

**2014 WATER RESOURCES MANAGEMENT PLAN  
ANNUAL REVIEW (2017)**



**SOUTH STAFFORDSHIRE  
WATER PLC**

**Cambridge Water Region**

# WATER RESOURCES MANAGEMENT PLAN ANNUAL REVIEW 2017

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## EXECUTIVE SUMMARY

- **Implementation of the 2014 Water Resources Management Plan**

The Company has separate Water Resources Management Plans for both regions of operation; Cambridge (CAM) and South Staffs Water (SST). This annual report relates to the Cambridge region only. However, some of our performance commitments are combined across the two regions.

The Company has achieved almost all of its 2016/17 targets and outputs published in the 2014 Water Resources Management Plan (WRMP14) for the Cambridge region and water resources zone and has not made any changes to the plan. The Company has failed to achieve the regional leakage target (ODI Performance Commitment) for the year of 13.5 MI/d by 0.8 MI/d (6%).

The WRMP14 includes a number of scenarios to take account of emerging risk to licenced volumes as a result of Water Framework Directive legislation, the No Deterioration principle, and the Environment Agency approach to the removal of the presumption of renewal principle for time limited licences. We did not include any of these risks in the WRMP14 supply demand balance, in accordance with the guidance from the Environment Agency. However, these issues represent substantial uncertainty and introduce significant risks to the future supply demand balance. We continue to explore them with the Environment Agency.

The Cambridge region is an area of significant growth and development. This, alongside the supply side pressures mentioned above, increases risk around resilience of water supplies to customers for the future. We have begun consultation on our next plan, WRMP19, during 2016-17. These risks and the implications will be considered in greater detail in the preparation of the WRMP19.

- **Levels of Service**

In the CAM region, the Company has not imposed a temporary use ban within the report year and has made no change to its planned level of service for temporary use bans.

- **Leakage**

The CAM region has failed to achieve its Ofwat leakage target with an outturn total leakage figure of 14.32 MI/d against a WRMP14 target of 14.00MI/d, and the performance commitment Outcome Delivery Incentive (ODI) of 13.5MI/d.

Further details of the Leakage ODI and performance outturn are

published in the 2017 'Annual Performance Report' submitted to Ofwat as a public document.

- **Water Efficiency**

Water efficiency performance is measured by Per Capita Consumption. This is a performance measure which is an average across the Company's two regions of operation. The average Per Capita Consumption (PCC) outturn for 2016/17 is 129.85 ltrs/head/day against a target of 130.15ltrs/h/d. This continues to be a positive movement towards the Company's AMP6 targets for reducing average Per Capita Consumption. Per Capita Consumption for measured and unmeasured households in the Cambridge region are reported separately in the data table.

The Water efficiency target is applicable across both regions therefore the commentary is repeated in both Annual Reviews.

Further details of the Water Efficiency ODI and performance outturn are published in the 2017 'Annual Performance Report' submitted to Ofwat as a public document.

- **Metering**

There has been no change to the metering policy in the CAM region during 2016/17.

The number of new household connections made during the year was 1,878 and new non-household connections made was 67. There were 770 household optants and 67 non household optants. A total of 2,648 household meters were installed and 67 non-household meters. This is lower than forecast optants, and higher than forecast new household connections compared to that forecast in the WRMP14.

- **Customer Demand**

Annual average distribution input was 79.32MI/d (post MLE) compared to 76.04 (post MLE) 15/16. This continues to reflect an overall increasing trend over recent years and reflects higher household, non-household consumption and leakage.

- **Sustainability Reductions**

No reductions have been made to Deployable Output during 2016/17 as a result of Sustainability Changes. However, the Company is on target for implementation of its National Environment Programme (NEP) obligations.

- **Expectations for 2017/18**

For 2017/18 annual average demand in the Cambridge region is

expected to follow a similar trend as in previous years. The number of new household properties in 2017/18 is expected to increase further. Cambridge is an area of growth and it is anticipated that levels of new development will continue to increase in the region in line with the WRMP14 forecasts and begin to reflect the extensive development activity in the region.

The Company continues to take an active part in the North West Cambridge project and will welcome involvement in similar projects in the future. We are supportive of council local plans to require buildings to meet a maximum Building Regulations standard of 110l/p/p/d, and is seeking to proactively engage with developers to incorporate site wide water recycling schemes.

There are some signs of recovery and significant growth in the biomedical research campus at Addenbrookes as well as a number of similar development projects across Cambridgeshire. These are likely to be completed before the end of AMP6. It should be noted that significant volumes of water are consumed during the construction phase of such developments

Leakage will continue to be a key Performance Commitment and priority during 2017/18. Our methodology to reporting leakage is being reviewed, and we will be investing in improvements to monitoring in the network to aid both active leakage control and to better understand all components of consumption. This includes night use monitors, smart metering, fast logging and the reduction in size of some larger DMAs will continue. This will support a continued integrated leakage strategy across both regions targeting performance below the Performance Commitment target across the AMP6 period.

In preparation of the next Water Resources Management Plan and for potential supply demand balance pressures we are reviewing our demand management options. This includes increasing the current level of water meter penetration

Our water efficiency strategy and customer engagement in the Cambridge region will continue to follow the successes from previous year's projects and reflects a segmented approach to our customers resulting in more effective and efficient engagement.

- **Forward Look**

The final approved WRMP14 came into effect on 1 April 2015.

The WRMP14 does not forecast a supply demand deficit within the 25

year planning horizon; therefore major resource development or increased demand management measures were not required to meet a supply shortfall for the period 2015-2040.

This outlook may be subject to change in our next WRMP as a result of emerging risks to licences and to the surplus supply over forecast demands. These uncertainties arise from changes to EA policy and the requirements of the Water Framework Directive, and we continue to work with the EA to minimise the impacts in future WRMPs.

Our aim is to continue to maintain the highest levels of drinking water quality and security of supply to our customers.

We have in place a number of actions to ensure the 2017/18 leakage target is achieved, and will actively encourage our customers to be more water efficient in order to manage demands.

Promoting Water Efficiency and increasing the Company's engagement with customers will continue to be a high priority over the remaining years of AMP6. This will be done through increasing partnering arrangements where possible, having a high profile at community events, offering advice and devices free of charge through various forms and channels. We are currently in the development stages of a new customer engagement trial for 10,000 households in our Cambridge region. Watersmart goes live in October 2017 and the trial will last for 12 months. This is the first trial of this product within the UK and will potentially influence customer behaviour through the provision of on-line data.

The North West Cambridge rainwater harvesting project continues to progress well with construction work scheduled for completion during 2017, on-site monitoring and evaluation of performance has already been initiated. We have included the expected efficiency savings in our demand forecasts.

# 1 Introduction

Following the acquisition of Cambridge Water by South Staffordshire Water, and unification on 1 April 2013, South Staffordshire Water comprises 2 geographically separate and distinct Water Resources Zones. As the Water Resources Zones are distinctly separate, each has its own Water Resources Management Plan, and an annual review is undertaken separately for each region.

South Staffordshire Water published its current Water Resources Management Plan (WRMP14) for the Cambridge Region resource zone in June 2014, and this plan came into effect from 1 April 2015 for the period 2015/16 to 2039/40. This annual review is the second review of this current WRMP.

