28.93
Discrepancy		3.98	0.03	1.03	92.41	1.08	16.34	114.63
% Discrepancy		**8.15**	**0.23**	**1.04**	**4.55**	**0.80**	**6.20**	**4.42**

Most of the Water Resource Zone water balances are within 5%, with the exception of Guildford and SWOX.

Metering

Our on-going communication strategy with customers through our website and via the billing process has generated an Optant rate broadly in line with expectations. 30,627 Optant meters have been installed during 2013/14 which is 13% over our stated target of 27,000.

Planning for the delivery of the progressive metering programme is well advanced and targets for meter installations are expected to be met by the end of 2014/15. However, as customers have up to 2 years before they are billed on the meter, the demand savings are forecast to fall short of the target and will continue to be offset by outperformance of leakage. 4,109 progressive meters have been installed since January 2014.

Leakage

At Company level leakage for 2013/14 is 644.3 Ml/d, well below the Ofwat FD09 target of 673 Ml/d and our revised draft WRMP14 target of 665 Ml/d. This means we have met the leakage target set by Ofwat for an eighth consecutive year and brings total leakage reductions achieved over the last 10 years to over 300 Ml/d.

In contrast leakage in Guildford has increased. During July 2013, driven by the need

to meet very high customer demands, leakage in Guildford increased by about 4 Ml/d. This leakage proved difficult to locate and repair, and was not fully recovered until the end of the year which resulted in the high annual average leakage level. With recent successes leakage in Guildford is now running about 1 Ml/d below that for May 2013.

Water Efficiency

In total we have delivered 5.19 Ml/d of water savings in 2013/14, exceeding our annual target by almost 0.8 Ml/d.

Under our baseline water efficiency programme we delivered 4.19 Ml/d of reportable savings in 2013/14, exceeding our baseline annual target of 3.45 Ml/d. This has been achieved through a mix of activities including targeted non-household activities, the distribution of water saving devices to household and non-household customers and through influencing behaviour by the provision of advice and guidance to customers.

We have also delivered 1.0 Ml/d of reportable savings in 2013/14 against our Sustainable Economic Level of Water Efficiency (SELWE) annual target of 0.97 Ml/d, through a number of projects involving household and non-household customers and behaviour change activities.

Update on impacts of climate change

Further work has been undertaken to evaluate the impacts of the UKCP09 climate change scenarios on both resource side and demand side components. This includes developing models to estimate the likely impacts of climate change upon household demand. Full details are provided in our revised draft WRMP14 (rdWRMP14).

1.2 Changes in Water Resource Zones

There has been a small change to the geographical boundaries of the Henley and Kennet Valley Water Resource Zones (WRZs) between AR13 and AR14 in order to resolve poor pressure customer complaints. Two District Meter Areas in the Sheeplands Flow Monitoring Zone (FMZ) in the Henley WRZ have been re-zoned onto the Earley Booster FMZ in Kennet Valley. This has resulted in the movement of 432 domestic properties and 42 commercial properties from Henley to Kennet Valley along with a population of 1082 people.

The remaining WRZ's have remained unchanged.

1.3 Changes to Levels of Service

There have been no changes to any levels of service between AR13 and AR14.

2. Supply

2.1 Deployable Output

2.1 Water Resource Schemes and Network Constraint Removals

Table 1: AMP5 Resource Schemes Progress

Resource Schemes (Ml/d)		*2010/11*	*2011/12*	*2012/13*	*2013/14*	*2014/15*	*AMP5 Total*
Annual Average	*Target*	*5.80*	*4.27*	*7.10*	*0.00*	*5.40*	*23*
	Actual/*Forecast*	10.10	2.90	3.00	1.50	*2.90*	*20*
Critical Period	*Target*	*5.80*	*4.27*	*12.10*		*5.80*	*28*
	Actual/*Forecast*	17.00	2.68	4.27	1.40	*2.60*	*28*

Table 1 presents a summary of progress against targets for the delivery of our water resources development programme and network constraint removal for AMP5. All schemes are being delivered within the SWOX WRZ, which was driven by the deficit between supply and demand during the peak week condition.

The under delivery against annual average benefit is being offset by out-performance on leakage reduction in London. This decision was considered appropriate as the SWOX WRZ is now comfortably in surplus, whereas the reintroduction of climate change would mean a deficit in London at the start of the next planning period.

Table 2 sets out the latest progress of delivery of each scheme against the original programme. The supply demand deficit in SWOX was removed by the enhanced delivery of Gatehampton in 2010/11 and a review of the need for all schemes identified an opportunity to defer delivery of Leckhampstead until 2013/14, reduce the benefit delivered by Woods Farm and defer South Stoke pending the results of further review.

Table 2: AMP5 Water Resource Schemes Schedule

X Delayed forecast of WAFU benefit X Current forecast of WAFU benefit

	Option	Scheme name	rdWRMP Ml/d		Forecast Ml/d		WAFU Claim Timing					Current Forecast Delivery
			AA	CP	AA	CP	10/11	11/12	12/13	13/14	14/15	
SWOX	Goring Gap 1	Gatehampton/Compton licence transfer	4.5	4.5	9.5	16.0	X					complete
SWOX	SWOX NC1	Britwell WTW DO constraint relief	1.0	1.0	0.6	1.0	X					complete
SWOX	SWOX NC2	Chinnor network constraint relief	0.3	0.3	0.7	0.3		X				complete
SWOX	Lambourn Down	Ashdown Park WTW pump upgrade	0.94	0.94	0.94	0.94		X				complete
SWOX						0.67			X			complete
SWOX	SWOX NC3	Leckhampstead WTW high lift pump replacement	2.0	2.0	1.5	1.4				X		complete
SWOX	SWOX NC4	Ramsbury WTW connection to Aldbourne network	1.0	1.03	0.6	1.14		X				complete
SWOX	SWOX NC5	Watlington WTW Option 2	0.3	0.3	0.7	0.3		X				complete
SWOX	Goring Gap 3	South Stoke Replacement resource	5.0	10.0	0.0	0.0						deferred
SWOX	SWOX NC6	Manor Road WTW nitrate removal	2.1	2.1	3.0	3.6			X			complete
SWOX	Goring Gap 2	Woods Farm licence uprate & transfer/treatment to Compton	5.4	5.8	2.9	2.6					X	2014/15
	Annual Average Ml/d						10.1	2.9	3.0	1.5	2.9	
	Critical Period Ml/d						17.0	2.7	4.3	1.4	2.6	

Goring Gap 1 – Gatehampton groundwater
This scheme delivered 9.5 Ml/d annual average (AA) and 16 Ml/d critical period (CP), against the original target of 4.5 Ml/d (AA and CP) in 2010/11.

SWOX NC1 – Britwell network constraint
This network constraint removal scheme delivered 0.6 Ml/d AA and 1.0 Ml/d CP benefit in 2010/11. The scheme was split into two phases to enable the benefits of the work to be delivered by end of 2010/11.

Phase 1 – Uprating of booster pumps with manual operation of the network to allow delivery of maximum licensed borehole output of 1.31 Ml/d, and

Phase 2 – Network improvements with automatic operation of network.

Phase 1 was achieved by March 2011 and the site is available to meet the full licence as the network constraint has been removed.

Phase 2 still requires extensive flushing due to deterioration of the water quality to bring the site online. Operations have decided not to continue with this course of action as the resource is not currently required. The site is not therefore in supply and this is not likely to happen during the rest of AMP5 unless we have a drought and need the resource. Flushing will be easier when the proposed run to waste main is installed in AMP6.

SWOX NC2 – Chinnor network constraint
This scheme removed the existing constraint on the site to enable full utilisation of the licence. It was originally forecast to deliver 0.7 Ml/d AA and 0.3 Ml/d CP by 31 March 2011, the higher AA benefit being due to a larger differential between AA licence and the demand requirement within the supply area than is the case in the critical period. The scheme was reprogrammed and delivered by the end of June 2011.

Lambourne Down - Ashdown Park WTW pump upgrade
This scheme delivered 0.94 Ml/d (AA and CP) by the end of March 2011/12 and delivered a further 0.67 Ml/d CP by June 2012 on the installation of the second pump.

SWOX NC3 - Leckhampstead WTW high lift pump replacement
The enhanced delivery of Gatehampton in 2010/11 enabled this scheme to be deferred until 2013/14. This network constraint removal scheme delivered 1.5 Ml/d AA and 1.4 Ml/d CP benefit in March 2014.

SWOX NC4 - Ramsbury WTW connection to Aldbourne network
This network constraint removal scheme to release available water at Ramsbury delivering 0.6 M/d AA and 1.14 Ml/d CP benefit was completed in 2011/12.

SWOX NC5 - Watlington WTW Option 2
This network constraint removal scheme delivered 0.7 Ml/d AA and 0.3 Ml/d CP in 2011/12. The higher AA benefit is due to a larger differential between AA licence and the demand requirement within the supply area than is the case in the critical period.

SWOX NC6 - Manor Road WTW nitrate removal
This network constraint removal scheme delivered the full licence of 3.0 Ml/d AA and 3.6 Ml/d CP in September 2012. This scheme has reinstated the original output that was removed from DO in 2009/10 due to the long term outage associated with nitrate. The work was done as part of the Water Quality submission.

The increased outputs are because the works were taken out of supply so delivered the full output and not just removal of network constraints. In the AR13 updates Manor Road has a DO of 2.7 Ml/d AA & CP.

Goring Gap 3 - South Stoke replacement resource
This scheme was forecast to deliver 5.0 Ml/d AA and 10.0 Ml/d CP by the end of 2012/13. However, owing to the additional output delivered by the Gatehampton scheme, there is now flexibility in determining the most appropriate combination of scheme outputs for SWOX in AMP5. As a result the South Stoke scheme output has been deferred.

Goring Gap 2 - Woods Farm licence uprate and transfer treatment to Compton
This scheme originally included both increased output and the removal of existing network constraint elements and was forecast to deliver 5.4 Ml/d AA and 5.8 Ml/d CP by the end of 2014/15. Due to the surplus supply demand in SWOX and removal of the quality element by DWI, the decision has been made to put part of the scheme on hold and only deliver the network constraint (2.9 Ml/d AA and 2.6 Ml/d CP) part of the scheme.

The elements currently being delivered are the transfer mains from Woods Farm to Streatley reservoir, and a new main from Streatley to the GATOX main at Moulsford. The work being undertaken at Woods Farm is restricted to the provision of an orthophosphate dosing plant for lead control, as this water could ultimately feed into the Oxford network which is a high risk lead area.

Construction of the pipelines is underway and land access issues are being managed to ensure delivery in 2014/15.

2.1.2 Update of Deployable Output

Table 3 provides a summary of the Dry Year Annual Average (DYAA) DO for each WRZ for last year and this year. Similarly, Table 4 provides a summary of the Dry Year Critical Period (DYCP) DO for each WRZ for last year and this year.

Table 3: WRZ Dry Year Annual Average (DYAA) DOs

Supply (Ml/d)	London	SWOX	Kennet Valley	Henley	SWA	Guildford
DYAA DO 2012-13	2144	319.5	137.1	25.7	186.3	65.0
DYAA DO 2013-14	2150	318.5	137.1	25.7	186.3	65.0
DO Difference	6	-1.0	0.0	0.0	0.0	0.0

Table 4: WRZ Dry Year Annual Average (DYCP) DOs

Supply (Ml/d)	London	SWOX	Kennet Valley	Henley	SWA	Guildford
DYCP DO 2012-13	N/A	373.9	160.1	26.3	215.1	71.2
DYCP DO 2013-14	N/A	372.7	160.1	26.3	216.2	71.2
DO Difference	N/A	-1.2	0.0	0.0	1.1	0.0

For AR13, in line with the EA Water Resources Planning guidelines we have reassessed the groundwater source DOs to take account of the 2011/12 drought and also hindcasting, assessing hydrological conditions back to 1920.

The hindcasting has been carried out by identifying groundwater levels at key observation boreholes that reflect critical historic droughts outside the period of operational abstraction records. By identifying these historic droughts it is then possible to define hydrogeologically consistent groundwater SDOs; that is, the same drought year defines the SDO for sources located in the same and similar groundwater catchments.

The historic groundwater levels used to identify critical historic droughts have been derived using a mix of approaches, including the following:

- Long term, measured groundwater level records, some of which extend to the 1900
- Long term groundwater level records modelled hydrologically using analytical models extending back to at least 1910
- Groundwater level records modelled statistically to infill data gaps and to provide long term records.

SDOs were reassessed in March 2014 as part of the Annual Review process. Further details of the updates to the Company's Deployable Output can be found in Appendix 3.

Upgrade of WARMs

Thames Water has been re-developing its Water Resources Management System over the last few years as part of a continual programme of development of analytical tools. The Water Resources Management System (WARMS) has been rebuilt using the Aquator software developed by Oxford Scientific Software and is now known as WARMS2. The model is used to determine the Deployable Output (DO) of the conjunctive use water resource zones of London and the Upper Thames part of Swindon and Oxfordshire (SWOX). Work on the model development has continued over the past year with regular discussions being held with the Environment Agency (EA). A good deal of focus within these discussions relates to the optimisation of the Lower Thames Control Diagram; the means by which abstractions are controlled to the London reservoirs from the River Thames. In conjunction with these discussions a significant amount of data has been passed to the EA relating to various modelling scenarios for DO. The model development is on-going as a result of the discussions and is aimed at developing the model to be able to identify an optimal abstraction control strategy for the Lower Thames. In addition to this work, HR Wallingford has been commissioned to audit WARMS2, the results of which are expected shortly.

2.1.3 Review of the Lower Thames Abstraction Licence

The Water Framework Directive (WFD) compels European Union member states to achieve good ecological and environmental health in all water bodies. Part of the required set of actions to achieve good ecological status is to reduce abstraction in over abstracted catchments to sustainable levels.

The implementation of the WFD will require future sustainability reductions in abstraction from the Thames catchment and the wider South-East. This need is recognised in published documents and the "Restoring Sustainable Abstraction" programme from the Environment Agency (EA).

Thames Water has been working with the EA to understand the impact of abstraction under licence from the Lower Thames. The approach to the investigations has been to understand the impact of abstractions from the Lower Thames and this was agreed with the EA. The investigation has been completed and its conclusions were that there was no overriding significant adverse impact of abstraction that would lead to a requirement for major sustainability reductions. An options appraisal was required to determine the best, most cost-effective, options to mitigate the impact that had been identified. The options appraisal identified that there is a requirement for measures to improve the levels of dissolved oxygen in the upper Tideway associated with the discharge from Mogden STW and the best way to implement this will be investigated in AMP6 and the solution implemented.

2.1.4 Impact of HS2 on Water Supply Sources

To ensure that our water supply sources are not impacted significantly, Thames Water has reviewed and assessed the available proposals for the HS2 route and designs. The area of potential interaction between HS2 and our water supply sources is in the upper Misbourne catchment within our Slough Wycombe and Aylesbury WRZ. Thames Water has two groundwater abstractions from the Chalk aquifer for public supply in this area, in Hampden Bottom and Wendover Dean. The abstraction licences for Hampden Bottom and Wendover Dean are aggregated, and the full quantity authorised by the Environment Agency for abstraction can be taken entirely from Hampden Bottom. As a result, the abstraction at Wendover Dean does not need to be used and currently it is not operational. Nevertheless, as both groundwater abstractions have source protection zones (SPZ) defined by the Environment Agency, we have considered the potential impact from HS2 as the proposed alignment crosses the SPZ2 of the Wendover Dean abstraction and, furthermore, land drainage areas are proposed within its SPZ1.

Part of the proposed HS2 route is on embankment and viaduct within the SPZ2of Wendover Dean, so as a result groundwater flow in the Chalk will not be affected significantly by the construction and operation of the railway. Where the proposed route is in cutting, the track level is always above 170 m AOD, which is well above normal groundwater levels at Wendover Dean. We have noted that the occurrence of high groundwater levels in the Chalk aquifer in 2001 has been recognised by HS2, and the inference drawn that even these elevated groundwater levels would be below ground level; the ES notes that highest groundwater levels would be around 1-2 metres below ground level (mbgl) to 13 mbgl. However, from groundwater level data collected by the Environment Agency, Thames Water infers shallower groundwater levels from <1 mbgl to 3.5 mbgl, based on 2001 peak levels. Current (February 2014) groundwater levels in this area are close to 2001 levels and may well exceed

these levels. Furthermore, Thames Water notes that climate change analysis has considered the impact on rainfall and flood risk, but it is unclear if climate change impact on peak groundwater levels has been considered; it is possible that higher groundwater level peaks could occur. This means that groundwater levels are likely to be well below the cutting level and, as such groundwater flow will not be intercepted by the construction and operation of the cutting, although this requires further assurances from HS2.

The HS2 drainage proposals include implementation of SuDS principles, to minimise the impact on groundwater recharge. There are a series of balancing ponds included in the drainage proposals, one of which overlays the outer edge of the SPZ1 for Wendover Dean. It is currently unclear whether this and other ponds will allow infiltration into the Chalk and as such pose a risk to groundwater quality. Thames Water has engaged with HS2 and its consultants to enable and assessment of impact, and we have recently (27th February 2014) responded to the HS2 Environmental Statement consultation. In our response we have sought clarification on depths to groundwater inferred from 2001 data, but also in the context of current, exceptionally high groundwater levels and future climate change impacts. As higher groundwater level peaks could occur and therefore result in thinner unsaturated zones, the consequences require clarification for the HS2 drainage proposals as well as the impact of piled foundations for the Wendover viaduct, the latter relating to the risk to groundwater sources from turbidity associated with piling. With regard to the drainage proposals, a thick unsaturated zone will provide attenuation of pollutants from drainage ponds, so the impact of the thinner unsaturated zone inferred above requires consideration and clarification. This is especially the case for the balancing pond proposed close to the edge of SPZ1 of the Wendover Dean abstraction and also the land drainage area proposed within SPZ1 of the Wendover Dean abstraction.

Despite clarification and assurances being requested, assessing the HS2 proposal in the context of current and future planned water supply source operations, Thames Water does not consider HS2 to pose a significant risk, but we will continue to work with HS2 and its consultants to ensure that there is no undue risk to public water supply sources. This could include discussion and agreement on the HS2 Code of Construction Practice, currently in draft, which sets out measures to mitigate the risk of impact, including appropriate baseline and construction phase monitoring, as well as methods to minimise the use of potentially polluting materials.