Since 2012, annual June Return data provided to Ofwat has been replaced by annual reporting against a number of Key Performance Indicators (KPIs). The annual outturn data reported in internal and external KPIs covering the period 1 April 2016 to 31 March 2017 is used to inform this review, and the data table presented in Appendix 1 on the request of the Environment Agency. This is consistent with the latest guidance from Defra and the Environment Agency.

This review is a statutory requirement of the Water Industry Act 1991 (as amended by the Water Act 2003), which states that:

Before each anniversary of the date when its plan was last published, the water undertaker shall –

- (a) review its plan; and
- (b) send a statement of the conclusions of its review to the Secretary of State

The purpose of the annual review is to identify any material changes to the WRMP, and to report on progress made in updating and implementing the plan, hence this review includes commentary on the plan effective in the reporting period and takes a forward look to what the next WRMP may include. The review has been undertaken in accordance with the latest guidance published by the Environment Agency, which advises that the following information should be contained in the annual review:

- an overall summary of the supply demand balance situation
- progress on the areas for improvement identified by Defra and the Environment Agency at the time of publication of the final WRMP

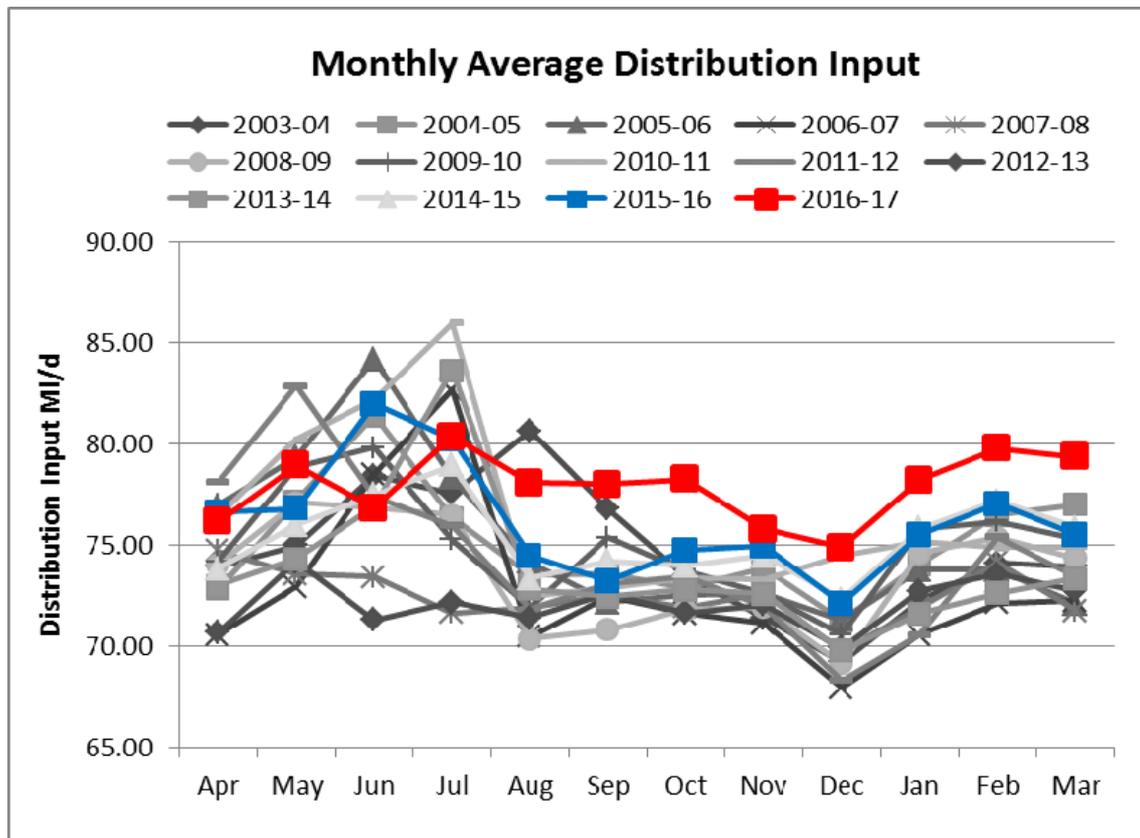
- progress with implementation of the WRMP
- changes to the components of the WRMP, such as bulk supply agreements, deployable output and other changes to the forecast
- A forward look to highlight challenges, risks and milestones.
- Any new approaches or information that could affect the supply demand balance or components of the WRMP

## 2 Overview of 2016/17

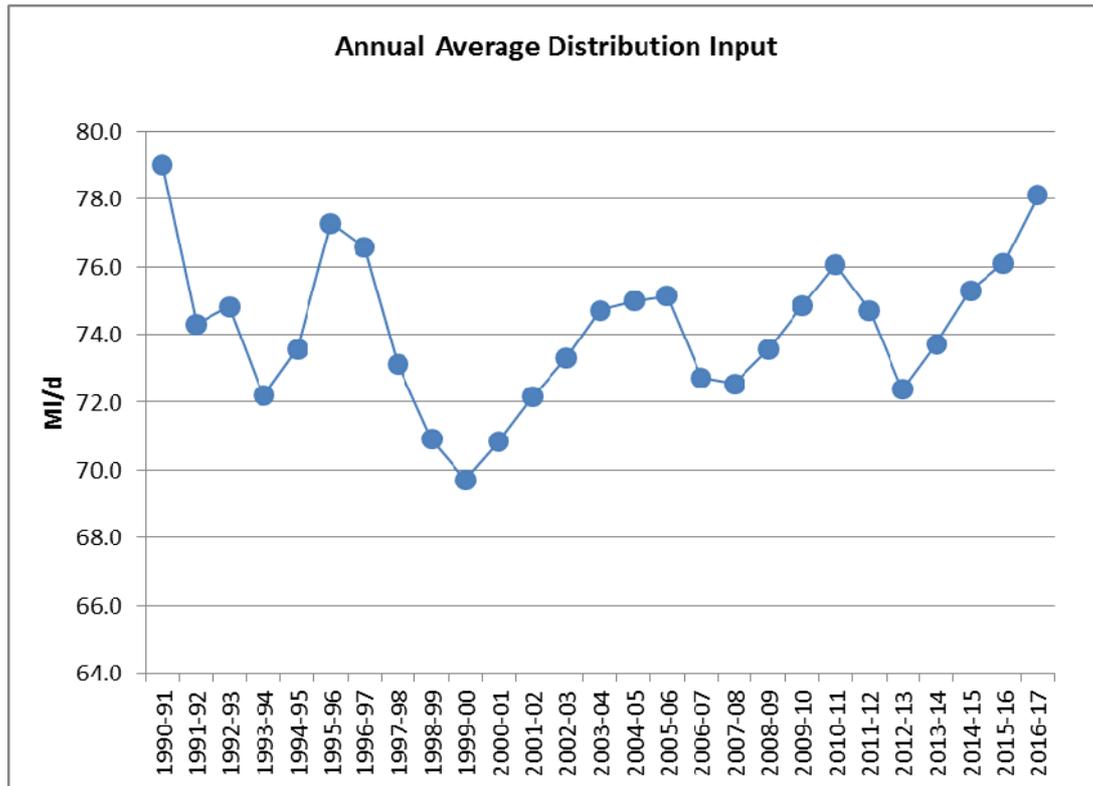
Average distribution input for the year was 78.1MI/d (79.3MI/d post MLE) with a peak week demand in July 2016, where average distribution input was 86.6MI/d and with a peak day of 92.1MI/d. The monthly average daily demand profile and comparison with previous years is shown in the chart below, indicating a fairly typical average year in the first 4 months, and then a high demand year for the remainder of the year, following the summer peak.