2.2 Outage

2.2.1 Comparison of Actual Outage against Planned Outage

There are changes in Outages year on year and the total Actual Outage for the Thames Water area for the current reporting year is 86.4 Ml/d, which is a decrease from the level experienced last year following the resolution of issues at some sites. This information has been used to improve the assessment of Outage Allowance. Details of actual and planned Thames Water Outages for each WRZ can be found in Appendix 4.

2.2.2 Outage Allowance

Table 5: AMP5 Outage Allowance

Outage Allowance (Ml/d)	2010/11	2011/12	2012/13	2013/14	2014/15
Target (fWRMP09)	31.55	31.55	31.55	31.55	31.55
Actual/*Forecast*	64.15	66.67	77.39	70.88	-

The outage assessment follows the principles set out in the UKWIR report "Outage allowances for water resources planning (UKWIR, 1995)" but also incorporates the improved probabilistic methodology that employs Monte Carlo techniques.

The outage allowance has been updated for AR14 to incorporate the latest experiences of actual outage. Details are provided in Appendix 4.

Table 6: Outage allowance by WRZ as reported in AR13, AR14 and fWRMP09 and rdWRMP14 2013/14 forecasts

Outage Allowance (Ml/d)				
WRZ	2012/13	2013/14		
	AR13	AR14	fWRMP09	rdWRMP14
Guildford	0.81	0.77	0.38	0.81
Henley	1.05	1.04	1.05	1.05
Kennet Valley	1.85	2.14	1.68	1.85
London	46.27	39.32	14.76	46.27
SWA	12.53	12.27	3.06	12.53
SWOX	14.88	15.34	10.62	14.88

2.3 Bulk Supplies

2.3.1 Changes in Agreements

There have been no changes to bulk supply agreements during 2013/14 for annual average conditions, except those associated with Inset Appointments.

For critical period, there have been two small changes to bulk supply exports from those reported last year, with the addition for Hampstead Lane of 0.2 Ml/d in London and a small reduction of 0.03 Ml/d to the Affinity Water export.

2.3.2 Inset Appointments

There are currently 17 appointed inset sites in TWUL's region. Multi-phase sites are counted as one appointment for the purpose of reporting. At the time of writing there are three inset providers in operation within Thames Water's region:

- SSE Water (12 inset sites)
- Independent Water Networks Limited (4 inset sites)
- Albion Water (1 inset site)

Once fully developed, there will be approximately 21,000 properties located within the inset sites, with a contracted total maximum demand of 10.82 Ml/d. Many are still in construction phases and as a result the total billed volume for 2014/15 was only 1.27 Ml/d.

A summary table of all existing Inset Appointments is provided in Appendix 5.

2.4 Sustainability Reductions

All the actions relating to AMP3 (non-statutory) Restoration of Sustainable Abstraction Programme (RSAP) have now been completed, as reported in the AR13 Environment Agency Annual Report.

The AMP4 investigations relating to sustainability reductions were all completed in AMP4, as reported in JR10 Table 10b.

Sustainability reductions or mitigation solutions to address low flow issues are required for two cases in AMP5. These are for Speen groundwater source and tor Thatcham Reedbeds Special Area of Conservation (SCA). These are due for completion in March 2015 and October 2014 respectively.

A licence reduction is also required at the Axford source. Although not funded as part of the FD09, work has commenced on the scheme. Following changes to the funding of schemes, in the Water Act 2013, outline design work (including network modelling) has been undertaken. Thames Water has committed to undertake detailed design and site investigations to enable scheme construction to commence in summer 2015 with completion scheduled for the end of 2016 and the project included in the AMP6 business plan.

The majority of the AMP5 investigations have been completed and indicative results were used in the rdWRMP14. Three of the options appraisals that were required to be completed in AMP5 are on-going. These are at Childrey Warren, scheduled to be complete by March 2015, at Pann Mill, which is due to be completed in 2014 and at Waddon. This appraisal has been deferred until AMP6 after the Environment Agency identified the requirement for further work to be undertaken to jointly investigate the impact of Thames Waters' Waddon abstraction in conjunction with Sutton and East Surrey's investigation into the impact of their abstractions in the area.

A detailed update of progress on the delivery of AMP3, AMP4 and AMP5 sustainability reductions can be found in Appendix 6

3. Demand

3.1 Distribution Input and Dry Year Demand against Forecast

Table 7: AMP5 Dry Year Distribution Input

Dry Year Distribution Input (Ml/d)		2010/11	2011/12	2012/13	2013/14	2014/15
Annual Average	Target (fWRMP09)	2537	2523	2504	2485	2467
	FD Target	2546	2549	2555	2561	2568
	Actual/*Forecast*	2595	2579	2581	2591	*2587*
Critical Period	Target (fWRMP09)	2711	2697	2678	2659	2640
	FD Target	2721	2724	2730	2736	2744
	Actual/*Forecast*	2748	2707	2709	2725	*2717*

Once again the weather in 2013/14 contained some extreme conditions. The rainfall in the summer months was consistently below long term (126 year) average yet the winter rainfall was very much above average. The relatively dry summer, coupled with a very hot period in July lead to a large peak in 7-day rolling average summer demand. The wet and relatively mild winter caused little stress to the distribution network and hence there was little seasonal rise in leakage through December, January or February.

Figure 1 and Figure 2 show key weather measurements alongside 7-day rolling average Distribution Input DI for London and Thames Valley respectively.

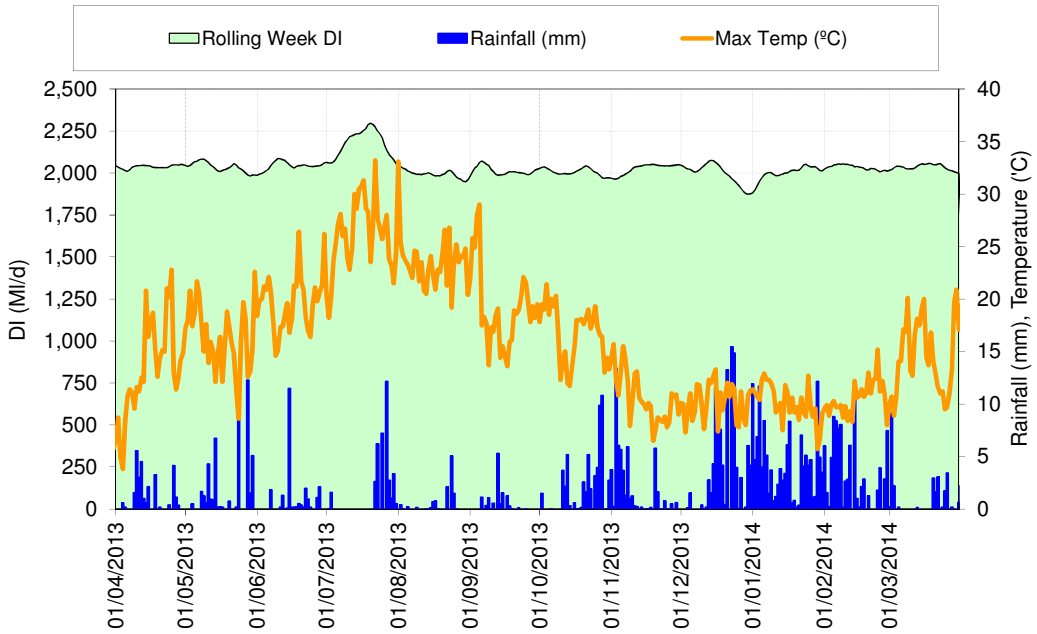

Figure 1: London 7-day rolling average demand 2013/14

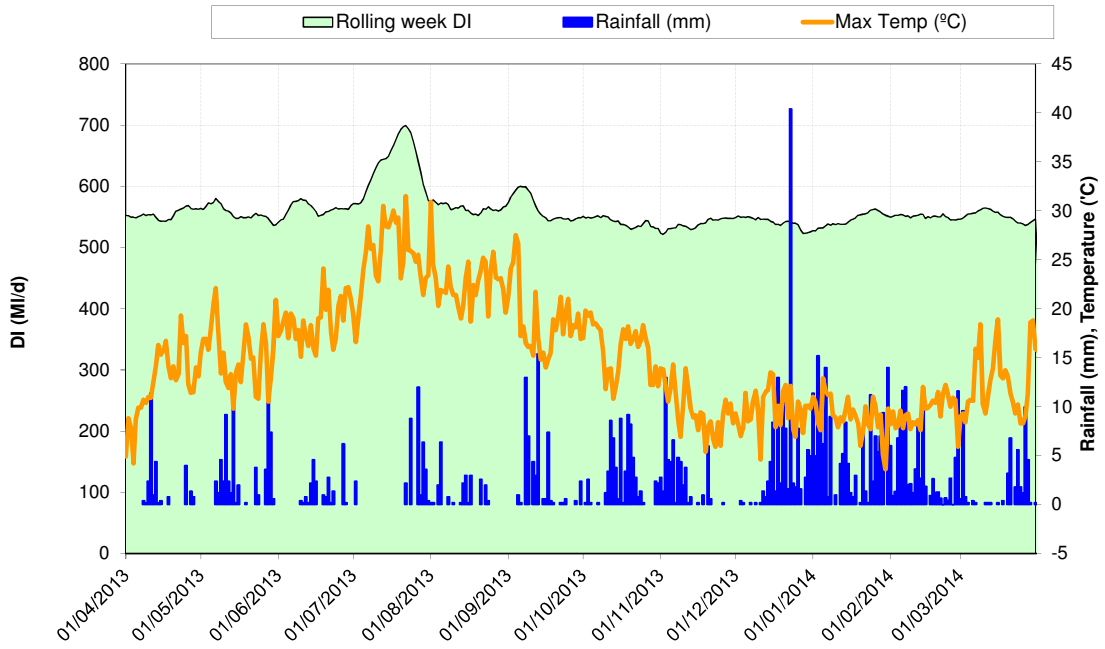

Figure 2: Thames Valley 7-day rolling average demand 2013/14

Table 8 presents the actual distribution input for each of the last four years for the company.

Table 8: AMP5 Measured Distribution Input

Measured Distribution Input (Ml/d)	2010/11	2011/12	2012/13	2013/14
Annual Average	2589	2551	2526	2567
Critical Period	2695	2616	2571	2714

Table 9 presents the dry year demands (both annual average and critical period) for each WRZ as reported in AR14, AR13, fWRMP09 and rdWRMP14 for 2013/14.

Table 9: Dry Year Distribution Input by WRZ

Dry Year Distribution Input (Ml/d)								
WRZ	2012/13		2013/14					
	AR13		AR14		fWRMP09		final RdWRMP14	
	AA	CP	AA	CP	AA	CP	AA	CP
Guildford	44.7	61.3	48.4	65.2	40.8	61.7	45.0	61.8
Henley	13.0	19.1	12.2	18.7	13.1	18.9	13.0	19.1
Kennet Valley	100.1	118.8	100.3	120.6	102.2	133.1	100.5	119.4
London	2025.2	2025.2	2033.9	2033.9	1935.5	1935.5	2029.9	2029.9
SWA	134.5	166.5	135.3	166.7	125.9	164.5	134.9	167.0
SWOX	263.2	318.2	261.2	319.8	268.0	344.7	265.3	321.1
Total	2580.8	2709.0	2591.2	2724.8	2485.5	2658.6	2588.6	2718.3

3.2 Per Capita Consumption

Table 10: Company level PCC against plan

Per Capita Consumption (l/head/day)		2010/11	2011/12	2012/13	2013/14	2014/15
Unmeasured	Target	163.87	163.55	163.24	162.98	162.76
	Actual/*Forecast*	170.40	169.14	164.54	164.54	*170.11*
Measured	Target	149.28	148.35	147.58	146.93	146.27
	Actual/*Forecast*	141.46	138.57	136.86	136.86	*137.78*

Table 10 presents the annual average Per Capita Consumption (PCC) for the Company. The target is taken from the fWRMP09 and reflects "dry year" demand. Actual is the actual PCC for the report year, and will therefore be dependent on the weather conditions within the report year. Table 11 shows similar information broken down into WRZs for this year and last.

Table 11: Per Capita Consumption by WRZ

Per Capita Consumption (l/head/day)						
WRZ	2012/13		2013/14		2013/14	
	AR13		AR14		fWRMP09	
	Measured	Unmeasured	Measured	Unmeasured	Measured	Unmeasured
Guildford	134.57	155.34	142.58	160.46	158.24	182.16
Henley	138.06	149.31	143.41	149.29	149.97	163.18
Kennet Valley	125.77	146.96	129.74	150.40	140.16	159.07
London	134.84	167.06	140.33	166.55	148.17	162.34
SWA	131.89	154.14	137.45	158.70	143.45	159.16
SWOX	123.21	149.02	126.21	154.17	143.69	171.47

Further details of the derivation of unmeasured household PCC for each resource zone can be found in Appendix 11**: Per Capita Consumption Methodology**.

3.3 Metering

Table 12 presents the total number of meters installed during 2013/14 and forecasted progress against targets for the rest of AMP5.

Table 12: Company Optant and Progressive meter installations

Metering		2010/11	2011/12	2012/13	2013/14	2014/15	AMP5 Total
Optant Metering	Target	29,000	29,000	28,000	27,000	26,000	139,000
	Actual/*Forecast*	23,700	36,817	29,083	30,627	*28,200*	*148,427*
Progressive Metering	Target	36,038	36,038	4,528	4,528	4,528	85,660
	Actual/*Forecast*	0	0	0	4,109	*58,942*	*63,051*
TOTAL	Target	65,038	65,038	32,528	31,528	30,528	224,660
	Actual/*Forecast*	23,700	36,817	29,083	34,736	*87,142*	*211,478*

The proportion of Billed Households which are metered is now 33.1% for the company. This compares to a figure of 31.8% for 2012/13.

Our metering programme is comprised of both Optant and Progressive metering as a means for managing the demand for water; it is also our preferred method for charging customers as it represents the fairest way to pay.

Our on-going communication strategy with customers through our website and via the billing process has generated an Optant rate broadly in line with expectations. 30,627 Optant meters have been installed during 2013/14, which is 13% over our stated target of 27,000.

We forecast to exceed our Optant metering target activity of 139,000 meter installations for the AMP5 period by 6.8% (an additional 9,427 meters).

The Water Resources Management Plan forecast to deliver 63,000 Progressive domestic water meters to be installed by the end of AMP5 to contribute towards the achievement of 20 Ml/d of demand related savings. In 2013/14 we intended to deliver 12,000 with the balance in 2014/15.

The delivery of the metering programme has, however, been more challenging than expected, primarily due to technology issues associated with pioneering the use of smart metering in the water industry. In light of these issues, and the fact that some flexibility is provided by over-delivery of other elements of the programme, we are currently reviewing our metering strategy. We remain fully committed to metering as a key part of our forward demand management programme, but want to ensure that technology issues are fully resolved before accelerating the rate of delivery.

A total of 4,109 Progressive meters were installed in 2013/14, predominately in the London Borough of Bexley.

We are still on track to meet our target to reduce demand for water by 20 Ml/d by 2015.

The new ‘smart metering’ technology being used in the scheme will give our customers more control over their water use. The new meters being installed can

automatically collect high frequency water usage data, giving customers in-depth information on how much water they use, as well as more accurate bills. They will also give us a more detailed understanding of where water is being used, and in what quantities, enhancing our ability to pinpoint and tackle leakage.

The meter installation will include an initial check for leaks - leaks on customers' pipes currently account for a quarter of leakage in our supply area. Meter readings will also be monitored automatically to detect any periods of continual usage (which often indicates a leak). Any leaks detected by these methods - or by customers themselves - will be repaired free of charge.

3.4 Leakage

Table 13: AMP5 Leakage progress

Leakage (Ml/d)	2010/11	2011/12	2012/13	2013/14	2014/15
FD Leakage target	674	673	673	673	673
Actual/*Forecast*	665	637	646	644	*665*

Leakage for 2013/14 is 644.3 Ml/d. This means we have met the leakage target set by Ofwat in their Final Determination for an eighth consecutive year and brings total leakage reductions achieved in the last 10 years to over 300 Ml/d.

3.4.1 Leakage Targets

The Final Determination (FD) only provided for partial funding of our WRMP leakage programme. It did not allow for a leakage reduction programme but instead included funding to manage recurrence and hold leakage constant through a combination of mains replacement and find and fix activity. This was because the need to reduce leakage was driven by mitigation of the forecast impacts of climate change and no climate change related investment was funded by Ofwat pending the outcome of analysis of the new UKCP09 scenarios.

Despite the sizable mains replacement programme delivered during AMP4, very high levels of leakage control activity, principally find and fix, are still required to offset some 500 Ml/d of leakage recurrence with a significant proportion of our distribution network still in relatively poor condition.

Given that the funding for leakage control and the associated leakage targets were different in the FD to the planned programme of work in our fWRMP09, a review of the work programme was required at the start of the AMP period to ensure efficient expenditure of the revised investment. As a result of our planned leakage reduction programme not being funded in the FD many of the original leakage reduction options identified in our original plan remained available for management of leakage recurrence. The tight funding limits meant that it was essential to select the most cost effective options for leakage control if they were available. The capital expenditure activity delivered in 2013/14 has been a mixture of full DMA level mains replacement, partial cohort level distribution mains replacement, new pressure management and trunk mains repairs. This is supported with on-going high levels of find and fix activity.

As part of the development of our WRMP14 we have reviewed our supply demand position for 2012/13 onwards and correspondingly revised our baseline leakage targets for the period up to 2014/15. In response to the deficit between supply and demand in London once the impacts of climate are reinstated into the assessment, and the strong views of our customers that we should reduce leakage further, we have set ourselves the company leakage target of 665 Ml/d for 2013/14 and 2014/15. This target reflects an upper bound which we would not expect to exceed unless we experienced a severe winter.

3.4.2 Activities being undertaken to manage leakage

The activities that the Company is currently undertaking to manage leakage are an optimum blend of:

- Replacing old mains with new (mains replacement);
- Finding and then fixing leaking parts of the distribution and trunk mains network (find & fix);
- Identifying leaks on our customers supply pipes and then, for domestic customers, offering to repair or replace their supply pipes free of charge;
- Relining trunk mains and installing advanced early warning systems to identify leaks before they become bursts;
- Reducing excessive water pressure within the mains to reduce rate of leakage (pressure reduction) and installing schemes to better manage fluctuations in pressure through advanced pressure and pump control.