The annual average distribution input for 2016/17 was 3.26MI/d higher than 76.04MI/d seen in 2015/16 (post MLE), and lower than the (79.08MI/d) dry year forecast in the 2014 WRMP.

The table below compares average distribution input over recent years (pre MLE values)



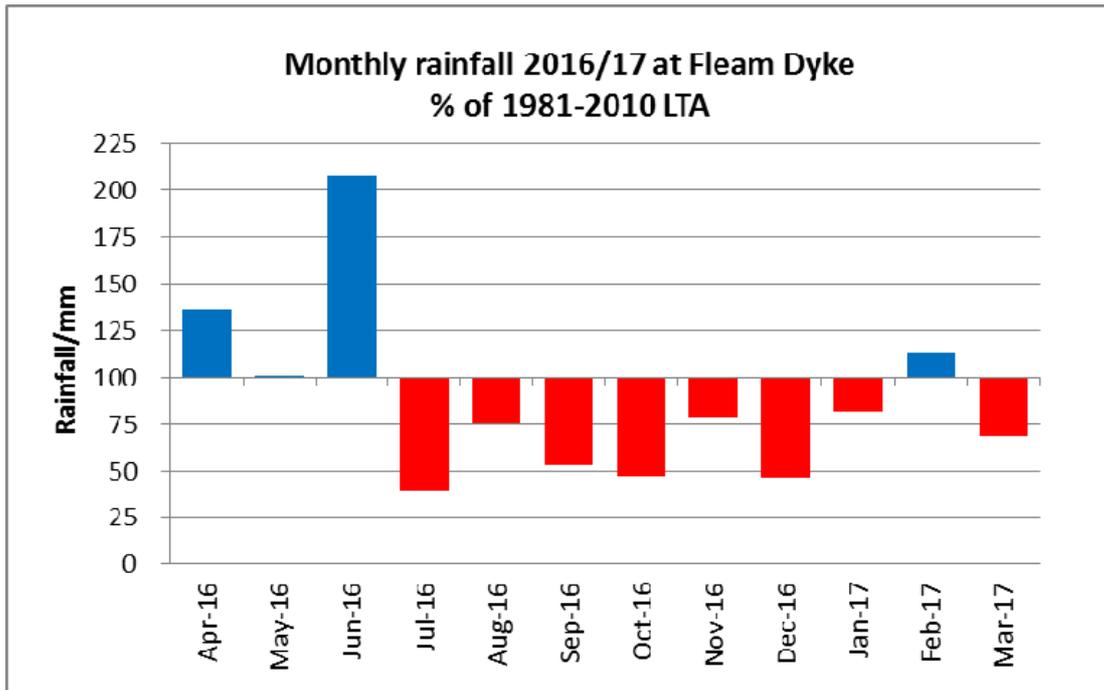
The trend in annual average distribution input between 1990 and 2017 is shown in the following chart.



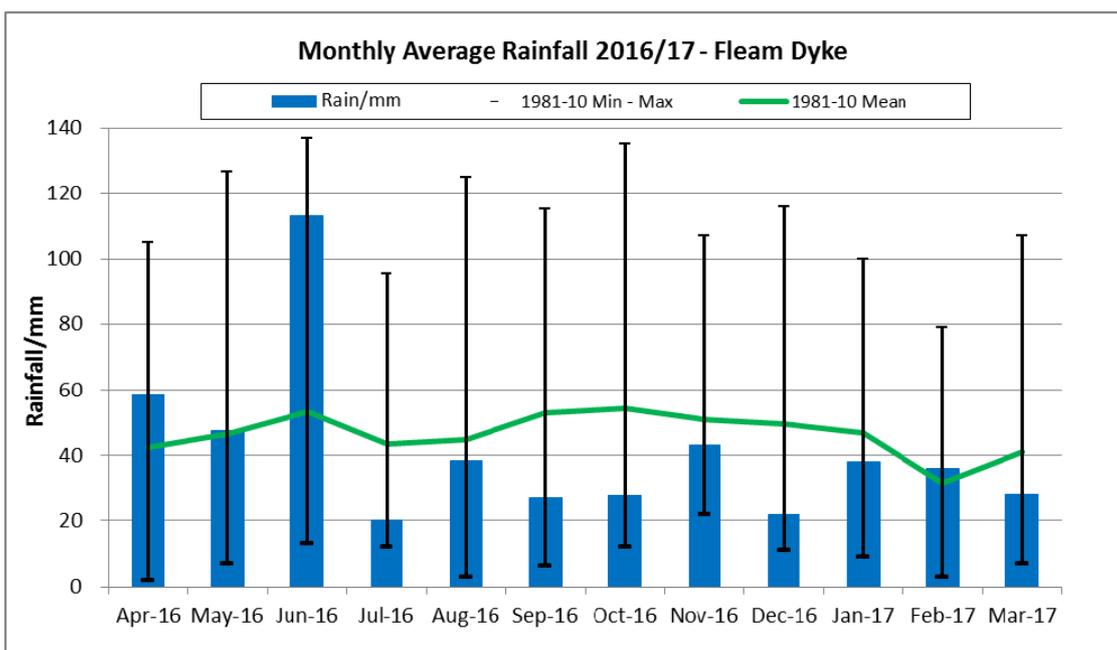
This appears to show that there is no clear long term trend in demand over the period. There is however a rising trend in the last 4 years, which indicates that the significant growth and development in the Cambridge area is starting to increase demand. A similar rising trend is seen prior to the 2011-12 prolonged period of dry weather, which could indicate a rising trend which is only curbed by additional awareness of water efficiency and media coverage at such times, when neighbouring companies also had temporary use bans in place. However, it is difficult to confirm an overall long term trend against these and other factors which impact on demand such as weather.

Total annual rainfall for the report year was 500mm, 86% of the long term average, as measured from 1981 to 2010. Monthly rainfall in comparison to annual long term averages is shown below. Whilst the average rainfall over the year is below the long term average, the winter recharge period was in particular consistently below average.

At the start of the period, Soil Moisture Deficit (SMD) was around or slightly below average, and from November to December was higher than average as a result of reduced rainfall in the main groundwater recharge period, increased levels of rainfall during the Spring saw the SMD return to average values by the end of the year.



Borehole levels declined through November to March, remaining below average at most indicator sites throughout the period, and at the end of the period borehole levels remain below average for the time of the year. Drought trigger thresholds for enhanced monitoring were reached in November, and the recharge deficit calculation commenced. By the end of the report year the recharge deficit was -49mm, and thresholds for drought triggers D1/D2 had been reached. As a result, the actions for additional leakage effort and enhanced communications have been implemented.



### 3 General Water Resources Components

The guidance from Defra and the Environment Agency suggests a format for reporting on individual items in this annual review. Items are categorised according to whether or not their reporting requirement is triggered by change. The tables below, and in the following sections offer comments on all those items listed in the guidance. Additional commentary is included, where appropriate.

Item	Description	Review Criterion	Company Comment on Review
Water resource zones	Any changes to boundaries	Requirement triggered by change	There have been no changes to the Cambridge region water resources zone boundary, which remains a single water resource zone for the region.
Levels of service	Any changes to the proposed target level of service	Requirement triggered by change	There is no change to the target level of service identified in the WRMP14. We consulted on a revised draft Drought Plan in 2016/17, but this does not propose changes to our LoS. Forecast levels of service are; Temporary Use Ban not more than one in every 20 years; and Non-Essential Use Ban not more than once every 50 years.
Progress against outcomes	Where relevant to the delivery of the WRMP, progress	New requirement to report on	The Company has a suite of performance commitments of which

and performance commitments	against achievement of customer outcomes and performance commitments of the business plan	ODI progress if applicable.	there are some directly related to the WRMP14; leakage and water efficiency. These are discussed in section 5.
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### 3.1 AMP6 Performance Commitments

For the 2015-2020 business plans, the Company has agreed with the regulator Ofwat, a number of Outcome Delivery Incentives, and associated performance commitments. Of these, four are Outcomes relating to environmentally sustainable operations; leakage, water efficiency (measured by household pcc), biodiversity and carbon emissions.

Two of these are directly related to the WRMP, our water efficiency commitment and leakage commitment, and these are discussed in Section 5: Demand. Carbon emissions and biodiversity are indirectly linked to Supply in the WRMP as they can be impacted by water resources operations and options; and can feature as improvements that benefit flows for the NEP respectively.

The water efficiency target has been developed to apply across the 2 regions of the Company so that we are able to report on combined progress. The commitment is measured by a reducing average per capita consumption across the regions, which is the overall effect of our water efficiency and customer awareness programme. The target equates to at least the 1 litre/property /day reduction that is defined in the 2014 WRMP.

The Company leakage target is separate for each region and water resources zone, and for 2015-2020 there are financial rewards and penalties associated with achievement of the target. For this purpose, our leakage commitment in the CAM region is 13.5 MI/d, 0.5MI/d below the figure defined in the WRMP.

## 4 Supply

Item	Description	Review Criterion	Company Comment on Review
Deployable output	Any changes to deployable output	Requirement triggered by change	A review of deployable output estimation was undertaken in preparation for the 2014 WRMP. This and other changes to DO is described in Section 4.1. A further review is underway in preparation for the 2019 WRMP.
Climate Change Impact on Supply	Any changes in assessment of impacts	Requirement triggered by change	The Company reviewed the vulnerability of its sources to climate change on supply, and the sensitivities of medium to high impacts on available supply for the 2014 WRMP. No changes have been made in the period. Further work on the impacts of climate change is underway in preparation for the 2019 WRMP.
Outage	Explain reasons for any outage incidents and any work being done to reduce outage	Requirement	Outage in the review period is described in Section 4.3

Bulk supply	Explain any changes to bulk supply agreements	Requirement triggered by change	2 additional bulk supply agreements came into effect in 2015-16, details are in section 4.4. There have been no further changes to bulk supply agreements in 2016/17.
Sustainability reductions	Detail any alterations to the sustainability changes required  Report on progress with implementation of sustainability changes	Requirement triggered by change  Requirement	A revised table of Sustainability changes was provided by the Environment Agency in the period. Details are indicated in section 4.5  Reductions of 5.42MI/d due to confirmed sustainability changes are included in WRMP14. No reductions to the baseline DO have been made during 2016/17 as a result of progress with implementation of schemes, in accordance with the current guidance. Details of current scheme progress is in section 4.6

#### 4.1 Deployable Output

The Company undertook a comprehensive review of its deployable output assessment for the WRMP14 and revised Source Reliable Output reports for each source. The dry year annual average deployable output reported in WRMP14 was 113.36MI/d.

This figure included deployable output from Croydon and Kingston. These were both removed from supply prior to the plan being concluded, but at the time there was a view that they may be rehabilitated and returned to availability. It is now expected that works will commence to potentially re-introduce these sources during AMP6. However, until a firm plan is in place the output from these sources has been removed from the deployable output calculation for AMP6.

Similarly, a long term outage at Fleam Dyke 12, the satellite borehole to the main Fleam Dyke site continues. Works have already commenced to investigate the viability of re-introduction during AMP6. The loss of deployable output attributable to Fleam Dyke 12 was previously included as outage but is now included as a change to deployable output. Current plans are to re-commission the source in 2017-18. At this point the output from the source will be added back into deployable output.

The combined impact of Croydon, Kingston and Fleam Dyke 12 is a 5.29 MI/d reduction to Deployable Output. Some of this will be recovered next year if works at Fleam Dyke are completed and during 2017/18 we will have a clearer view on the requirements for recommissioning Croydon and Kingston which may further restore deployable output within AMP6. The WRMP14 DO also included Horseheath which was planned to be re-commissioned during 2015-16, however this was delayed, and was finally completed in 2016-17.

The reduction to deployable output included in the previous annual review has not been entirely offset by the return of the Horseheath source, as it is only being utilised at 1.7MI/d, as a result of on-going Water Framework Directive (WFD) requirements to manage the risk of deterioration to WFD status of waterbodies, and in agreement with the EA. As a result deployable output is 0.6MI/d lower than it would have been had Horseheath been reintroduced at the full volume originally envisaged for the site.

A further reduction to deployable output at Westley due to pressure constraints within the network with other sources operating in combination continues from 2015-16, resulting in a 0.79MI/d reduction to deployable output for 2016-17.

These changes result in an actual Deployable Output for 2016-17 of 106.68MI/d, a reduction of 5.8% from that estimated in the WRMP14.

## **4.2 Impact of Climate Change on Supply**

In accordance with the planning guidelines the Company performed a vulnerability assessment of all sources to climate change impact for the WRMP14. From the initial vulnerability assessment 8 sources were carried forward for more detailed analysis applying a range of climate change scenarios and the impact of these on groundwater recharge. This concluded

that the impact from climate change in an annual average year was minor, and only three sources would be of high vulnerability. Once taken into the context of total deployable output and likely changes, a reduction of <1MI/d (-2.1%) would be the most significant overall change to deployable output from climate change impacts. There has been no change to this assessment during the report period. However, for the next WRMP we have started work to further develop our methodology for assessing the impacts of climate change in the CAM region.

During the year we commissioned consultants to further review our Source Reliable Output (SRO) assessments to include more serious drought conditions than historically experienced, in order to inform our Drought Plan review.

### 4.3 Outage

For the WRMP14 the outage allowance was reassessed, resulting in an outage allowance of 8.48MI/d, which represents a reduction in relation to the previous plan of 3.7MI/d.

Actual outage for the 2016/17 period was 11.53MI/d, of which 3.6MI/d was unplanned outages. Long term outage at Croydon, Kingston, and Fleam Dyke 12 sources has been included as reductions to deployable output, as these sites were not in operational use during the year. As a result unplanned outage has been reduced by equivalent reductions to deployable output. Overall outage has increased, planned outage accounts for this increase, as unplanned outage is similar to the previous year.

Details of changes to deployable output are included in section 4.1

Planned outages were a combination of brief downtime for operational requirements and of the continued programme of treatment improvements at all source works, to remove gas chlorination and the addition of UV.

The unplanned events are summarised in the table below.