In 2012 we completed a joint study with Ofwat reviewing the costs and benefits of our mains replacement programme which started in 2002. This has resulted in considerable learning which has been used to shape our programme for AMP6. This has resulted in a more integrated approach to scheme development and selection, with mains replacement, pressure management, unaccounted for water activity and metering being delivered together, selected with a more complete assessment of benefits. This new approach is now being piloted in areas in London, allowing us to gain experience of delivering this new approach so that we are fully up to speed come the 1st April 2015.

3.4.3 Progress on leakage during 2013/14

The weather in March 2013 was much colder than normal and as a result leakage levels at the start of April were approximately 100 Ml/d above target. During April leakage levels reduced quickly as water temperatures returned to normal for the time of year but the extended cold weather into late spring resulted in a high starting point for the rolling 12 month leakage level this year.

This high starting point, coupled with leakage levelling out after the winter, resulted in leakage at approximately 30 Ml/d above our internal leakage target profile. To remedy this we implemented a leakage recovery plan at the end of April in order to ensure that we recovered the annual average leakage position prior to entering the winter. The leakage recovery plan was implemented to increase focus on a range of leakage management activities and covered aspects such as optimising network pressures, improving the repair planning processes, making improvements to working arrangements to better schedule network support to the repair gangs, and improving customer side leakage delivery. However, its primary focus was to reduce leak repair backlogs.

At the end of June recovery was positive with the leakage spot value close to target. However, in July we experienced four weeks of sustained hot dry weather which resulted in extremely high customer demand and hence the need to pump at very high pressures to keep customers supplied with water. It has been 10 years since we stressed our pipework to this level. In addition, we have seen on-going below average rainfall, resulting in the ground drying out more than normal with correspondingly higher levels of ground movement and hence bursts and leakage.

In response to the impacts of the hot dry weather, at the end of July the management of the leakage recovery plan was raised to “event” status. A senior manager was dedicated to the day to day management of the event with daily event calls between the Thames Water team and the Repair & Maintenance contractors to ensure sufficient resources were made available to deliver the numbers of repairs required. These daily calls were supported by weekly leakage meetings led by our Operations Director to ensure the correct focus of all activities. As well as the extra effort on leakage detection and repair, further new pressure management schemes, in addition to those already within the 2013/14 plan were fast-tracked to delivery. We also increased our activity on specialist leak detection and repair on our large trunk mains.

Through the autumn numbers of repair gangs were increased, and network maintenance work was given to alternative contractors to allow the Repair and Maintenance contractors to focus on leak repairs. With leak backlogs reduced the leakage detection gangs became more productive in finding leaks that occurred during the summer months.

By the end of the autumn our year-to-date leakage level had been recovered. Leak backlogs were driven down to very low levels, leakage detection performance continued to be very productive, and we continue to deliver trunk mains repairs and new pressure management schemes ahead of plan. Prior to going into the winter we also implemented our Winter Contingency plan, with the burst forecasting model run daily to provide a 10 day look ahead, ensuring we were as prepared as possible should the weather have turned very cold.

In the end this winter turned out mild. Despite this the leakage recovery plan remained in place to the end of the year with activities tracked against plan on a weekly basis, daily event calls continued with our R&M contractors, as did the weekly director level performance meetings.

3.4.4 Resource Zone Leakage Levels

Table 14 presents the annual average leakage levels for 2013/14 for each WRZ and Company. It also presents leakage levels for the previous three years and also water resource targets as set in our revised draft WRMP14. WRZ leakage levels are taken from our EA Annual Return tables and are therefore derived from WRZ water balances. The Company level leakage is taken from the Company level water balance following the Ofwat Annual Return Table 10 processing rules. There are therefore small differences between the sum of the WRZ leakage levels and the Company total.

Table 14: WRZ Leakage Performance

Leakage (Ml/d)	2010/11 Actual	2011/12 Actual	2012/13 Actual	2013/14 Actual	2013/14 rdWRMP target
Guildford	11.4	12.5	14.0	16.2	12.8
Henley	3.7	3.3	3.5	3.4	3.3
Kennet Valley	23.3	21.9	24.6	24.3	24.6
London	539.6	512.7	512.3	506.5	533.1
SWA	35.5	35.1	34.6	36.9	35.6
SWOX	54.8	55.6	60.3	60.8	59.5
Company (Table 10 consistent)	664.6	637.1	645.5	644.3	665.0

London continues to benefit from the majority of the mains replacement undertaken during 2013/14, and similarly the largest proportion of new pressure management schemes. As a result London leakage is significantly ahead of target, which is critical given how tight security of supply is in London.

As outlined in the previous section this year has been particularly challenging, with significant increases in leakage over the summer months. The greatest increases in customer demand were experienced in our supply areas outside London, much of which is rural. As a consequence, this is where we experienced the largest increases in leakage. These increases in leakage have now been fully recovered.

The worst increases were seen in Guildford WRZ. For several years Guildford leakage had been increasing under our existing leakage management contracts which favoured work in London over that in Guildford. As a result in June 2013 we went live with a new form of leakage detection contract in the Guildford WRZ. This contract gave more reward for leakage reduction and less for just finding leaks. Unfortunately, during July 2013, driven by the very high customer demands, leakage in Guildford increased by about 4 Ml/d. This leakage proved difficult to locate and repair, and was not fully recovered until the end of the year which resulted in the high annual average leakage level. However, with recent successes leakage is now running about 1 Ml/d below that for May 2013. We are now continuing with this new detection contract in Guildford and have set ourselves a target to reduce leakage to 13.26 Ml/d for 2014/15, such that we will be back at our rdWRMP14 leakage target of 12.8 Ml/d by 2015/16. We are also undertaking a full source to tap review of the Guildford water supply area to identify how we ensure better network resilience going forward.

3.5 Water Efficiency

3.5.1 Water Efficiency progress

Table 15: AMP5 Water Efficiency Progress

Water Efficiency (Ml/d)		2010/11	2011/12	2012/13	2013/14	2014/15	AMP5 Total
Baseline	Target	3.45	3.45	3.45	3.45	3.45	17.25
	Actual/*Forecast*	4.01	4.95	5.46	4.19	*3.45*	*22.06*
SELWE	Target	0.97	0.97	0.97	0.97	0.97	4.85
	Actual/*Forecast*	1.06	1.12	0.99	1.00	*0.97*	*5.14*

We have delivered 4.19 Ml/d of Baseline (BSWE) reportable savings in 2013/14, exceeding our BSWE annual target of 3.45 Ml/d through a combination of activities including the distribution of water saving devices to household and non-household customers, targeted non-household activities, and through influencing behaviour by the provision of advice and guidance to customers.

In addition to this, 1.0 Ml/d reportable savings has been achieved in 2013/14 against our Sustainable Economic Level of Water Efficiency (SELWE) annual target of 0.97 Ml/d. This has been through a number of projects involving household and non-household customers and behaviour change activities, but specifically Save Water Swindon, and the Fixed Network Trial Water efficiency project.

Highlights during this regulatory year are presented below:

- Our baseline water efficiency activities have continued and include offering customers a range of free water saving products and behaviour change advice via a number of routes such as our freebie website (www.thameswater.co.uk/freebies), leaflets and events. In 2013/14, we dealt with 54,909 orders and distributed a total of 214,614 water saving products.

- We have also managed a number of key water efficiency projects, and worked with 3rd parties and organisations to reduce water use in households, schools, businesses and other organisations.

- Save Water Swindon has continued to be a focus for water efficiency, and activities this year have included an eight week media campaign, which included radio adverts, daily newspaper articles and adverts, billboards and bus stop posters. This was combined with a number of direct mailings to over 50,000 Swindon homes offering water saving devices and free home water makeovers. We have also carried out a number of water audits and leakage detection on a number of schools and non-household properties with AMR in Swindon.

- As part of the Fixed Network trial, the water efficiency project has tested various mailings to approximately 4,500 homes in the 5 Thames Water DMA areas with AMR meters. The mailings included offerings of water saving products, installs, and leaky loo fixes. The data and results are currently being analysed. The results will help us develop future messaging plus build evidence on measured water savings.

- Thames Water has worked in partnership with the Girlguiding South West region to develop a water efficiency Girl Guide badge called 'H2O 4 Life'. This is a great resource which is now available for guides to order via the Girl Guide online shop (http://www.girlguidingsouthwest.co.uk/h2o-4-life-resource-activity-pack-447-p.asp), and the pack includes a number of activities and games which raise awareness of water and wastage.

- Water Efficient Mosque. Thames Water is collaborating with the Wapping Bangladesh Association and we are currently installing a grey water system within a mosque under construction. Muslim prayer rituals (ablutions) use considerable quantities of water. We are looking to fit water efficient taps that are sensitive to the practice but are water efficient. Furthermore such water is collected and recycled to flush toilets in the mosque. This refit is part of a much larger programme of works to understand how water efficiency communication messages can be informed and are sensitive to ethnic and religious considerations.

- We have continued our automatic meter reading (AMR) work with non-domestic properties, including schools and universities, and these case studies can help support non-household customers. We are looking to build on this evidence base by working in different sectors, to understand the differing water management needs of non-household customers.

- Thames Water teamed up with Save Water Save Money to promote our free water saving products on the Money Saving Expert website, and a link ("free showerhead worth £17") was included in the MSE weekly email. This resulted in 10,000 product orders in one week.

More detail of activities undertaken and water saved during 2013/14 is provided in Appendix 12.

3.5.2 Future Water Efficiency activity

- We are carrying out a non-household audit project across different sectors of commercial customers to determine what water savings can be achieved and create case studies to use for future water saving programmes.
- We have developed an App (Thames TAP) to use on portable devices as part of a trial with a London Housing Association and water efficiency programmes that involve in-home engagement, to roll out water efficiency advice and products with 3rd party installers. Providing high-quality and household-specific advice to vulnerable customers will be a key benefit of this tool.
- We will continue to work alongside our AMR metering roll out to help and encourage newly metered customers to reduce their water use.
- The results of the Energy Saving Trust '*At Home With Water'* phase 2 (AHWW2) will be published in May-June 2014. The results will help improve future water efficiency communication and customer engagement.
- We are planning a full programme of work to understand ethnic and religious water use practices to help us develop our water efficiency messages and information to be used in wider community groups.

4. Climate Change

Climate change is expected to lead to variations in patterns and frequencies of droughts, and other extreme weather events. UKCP09 reports that by the 2080's, with medium emissions, *"The biggest changes in precipitation in summer, down to about –40% (–65 to –6%), are seen in parts of the far south of England"*, (UKCP09 Briefing). The updated climate change scenarios launched by UKCIP in June 2009 provide 10,000 equally possible outcomes of future temperature and precipitation (rainfall). The new projections are 'probabilistic' in that they encompass a wide range of possible changes in climate based upon the strength of evidence from observations, climate change models and expert opinion.

As such, UKCP09 provide a large amount of information on how the UK climate may change over the next 100 years in response to different levels of greenhouse gas emissions. To understand the impact of the new scenarios on our assessments of supply and demand, HR Wallingford (HRW) was engaged to develop a methodology to make the most use of the UKCP09 output data as practically possible. Further details can be found in our revised draft WRMP14 (rdWRMP14).

However, in line with the direction from Ofwat in FD09, the impacts of climate change are not included in the supply demand balance for current reporting.

4.1 Impact on Deployable Output

Prior to the publication of the revised WRPG we had undertaken analysis of our groundwater sources based on the UKCP09 data for the 2020s. Five scenarios from the 20 were selected to assess the groundwater system sensitivity to each of the potential futures. The scenarios were selected, based on their percentiles, to focus on drier potential futures, but also to consider wetter scenarios. The percentiles used were 99, 95, 90, 50 & 10. The rainfall and temperature climate change factors for each of the five scenarios were used to generate recharge scenarios for input to Thames Water regional groundwater models within the Thames Valley. These models were then used to undertake hydrogeological analysis of the climate change impacts on the aquifers.

The groundwater level changes derived from this analysis were then used to assess the impact on groundwater Source Deployable Outputs (SDOs). The SDOs for the remainder of the twenty climate change scenarios were derived by interpolation; this used a linear relationship between SDO and Aridity Index (AI) defined for successive pairs of the five discretely defined SDO's. These data have been used in our assessment of climate change impacts in the dWRMP14. The impact on groundwater sources has since been updated for the revised draft WRMP14 to reflect the UKCP09 data following publication of the WRPG. The results of this work show a further decrease in the central impact of climate change on DO, in London from 82.2 Ml/d to 72.7 Ml/d.

The amended groundwater SDOs together with the rainfall, PET and flow factors were input to the Water Resources Management System (WARMS) to assess the impact on the DO for London and SWOX of the 20 climate change scenarios. The results of the groundwater analysis also provided the basis for the impact

assessments for the other non-conjunctive use WRZs. The flow factors derived from the HRW work for the 2030s is the basis for the impact assessment on the Fobney DO in the Kennet Valley WRZ and Shalford DO in the Guildford WRZ, which are both river abstraction sources.

The methodologies developed have then allowed us to derive uncertainties around these possible outcomes such that target headroom can be calculated for London and the other WRZs.

Using the sub-sample of 20 climate change scenarios to assess the impact on the London DO gives a range of change by 2035/36 from –408 Ml/d (Dry scenario) to +169 Ml/d (Very Wet scenario) with a 'best estimate' of the impact of –72.7 Ml/d. This indicates that the more extreme changes could be highly significant for supply/demand long term planning. The 'best estimate' of the climate change impact has been calculated by modelling a discrete probability distribution function (pdf) using the variation in DO data and probability weightings. The Target Headroom model applies Monte Carlo techniques to determine the statistics from the discrete distribution and the mean impact value of -72.7 Ml/d has been calculated as the 'best estimate' by 2035.

As set out in the WRPG, the 'best estimate' of the modelled climate projection is applied as a reduction in DO and the uncertainty around this projection is handled in Headroom. The impact of the 'best estimate' scenario for each of the WRZs average DO is shown in Table 16 and for peak DO in Table 17. The target headroom methodology shows climate change to be the most significant uncertainty on the supply side. In London the direct impact on DO is around 11 Ml/d by the start of AMP6 increasing to around 78 Ml/d by the end of the period. When the uncertainty on this is taken into account the impact is around 31 Ml/d increasing to 140 Ml/d by the end of the period; a reduction of around 10 Ml/d since the draft plan.

On our current forecast the impact of climate change is greatest in London.

Table 16: Climate Change Impact on DO – DYAA

Reduction in DYAA DO due to Climate Change (Ml/d)							
WRZ	2012/13	2015/16	2020/21	2025/26	2030/31	2035/36	2039/40
Guildford	0.0	0.00	0.00	0.00	0.00	0.00	0.00
Henley	0.0	0.00	0.00	0.00	0.00	0.00	0.00
Kennet Valley	0.0	0.09	0.24	0.40	0.53	0.58	0.62
London	0.0	11.5	30.6	49.8	66.7	72.7	77.6
SWA	0.0	0.18	0.48	0.77	1.04	1.13	1.21
SWOX	0.0	1.34	3.58	5.81	7.79	8.49	9.06

Table 17: Climate Change Impact on DO – ADPW

Reduction in DYCP DO due to Climate Change (Ml/d)							
WRZ	2012/13	2015/16	2020/21	2025/26	2030/31	2035/36	2039/40
Guildford	0.0	0.08	0.21	0.35	0.47	0.51	0.54
Henley	0.0	0.00	0.00	0.00	0.00	0.00	0.00
Kennet Valley	0.0	0.79	2.11	3.42	4.59	5.00	5.34
London	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SWA	0.0	0.39	1.05	1.71	2.29	2.50	2.66
SWOX	0.0	1.56	4.17	6.77	9.07	9.90	10.56

4.2 Impact on Demand

HR Wallingford was also commissioned to carry out a study[1] to estimate the likely impacts of climate change upon household demand. No climate change effects are assumed for other components of demand.

HR Wallingford undertook a statistical analysis of available data in order to derive empirical relationships that describe how weather and other factors affect household demand for water in our supply area.

We provided the following data sets:

- Domestic Water Use Survey (DWUS) Unmeasured PCC by property type (2000-2010)
- PCC by property type for testDWUS[2] panel (2002-2004)
- Demand data (distribution input – minimum night line, 1998 onwards)
- Climate data (temperature, rainfall and sunshine hours, 1998 onwards)

HR Wallingford used multiple linear regression to analyse data and to produce predictive equations.

Three climate variables were considered in the statistical analysis; temperature, rainfall and sunshine hours. However sunshine hours were removed as it was found to be highly correlated with temperature, and temperature provided a stronger and better understood climate change signal which would increase confidence in the model. Including both sunshine hours and temperature could have resulted in instability within the model. For the DYAA model both rainfall and temperature were included. For the ADPW model only temperature was included as an explanatory variable, this was due to insufficient data as for most years there was no rainfall in the peak period.

To estimate the impacts of climate change, the full sample of 10,000 UKCP09 climate change projections for maximum temperature and rainfall in the Thames

[1] HR Wallingford (2012) EX6828 Thames Water Climate Change Impacts and Water Resource Planning. Thames Water Climate Change Impacts on Demand for the 2030s

[2] testDWUS – A temporary panel of unmeasured customers used to validate DWUS

Valley basin in the 2030s; medium emissions scenario, was used. These scenarios provide climate change factors that are applied to the regression models.

The climate change factors are reported as the change between the baseline period (1961-1990) and the future period (2021-2050). As the baseline for the WRMP is 2011 a scaling factor was calculated:

$$ScalingFactor = \frac{2035 - BaseYear}{2035 - 1975}$$

This results in a scaling factor of 0.4, i.e. 60% of the climate change between 1975 and 2035 has already been assumed to have occurred.

These factors were then used with the regression relationships, described above, to provide estimates of PCC change due to climate change in the 2030s. The results of this gave 10,000 potential future PCC factors. The 10th, 50th and 90th percentiles of these factors were extracted to represent and lower, mid and upper estimates of impact on PCC. The mid estimate was used in the demand forecasting models while the upper and lower estimates were used in headroom modelling.

4.3 Climate Change and the Supply Demand Balance

Table 18 and Table 19 contain the Annual Average and Critical Period climate change impacts reported in the revised draft WRMP14 for 2012/13 and the remainder of AMP5. This is made up of the climate change impact on Deployable Output and the Target Headroom component of climate change.

It can be seen that by following the latest guidance there are climate change impacts in 2013/14 in a number of WRZ's. It means that if the impacts of climate change were reintroduced into the supply demand balance calculation, then all WRZs would remain in surplus for this reporting year, 2013/14. However, given the current surplus in London is so small, if the impacts of climate change were reintroduced into the supply demand balance calculation at the rdWRMP14 proposed levels it is highly likely that London will fall into deficit in 2014/15. The rdWRMP14 defines the plan to address the supply demand deficit early in the next AMP period, 2015-2020.

Table 18: dWRMP14 Annual Average Climate Change Impacts

dWRMP14 Total Climate Change Impact			
WRZ	Annual Average (Ml/d)		
	2012/13	2013/14	2014/15
Guildford	0.00	0.00	0.00
Henley	0.00	0.00	0.00
Kennet Valley	0.00	0.18	0.36
London	0.00	13.07	24.47
SWA	0.00	0.21	0.41
SWOX	0.00	0.89	1.60

Table 19: dWRMP14 Critical Period Climate Change Impacts

dWRMP14 Total Climate Change Impact			
WRZ	Critical Period (Ml/d)		
	2012/13	2013/14	2014/15
Guildford	0.00	0.03	0.05
Henley	0.00	0.00	0.00
Kennet Valley	0.00	0.43	0.86
London			
SWA	0.00	0.32	0.63
SWOX	0.00	1.09	1.99

4.4 Excluding Climate Change from Target Headroom

In their FD09 for Thames Water, Ofwat removed the impact of climate change from the assessment of the supply demand balance along with the associated outputs and funding. They also made it clear that the impacts of climate change should be removed from the reporting requirements for AMP5.

Originally Ofwat applied a simplistic approach to the removal of climate change within target headroom, by removing the climate change component from the output of the target headroom model. However, in order to calculate the effect of removing climate change from target headroom for AR14, in line with considered best practice, we have now removed the climate change impacts from the input to the risk model used to derive target headroom. The results from this revised approach have been used within the assessment of supply and demand and the calculation of the Security of Supply Index (SoSI) presented in this report.

Table 20 below summarises the impact of climate change on target headroom for the London WRZ, where the impact is largest. Had this change in approach not been applied there would have been a step reduction of 7.33 Ml/d in Target Headroom in London, from 54.79 Ml/d (reported in 2012/13) to 47.46 Ml/d in 2013/14.

Table 20: Target Headroom With and Without Climate Change (AR14) for London

Target Headroom Components (5% Risk assumed)	Excluding Climate Change	Including Climate Change
S1 & S2 Vulnerable Licences	0.00	0.00
S3 Time Limited Licences	0.00	0.00
S4 Bulk Supplies	0.00	0.00
S5 Gradual Pollution	0.00	0.00
S6 Accuracy of Supply Side Data	18.59	15.57
S8 Climate Change	0.00	8.34
S9 Uncertainty around New Sources	13.94	12.18
D1-D4 Demand Uncertainty	22.07	19.72
Total Target Headroom	**54.60**	**55.81**

5. Security of Supply

5.1 Target Headroom

Table 21: AMP5 Target Headroom

Target Headroom (Ml/d)		2010/11	2011/12	2012/13	2013/14	2014/15
Annual Average	Target (fWRMP09)	127.09	136.68	157.65	176.97	199.46
	Actual/Forecast	77.76	77.98	74.30	74.66	-
Critical Period	Target (fWRMP09)	131.38	140.40	164.13	182.81	205.65
	Actual/Forecast	82.81	84.65	82.31	81.39	-

Target headroom includes the key components of supply and demand uncertainty, accuracy of supply side data, risk from gradual pollution, demand uncertainty, climate change uncertainty and uncertainty around bromates. Uncertainties around leakage reductions are handled separately.

Climate change together with the demand side uncertainty is the most significant long-term risk. The security of supply risk associated with climate change is normally managed through the target headroom allowance, however in line with the direction in FD09 the target headroom analysis has been rerun for AR14 without including the uncertainty around climate change.

The target headroom methodology requires that a risk level be chosen over the planning period. In the draft final WRMP09 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 has been adopted. As we are now into a new AMP period then the risk profile will be 5% and will be consistent with AR13.

Table 22 presents the annual average target headroom requirements as reported in AR13, AR14 and 2013/14 fWRMP09 and the rdWRMP14.

Table 22: Target Headroom - Annual Average (Ml/d)

Target Headroom (Annual Average) Ml/d				
WRZ	2012/13	2013/14		
	AR13	AR14	fWRMP09	rdWRMP14
Guildford	3.43	3.58	3.97	4.20
Henley	0.35	0.32	0.49	0.54
Kennet Valley	3.63	3.82	5.46	5.41
London	54.79	54.60	141.21	98.63
SWA	5.14	5.02	7.82	8.08
SWOX	6.96	7.30	18.02	8.39

Table 23 reports the equivalent for critical period.

Table 23: Target Headroom - Critical Period (Ml/d)

Target Headroom (Critical Period) Ml/d				
WRZ	2012/13	2013/14		
	AR13	AR14	fWRMP09	rdWRMP14 (Note 1)
Guildford	4.06	4.21	4.44	4.77
Henley	0.45	0.44	0.57	0.97
Kennet Valley	4.28	4.36	5.57	6.16
London				
SWA	9.53	9.38	12.25	12.95
SWOX	9.22	8.41	18.76	10.51

Note 1: rdWRMP14 CP target headroom numbers revised from those in the public domain document.

5.2 Current Supply Demand Balance

Due to the publication of updated climate change scenarios, UKCP09, in summer 2009, Ofwat excluded any climate change related investment in their determination of the Company's Business Plan. The regulatory targets for AMP5 do not include an allowance for this factor and the assessment of the supply demand position below therefore has climate change impacts removed from WAFU and target headroom.

The supply demand positions for annual average and critical period are shown in Table 24 and Table 25 below.

Table 24: Forecast supply demand position for each WRZ – Annual Average

Surplus / Deficit – Annual Average (Ml/d)		
WRZ	2012/13	2013/14
	AR13	AR14
Guildford	13.8	10.0
Henley	11.2	12.1
Kennet Valley	31.5	30.8
London	5.8	10.0
SWA	26.8	26.4
SWOX	33.4	32.9

Table 25: Forecast supply demand position for each WRZ – Critical Period

Surplus / Deficit – Critical Period (Ml/d)		
WRZ	2012/13 AR13	2013/14 AR14
Guildford	2.7	-1.3
Henley	5.7	6.2
Kennet Valley	35.2	33.0
London	5.8	10.0
SWA	16.3	17.7
SWOX	33.9	30.5

SoSI for 'annual average' (AA) conditions remains at 100 with all water resource zones in surplus.

For 'critical period' (CP) conditions SoSI has dropped to 99. This is due to a shortfall of 1 Ml/d in our Guildford WRZ. Although we have achieved our company level leakage targets in recent years, leakage in Guildford has been increasing. This coupled with the exceptionally high customer demands experienced in July meant we had to pump hard and reconfigure the network to ensure customers were kept in supply. This activity caused more leakage and bursts to breakout, which has taken time to locate and repair. These increases during the summer have now been fully recovered. However, because the SoSI calculation is calculated over the period of April 2013 to March 2014, the increases in leakage experienced over the summer are still reflected in our end of year SoSI number. We are now reducing leakage further in Guildford to avoid this sequence of events happening again.

The supply demand balance has improved by 4.24 Ml/d in London. This is the result on an increase in DO of 6.0 Ml/d, a reduction in outage allowance of 7.0 Ml/d, a reduction of 0.2 Ml/d in target headroom, an increase in dry year DI of 8.7 Ml/d and an increase in bulk export of 0.2 Ml/d.

In Guildford the supply demand balance has deteriorated by 3.80 Ml/d under annual average conditions and 4.03 Ml/d under peak conditions, with the supply demand balance going into deficit under peak conditions by 1.30 Ml/d. The cause of this is the increase in dry year DI, with an increase for annual average of 3.71 Ml/d and for critical period of 3.94 Ml/d. 2.24 Ml/d of this increase is due to leakage increasing, from 14.0 Ml/d last year to 16.2 Ml/d this year. Leakage in Guildford increased by about 4 Ml/d during July 13, as a result of the need to pump hard and rezone the network to ensure that customers were kept in supply. This leakage proved difficult to locate and repair, and was not fully recovered until the end of the year. We have now set a target to reduce leakage to 13.26 Ml/d in Guildford for 2014/15 to avoid this scenario repeating itself. We are also undertaking a full source to tap review of the Guildford water supply area.

Other WRZs show small movements that do not have any material impact on the supply demand balances.

The forecast SoSI scores that are associated with the data presented in Table 24 and Table 25 are presented in Table 26 along with the PR09 Final Determination targets.

Table 26: Forecast SoSI

SoSI		2010/11	2011/12	2012/13	2013/14	2014/15
SoSI (AA)	Target	100	100	100	100	100
	Actual/*Forecast*	100	100	100	100	*100*
SoSI (CP)	Target	99	99	100	100	100
	Actual/*Forecast*	100	100	100	99	*100*

SoSI Annual Return tables showing the calculation of SoSI are provided in Appendix **1** for reference.

For comparison the supply demand position for annual average and critical period with the climate change components of WAFU and target headroom consistent with rdWRMP14 are shown in Table 27 below.

Table 27: Supply demand position including climate change for each WRZ

Surplus / Deficit (Ml/d) with climate change included		
WRZ	**2013/14 (AA)**	**2013/14 (CP)**
Guildford	9.91	-1.24
Henley	12.11	6.16
Kennet Valley	30.87	32.70
London	5.25	
SWA	26.37	17.52
SWOX	32.71	29.86

The revised draft WRMP14 climate change impacts on the supply demand position for the rest of AMP5 are included in Climate Change.

5.3 Changes to our plan

The activities that we are undertaking to manage the supply demand balance in each of our WRZs remain close to that defined by Ofwat's FD09. However, we have made the following changes to ensure we continue to deliver the activities that reflect the best value for money and put us in the best position to manage supply demand going forward.

Because the SWOX WRZ is comfortably in surplus, whereas the reintroduction of climate change would mean a deficit in London at the start of the next planning period, we have decided to not deliver all the proposed new resource schemes in SWOX (see Section 2.1). Instead we have decided to outperform our regulatory leakage target of 673 Ml/d, through further leakage reductions in London. We have therefore set ourselves a leakage target of 665 Ml/d for 2014/15, and this has been incorporated within our rdWRMP14 baseline forecasts.

We have also re-evaluated our progressive metering programme. The metering programme from FD09 was focused on cost effective meter installations fitted in existing boundary boxes, installed as part of the Victorian Mains Replacement (VMR) and District Mains Replacement programmes. Customers would be scattered across the region and consistency of messaging across our customer base would have been difficult and programme efficiency low. During the process of refining our roll-out strategy it has become evident that clear and consistent messaging to our customers is of paramount importance. We have therefore redeveloped our rollout programme to focus on geographic areas, providing a clearer roll out plan for customer and Borough, allowing easier communication, protecting company reputation and providing a scalable delivery plan. This means that we cannot use the VMR areas. This will make meter installs more expensive, but will deliver more demand savings per meter, as meters will be installed in areas where supply pipe leakage has not already been intensively targeted.

6. Progress on the fWRMP09, dWRMP14 and Drought Plan

Publication of fWRMP09

The fWRMP09 was published on the 19 June 2012 following approval from the Secretary of State.

Publication of draft WRMP14

On 1 May 2013, we launched a 12 week public consultation on the draft WRMP14.

The draft Plan was sent to a wide range of stakeholders, including all statutory consultees and stakeholders who had participated in the public consultation on our previous Water Resources Management Plan covering the period 2010-2035. The draft Plan was also made available for stakeholders to download from our website. The public consultation was widely promoted through press, media and stakeholder events to give as many people and organisations as possible the opportunity to comment. We received 350 representations in response to the consultation.

http://www.thameswater.co.uk/about-us/wrmp

On 30 October 2013 we published a Statement of Response (SoR) setting out the consideration given to representations and setting out the changes made to the plan with reasons. The changes also included those arising from new and updated information and data since the publication of the draft Plan. We sent a copy of the Statement to all consultees who submitted a representation and we published the Statement on our website.

www.thameswater.co.uk/wrmpsor

In December 2013 we published our revised draft plan incorporating the representations to the consultation and updated and new information.

The Secretary of State (SoS) has reviewed our SoR, taking into account advice from technical experts and the responses to the public consultation, and on 17 March, requested further information in support of our plan and SoR. We responded to the SoS on 10th April. The revised draft WRMP14 is currently with Defra for final approval.

The plan demonstrates a growing deficit in supply and demand in London, the proposed solution to which includes a combination of demand reduction and resource development.

In the short-term the plan focuses heavily on demand reduction in London, driven through a combination of leakage reduction, progressive metering and water efficiency measures. In the long-term a large resource is needed.

The plan recommends:

- Reduced leakage by 103Ml/d by 2030
- Rollout of household metering in London so that by 2025, ~70% of households will receive water supplies on a metered basis.

- Rollout of innovative water pricing tariffs during 2020 - 2025 to help reduce the demand for water;
- Temporary reduction of an existing bulk export (17Ml/d) and development of 9 Ml/d of groundwater supplies.
- Development of a water trading option to provide 17 Ml/d of resource for London.
- The need for a resource scheme to secure long-term supply-resilience for London, and potentially the wider South East of England between 2025 and 2030. A 150Ml/d wastewater re-use plant is proposed as the solution based on minimising cost and on the assumption it can be promoted successfully. However we propose further work on other 'long-term' options, such as reservoirs and regional transfers in the next period to help determine the most appropriate solution.
- Roll out of household metering from 2020 to achieve meter penetration of 90% by 2030. This reduces the cost of the Plan in the short-term and also gives a more flexible approach to future uncertainties.

Publication of Drought Plan in 2013/14

An update to the Drought Plan, incorporating the changes to the water industry's powers to restrict usage in the early stages of a drought event, following the passing into law of the Floods and Water Management Act 2010, was consulted on and changes were made and a revised version sent to the Secretary of State for approval in 2012.

The Secretary of State required further work to address the impact of Drought Permit options. The final version of the plan and Environmental Reports were submitted to Defra on 21 March 2013 however further amendments were required and the finally amended plan and Environmental Reports were sent to the SoS in July 2013 and the Drought Plan was finally approved for publication by Defra on 1st August 2013.

Thames Water has undertaken a programme of baseline monitoring to obtain information in support of its Drought Permit options through 2013 and is continuing this programme through 2014 and into 2015.

Date: 9th September 2014
Prepared By: IP, DH, AO

Appendix 1: Security of Supply Index Table

1 Security of Supply Index - 2013/14 ANNUAL AVERAGE

Security of Supply Index - Planned level of service

Water resource zone	WAFU (EA definition) (Ml/d)	Bulk imports (Ml/d)	Bulk exports (Ml/d)	Dry year distribution input (Ml/d)	Reporting year distribution input (Ml/d)	Dry year available headroom (Ml/d)	Target headroom (Ml/d)	Surplus/ deficit (Ml/d)	Percentage deficit (Ml/d)	Zonal population	Percentage of total population with headroom deficit	Zonal index (%age deficit^2 x % population affected x 100)	Security of supply index
Guildford	64.24	0.00	2.27	48.42	48.02	13.55	3.58	9.97	19.17%	153.292	0.00%	0.000	
Henley	24.61	0.00	0.00	12.16	12.01	12.44	0.32	12.12	97.08%	48.523	0.00%	0.000	
Kennet Valley	134.92	0.00	0.00	100.28	99.31	34.64	3.82	30.82	29.61%	396.445	0.00%	0.000	
London	2,110.68	0.00	12.20	2,033.87	2,013.47	64.62	54.60	10.01	0.48%	7,133.605	0.00%	0.000	
SWA	168.81	0.00	2.08	135.34	134.75	31.40	5.02	26.37	18.79%	516.667	0.00%	0.000	
SWOX	299.31	2.08	0.00	261.16	259.61	40.23	7.30	32.92	12.26%	1,013.476	0.00%	0.000	
Total	2,802.57	2.08	16.55	2,591.22	2,567.17					9,262.007		0.000	100

SoSI - planned & critical AR14 Table DRAFT v5 with links.xlsx

2 Security of Supply Index – 2013/14 CRITICAL PERIOD

Security of Supply Index - critical period

Water resource zone	WAFU (EA definition) (Ml/d)	Bulk imports (Ml/d)	Bulk exports (Ml/d)	Dry year distribution input (Ml/d)	Reporting year distribution input (Ml/d)	Dry year available headroom (Ml/d)	Target headroom (Ml/d)	Surplus/ deficit (Ml/d)	Percentage deficit (Ml/d)	Zonal population	Percentage of total population with headroom deficit	Zonal index (%age deficit^2 x % population affected x 100)	Security of supply index
Guildford	70.43	0.00	2.27	65.25	62.71	2.91	4.21	-1.30	-1.87%	153.292	1.66%	0.001	
Henley	25.26	0.00	0.00	18.66	17.81	6.60	0.44	6.16	32.27%	48.523	0.00%	0.000	
Kennet Valley	157.94	0.00	0.00	120.55	122.33	37.39	4.36	33.03	26.44%	396.445	0.00%	0.000	
London	2,110.68	0.00	12.20	2,033.87	2,013.47	64.62	54.60	10.01	0.48%	7,133.605	0.00%	0.000	
SWA	198.70	0.00	5.00	166.66	170.15	27.04	9.38	17.66	10.03%	516.667	0.00%	0.000	
SWOX	353.67	5.00	0.00	319.78	327.56	38.89	8.41	30.48	9.29%	1,013.476	0.00%	0.000	
Total	2,916.68	5.00	19.47	2,724.77	2,714.03					9,262.007		0.001	99

SoSI - planned & critical AR14 Table DRAFT v5 with links.xlsx

Appendix 2: Line Commentary

The table "Environment Agency Data - Annual Average Out-turns" reports annual average data and the table "Environment Agency Data - Critical Period Out-turns" reports peak period data for each water resource zone as specified in the Annual Returns Definitions for the Environment Agency Data tables.

All lines have been completed, whether required by exception, optional or not.