#### Unplanned outage

Source	Outage/days	deployable output/MI/d	Outage Cause
Abington Park	79.7	1.00	asset failure: pump
Abington Park	8	1.00	water quality: turbidity
Babraham	4.5	9.09	asset failure: treatment, pump

Brettenham	6.0	3.60	asset failure: treatment
Dullingham	29.9	3.60	asset failure: treatment
Duxford Airfield	25.8	4.56	asset failure: treatment
Duxford Airfield	2.6	4.56	water quality: turbidity
Fowlmere	1	3.60	asset failure: treatment
Gt Chishill	15.9	1.06	asset failure: treatment
Fulbourn	36	1.49	asset failure: treatment
Hinxton Grange	77.7	5.77	water quality: turbidity
Hinxton Grange	7.7	5.77	asset failure: treatment
Lowerfield	1.6	3.41	water quality: turbidity
Lowerfield	17.9	3.41	asset failure: treatment
Weston Colville	8.1	2.92	water quality: turbidity
Weston Colville	2.3	2.92	asset failure: treatment
Sawston	45	1.49	asset failure: treatment

#### 4.4 Bulk Supplies

Agreements for two additional bulk supplies to Anglian Water commenced in April 2015. These new arrangements at Barnham Cross and Northstowe represent an agreed maximum volume of 0.25Ml/d and 0.65Ml/d respectively. There have been no further changes during 2016/17.

#### 4.5 Sustainability Reductions

The Environment Agency notified the Company of sustainability changes to include in the WRMP14, and the confirmed reductions totalling 5.42Ml/d were included in the plan, as indicated below. A revised National Environment Programme (NEP) table was provided in January 2016, in which the only change was the removal of the River Shep options appraisal requirement. This does not change the sustainability reduction applied in WRMP14.

There were no Sustainability Reductions due to be made in the reporting period. However, they will all be implemented before the end of the AMP6 period. The latest NEP sustainability reductions are indicated in the table below.

<b>NEP Site Name</b>	<b>Sustainability Reduction</b>	<b>Status</b>
Hobsons Brook	1.92MI/d	Confirmed
Dernford Fen	0	Confirmed
River Granta & Catchment	3.5MI/d	Confirmed
Cherry Hinton Brook	1.2MI/d	Options Appraisal
River Shep	0.03MI/d	Removed

## **4.6 National Environment Programme**

This section describes the progress to date on NEP schemes in the AMP6 programme.

### **Hobson's Brook (Nine Wells)**

Originally a scheme to mitigate the impact of abstractions on Nine Wells Local Nature Reserve, the implementation of this is an augmentation scheme to support spring flows at Nine Wells at times of low groundwater level equivalent to the impact of South Staffs Water nearby abstractions. The augmentation is also expected to improve flows in Hobson's Brook.

The proposal is for a new abstraction borehole to be drilled along with a number of shallow recharge boreholes. Water will be taken from the abstraction borehole and injected into the recharge boreholes close to the springs. Operation of this will be triggered by a low flow threshold.

During 2016-17, injection boreholes were drilled along the boundary of the Nine Wells site, and tested to determine if the expected recharge rate would provide the required augmentation flow. A total of 4 injection boreholes were required to ensure the required augmentation input. Negotiations for access to the permanent flow gauge, required for licence conditions to be implemented, have continued through 2016-17 and this is yet to be resolved. Further works to provide the augmentation supply to the boreholes at Nine Wells will continue in 2017-18.

### **River Granta**

The sustainability changes for this scheme apply to 2 licences, Rivey Hill and Linton, and licence conditions have been agreed with the Environment Agency. The Rivey Hill licence was amended on time limit expiry in 2015 to incorporate the conditions, which will come into effect in 2020, and a draft for the Linton licence is proposed.

The Environment Agency operates the Lodes Granta River Support Scheme in this area. The investigations and proposed sustainability reductions for the River Granta have been based on the assumption that this support scheme will continue to operate in the future. The licence held for this by the Environment Agency is due for renewal in 2018 and there is some uncertainty regarding whether this will be renewed. We will not make further licence amendments at Linton until the future of the Lodes Granta River Support Scheme is clarified.

The Company's mitigation for the loss of deployable output at Linton and Rivey is the re-commissioning of Horseheath; this is subject to the EA acceptance of our No Deterioration assessment as required under the Water Framework Directive.

We have undertaken comprehensive modelling as required by the EA, in addition to our no deterioration assessment, to understand any impacts of using Horseheath. As a result we have restricted the use of Horseheath at 1.7Ml/d, in agreement with the EA, who consider that there may be additional impacts from using this source.

Whilst the licence changes proposed will protect flows in the Granta at the gauged location, abstraction at Horseheath may impact flows higher in the catchment, affecting the overall objectives for the Granta. Therefore, the AMP6 scheme for the Granta is yet to be finalised insofar as mitigation for loss of deployable output is concerned, although this is within our current licenced deployable output.

Linton and Rivey have been included as Abstraction Incentive Mechanism (AIM) sites for the remainder of AMP6 prior to licence conditions being in effect. During 2016-17, our AIM performance had a positive impact on flows in the Granta, i.e. we did not abstract above the baseline, abstracting less during periods of lower flow in the river.

AIM performance is indicated in the table below

<b>Abstraction sites</b>	<b>2016-17 AIM performance [MI]</b>	<b>2016-17 normalised AIM performance</b>	<b>Cumulative AIM performance 2016-17 [MI]</b>	<b>Cumulative normalised AIM performance 2016-17</b>
RIVEY	-10	0	-10	0
LINTON	-20	-1	-20	-1

## **Cherry Hinton Brook**

During 2016-17 additional monitoring was undertaken for flow and ecology, at additional locations in the upper catchment to understand any abstraction impacts, following a walk over survey that identified multiple other confounding pressures influencing flows along the river before the WFD compliance point. Groundwater modelling was also undertaken to support this monitoring.

The conclusions of this work have been presented to the EA and the options appraisal scheme has subsequently been agreed as complete, at recent actual abstraction as no bespoke flow target would be appropriate. There remains a residual risk of deterioration at full licenced volumes, and for this reason the scheme will remain with this driver, and we have undertaken to continue monitoring for an extended period.

## 5 Demand

Item	Description	Review Criterion	Company Comment on Review
Demand forecasting	Highlight and explain any changes to the demand forecast, including population and property forecasting.	Requirement triggered by change	Demand forecasts were comprehensively revised for the WRMP14 for the period from 2015 onwards. A further review is underway in preparation for the 2019 WRMP. No revision appropriate at this time
Per capita consumption (pcc)	Actual PCC	Requirement	Actual PCC over the year is discussed in section 5.2
	PCC forecasts	Requirement triggered by change	The PCC forecast was revised for the WRMP14 for the period from 2015. These forecasts are lower than previous WRMPs, and a downward trend is indicated. A further review is underway in preparation for the 2019 WRMP.
Metering	Update on progress with household metering.	Requirement	The Company has continued with its metering policies and has installed 2,715 additional meters in the report year. Progress with household metering is described in section 5.4

Leakage	Update on progress with leakage management and reductions	Requirement	Total leakage for 2016/17 is 14.32 MI/d compared to a WRMP14 target of 14.00MI/d. Progress with leakage reductions is described in section 5.5
Water efficiency	Update on progress with Water Efficiency	Requirement	The water efficiency strategy is applied across both regions of operation. It is described in section 5.6.

## 5.1 Key Demand Features

Distribution input for 2016/17 was 79.32 MI/d (Post MLE) which is 3.26 MI/d higher than the prior year. This was the net result of an increase in household and non-household demands and an increase in leakage.

The breakdown of the variance in the overall Distribution Input compared to the prior year is set out in the table below.

Component	Variance to 2015/16
Total leakage	1.08
Billed unmeasured household consumption	0.21
Billed measured household consumption	1.89
Billed measured non-household consumption	-0.09
Billed unmeasured non-household consumption	0.02
Miscellaneous (incl rounding)	0.15
Overall variance in Distribution Input to 2015/16	3.26MI/d

The general rise in Distribution Input over the last 5 years, as shown in the chart in section 2, is an indication that the significant growth and development in the Cambridge area is starting to increase underlying demand. The

Company is working on the draft demand forecasts for the PR19 Draft Water Resource Management Plans for which the increase in housing growth will be a significant factor.

## **5.2 Population updates**

For the WRMP14 the Company committed to conducting a bi-annual household water use and occupancy survey for both the South Staffs and Cambridge regions. The first of these was undertaken in the spring of 2015 followed by the second in autumn 2016. This is beginning to develop a valuable data set of household occupancy and water use trends in the Cambridge region. Future household surveys will continue in 2020/21.

The survey proportionally targeted measured and unmeasured customers to determine water using habits and occupancy rates for these different groups of customers. As a result of the survey the population split between unmeasured and measured households was re-based for 2015/16 using occupancy rates of 2.57 and 2.17 respectively compared to 3.04 and 2.18 previously.

This was further verified in the 2016 survey with 2.52 for unmeasured households and 2.33 for measured household. The overall average between the two surveys equates to 2.55 for unmeasured households and 2.25 for measured households.

The total population estimate for 2016/17 remains based on the forecast published in the Water Resources Management Plan (2014). In order to reconcile against this estimate the resulting survey occupancy is corrected proportionately to meet the total household population.

## **5.3 Per Capita Consumption**

Measured household PCC for the period was 123.16 l/h/d (Post MLE) and for unmeasured households 175.17l/h/d (Post MLE). This is compared to the prior year measured household PCC of 117.30 ltrs/h/d (Post MLE) and unmeasured household PCC of 163.31 ltrs/h/d (Post MLE).

We are reviewing options for the development of an independent consumption monitor for unmeasured PCC in the Cambridge region. This will assist with understanding movement in PCC year on year going forwards.

## 5.4 Metering

The Company policy is to encourage unmeasured households to switch voluntarily to a water meter. Every household is entitled to a free internal meter installation. Where an internal installation is not possible, an external meter will be fitted, also free of charge, provided no 'special' reinstatement is involved. This approach to metering was supported by customers during the consultation period for the AMP6 business plan.

The number of unmeasured households switching to a meter during the report year was 770 and 1,878 new household properties were connected during the year. In addition there were 67 new non household connections and 9 non-household properties who switched from unmetered charges to meter. Overall the number of meters installed were lower than forecast in the WRMP14.

The tables below compare the actual outturn against forecast metering;

Households	2015/16	2016/17	2017/18	2018/19	2019/20
Forecast Household optants	908	874	842	812	783
Actual Household optants	772	770			
Forecast Household new connections	1,458	1,570	1,658	1,770	1,845
Actual Household new connections	1,474	1,878			
Total Forecast Meters	2,366	2,444	2,500	2,582	2,628
Total Actual Meters	2,246	2,648			
Forecast meter penetration	69%	70%	71%	72%	73%
Actual meter penetration (at yr end)	69.8%	71%			

Non-Households	2015/16	2016/17	2017/18	2018/19	2019/20
Forecast Non - Household optants	28	28	28	28	28
Actual Non - Household optants	14	9			

<b>Forecast Non-Household new connections</b>	<b>98</b>	<b>98</b>	<b>98</b>	<b>98</b>	<b>98</b>
<b>Actual Non-Household new connections</b>	<b>73</b>	<b>67</b>			
<b>Total Forecast Meters</b>	<b>126</b>	<b>126</b>	<b>126</b>	<b>126</b>	<b>126</b>
<b>Total Actual Meters</b>	<b>87</b>	<b>76</b>			

The Company is attempting to increase meter penetration in the Cambridge region in anticipation of the potential requirement for greater demand management in AMP7. Greater promotion of free meters to increase the level of opting beyond the normal peak experienced around the time of annual unmeasured bills is underway. Proactive communication with customers to date includes:

- A free metering insert included with unmeasured bill reminders sent out during April. This did not yield significant results and a market research consultant has been tasked with contacting 100 customers to understand the key barriers to customers switching to a meter and understand what messages and communication channels would be most effective in switching customers to take up a meter. The analysis from the research will be used to refine subsequent metering promotion. Other channels currently being tested include text messaging and outbound targeted calling.
- A joint initiative with Cambridge City Council (CCC) has commenced with an initial focus on 1 and 2 bed properties where CCC are writing to their tenants providing anonymous examples of residents who have switched to a meter and saved money. A next step with CCC will be to seek to introduce metering of void properties during occupancy change.
- New 'Switching to a meter' leaflets have been produced for field teams in both regions to discuss/leave with customers at key touch points such as mains rehab schemes stop tap repairs and supply queries.
- The web content for new meter enquires is being refreshed to simplify key steps

The success of these initiatives will help determine what further options may be appropriate. The introduction of metering on change of occupancy may be required and this is currently under consideration.

## 5.5 Leakage

The CAM region has failed to achieved its ODI Performance Commitment with an outturn total leakage figure of 14.32 MI/d against a WRMP14 target of 14.00MI/d, and the ODI of 13.5MI/d

Leakage continues to be calculated using data obtained from district meter areas (DMAs) which monitor an area of approximately 1,000-2,000 properties.

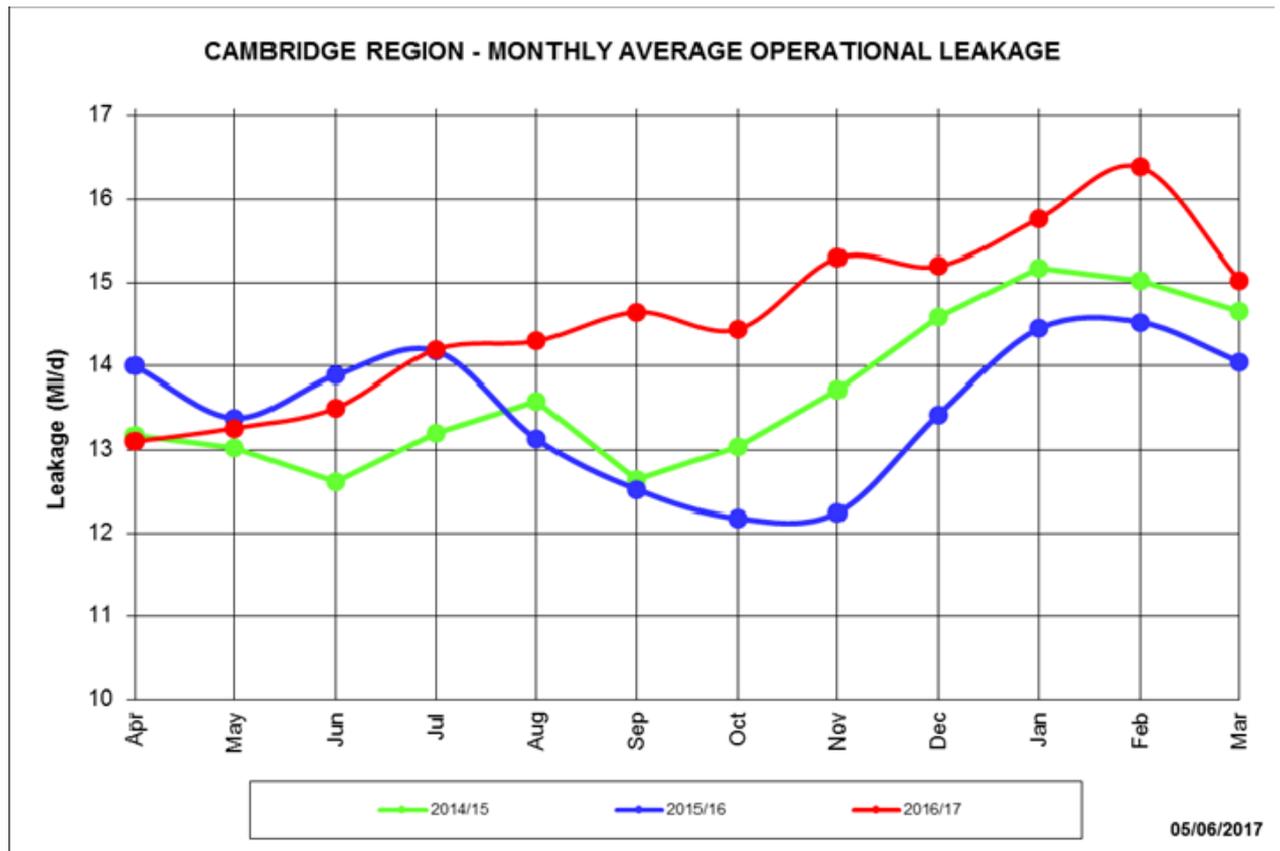
Further details of the Leakage ODI and performance outturn are published in the 2017 'Annual Performance Report' submitted to Ofwat as a public document.