Zones that are sensitive to peak demands are the SWOX, Kennet Valley, Henley, SWA, and Guildford water resource zones. Data for these zones has been compiled for the average day peak week demand (ADPW) period. The method of calculating each line within the table is consistent with the guidance.

In Table 10, the water balance is calculated at the company level, being adjusted by the MLE to apportion the overall water balance discrepancy. However, the Environment Agency Data tables are based upon water balances for individual water resource zones, each with their own water balance discrepancy adjustments.

Critical Period

Graphs showing the daily demand profile as a rolling 7-day average and therefore showing the ADPW of the year are included in Appendix 12. To be consistent with the ADPW dry year demand, the Critical Period table was populated using the summer peak week shown in the table below.

Table 28: WRZ Summer ADPW Date and DI

WRZ	Summer ADPW (Week ending)	Summer ADPW DI (Ml/d)
Guildford	22/07/2013	62.71
Henley	19/07/2013	17.81
Kennet Valley	22/07/2013	122.33
Slough Wycombe Aylesbury	23/07/2013	170.15
SWOX	22/07/2013	327.56

To populate the critical period table (Environment Agency Data - Critical Period) we have peaked the annual average water balance components using peaking factors from the fWRMP09. The peaking factors were adjusted proportionally so that the sum of the peak water balance components reconciled with the 2013/14 observed summer ADPW DI. This ensures that our approach remains consistent between these tables and the fWRMP09. For a detailed discussion of our peak demand forecasting methodology, please refer to Section 3.1 of the fWRMP09 Main Report.

Annual Average - Line Commentary

Supply

A: Resources

Line	Description	2012/13	2013/14	Variance
1	Raw Water Abstracted	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	48.41	51.78	3.37
WRZ 2	Henley	12.60	12.07	-0.53
WRZ 3	Kennet Valley	106.42	110.03	3.61
WRZ 4	London	2232.18	2257.29	25.11
WRZ 5	Slough/Wycombe/Aylesbury	132.09	138.45	6.36
WRZ 6	SWOX	258.48	274.12	15.65
Total	Total	2790.19	2843.75	53.56
Line Commentary:				

Raw water abstracted has been calculated using the same methodology as used last year. The methodology includes the points:

- Annual meter verifications for all abstraction meters. Where abstraction meters are also Distribution Input meters, meter error adjustments are applied consistently.
- Greater clarity of London and Thames Valley system mass balances, taking account of abstraction, returns to river, non-public sources and water into supply.
- Ensuring that flows identified as “returns to river” are not actually returns to a storage reservoir.

As in previous years, the values reported in Line 1 are Actual Raw Water Abstracted without any adjustment for abstraction that supplies non-public sources and returns to river. Changes in raw water reservoir levels have also not been included.

Abstraction has increased in all WRZ except Henley due to increased demand resulting from warmer and drier weather during the reporting year. The reduction in Henley is due to the reduction in demand following the changes to the WRZ boundary previously outlined.

Line	Description	2011/12	2012/13	Variance
2	Raw Water Imported	Ml/d	Ml/d	Ml/d
Line Commentary:				

There are no raw water imports to Thames Water.

Line	Description	2012/13	2013/14	Variance
3	Potable Water Imports	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	0.00	0.00	0.00
WRZ 2	Henley	0.00	0.00	0.00
WRZ 3	Kennet Valley	0.00	0.00	0.00
WRZ 4	London	0.00	0.00	0.00
WRZ 5	Slough/Wycombe/Aylesbury	0.19	0.00	-0.19
WRZ 6	SWOX	0.93	0.79	-0.14
Total	Total	1.12	0.79	-0.33
Line Commentary:				

Potable Water Imports (Annual Average)				
To (WRZ)	**From**	**AR13 (Ml/d)**	**AR14 (Ml/d)**	**Change (Ml/d)**
SWA	Anglian Water	0.19	0.00	-0.19
SWOX	Anglian Water	0.10	0.28	0.18
SWOX	Severn Trent	0.00	0.01	0.01
SWOX	SWA	0.82	0.50	-0.33
Total		1.12	0.79	-0.33

Thames Water has no potable water imports governed by formal bulk supply agreements. However, a number of small imports exist that are not covered by formal bulk supply agreements and hence not included in the fWRMP09 or in Table 10a. These include a transfer from Anglian Water to SWA (which was not used) and SWOX, which averaged 0.28 Ml/d during 2013/14. The import from Severn Trent to SWOX was averaged 0.01 Ml/d in 2013/14.

Also included in this line is an interzonal transfer from SWA to SWOX. This averaged 0.50 Ml/d during 2013/14. A provision of 2.08 Ml/d is included in the fWRMP09.

Line	Description	2012/13	2013/14	Variance
4	Raw Water Losses and Operational Use	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	0.14	0.07	-0.06
WRZ 2	Henley	-0.01	-0.01	-0.01
WRZ 3	Kennet Valley	0.71	0.86	0.15
WRZ 4	London	11.68	3.44	-8.24
WRZ 5	Slough/Wycombe/Aylesbury	0.13	0.12	0.00
WRZ 6	SWOX	0.55	0.02	-0.53
Total	Total	13.20	4.50	-8.70
Line Commentary:				

Process losses are calculated as the difference between the volume of raw water entering treatment and the volume of potable water entering supply. Raw water losses and operational use are assumed to be 10% of total process losses in London and 15% in the remaining WRZ's.

Additionally in London, there is an abstraction that supplies non-public sources at Crossness Nature Reserve which is used for conservation purposes. The abstraction averaged 0.11 Ml/d and is included as raw water operational use.

Negative process losses are reported in Henley. This is due to small errors, in the order of +/- 0.5%, in the measurement of Raw Water into Treatment and Treated Water into Supply. This is well within the meter verification tolerances of +/- 5%.

Line	Description	2012/13	2013/14	Variance
5	Raw Water Exported	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	0.00	0.00	0.00
WRZ 2	Henley	0.00	0.00	0.00
WRZ 3	Kennet Valley	0.00	0.00	0.00
WRZ 4	London	91.42	81.07	-10.35
WRZ 5	Slough/Wycombe/Aylesbury	0.00	0.00	0.00
WRZ 6	SWOX	0.00	0.00	0.00
Total	Total	91.42	81.07	-10.35
Line Commentary:				

Raw Water Exported (Annual Average)				
From (WRZ)	To	AR13 (Ml/d)	AR14 (Ml/d)	Change (Ml/d)
London	Essex & Suffolk Water	87.56	79.81	-7.75
London	Veolia Water Central	3.86	1.26	-2.60
Total		91.42	81.07	-10.35

There are two raw water exports, both within the London WRZ. The largest, which is the export from the Lea Valley to Essex and Suffolk Water (Northumbrian South), averaged 79.81 Ml/d during the 2013/14 report year which is a reduction of 10.35 Ml/d since AR13.

The second is a transfer from the Wraysbury or Queen Mother reservoirs to the Veolia treatment works at Iver which averaged 1.26 Ml/d over the year, a reduction of 2.60 Ml/d since AR13. This supply forms part of an agreement that permits Veolia to use Thames Water reservoir storage in the event of a serious pollution incident that would prevent Veolia from using their run-of-river source to Iver works. The agreement is only for the duration of the pollution but there is a provision for up to 10 Ml/d in the fWRMP09 as a sweetening flow in the connecting pipeline, which can be interpreted as a raw water bulk supply.

The bulk supply export to Essex and Suffolk Water is included as part of the calculation of DO for London through the WARMS model and not explicitly shown in the fWRMP09 tables. By including this in the fWRMP09 table it would double count this transfer and misrepresent the supply-demand position. We have included the data in this return for information purposes.

Line	Description	2011/12	2012/13	Variance
5.1	Non Potable Supplies	Ml/d	Ml/d	Ml/d
Line Commentary:				

Thames Water has no non-potable supplies.

Line	Description	2012/13	2013/14	Variance
6	Potable Water Exported	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	1.71	1.93	0.22
WRZ 2	Henley	0.00	0.00	0.00
WRZ 3	Kennet Valley	0.00	0.00	0.00
WRZ 4	London	0.39	0.38	-0.01
WRZ 5	Slough/Wycombe/Aylesbury	1.11	0.75	-0.35
WRZ 6	SWOX	0.02	0.00	-0.02
Total	Total	3.22	3.07	-0.15
Line Commentary:				

Potable Water Exports (Annual Average)				
From (WRZ)	To	AR13 (Ml/d)	AR14 (Ml/d)	Change (Ml/d)
London	Affinity Water	0.32	0.32	0.00
London	Affinity Water	0.07	0.06	-0.01
Guildford	Affinity Water	1.71	1.93	0.22
SWA	SWOX	0.82	0.50	-0.33
SWA	Anglian Water	0.28	0.26	-0.03
SWOX	Wessex Water	0.02	0.00	-0.02
Total		3.22	3.07	-0.15

The bulk supply export to Affinity Water (Three Valleys Water) from the London Borough of Haringey averaged 0.32 Ml/d during 2013/14. This compares to an allowance of 10 Ml/d in the fWRMP09. Another export occurs in this zone, which is not covered by formal bulk supply agreements. This is the export from Kempton Park to Affinity Water (North Surrey), which averaged 0.06 Ml/d in 2013/14.

There is also an export from Ladymead in the Guildford WRZ to Affinity Water (Three Valleys Water), which averaged 1.93 Ml/d during 2013/14. This compares to the allowance of 2.3 Ml/d in the fWRMP09.

In SWA, there is an export of 0.50 Ml/d to SWOX. There is also another export of 0.26 Ml/d from Hambledon in SWA to Anglian Water which is not covered by a formal bulk supply agreement. There is an export from SWOX to Wessex Water at Ashton Keynes which is also not covered by formal bulk supply agreements. This export averaged 4.84 m^3/d in 2013/14.

Line	Description	2012/13	2013/14	Variance
7	Deployable Output	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	65.01	65.01	0.00
WRZ 2	Henley	25.65	25.65	0.00
WRZ 3	Kennet Valley	137.06	137.06	0.00
WRZ 4	London	2144.00	2150.00	6.00
WRZ 5	Slough/Wycombe/Aylesbury	181.08	181.08	0.00
WRZ 6	SWOX	316.34	314.65	-1.69
Total	Total	2869.14	2873.45	4.31
Line Commentary:				

The changes in DO between the reporting year and last year are primarily due to a review of the Source Deployable Outputs in March 2014. The details of these updates are contained in Appendix 3.

The tables below compare the changes in the components of DO between the reporting year, last year and the fWRMP09.

Guildford

Annual Average (All figures in Ml/d)	2012/13	2013/14		
	Actual (AR13)	Actual (AR14)	fWRMP09 Forecast	rdWRMP14 Forecast
DO	65.01	65.01	65.30	65.01
Climate Change Impacts	0.00	0.00	0.00	0.00
Network Constraints	0.00	0.00	0.00	0.00
Guildford Constrained DO	**65.01**	**65.01**	**65.30**	**65.01**

There have been no changes in DO between AR13 and AR14. The changes from the fWRMP09 are due to revision to the SDO's the have occurred since the fWRMP09.

Henley

Annual Average (All figures in Ml/d)	2012/13	2013/14		
	Actual (AR13)	Actual (AR14)	fWRMP09 Forecast	rdWRMP14 Forecast
DO	25.65	25.65	25.80	25.65
Climate Change Impacts	0.00	0.00	0.00	0.00
Network Constraints	0.00	0.00	0.00	0.00
Henley Constrained DO	**25.65**	**25.65**	**25.80**	**25.65**

There has been no change in DO between last year and the reporting year.

The change between the reporting year and, the fWRMP09 is due to clarification of the treatment of Harpsden and Sheeplands DO. Harpsden DO is now considered as the treated output from the site whereas the transfer of Harpsden raw water to Sheeplands for blending is now considered in the Sheeplands DO.

Kennet Valley

Annual Average (All figures in Ml/d)	2012/13	2013/14		
	Actual (AR13)	Actual (AR14)	fWRMP09 Forecast	rdWRMP14 Forecast
DO	137.06	137.06	146.75	137.06
Climate Change Impacts	0.00	0.00	0.20	0.00
Network Constraints	0.00	0.00	0.00	0.00
Kennet Valley Constrained DO	**137.06**	**137.06**	**146.55**	**137.06**

There has been no change in DO between last year and the reporting year.

WAFU in Kennet Valley has decreased by 5.95 Ml/d when compared to the forecast in the fWRMP09. 4.55 Ml/d of the 9.69Ml/d reduction in DO is the result of

discolouration problems due to iron at Mortimer that resulted in the scheme being removed from DO in JR10. DO was further reduced by 4.45 Ml/d at Pangbourne due to hindcasting the impact of drought conditions, as reported in AR13.

The removal of climate change impacts accounts for the additional difference in Constrained DO between AR13 and the fWRMP09.

London

Annual Average (All figures in Ml/d)	2012/13	2013/14		
	Actual (AR13)	Actual (AR14)	fWRMP09 Forecast	rdWRMP14 Forecast
DO	2144.00	2150.00	2167.00	2145.00
Climate Change Impacts	0.00	0.00	42.43	3.80
Network Constraints	0.00	0.00	0.00	0.00
London Constrained DO	**2144.00**	**2150.00**	**2124.57**	**2141.20**

DO in London has seen an increase of 6 Ml/d (see Appendix 3). This is the net result of a reduction of:

- 2 Ml/d as a result of a review of Source Deployable Outputs (SDOs) in March 2014
- An increase of 1 Ml/d resulting from a change to the Axford licence
- A reduction in 10 Ml/d due to reduced Hoddesdon drought output
- An increase of 17 Ml/d resulting from an agreement with RWE npower to utilise water not abstracted following closure of Didcot Power Station A (see Appendix 3).

DO is 17 Ml/d lower than forecast in the fWRMP09. The most significant adjustments to DO include:

- An increase of 10 Ml/d associated with the Thames Gateway WTW (JR10);
- A reduction of 26 Ml/d following a major review of the abstraction licences and demands of Water Only Companies within the Thames Water area (AR12);
- A reduction of 4 Ml/d following minor changes to the NLARS operating strategy (AR12).
- A reduction of 20 Ml/d as a result of aligning the operation of strategic water resource schemes with the Thames Water Drought Plan (AR12).
- An increase of 20 Ml/d as a result of including the impact savings associated with demand management as part of the Drought Direction 2011 (AR12);
- An increase of 4 Ml/d due to Grimsbury being out of supply (AR12);

The difference between AR14 and the rdWRMP14 is due to the movements seen between AR13 and AR14, less the 1 Ml/d increase due to the change in the Axford licence, which was already built into the forecast.

The removal of climate change impacts accounts for the additional difference in Constrained DO between AR14, the fWRMP09 and the rdWRMP14.

Slough/Wycombe/Aylesbury

Annual Average (All figures in Ml/d)	2012/13	2013/14		
	Actual (AR13)	Actual (AR14)	fWRMP09 Forecast	rdWRMP14 Forecast
DO	186.28	186.28	188.30	186.28
Climate Change Impacts	0.00	0.00	0.73	0.06
Network Constraints	5.20	5.20	5.20	5.20
SWA Constrained DO	**181.08**	**181.08**	**182.37**	**181.02**

There has been no change in DO between last year and the reporting year.

Reviews of SDO prior to AR14 account for the difference to the fWRMP09 as previously reported.

The removal of climate change impacts account for the additional difference in Constrained DO between the report year, the fWRMP09 and the rdWRMP14.

SWOX

Annual Average (All figures in Ml/d)	2012/13	2013/14		
	Actual (AR13)	Actual (AR14)	fWRMP09 Forecast	rdWRMP14 Forecast
DO	319.47	318.47	332.58	318.47
Climate Change Impacts	0.00	0.00	2.28	0.40
Network Constraints	3.13	3.82	8.93	3.70
SWOX Constrained DO	**316.34**	**314.65**	**321.37**	**314.40**

DO has reduced by 1.00 Ml/d in SWOX from last year. This is a result of the March 2014 review of SDO (see Appendix 3). A small increase in network constraints of 0.69 Ml/d accounts for the additional variance in Constrained DO.

Reviews of SDO since the fWRMP09, the resolution of some network constraints and the removal of climate change impacts account for the difference in the fWRMP09 forecast of DO.

The removal of climate change impacts and a slight difference in the impact of networks constraints account for the difference between the AR14 and rdWRMP14 Constrained DO.

B: Process Losses

Line	Description	2012/13	2013/14	Variance
9	Treatment Works Losses and Operational Use	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	1.22	0.65	-0.57
WRZ 2	Henley	-0.05	-0.11	-0.06
WRZ 3	Kennet Valley	6.52	7.82	1.30
WRZ 4	London	136.60	158.36	21.76
WRZ 5	Slough/Wycombe/Aylesbury	1.13	1.70	0.57
WRZ 6	SWOX	4.94	0.14	-4.80
Total	Total	150.37	168.56	18.20
Line Commentary:				

Process losses are calculated as the difference between the volume of raw water entering treatment and the volume of potable water entering supply. Treatment works losses and operational use is assumed to be 90% of total process losses in London and 85% in the remaining WRZ's.

Additionally, there are abstractions that supplies non-public sources at Sewage Treatment Works (STWs) and returns to river at Water Treatment Works (WTWs) which are included as treatment works operational use.

Negative process losses are reported in Henley. This is due to small errors, in the order of +/- 0.5% in the measurement of Raw Water into Treatment and Treated Water into Supply. This is well within the meter verification tolerances of +/- 5%.

The amount of non-public supply and relevant WRZ are listed below:

Non-Public Supply (Annual Average)- Treatment Works Ops Use		
Site	**WRZ**	**(Ml/d)**
Maple Cross STW	London	0.34
Mogden STW	London	4.24
Rye Meads STW	London	1.00
Juniper Pumping Station	London	0.00
Total		**5.58**
Slough STW	SWA	0.35
Iver South STW	SWA	0.23
Total		**0.58**

Non-public supply levels have increased in London from 4.45 Ml/d to 5.58 Ml/d and increased in SWA from 0 Ml/d to 0.58 Ml/d compared to last year.

Returns to river are reported for those water treatment works where there is a requirement to measure and report on these flows in the discharge consent.

Returns to River (Annual Average)- Treatment Works Ops Use		
Site	**WRZ**	**(Ml/d)**
Ashford Common WTW	London	32.39
Beckton Desalination Plant	London	20.97
Coppermills	London	67.95
Kempton WTW	London	4.11
Walton WTW	London	8.48
Total		**133.89**
Farmoor WTW	SWOX	0.00
Fobney WTW	Kennet Valley	0.10

Returns to river have increased by 67.35 Ml/d since AR13. The main movement was in London, which increased by 67.38 Ml/d, predominately due to issues with the clear water pumps at Coppermills Water Treatment Works which reduced the amount of wash water that was able to be recovered back into the inlet system.

Line	Description	2012/13	2013/14	Variance
10	Outage Experienced	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	2.08	0.81	-1.27
WRZ 2	Henley	0.00	0.00	0.00
WRZ 3	Kennet Valley	0.02	1.81	1.79
WRZ 4	London	120.28	65.79	-54.49
WRZ 5	Slough/Wycombe/Aylesbury	18.30	13.84	-4.46
WRZ 6	SWOX	3.83	4.18	0.35
Total	Total	144.51	86.43	-58.08
Line Commentary:				

Actual Outage is reported here in order to compare against planned outage.

Details of changes to outage in London and Thames Valley can be found in Appendix 4.

Demand

Line	Description	2012/13	2013/14	Variance
11	Distribution Input	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	44.28	48.02	3.74
WRZ 2	Henley	12.38	12.01	-0.38
WRZ 3	Kennet Valley	97.10	99.31	2.22
WRZ 4	London	1987.99	2013.47	25.48
WRZ 5	Slough/Wycombe/Aylesbury	129.03	134.75	5.72
WRZ 6	SWOX	255.16	259.61	4.44
Total	Total	2525.95	2567.17	41.22
Line Commentary:				

Distribution input has increased by 41.22 Ml/d at Company level to 2567.17 Ml/d principally driven by increase in customer demand, notably measured households, as a result of the dry summer in which demand peaked at “Dry-Year” levels. This represents an increase of 1.6% at Company level. Increases were mirrored across all the Water Resource Zones with the exception of Henley, which experienced a small reduction, partly due to the movement of 474 properties to the Kennet Valley resource zone.

Distribution Input is calculated from the sum of the works output plus the net balance between bulk imports and exports. Adjustments are made for meter errors (where the discrepancy with the test meter is greater than 5%) and for on-site operational use where the off take is after the meter location. The majority of the on-site operational use is directly metered. However, where metered flows are not available values are taken from a detailed study undertaken in 2000/01 which estimated the on-site operational use for each water treatment works based on the original design and best practice information to calculate values. These estimates are updated following meter replacement where the new meter is installed in a different location to the original meter.

Actual measured flows for distribution inputs come from the Control Room using arithmetic averages of daily outputs from the SCADA. Operational use also includes recharge on the North London Aquifer Recharge Scheme and boreholes run to waste for quality or testing purposes.

A number of improvements to the verification process were introduced for 2007/08 which has led to the size of the meter error adjustments reducing significantly from those used previously.

Thames Water has a specialist team to manage the verification and maintenance of regulatory flow meters, ensuring a greater focus on regulatory performance and reporting processes and this is supported with a metering web-based database developed to allow automation of performance reporting.

DI meter verification has generally taken place in the first six months of the year to allow more time for discrepancies to be addressed within the reporting year. However this year, due to access issues associated with ICA support, much of the verification was undertaken in the second half of the year. The issues that caused this have been addressed and in future we expect that meter verifications will again be concentrated in the first half of the year.

Error adjustments have been reduced from 18.6 Ml/d in 2006/07 to 3.61 Ml/d this year. This is a slight increase from last year's value of -0.16 Ml/d.

The DI reporting and verification process is supported with a metering Best Operating Practice manual and Quality Management Documents which are updated and maintained.

C: Consumption

Line	Description	2012/13	2013/14	Variance
19	Measured Non-Household Water Delivered	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	8.22	8.62	0.40
WRZ 2	Henley	1.96	1.71	-0.26
WRZ 3	Kennet Valley	19.38	20.16	0.78
WRZ 4	London	365.49	380.16	14.67
WRZ 5	Slough/Wycombe/Aylesbury	21.93	22.28	0.35
WRZ 6	SWOX	60.33	59.48	-0.85
Total	Total	477.31	492.40	15.09
Line Commentary:				

At company level, measured non-household water delivered has increased by 15.09 Ml/d, the majority of which was in the London WRZ. The increase this year has reversed the trend of reducing non-household demand seen over recent years.

Line	Description	2012/13	2013/14	Variance
20	Unmeasured Non-Household Water Delivered	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	0.24	0.20	-0.03
WRZ 2	Henley	0.06	0.04	-0.01
WRZ 3	Kennet Valley	0.33	0.27	-0.06
WRZ 4	London	19.99	16.52	-3.48
WRZ 5	Slough/Wycombe/Aylesbury	0.35	0.29	-0.06
WRZ 6	SWOX	0.90	0.73	-0.17
Total	Total	21.87	18.05	-3.82
Line Commentary:				

At Company level, there has been a reduction of 3.82 Ml/d this year, the majority of which was in the London WRZ.

The bulk of this estimate relates to assessed properties (properties that are unable to be metered directly and therefore charged on an assessed basis). There has been a small increase in the volume associated with these properties.

Licensed hydrant use and building site standpipes are included in this category as well as properties where warrants to enforce metering are issued. Although there has been little change to the number of licenses issued the calculated volume associated to them has dropped by 3.03 Ml/d (pre water balance) as a result of an improvement to the methodology of deriving the allowances used in the calculation. Allowances are now based on a sample of real measured data rather than the allocated allowances used last year. The allowance based estimation, previously

used, assigned a volume to each licence issued dependent on use category and assumptions on use rate and frequency were then applied.

At the end of 2012 the licensing process was changed and customers were required to use a measured hydrant stand-post and submit meter readings. The data from the customers' meters have provided new base volumes from this year for extrapolation across all issued licences. Although volumes are being recorded for many hydrant customers there is still a large component, primarily shorter duration licences, which are still estimated. All customers are still billed on the assessed charges.

Line	Description	2012/13	2013/14	Variance
21	Measured Household Water Delivered	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	8.57	9.62	1.04
WRZ 2	Henley	3.77	3.90	0.13
WRZ 3	Kennet Valley	20.44	22.26	1.81
WRZ 4	London	235.86	257.63	21.77
WRZ 5	Slough/Wycombe/Aylesbury	26.12	28.69	2.56
WRZ 6	SWOX	65.12	69.99	4.87
Total	Total	359.90	392.09	32.19
Line Commentary:				

This year the reported figure has increased by 32.19 Ml/d from last year due to both an increasing number of metered properties and higher consumptions due to the warmer than average summer. The average number of properties for the year in this category has increased from last year as a result of the continued uptake in optant metering as well as the newly built properties. Although the roll-out of progressive metering began this year the 2-year lead time to billing means that we will only see the first non-opted customers in these figures in the 2015-16 reporting year.

Line	Description	2012/13	2013/14	Variance
22	Unmeasured Household Water Delivered	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	16.26	16.87	0.61
WRZ 2	Henley	3.87	3.72	-0.16
WRZ 3	Kennet Valley	37.66	37.49	-0.17
WRZ 4	London	965.10	958.99	-6.11
WRZ 5	Slough/Wycombe/Aylesbury	53.86	54.84	0.97
WRZ 6	SWOX	80.10	79.87	-0.23
Total	Total	1156.86	1151.77	-5.09
Line Commentary:				

The reported figure shows a reduction of 5.09 Ml/d against the value for last year. This reflects the reduction in the number of properties as well as a small reduction in the estimate of per capita consumption (PCC). The reduction is primarily driven by the reduction in London, where the proportion of flats is largest.

The reduction in PCC has been driven by the flats group within the Domestic Water Use (DWUS) panel. Consumption in this group has reduced this year in contrast to the non-flats groups which saw increased consumptions, reflecting the increase in demand seen over the summer peak. Work is on-going to increase the sample size of flats within the DWUS panel to ensure this group is fully representative.

Although the overall population number has increased, the number of unmeasured household population has decreased as the rate of population increase is not as great as the rate that properties have moved onto a measured tariff.

Line	Description	2012/13	2013/14	Variance
23	Measured Non-Household - Consumption	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	8.03	8.39	0.36
WRZ 2	Henley	1.91	1.66	-0.26
WRZ 3	Kennet Valley	19.09	19.87	0.78
WRZ 4	London	360.77	375.43	14.66
WRZ 5	Slough/Wycombe/Aylesbury	21.50	21.83	0.32
WRZ 6	SWOX	59.40	58.52	-0.87
Total	Total	470.70	485.69	14.99
Line Commentary:				

This line is calculated from subtracting line 34 from line 19.

Line	Description	2012/13	2013/14	Variance
24	Unmeasured Non-Household - Consumption	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	0.21	0.17	-0.04
WRZ 2	Henley	0.05	0.04	-0.01
WRZ 3	Kennet Valley	0.30	0.24	-0.06
WRZ 4	London	17.96	14.54	-3.42
WRZ 5	Slough/Wycombe/Aylesbury	0.31	0.25	-0.06
WRZ 6	SWOX	0.81	0.64	-0.17
Total	Total	19.64	15.87	-3.76
Line Commentary:				

This line is calculated from subtracting line 35 from line 20.

Line	Description	2012/13	2013/14	Variance
25	Measured Household - Consumption	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	7.76	8.61	0.85
WRZ 2	Henley	3.47	3.59	0.12
WRZ 3	Kennet Valley	18.95	20.67	1.72
WRZ 4	London	220.93	241.89	20.95
WRZ 5	Slough/Wycombe/Aylesbury	24.16	26.44	2.29
WRZ 6	SWOX	60.29	64.76	4.46
Total	Total	335.56	365.95	30.39
Line Commentary:				

This line is calculated from subtracting line 36 from line 21.

Line	Description	2012/13	2013/14	Variance
26	Unmeasured Household - Consumption	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	13.49	13.72	0.23
WRZ 2	Henley	3.29	3.16	-0.13
WRZ 3	Kennet Valley	32.75	32.78	0.03
WRZ 4	London	847.17	843.44	-3.73
WRZ 5	Slough/Wycombe/Aylesbury	46.82	47.49	0.67
WRZ 6	SWOX	69.50	69.57	0.07
Total	Total	1013.02	1010.15	-2.86
Line Commentary:				

This line is calculated from subtracting line 37 from line 22.

Line	Description	2012/13	2013/14	Variance
29	Measured Household - PCC	l/h/d	l/h/d	l/h/d
WRZ 1	Guildford	134.57	142.58	8.01
WRZ 2	Henley	138.06	143.41	5.35
WRZ 3	Kennet Valley	125.77	129.74	3.97
WRZ 4	London	134.84	140.33	5.49
WRZ 5	Slough/Wycombe/Aylesbury	131.89	137.45	5.56
WRZ 6	SWOX	123.21	126.21	3.00
Total	Total	131.88	136.86	4.98
Line Commentary:				

This line is calculated from multiplying line 25 by 1,000 and then dividing by line 49.

Line	Description	2012/13	2013/14	Variance
30	Unmeasured household - PCC	l/h/d	l/h/d	l/h/d
WRZ 1	Guildford	155.34	160.46	5.12
WRZ 2	Henley	149.31	149.29	-0.03
WRZ 3	Kennet Valley	146.96	150.40	3.43
WRZ 4	London	167.06	166.55	-0.50
WRZ 5	Slough/Wycombe/Aylesbury	154.14	158.70	4.56
WRZ 6	SWOX	149.02	154.17	5.14
Total	Total	164.10	164.54	0.44
Line Commentary:				

This line is calculated from multiplying line 26 by 1,000 and then dividing by line 50.

Line	Description	2012/13	2013/14	Variance
31	Average Household - PCC	l/h/d	l/h/d	l/h/d
WRZ 1	Guildford	147.05	153.06	6.01
WRZ 2	Henley	143.31	146.10	2.79
WRZ 3	Kennet Valley	138.41	141.67	3.26
WRZ 4	London	159.19	159.89	0.70
WRZ 5	Slough/Wycombe/Aylesbury	145.77	150.39	4.62
WRZ 6	SWOX	135.81	139.29	3.48
Total	Total	154.70	156.14	1.44
Line Commentary:				

This line is calculated from multiplying the sum of lines 25 and 26 by 1,000 and then dividing by the sum of lines 49 and 50.

Line	Description	2012/13	2013/14	Variance
32	Water Taken Unbilled	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	0.79	0.84	0.05
WRZ 2	Henley	0.18	0.16	-0.02
WRZ 3	Kennet Valley	1.40	1.43	0.03
WRZ 4	London	28.66	30.23	1.57
WRZ 5	Slough/Wycombe/Aylesbury	1.60	1.73	0.13
WRZ 6	SWOX	4.80	5.05	0.26
Total	Total	37.43	39.43	2.01
Line Commentary:				

This line is calculated from subtracting lines 19, 20, 21, 22, 33 and 39 from line 11.

Line	Description	2012/13	2013/14	Variance
33	Distribution System Operational Use	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	0.14	0.21	0.07
WRZ 2	Henley	0.03	0.03	0.00
WRZ 3	Kennet Valley	0.21	0.25	0.05
WRZ 4	London	4.65	5.92	1.27
WRZ 5	Slough/Wycombe/Aylesbury	0.27	0.38	0.10
WRZ 6	SWOX	0.58	0.76	0.18
Total	Total	5.88	7.56	1.67
Line Commentary:				

Distribution system operational use includes reservoir drain down losses, usage due to network maintenance activities, sewer jetting (within our water supply area), pump bearing cooling in the London ring main and use for capital works such as mains flushing during commissioning of new mains. As for previous years the analysis is based on records from the Job Management System (JMS) and recommended mains flushing volumes and rates, or other appropriate records and assumed use.

There has been an increase this year of 1.67 Ml/d to 7.56 Ml/d. This increase is due to a higher level of, primarily, clean water activities and associated flushing. Last year this work was minimised as part of our drought actions and subsequently the Olympic Games. The volume of activities has returned to more normal levels.

This year has seen a small reduction in the reservoir drain down losses, London ring main use and construction, from 2.23 Ml/d in 2011/12 to 2.04 Ml/d this year.

D: Leakage

Line	Description	2012/13	2013/14	Variance
34	Measured Non-Household - USPL	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	0.20	0.23	0.04
WRZ 2	Henley	0.05	0.05	0.00
WRZ 3	Kennet Valley	0.28	0.29	0.00
WRZ 4	London	4.72	4.73	0.01
WRZ 5	Slough/Wycombe/Aylesbury	0.43	0.46	0.03
WRZ 6	SWOX	0.93	0.96	0.03
Total	Total	6.61	6.72	0.11
Line Commentary:				

Movements in measured non-household USPL reflect the movements in total Resource Zone leakage along with the changes in the numbers of properties. Leakage per property increased in Guildford, S/W/A and SWOX, counteracting the reductions in property numbers in S/W/A and SWOX. Although leakage per property reduced in London there was an increase in the number of properties, resulting in a rise in USPL.

Line	Description	2012/13	2013/14	Variance
35	Unmeasured Non-Household - USPL	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	0.03	0.03	0.00
WRZ 2	Henley	0.01	0.01	0.00
WRZ 3	Kennet Valley	0.04	0.03	0.00
WRZ 4	London	2.03	1.97	-0.05
WRZ 5	Slough/Wycombe/Aylesbury	0.04	0.04	0.00
WRZ 6	SWOX	0.09	0.09	0.00
Total	Total	2.23	2.18	-0.05
Line Commentary:				

With the exception of a very small reduction in London all areas have seen unmeasured non-household USPL remain static compared to the previous year. The reduction in London was the result of both reducing leakage and reducing property numbers.

Line	Description	2012/13	2013/14	Variance
36	Measured household - USPL	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	0.81	1.01	0.20
WRZ 2	Henley	0.31	0.31	0.01
WRZ 3	Kennet Valley	1.49	1.59	0.10
WRZ 4	London	14.93	15.75	0.82
WRZ 5	Slough/Wycombe/Aylesbury	1.97	2.24	0.28
WRZ 6	SWOX	4.83	5.24	0.41
Total	Total	24.34	26.14	1.80
Line Commentary:				

The increase in the number of measured households is the primary cause for the increase in measured household supply pipe leakage.

Line	Description	2012/13	2013/14	Variance
37	Unmeasured household - USPL	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	2.77	3.15	0.38
WRZ 2	Henley	0.59	0.56	-0.03
WRZ 3	Kennet Valley	4.91	4.72	-0.20
WRZ 4	London	117.93	115.55	-2.38
WRZ 5	Slough/Wycombe/Aylesbury	7.04	7.35	0.31
WRZ 6	SWOX	10.61	10.30	-0.31
Total	Total	143.85	141.62	-2.23
Line Commentary:				

In 1996, we estimated supply pipe leakage to be 25% of total leakage based on one sample area covering approximately 20,000 properties and data from the DWUS monitor. Since then, we have continued to carry our further work to assess supply pipe leakage in the DWUS monitor and have updated the percentage of total leakage to take account of the number of supply pipe leaks repaired. The figure this year is 28.12%, the same as last. We assume that the average supply pipe leakage for externally metered properties is 25% of internally metered properties.

We recognise that this is an estimate of the proportion of total leakage and that there are other methods available to make this assessment based on estimating each component of leakage. However, having reviewed these methods, and having analysed their sensitivity to assumptions that need to be made, we do not consider these to be an improvement on our current approach.

We remain convinced that the most appropriate approach of evaluating supply pipe leakage levels is one that looks to measure total supply pipe leakage, rather than estimate individual components. We have continued to measure supply pipe leakage within VMR DMAs where we have full customer metering and are collecting continuous flow data for analysis from the areas in the fixed network metering trials that we initiated in 2012. We are also extending this analysis through the Water Infrastructure Network Solutions (WINS) project by including private mains (both rural and urban) and bulk supplies. The roll-out of the progressive metering programme will provide a further data set to supplement this analysis. Once we have accurate assessments of supply pipe leakage within a range of DMAs, we will then need to extrapolate to the rest of the company using cohorts of pipes based on, for example, length, material, age, diameter, surrounding soil type, etc. This work is still on-going.

Line	Description	2012/13	2013/14	Variance
38	Void Properties - USPL	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	0.13	0.14	0.01
WRZ 2	Henley	0.03	0.03	0.00
WRZ 3	Kennet Valley	0.20	0.20	0.00
WRZ 4	London	4.47	4.43	-0.03
WRZ 5	Slough/Wycombe/Aylesbury	0.26	0.30	0.03
WRZ 6	SWOX	0.50	0.52	0.03
Total	Total	5.58	5.62	0.05
Line Commentary:				

The change in the numbers of void properties across the WRZ's has been small in 2013/14 and the movement in USPL is dominated by the movement in leakage in each WRZ.