### Leakage performance

	2015/16	2016/17	2017/18	2018/19	2019/20
Leakage target MI/d	14.0	14.0	14.0	14.0	14.0
Reported leakage MI/d	13.24	14.32			

Monthly average operational leakage levels over the last three years are shown on the following chart.

A full review of performance has been undertaken with a recovery plan now implemented to ensure 2017/18 performance commitments are achieved.



Supply pipe leakage in CAM is currently based on standard industry allowances and has not been updated for several years. Current allowances are as follows:

- Externally Metered = 18 l/prop/d
- Meter Non-Households = 18 l/prop/d
- Not Externally Metered / Unmeasured / Void = 36 l/prop/d

During AMP6 we are working towards adopting the same methodology for deriving supply pipe leakage allowances as used in the South Staffs region. The South Staff's supply pipe leakage estimates are based on UKWIR project 05/WM/08/32 (Towards Best Practice for the Assessment of Supply Pipe Leakage) produced by Tynemarch Systems Engineering Ltd and are updated annually based on current year's performance and report of supply pipe leaks.

## 5.6 Water Efficiency

The Company's Water Efficiency Strategy (WES) and delivery plan for AMP6 has been designed to build on the successes of AMP5 and to incorporate initiatives that increase the Company's customer engagement and supports customers to change water using behaviour, reduce waste and become water

efficient. The WES is applied across both regions of operation with some regional variation to reflect the differing demographics. We continually review our WES to reflect successes and in light of developing best practice in the UK and globally.

The key aspects of the strategy for 2016/17 are summarised in the following text:

- The WES includes engaging with the Metering Strategy Group to develop initiatives to promote metering particularly targeted at those who might benefit from being on a meter.
- The Company has developed a series of video clips which will be used to promote water efficiency, customer engagement and information. The first of the video clips show the journey of water from cloud burst to tap and the second is a water efficiency promotional video.
- The Company is in the process of implementing a major project in the Cambridge region to engage with 10,000 household metered customers to provide personalised consumption data. There will be an additional 5,000 properties used as a control sample.

The Company has commissioned 'WaterSmart' to develop a water use information dashboard and portal. Watersmart have been very successful at reducing water use in USA states, particularly during the recent Californian drought. The pilot will be launched in October 2017 and will run for approximately 12 months.

The customer will receive water use reports comparing their water use to other similar households and where appropriate highlight suggested actions to reduce water use. Water efficiency devices and information can be requested. The pilot will be aimed at voluntary sign up and will test the level of customer engagement and support for reducing household water use.

- A number of council's have been approached with a view to develop partnerships where the Company can support the council in achieving corporate goals such as carbon reduction, water use reduction, debt management and asset improvements.
- In order to develop robust water efficiency and metering strategies that focus on customers that would most likely engage a socio-economic and demographic household postcode data base model has been procured. The ACORN based model will support functions across the business to segment the customer base to better enable targeted communications.
- North West Cambridge water harvesting project is entering its second year with significant progress being made.

The development will be monitored and measured to gauge if this level of consumption (Code for Sustainable Homes 5) can be achieved and if it is sustainable. This project is a key aspect of the Company's WES.

- Milton Festival (Cambridge) was attended at the end of September 2016 as part of the increased customer engagement strategy. It was estimated that about 90 families visited the stand and were given help and advice as well as a wide range of water saving devices.
- The Company has continued to record the volumetric savings from the various distributions of devices. During 2016/17 the number of devices distributed in the South Staffs region totalled 10,969 saving 0.21Ml/d and in the Cambridge region the devices distributed were 4,115 saving 0.08Ml/d, giving an overall combined total of 15,084 saving 0.29Ml/d.

The Company's water efficiency performance commitment was to deliver a reduction in PCC across both regions measured as an average PCC. The average PCC outturn for 2016/17 is 129.85 ltrs/head/day against a target 130.15 ltrs/h/d.

2017/18 will see the continuation of the majority of these initiatives and the introduction of the WaterSmart pilot and enhanced customer engagement. A summer campaign for promotion of water efficiency is planned for the Cambridge region particularly in light of the recharge deficit and potential for dry weather to continue. A mixture of adverts on buses, on bus shelters and on radio are planned.

The effectiveness of this campaign will be reviewed and the outcomes used to further develop the WES for future years.

## 6 Headroom and Options

Item	Description	Review Criterion	Company Comment on Review
Target Headroom	Set out any changes to the target headroom forecast	Requirement triggered by change	Target headroom was reviewed for the WRMP14. No changes have been applied to headroom allowances during the period.
Options	Set out any changes to the options chosen.	Requirement	No options were proposed for the final planning forecast.
	Set out any changes to the options chosen.	Requirement triggered by change	No options have been considered in the planning period

### 6.1 Target Headroom

The WRMP14 showed a dry year annual average forecast headroom of 16.45 MI/d against a target headroom of 4.50MI/d. For 2016/17 the Security of Supply Index (SoSI) shows headroom of 16.54, with a planning surplus of 12.04MI/d. Accordingly there were no concerns over the supply demand situation, and the Company reported a SoSI of 100% for the period.

## 7 Conclusions

This annual review confirms that 2016-17 was an above average year in terms of supply and demand. Although rainfall was slightly below average in total for the year, and in particular the winter recharge period below the long term average, there were no concerns for supplies. The lack of rainfall towards the end of the year in the recharge period triggered enhanced drought monitoring, however there was no likelihood of any restrictions on use. Groundwater levels at drought indicator sites declined to below average as a result of the low recharge, and remained at below average levels at the end of the year.

The Company has continued to work hard to meet its Performance Commitments for leakage and water efficiency within the year. The failure to achieve the leakage ODI is disappointing and the Company has plans in progress to address this during 2017/18.