Line	Description	2012/13	2013/14	Variance
39	Distribution Losses	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	10.06	11.67	1.61
WRZ 2	Henley	2.50	2.45	-0.05
WRZ 3	Kennet Valley	17.68	17.45	-0.23
WRZ 4	London	368.23	364.02	-4.21
WRZ 5	Slough/Wycombe/Aylesbury	24.89	26.55	1.66
WRZ 6	SWOX	43.34	43.72	0.38
Total	Total	466.69	465.86	-0.83
Line Commentary:				

In all areas the changes in the level of distribution losses reflect the movements in the overall leakage levels in the WRZ's during 2012/13.

Line	Description	2012/13	2013/14	Variance
40	Total Leakage	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	14.00	16.23	2.24
WRZ 2	Henley	3.48	3.40	-0.08
WRZ 3	Kennet Valley	24.60	24.28	-0.32
WRZ 4	London	512.31	506.46	-5.85
WRZ 5	Slough/Wycombe/Aylesbury	34.62	36.94	2.32
WRZ 6	SWOX	60.29	60.83	0.53
Total	Total	649.30	648.14	-1.16
Line Commentary:				

This line is calculated by summing lines 34 to 39.

Line	Description	2012/13	2013/14	Variance
41	Total Leakage	l/prop/d	l/prop/d	l/prop/d
WRZ 1	Guildford	221.84	256.03	34.19
WRZ 2	Henley	163.64	162.49	-1.16
WRZ 3	Kennet Valley	153.93	150.63	-3.30
WRZ 4	London	182.80	179.44	-3.36
WRZ 5	Slough/Wycombe/Aylesbury	168.47	178.26	9.79
WRZ 6	SWOX	145.41	147.53	2.12
Total	Total	177.07	175.77	-1.30
Line				

Total leakage expressed in terms of litres/property/day is calculated from multiplying line 43 by 1,000 and then dividing by line 48. Changes in this line reflect changes to total leakage and property numbers.

Customers

E: Properties

The derivation of properties is detailed in Appendix 9.

Property numbers in the following tables are calculated as an average of the year start and end numbers. The figures quoted in the commentary below are the total movements during the year.

Line	Description	2012/13	2013/14	Variance
43	Unmeasured Household - Properties	000's	000's	000's
WRZ 1	Guildford	31.64	30.82	-0.82
WRZ 2	Henley	8.01	7.59	-0.42
WRZ 3	Kennet Valley	80.35	77.67	-2.67
WRZ 4	London	1899.98	1884.94	-15.04
WRZ 5	Slough/Wycombe/Aylesbury	106.85	104.29	-2.56
WRZ 6	SWOX	167.82	158.08	-9.74
Total	Total	2294.65	2263.39	-31.26
Line Commentary:				

Over the reporting year the company has seen an overall reduction in property numbers in unmeasured households of 28,458. The most significant contribution is due to 32,912 customers moving from an unmeasured tariff to a metered tariff (primarily due to the Optant metering programme). There were also 799 properties that "switched back" to an unmeasured tariff under the Optant programme.

Other significant movements include 6,643 properties being removed from the billing system (i.e. demolished), a reduction of 2,744 properties that were classified as void during the year and 4,616 properties being set up under the Sales Maximisation programme. This is the programme whereby properties that are not currently on the billing system but are active are captured and added to the system.

The remaining difference of 2,938 is attributed to natural movement in the property base.

Line	Description	2012/13	2013/14	Variance

42	Measured Household - Properties	000's	000's	000's
WRZ 1	Guildford	25.81	27.02	1.21
WRZ 2	Henley	11.62	11.73	0.11
WRZ 3	Kennet Valley	67.84	71.77	3.93
WRZ 4	London	668.55	703.14	34.59
WRZ 5	Slough/Wycombe/Aylesbury	83.01	87.17	4.16
WRZ 6	SWOX	212.44	220.06	7.62
Total	Total	1069.27	1120.89	51.62
Line Commentary:				

The company has seen an overall increase of 51,975 in measured household properties during the reporting year. The main component of this was the addition of 32,912 properties, primarily through Optant metering. There was a reduction of 799 properties that "switched back" to a measured tariff under the Optant metering scheme.

Other significant movements include the addition of 23,989 newly built residential properties, 1,721 properties that were removed from the billing system (i.e. demolished) , a reduction of 1,235 properties that were made void during the year and an increase of 493 properties that were included under the Sales Maximisation programme.

In addition to this there has been a decrease in the Domestic New Accounts Accrual of 2,167 during 2013/14. This represents properties where either full details are yet to be passed from the builder to Thames Water, or where details have been received, but a property is yet to be set up for billing.

The remaining difference of 1,967 is attributed to natural movement in the property base.

Line	Description	2012/13	2013/14	Variance
46	Unmeasured Non-Household Properties	000's	000's	000's
WRZ 1	Guildford	0.34	0.34	0.00
WRZ 2	Henley	0.10	0.09	0.00
WRZ 3	Kennet Valley	0.58	0.57	0.00
WRZ 4	London	32.70	32.21	-0.48
WRZ 5	Slough/Wycombe/Aylesbury	0.62	0.60	-0.03
WRZ 6	SWOX	1.41	1.35	-0.06
Total	Total	35.75	35.17	-0.58
Line Commentary:				

At a company level, the number of unmeasured non-household properties has reduced slightly since last year, primarily as a result of a reduction in London. The bulk of these properties are assessed properties (properties that are unable to be metered directly and are therefore charged on an assessed basis).

Line	Description	2012/13	2013/14	Variance
45	Measured Non-Household - Properties	000's	000's	000's
WRZ 1	Guildford	3.84	3.84	0.00
WRZ 2	Henley	1.14	1.11	-0.03
WRZ 3	Kennet Valley	7.84	7.91	0.07
WRZ 4	London	129.37	129.83	0.46
WRZ 5	Slough/Wycombe/Aylesbury	11.04	10.95	-0.10
WRZ 6	SWOX	25.10	24.78	-0.33
Total	Total	178.33	178.41	0.08
Line Commentary:				

There have been small movements in numbers of properties across all Water Resource Zones except Guildford during 2013/14.

Line	Description	2012/13	2013/14	Variance
44	Void Household - Properties	000's	000's	000's
WRZ 1	Guildford	1.05	1.00	-0.06
WRZ 2	Henley	0.27	0.32	0.05
WRZ 3	Kennet Valley	2.33	2.46	0.13
WRZ 4	London	53.34	54.71	1.37
WRZ 5	Slough/Wycombe/Aylesbury	2.93	3.13	0.20
WRZ 6	SWOX	5.98	6.25	0.27
Total	Total	65.90	67.86	1.96
Line Commentary:				

In the report year there has been an increase in void household properties of 1,964 properties at Company level. The largest movement was in London which shows an increase of 1,374 properties. The remaining areas saw minor movements.

Line	Description	2012/13	2013/14	Variance
47	Void Non-Household - Properties	000's	000's	000's
WRZ 1	Guildford	0.40	0.38	-0.02
WRZ 2	Henley	0.12	0.10	-0.02
WRZ 3	Kennet Valley	0.87	0.82	-0.06
WRZ 4	London	18.61	17.57	-1.04
WRZ 5	Slough/Wycombe/Aylesbury	1.06	1.09	0.03
WRZ 6	SWOX	1.88	1.79	-0.09
Total	Total	22.95	21.76	-1.19
Line Commentary:				

Overall there has been a slight reduction in the number of void non-household properties. There have been minor changes across all zones, the largest of which was in London where there was a reduction of 1,040 properties.

Line	Description	2012/13	2013/14	Variance
48	Total Properties	000's	000's	000's
WRZ 1	Guildford	63.09	63.40	0.31
WRZ 2	Henley	21.25	20.94	-0.31
WRZ 3	Kennet Valley	159.80	161.20	1.40
WRZ 4	London	2802.54	2822.41	19.86
WRZ 5	Slough/Wycombe/Aylesbury	205.52	207.22	1.70
WRZ 6	SWOX	414.64	412.31	-2.33
Total	Total	3666.85	3687.48	20.64
Line Commentary:				

This line is calculated by summing lines 42, 43, 44, 45, 46 and 47.

F: Population

The derivation of properties is detailed in Appendix 9.

Line	Description	2012/13	2013/14	Variance
50	Unmeasured Household - Population	000's	000's	000's
WRZ 1	Guildford	86.85	85.49	-1.36
WRZ 2	Henley	22.01	21.16	-0.85
WRZ 3	Kennet Valley	222.82	217.93	-4.89
WRZ 4	London	5071.17	5064.05	-7.12
WRZ 5	Slough/Wycombe/Aylesbury	303.79	299.24	-4.55
WRZ 6	SWOX	466.35	451.27	-15.08
Total	Total	6172.99	6139.15	-33.84
Line Commentary:				

All areas except London have seen a reduction in unmeasured population. The changes are due to customers moving from an unmeasured tariff to a metered tariff, (primarily due to the Optant metering programme).

Line	Description	2012/13	2013/14	Variance
49	Measured Household - Population	000's	000's	000's
WRZ 1	Guildford	57.66	60.37	2.71
WRZ 2	Henley	25.12	25.01	-0.11
WRZ 3	Kennet Valley	150.68	159.29	8.61
WRZ 4	London	1638.48	1723.75	85.26
WRZ 5	Slough/Wycombe/Aylesbury	183.15	192.38	9.23
WRZ 6	SWOX	489.32	513.08	23.76
Total	Total	2544.42	2673.88	129.46
Line Commentary:				

Increases in population reflect the both the increase in property numbers as a result of new buildings and the movement of properties between unmeasured and measured tariffs via the Optant metering programme.

The reduction in Henley is due to the changes in the WRZ boundary which moved a number of measured properties into the Kennet Valley WRZ.

Line	Description	2008/09	2009/10	Variance
29	Unmeasured Non-Household Population	(000's)	(000's)	(000's)
Line Commentary:				

As assumed in previous years this remains as zero for all WRZs. This is consistent with the fWRMP09.

Line	Description	2012/13	2013/14	Variance
51	Measured Non-Household - Population	000's	000's	000's
WRZ 1	Guildford	7.37	7.43	0.06
WRZ 2	Henley	2.40	2.35	-0.05
WRZ 3	Kennet Valley	19.06	19.22	0.16
WRZ 4	London	342.33	345.81	3.48
WRZ 5	Slough/Wycombe/Aylesbury	24.84	25.05	0.20
WRZ 6	SWOX	48.76	49.13	0.37
Total	Total	444.76	448.98	4.22
Line Commentary:				

The movements in the measured non-household populations reflect the relative movements in the overall resource zone population splits on which they are based.

Population is derived from the sum of two components:

- Population in communal establishments (obtained from 2001 census data);
- Metered subsidiary population – derived from regulatory finance accounts listing properties with domestic size pipes supplying them.

Population in communal establishments has remained the same. Metered subsidiary population has increased from 334,911 to 339,130 following updates to the numbers of residential metered subsidiary properties.

Line	Description	2012/13	2013/14	Variance
53	Total Population	000's	000's	000's
WRZ 1	Guildford	151.89	153.29	1.40
WRZ 2	Henley	49.53	48.52	-1.01
WRZ 3	Kennet Valley	392.56	396.44	3.88
WRZ 4	London	7051.98	7133.60	81.62
WRZ 5	Slough/Wycombe/Aylesbury	511.78	516.67	4.88
WRZ 6	SWOX	1004.42	1013.48	9.05
Total	Total	9162.17	9262.01	99.83
Line Commentary:				

This line is calculated by summing lines 49, 50, 51 and 52.

G: Occupancy

Line	Description	2012/13	2013/14	Variance
55	Unmeasured Household - Occupancy Rate	h/pr	h/pr	h/pr
WRZ 1	Guildford	2.75	2.77	0.03
WRZ 2	Henley	2.75	2.79	0.04
WRZ 3	Kennet Valley	2.77	2.81	0.03
WRZ 4	London	2.67	2.69	0.02
WRZ 5	Slough/Wycombe/Aylesbury	2.84	2.87	0.03
WRZ 6	SWOX	2.78	2.85	0.08
Total	Total	2.69	2.71	0.02
Line Commentary:				

This line is calculated from dividing line 50 by line 43.

Line	Description	2012/13	2013/14	Variance
54	Measured Household - Occupancy Rate	h/pr	h/pr	h/pr
WRZ 1	Guildford	2.23	2.23	0.00
WRZ 2	Henley	2.16	2.13	-0.03
WRZ 3	Kennet Valley	2.22	2.22	0.00
WRZ 4	London	2.45	2.45	0.00
WRZ 5	Slough/Wycombe/Aylesbury	2.21	2.21	0.00
WRZ 6	SWOX	2.30	2.33	0.03
Total	Total	2.38	2.39	0.01
Line Commentary:				

This line is calculated from dividing line 49 by line 42.

H: Metering

Line	Description	2012/13	2013/14	Variance
56	Total Household Metering Penetration (excl. Voids)	%	%	%
WRZ 1	Guildford	44.92%	46.72%	1.79%
WRZ 2	Henley	59.20%	60.72%	1.52%
WRZ 3	Kennet Valley	45.78%	48.02%	2.24%
WRZ 4	London	26.03%	27.17%	1.14%
WRZ 5	Slough/Wycombe/Aylesbury	43.72%	45.53%	1.81%
WRZ 6	SWOX	55.87%	58.20%	2.33%
Total	Total	31.79%	33.12%	1.33%
Line Commentary:				

This line is calculated from dividing line 42 by the sum of lines 42 and 43.

Line	Description	2012/13	2013/14	Variance

57	Total Household Metering Penetration (incl. Voids)	%	%	%
WRZ 1	Guildford	44.12%	45.93%	1.81%
WRZ 2	Henley	58.40%	59.74%	1.34%
WRZ 3	Kennet Valley	45.07%	47.25%	2.17%
WRZ 4	London	25.50%	26.61%	1.11%
WRZ 5	Slough/Wycombe/Aylesbury	43.06%	44.80%	1.74%
WRZ 6	SWOX	55.00%	57.25%	2.25%
Total	Total	31.18%	32.47%	1.29%
Line Commentary:				

This line is calculated from dividing line 42 by the sum of lines 42, 43 and 44.

Critical Period - Line Commentary

Note that for the London WRZ, Annual Average is equivalent to the Critical Period. This is because London has a large volume of raw water storage reservoirs that can be drawn on to meet peak week demand and sufficient treatment capability. Thus, short-term peaks in demand can be met by treating more stored water. Therefore in London the critical period remains the annual average. Conversely, in the Thames Valley WRZs, where there is relatively little raw water storage, there is a greater risk to supply during times of peak demand during a dry year.

Supply

A: Resources

Line	Description	2012/13	2013/14	Variance
1	Raw Water Abstracted - Critical Period	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	52.69	63.68	11.00
WRZ 2	Henley	14.25	17.04	2.79
WRZ 3	Kennet Valley	113.23	133.90	20.67
WRZ 4	London	2232.18	2257.29	25.11
WRZ 5	Slough/Wycombe/Aylesbury	138.14	171.94	33.80
WRZ 6	SWOX	383.09	347.37	-35.72
Total	Total	2933.59	2991.23	57.65
Line Commentary:				

Critical period raw water abstracted is the average abstraction made during the summer peak demand week (DI) for each WRZ. Similar to Annual Average, the values reported in Line 5 are Actual Raw Water Abstracted without any adjustment for abstraction that supplies non-public sources and returns to river. Changes in raw water reservoir levels have also not been included.

All WRZ's have seen an increase in abstraction due to the increase in demand experienced in the peak week, with the exception of SWOX, which reduced in comparison to the previous year. Abstraction in the AR13 peak week was used to fill Farmoor reservoir to a much greater extent than was the case during the AR14 peak week.

Line	Description	2011/12	2012/13	Variance
2	Raw Water Imported - Critical Period	Ml/d	Ml/d	Ml/d
Line Commentary:				

There are no raw water imports to Thames Water.

Line	Description	2012/13	2013/14	Variance
3	Potable Water Imported - Critical Period	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	0.00	0.00	0.00
WRZ 2	Henley	0.00	0.00	0.00
WRZ 3	Kennet Valley	0.00	0.00	0.00
WRZ 4	London	0.00	0.00	0.00
WRZ 5	Slough/Wycombe/Aylesbury	0.17	0.00	-0.17
WRZ 6	SWOX	1.35	0.86	-0.49
Total	Total	1.52	0.86	-0.66
Line Commentary:				

Potable Water Imports (Critical Period)				
To (WRZ)	**From**	**AR13 (Ml/d)**	**AR14 (Ml/d)**	**Change**
SWA	Anglian Water	0.17	0.00	-0.17
SWOX	Anglian Water	0.02	0.41	0.39
SWOX	Severn Trent	0.00	0.00	0.00
SWOX	SWA	1.33	0.45	-0.88
Total		1.52	0.86	-0.66

Critical period potable water imports are the actual imports made during the summer peak demand week (DI) for each WRZ.

Thames Water has no potable water imports governed by formal bulk supply agreements. However, a number of small imports exist that are not covered by formal bulk supply agreements and hence not included in the fWRMP09 or in Table 10a. These include a transfer from Anglian Water to SWA and SWOX, which averaged 0.0 Ml/d and 0.41 Ml/d respectively during the summer peak week in 2013/14. The import from Severn Trent to SWOX was not used in the 2013/14 peak week.

There is also an interzonal transfer from SWA to SWOX. This averaged 0.45 Ml/d during the summer peak week in 2013/14. A provision of 5.0 Ml/d is included in the fWRMP09.

Line	Description	2012/13	2013/14	Variance
4	Raw Water Losses and Operational Use – Critical Period	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	0.13	-0.17	-0.30
WRZ 2	Henley	-0.14	-0.09	0.05
WRZ 3	Kennet Valley	0.91	0.96	0.05
WRZ 4	London	11.68	3.44	-8.24
WRZ 5	Slough/Wycombe/Aylesbury	-0.15	-0.05	0.10
WRZ 6	SWOX	-1.11	0.51	1.62
Total	Total	11.32	4.60	-6.72
Line Commentary:				

Process losses are calculated as the difference between the volume of raw water entering treatment and the volume of potable water entering supply. Raw water losses and operational use are assumed to be 10% of total process losses in London and 15% in the remaining WRZ's.