Overall outage has increased, planned outage accounts for this increase, as unplanned outage is similar to the previous year. Unplanned outages have been mainly driven by water quality events and short term asset failures.

Deployable output was reduced by 5.8% to 106.88MI/d compared to the WRMP14, this represents a slight increase in deployable output from the previous year.

The reported actual figures included in the table in Appendix 1 for 2016/17 are in general consistent with the WRMP14 forecasts for the period, and there is no material driver to change any of the forecasts in the WRMP14 for future years.

## 8 Forward look

We have already begun the process of preparing for the next Water Resources Management Plan, WRMP19.

There are a number of uncertainties arising from changes to the WRMP guidelines and as a result of changes in policy and the requirements of the Water Framework Directive that will need to be addressed in the next WRMP, we believe that these will significantly impact the available surplus in supply over forecast demands.

Growth in the region has continued, and the build rate of new properties increased, which we expect to continue. We are actively considering options to both manage demands and our supplies which will be included in our next plan

The twin challenge of growth in population and sustainability pressures on available resources could place more risk on the resilience of water supply for customers in future and we will continue to work closely with the Environment Agency to develop our WRMP19 to identify the best options to address this.

### 8.1 Uncertainty

The WRMP14 was produced in accordance with the current Water Resources Planning guidelines, which state that uncertainty around time limited licences and unknown potential sustainability changes cannot be included.

The Company has time limited licences that expire in 2018, within the planning period which if not renewed on the same terms or close to would place the forecast supply demand balance under significant pressure resulting in a potential deficit.

We are also concerned about potential Water Framework Directive related 'No deterioration' decreases to existing licences as sustainability reductions in future NEP tables; or for the deterioration risk to be expressed not as sustainability changes but as a cap to effective available licenced volume.

We have expressed these concerns to the Environment Agency and are continuing discussions regarding their policy on time limited licences and no deterioration, so that we are able to address these risks fully in our next WRMP. We will continue to work with the Environment Agency to minimise the impact of these risks on the WRMP and will continue to review annually.

These uncertainties will be examined during the preparation of the next WRMP, and any significant changes that can be incorporated into the current plan, reported in subsequent annual reviews.

## **8.2 Demand Management**

If the uncertainties mentioned above come to fruition the pressure on the supply demand balance will be much greater and there is potential for a deficit to arise within the next planning period. In preparation for this potential situation we are reviewing our demand management options. We are currently considering a number of metering options with a view to potential introduction in AMP7.

We will also continue to work with others on new and innovative developments such as the development at North West Cambridge. There a rainwater harvesting system is in place and new properties are being designed for consumptions at 80l/h/d below the standard for new properties of 125l/h/d.

We will also continue to work hard to bring leakage back to the economic level, and to encourage and support our customers to be water efficient in order to manage demands.

## **8.4 Outage**

The 2014 WRMP outage allowance is derived using probabilistic modelling using historic data. This allowance is 8.48MI/d including both unplanned and planned outages. The 2016-17 unplanned outage is 3.6MI/d and planned outage 7.93MI/d giving a total of 11.5MI/d. Planned outage has been elevated during the year as we roll out a programme of AMP6 treatment enhancements to source works by removing gas chlorination and the addition of UV.

This programme of treatment enhancements will continue through 2017-18, with associated planned outages. We will also be installing nitrate removal treatment at Fowlmere during 2017-18, which will require some significant planned outage.

In recognition of the impact that water quality events relating to turbidity can have on the length of outage at individual sources, where practical we are investing in run to waste facilities to reduce the time required to return to supply following such events.

**APPENDIX ONE: ANNUAL AVERAGE OUTTURN  
DATA 2016/17**

Row numbering in line with WRMP structure	Component	Units	DP	Data requirement	Resource zone 1 data	Free text
<b>SUPPLY</b>						
<b>Resources</b>						
1AR	Raw water abstracted	MI/d	2dp	Required	78.1	
2AR	Raw water imported	MI/d	2dp	Required	0	
3AR	Potable water imported	MI/d	2dp	Required	0.05	
4AR	Raw Water Losses and Operational Use	MI/d	2dp	Required	0	
5AR	Raw water exported	MI/d	2dp	Required	0	
5.1AR	Non potable water supplied	MI/d	2dp	Required	0	
6AR	Potable water exported	MI/d	2dp	Required	0.62	
7AR	Deployable output	MI/d	2dp	Optional	106.68	
<b>Process Losses</b>						
9AR	Treatment works losses and operational use	MI/d	2dp	Optional		
10AR	Outage experienced	MI/d	2dp	Required	11.03	
<b>DEMAND</b>						
11AR	Distribution input	MI/d	2dp	Required	79.32	
<b>Consumption</b>						
23AR	Measured non household - consumption (inc MUR)	MI/d	2dp	Required	20.42	
24AR	Unmeasured non household - consumption	MI/d	2dp	Required	0.64	
25AR	Measured household - consumption (inc MUR)	MI/d	2dp	Required	25.50	
26AR	Unmeasured household - consumption	MI/d	2dp	Required	17.06	
29AR	Measured household - pcc	l/h/d	0dp	Required	123.16	
30AR	Unmeasured household - pcc	l/h/d	0dp	Required	175.17	
31AR	Average household - pcc	l/h/d	0dp	Required	149.17	
32AR	Water taken unbilled	MI/d	2dp	Required	0.28	
33AR	Distribution system operational use	MI/d	2dp	Required	1.11	
<b>Leakage</b>						
34AR	Measured non household - uspl	MI/d	2dp	Required	0.17	
35AR	Unmeasured non-household - uspl	MI/d	2dp	Required	0.03	
36AR	Measured household - uspl	MI/d	2dp	Required	2.34	
37AR	Unmeasured household - uspl	MI/d	2dp	Required	1.34	
38AR	Void properties - uspl	MI/d	2dp	Required	0.07	
39AR	Total mains and trunk mains leakage (Distribution Losses)	MI/d	2dp	Required	10.36	
40AR	Total leakage	MI/d	2dp	Required	14.32	
41AR	Total leakage	l/prop/d	2dp	Required	102.65	
<b>CUSTOMERS</b>						
<b>Properties</b>						
43AR	Unmeasured household - properties	000's	3dp	Optional	37.330	
42AR	Measured household - properties	000's	3dp	Optional	89.950	
46AR	Unmeasured non household - properties	000's	3dp	Optional	0.794	
45AR	Measured non household - properties	000's	3dp	Optional	9.446	
44AR	Void household - properties	000's	3dp	Optional	1.804	
47AR	Void non households - properties	000's	3dp	Optional	0.177	
48AR	Total properties	000's	3dp	Optional	139.500	
<b>Population</b>						
50AR	Unmeasured household - population	000's	3dp	Optional	97.389	
49AR	Measured household - population	000's	3dp	Optional	207.040	
52AR	Unmeasured non household population	000's	3dp	Optional	4.08	
51AR	Measured non household - population	000's	3dp	Optional	24.10	
53AR	Total population	000's	3dp	Optional	332.609	
<b>Occupancy</b>						
55AR	Unmeasured household - occupancy rate	h/pr	2dp	Optional	2.61	
54AR	Measured household - occupancy rate	h/pr	2dp	Optional	2.30	
<b>Metering</b>						
57AR	Total Household Metering penetration (incl. voids)	%	2dp	Required	71.119%	
	Total numbers of household meters installed	000's	3dp	Required	71.122%	