Negative process losses are reported in Guildford, Henley and SWA. This is due to errors, in the order of +/- 1.33%, +/- 2.71%, +/- 0.15% respectively, in the measurement of Raw Water into Treatment and Treated Water into Supply. These are all within the meter verification tolerances of +/- 5%.

Line	Description	2012/13	2013/14	Variance
5	Raw Water Exported – Critical Period	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	0.00	0.00	0.00
WRZ 2	Henley	0.00	0.00	0.00
WRZ 3	Kennet Valley	0.00	0.00	0.00
WRZ 4	London	91.42	81.07	-10.35
WRZ 5	Slough/Wycombe/Aylesbury	0.00	0.00	0.00
WRZ 6	SWOX	0.00	0.00	0.00
Total	Total	91.42	81.07	-10.35
Line Commentary:				

The only raw water exports we operate are in the London WRZ, which remains as per the Annual Average.

Line	Description	2011/12	2012/13	Variance
5.1	Non Potable Water Supplied – Critical Period	Ml/d	Ml/d	Ml/d
Line Commentary:				

Thames Water has no non-potable supplies.

Line	Description	2012/13	2013/14	Variance
6	Potable Water Exported – Critical Period	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	1.79	2.45	0.66
WRZ 2	Henley	0.00	0.00	0.00
WRZ 3	Kennet Valley	0.00	0.00	0.00
WRZ 4	London	0.39	0.38	-0.01
WRZ 5	Slough/Wycombe/Aylesbury	1.76	0.80	-0.96
WRZ 6	SWOX	0.02	0.00	-0.01
Total	Total	3.95	3.63	-0.33
Line Commentary:				

Potable Water Exports (Critical Period)				
From (WRZ)	**To**	**AR13 (Ml/d)**	**AR14 (Ml/d)**	**Change**
Guildford	Veolia Water	1.79	2.45	0.66
SWA	SWOX	1.47	0.43	-1.04
SWA	Anglian Water	0.29	0.36	0.08
SWOX	Wessex Water	0.02	0.00	-0.01
Total		3.56	3.24	-0.32

Critical period potable water exports are the actual exports made during the summer peak demand week (DI) for each WRZ. Please refer to the Annual Average Commentary for potable water exports from London WRZ.

There is an export from Ladymead in Guildford WRZ to Affinity Water which averaged 2.45 Ml/d during the summer peak week of 2012/13. This is compared to an allowance of 2.3 Ml/d in the fWRMP09.

There are two transfers from SWA i.e. an export of 0.43 Ml/d to SWOX and 0.36 Ml/d from Hambledon in SWA to Anglian Water.

There is also a bulk transfer from SWOX to Wessex Water of 1.48 m^3/d.

Line	Description	2012/13	2013/14	Variance
7	Deployable Output – Critical Period	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	71.20	71.20	0.00
WRZ 2	Henley	26.30	26.30	0.00
WRZ 3	Kennet Valley	160.08	160.08	0.00
WRZ 4	London	2144.00	2150.00	6.00
WRZ 5	Slough/Wycombe/Aylesbury	209.89	210.97	1.08
WRZ 6	SWOX	371.21	369.01	-2.20
Total	Total	2982.68	2987.56	4.88
Line Commentary:				

Guildford

Critical Period (All figures in Ml/d)	2012/13	2013/14		
	Actual (AR13)	Actual (AR14)	fWRMP09 Forecast	rdWRMP14 Forecast
DO	71.20	71.20	76.70	71.20
Climate Change Impacts	0.00	0.00	0.00	0.03
Network Constraints	0.00	0.00	0.00	0.00
Guildford Constrained DO	**71.20**	**71.20**	**76.70**	**71.17**

There has been no change in constrained DO between AR13 and AR14.

WAFU is 5.50 Ml/d lower than the forecast in the fWRMP09. The largest movements from that forecast in the fWRMP09 are:

- A reduction in DO of 2.4 Ml/d at Ladymead due to reassessment of the drought curve and revised DAPWL, hind casting reduced potential yield plus the DO being limited by pump capacity, as reported in AR13;
- A reduction of 1.14 Ml/d in DO for Mousehill as a result of reduced abstraction pump capacity; as reported in AR13;
- Minor decreases in DO made to Dapdune, Netley Mill, Brook, Cotterells Farm & Shere Heath due to process losses being taken into account totalling 0.94 Ml/d, as reported in AR13; and
- A reduction of 0.8 Ml/d in DO at Dupdune due to abstraction pump performance, as reported in JR11.

The removal of climate change impacts explains the difference between AR14 and the rdWRMP14.

Henley

Critical Period (All figures in Ml/d)	2012/13	2013/14		
	Actual (AR13)	Actual (AR14)	fWRMP09 Forecast	rdWRMP14 Forecast
DO	26.30	26.30	26.65	26.30
Climate Change Impacts	0.00	0.00	0.00	0.00
Network Constraints	0.00	0.00	0.00	0.00
Henley Constrained DO	**26.30**	**26.30**	**26.65**	**26.30**

There have been no changes in DO since AR13 in Henley.

Compared to the fWRMP09, DO has reduced by 0.15 Ml/d as result of booster pump performance constraining output and 0.2 Ml/d due to clarification of Harpsden and Sheeplands DOs. Harpsden DO is now considered as the treated output from that site whereas the transfer of Harpsden raw water to Sheeplands for blending is now considered in the Sheeplands DO.

Kennet Valley

Critical Period (All figures in Ml/d)	2012/13	2013/14		
	Actual (AR13)	Actual (AR14)	fWRMP09 Forecast	rdWRMP14 Forecast
DO	160.08	160.08	177.55	160.08
Climate Change Impacts	0.00	0.00	4.44	0.26
Network Constraints	0.00	0.00	0.00	0.00
Kennet Valley Constrained DO	**160.08**	**160.08**	**173.11**	**159.82**

There has been no change in constrained DO between AR13 and AR14.

Critical period DO has reduced by further 11.75 Ml/d since the fWRMP09. The significant reductions are:

- A reduction in DO of 4.3 Ml/d at East Woodhay due to power restrictions at East Woodhay limiting borehole pumping capacity.
- The peak DO of Mortimer (4.55 Ml/d) was previously shown as an outage but is now assessed as disused as there are no plans to re-commission the source.
- The reduction in the Bishops Green DO (2.20 Ml/d) is due to reconsideration of deepest advisable pumping water level (DAPWL) based on fissure zone in ABH3.
- A reduction of 0.2 Ml/d due to power restrictions at East Woodhay preventing both borehole pumps being run together.
- The remaining difference is the result of minor adjustments across a number of other sources.

The removal of climate change impacts accounts for the additional difference between AR13 and the fWRMP09 Constrained DO as well as the variance to the rdWRMP14.

Slough/Wycombe/ Aylesbury

Critical Period (All figures in Ml/d)	2012/13	2013/14		
	Actual (AR13)	Actual (AR14)	fWRMP09 Forecast	rdWRMP14 Forecast
DO	215.09	216.17	223.61	215.09
Climate Change Impacts	0.00	0.00	0.77	0.13
Network Constraints	5.20	5.20	5.20	5.20
SWA Constrained DO	**209.89**	**210.97**	**217.64**	**209.76**

There has been a 1.08 Ml/d increase in DO in Slough/Wycombe/Aylesbury since AR13, due to a change to SDO at Hampden, as part of the March 2014 revision of SDO (see Appendix 3).

Critical period DO is 6.67 Ml/d lower than the fWRMP09. The largest movements are:

- A reduction in DO of 2.3 Ml/d at Dorney following revised summary diagram due to review of data, as reported in AR13;
- A reduction in DO of 1.24 Ml/d at Hawridge due to reassessment of the drought curve and hind casting reducing the potential yield, as reported in AR13;
- A reduction in DO of 2.3 Ml/d is as a result of a review of the Dorney source deepest advisable pumping level being re-defined and a revision of the WTW disinfection capability at Hampden, as reported in JR11.

The removal of climate change impacts accounts for the additional difference between AR14 and the fWRMP09 Constrained DO.

The removal of climate change impacts and the AR14 DO revision account for the variance to the rdWRMP14.

SWOX

Critical Period (All figures in Ml/d)	2012/13	2013/14		
	Actual (AR13)	Actual (AR14)	fWRMP09 Forecast	rdWRMP14 Forecast
DO	373.85	372.66	384.29	373.85
Climate Change Impacts	0.00	0.00	2.72	0.52
Network Constraints	2.64	3.65	9.58	4.30
SWOX Constrained DO	**371.21**	**369.01**	**371.99**	**369.03**

There has been a reduction in constrained DO of 2.20 Ml/d in SWOX since AR13 due to a small increase in network constraints and the March 2014 revision of SDO (see Appendix 3).

Critical period DO has reduced by 11.63 Ml/d from the forecast in the fWRMP09. The AR13 review of Source Deployable Outputs (SDOs) reduced DO significantly in SWOX and counteracted some of the previous increases resulting from the enhanced Gatehampton/Compton licence transfer scheme delivery in 2010/11, reviews of Source Deployable Outputs (SDOs) undertaken in July 2009 and March 2010 and amendments to the peak DO's of the Chinnor and Britwell groundwater sources reducing from the increase due to the Gatehampton/Compton licence transfer scheme.

The removal of climate change impacts and the resolution of some network constraints account for the remaining difference between the AR14 and fWRMP09 Constrained DO.

The AR14 review of SDO's, the removal of climate change impacts and a difference in the impact of network constraints accounts for the difference between the AR14 and rdWRMP14 Constrained DO.

B: Process Losses

Line	Description	2012/13	2013/14	Variance
9	Treatment Works Losses and Operational Use	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	1.14	-1.54	-2.68
WRZ 2	Henley	-1.29	-0.85	0.44
WRZ 3	Kennet Valley	8.27	8.80	0.53
WRZ 4	London	136.60	158.36	21.76
WRZ 5	Slough/Wycombe/Aylesbury	-1.37	0.15	1.51
WRZ 6	SWOX	-9.99	4.61	14.60
Total	Total	133.36	169.52	36.16
Line Commentary:				

Process losses are calculated as the difference between the volume of raw water entering treatment and the volume of potable water entering supply. Treatment Works losses and operational use are assumed to be 90% of total process losses in London and 85% in the remaining WRZ's.

Negative process losses are reported in Guildford and Henley. This is due to errors, in the order of +/- 1.33% and +/- 2.71% respectively, in the measurement of Raw Water into Treatment and Treated Water into Supply. These are all within the meter verification tolerances of +/- 5%.

There were abstractions during the summer peak week, that supply non-public sources at Sewage Treatment Works (STWs) which are included as treatment works operational use. These are listed below:

Non-Public Supply (Critical Period) - Treatment Works Ops Use		
Site	**WRZ**	**(Ml/d)**
Slough STW	SWA	0.36
Iver South STW	SWA	0.24
Total		**0.60**

There were returns to river at Fobney Water Treatment Works during the summer peak week.

Returns to River (Critical Period)- Treatment Works Ops Use		
Site	**WRZ**	**(Ml/d)**
Farmoor WTW	SWOX	0.00
Fobney WTW	Kennet Valley	0.10

Line	Description	2012/13	2013/14	Variance
10	Outage Experienced	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	2.08	0.81	-1.27
WRZ 2	Henley	0.00	0.00	0.00
WRZ 3	Kennet Valley	0.02	1.81	1.79
WRZ 4	London	120.28	65.79	-54.49
WRZ 5	Slough/Wycombe/Aylesbury	18.30	13.84	-4.46
WRZ 6	SWOX	3.83	4.18	0.35
Total	Total	144.51	86.43	-58.08
Line Commentary:				

Annual average actual outage is reported here. Please refer to the annual average commentary.

Demand

Line	Description	2012/13	2013/14	Variance
11	Distribution Input	Ml/d	Ml/d	Ml/d
WRZ 1	Guildford	49.29	62.71	13.43
WRZ 2	Henley	15.51	17.81	2.30
WRZ 3	Kennet Valley	102.23	122.33	20.09
WRZ 4	London	1987.99	2013.47	25.48
WRZ 5	Slough/Wycombe/Aylesbury	137.15	170.15	33.01
WRZ 6	SWOX	278.37	327.56	49.19
Total	Total	2570.53	2714.03	143.49
Line Commentary:				

Critical Period DI for the Thames Valley WRZs is derived by calculating average day peak week (ADPW) for each WRZ. This is done by calculating a rolling seven-day average of measured DI and taking the highest weekly average during the summer.

There are increases in DI in all zones for 2013/14 which reflects the warmer and drier weather experienced during the year than was the case in 2012/13.

Sections C-H, Lines 19-57

To populate the remaining lines the annual average water balance components have been peaked using peaking factors derived from 2012/13 data. To reconcile the peak water balance components with the 2012/13 observed ADPW DI, the peaking factors were adjusted downwards proportionally. This ensures that our approach remains consistent between these tables and the fWRMP09.

Confidence Grades:

There are no confidence grades associated with this table.

Appendix 3: AR14 Deployable Output Update

London's Deployable Output for AR14 Update April 2014

An update of the review of the Deployable Output (DO) for London for the Annual Return 2014 has been undertaken which reflects the latest information from a variety of sources across the Company. This analysis has been undertaken to the nearest 1 Ml/d for London.

The review has assessed the following scenarios:

	Steps	Ave. D.O. Ml/d	Description
1	AR13	2144	Annual Return 2013
2	Axford	2145	Annual licence & Base DO changes
3	SDO Updates March 2014	2143	Groundwater SDOs reviewed
4	Hoddesdon	2133	Review of pumping capability
5	Didcot	2150	Review of demand

1. The Annual Return 2013 DO of 2144 Ml/d is the starting point for this update.

2. As of 1 April 2013 the Axford annual licence was changed from 4049 to 3660 Ml and the Base SDO from 11.1 to 10 Ml/d as part of sustainability reductions. This increases London DO by 1 Ml/d to 2145 Ml/d and was included in the WRMP14.

3. The Water Modelling Groundwater Team completed reviews of Source Deployable Outputs (SDOs) in March 2014. The largest change is at Merton where the SDO is now 0 Ml/d; a loss of 2.27 Ml/d. This site requires total refurbishment and therefore the status has been changed to disused. Other changes are marginal ones at Epsom, Eynsford, Horton Kirby and Southfleet. This review of SDOs decreases London DO by 2 Ml/d

4. Hoddesdon drought output was amended to reflect reviewed pumping capability. This decreases London DO by 10 Ml/d.

5. Station A at Didcot Power Station was closed by npower in 2013 and an agreement has been reached with npower that allows Thames Water to utilise the water not abstracted as a result of this closure. This increases London DO by 17 Ml/d.

Note: the step change in DO will not necessarily be even as with changes to schemes or assumptions. This is because the analysis is dependent upon the steps of the demand forecasts, the level of demand, the assumptions within the Lower Thames Operating Agreement and other factors used to produce the DO.

SWOX (Swindon, North & South Oxon.) Deployable Output

	Steps	Ave. D.O. Ml/d	Peak D.O. Ml/d	Description
1	AR13	319.5	373.9	Annual Return 2013
2	SDOs Updates March 2014	318.5	372.7	Groundwater SDOs reviewed

1. The DOs as submitted in the Annual Return 2013 are the starting point for the update.

2. The Water Modelling Groundwater Team completed reviews of Source Deployable Outputs (SDOs) in March 2014. As part of sustainability reductions the Axford annual licence was decreased from 4049 to 3660 Ml/d and the Base SDO from 11.1 to 10 Ml/d. The only other change in SWOX was that Bedwyn Peak SDO increased marginally by 0.07 Ml/d. These changes decrease SWOX Average DO by 1 Ml/d and Peak DO by 1.2 Ml/d.

Summary of DO changes

In addition to the changes in London and SWOX there are changes in SWA DYCP only.

The summary of the Dry Year Annual Average (DYAA) DO's is as follows:

Supply (Ml/d)	London	SWOX	Kennet Valley	Henley	SWA	Guildford
DYAA DO 2012-13	2144	319.5	137.1	25.7	186.3	65.0
DYAA DO 2013-14	2150	318.5	137.1	25.7	186.3	65.0
DO Difference	6	-1.0	0.0	0.0	0.0	0.0

The summary of the Dry Year Critical Period (DYCP) is as follows:

Supply (Ml/d)	London	SWOX	Kennet Valley	Henley	SWA	Guildford
DYCP DO 2012-13	N/A	373.9	160.1	26.3	215.1	71.2
DYCP DO 2013-14	N/A	372.7	160.1	26.3	216.2	71.2
DO Difference	N/A	-1.2	0.0	0.0	1.1	0.0

DYCP Notes:

Slough, Wycombe and Aylesbury

The only SDO change was Hampden which increased by 1.08 Ml/d through hind casting revision which increases SWA DYCP DO by 1.1 Ml/d.

Appendix 4: Summary of Thames Water Outages for 2013-14

1. Introduction

The Company reports on "Actual Outages" in the Annual Return to the Environment Agency and "Outage Allowance" in the Security of Supply Index Annual Return. This allows Actual Outage to be compared with the Outage Allowance, the planning outage. Information has been collated for the period from April 2013 to the end of March 2014 and an assessment of the Actual Outage for 2013-14 has been made together with an update of the Outage risk assessment; the Outage Allowance.

2. London Outage

The collated events for London are summarised in Table 29 below. The impact of these outages on the major Water Treatment Works are assessed using WARMS and input as a cumulative impact across the year. This is because the outages at the various works occur at different times throughout the year and influence how water is supplied to Thames Water customers. The result is an outage of 11 Ml/d, which when added to the outages at the smaller works gives a total London Outage of 65.8 Ml/d, which is a decrease in Actual Outages for London over the reporting period of 54.5 Ml/d compared to last year's figure of 120.3 Ml/d.

3. Thames Valley Outage

The collated events for Thames Valley are summarised in Table 30. The largest of the Outages has occurred in Slough, Wycombe & Aylesbury (SWA) with 13.8 Ml/d as a result of the refurbishment of Pann Mill. There are a number of events that have contributed to outage in SWOX with a number of sites being re-furbished. Overall there has been a little change in the level of outages in the reminder of the Thames Valley over the reporting period.