

**Portsmouth  
Water**



**WATER RESOURCES  
MANAGEMENT PLAN**

**ANNUAL REVIEW 2016**

Portsmouth Water Ltd  
PO Box 8  
West Street  
Havant  
Hants  
PO9 1LG

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## 1 GENERAL

### 1.1 Introduction

The Water Act 2003 places a duty on all water companies to prepare a Water Resources Management Plan (WRMP). At each anniversary of this Plan the Company must review progress and send a statement to the Secretary of State.

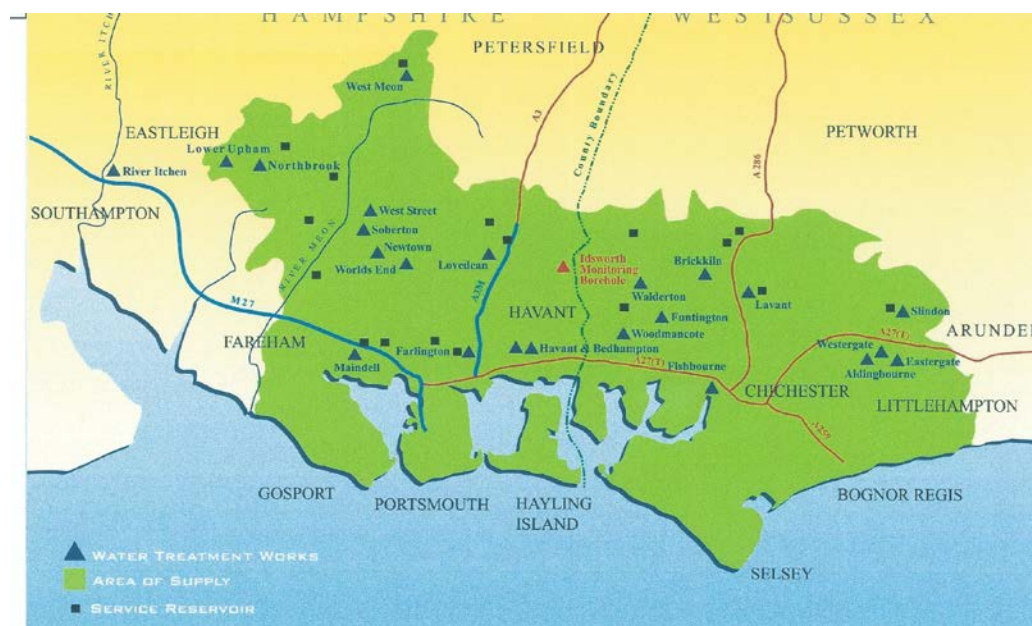
Portsmouth Water published its Final Water Resources Management Plan in August 2014 and this is the first Annual Review. Guidance published in April 2016 sets out the content of the Annual Review and the submission procedure.

The Guidance specifically requires the review to include progress on actions agreed with the Agency and Defra when the Plan was finalised.

The guidance requires the Annual Review to provide an overall summary of the supply demand balance for the financial year. This document replaces Table 10B and the Environment Agency commentary previously provided in the June Return to Ofwat.

### 1.2 Water Resources Zones

Portsmouth Water only included one Water Resources Zone in the Final Water Resources Management Plan 2014. The distribution system includes a spine main and strategic treated water storage. The system ensures that all of Portsmouth Water's customers experience the same level of service.



The Company's boundary has not changed but some customers on new housing estates are supplied by inset appointments. These inset appointees did not comment on Portsmouth Water's Final Water Resources Management Plan 2014 or on the Final Drought Plan 2013.

### 1.3 Levels of Service

During the preparation of the Final Water Resources Management Plan 2014 Portsmouth Water proposed a range of levels of service relating to unrestrained demand and drought scenarios.

- Temporary Bans 1 year in 20
- Ordinary Drought Orders 1 year in 80
- Emergency Drought Orders 1 year in 300

We would only expect to require to introduce domestic customer use restrictions (e.g. hosepipe bans) one year in 20. We would only expect commercial use restrictions and further domestic restrictions one year in 80. Emergency measures, such as standpipes in the street, would only be required one year in 300.

## 2 SUPPLY

### 2.1 Deployable Output

A full review of deployable output was carried out for the Final Water Resources Management Plan 2014. The Annual Review is based on the Dry Year scenario with a return period of 1 in 20.

#### Yield Assessment Summary

Source	Abstraction Licences (MI/d)		WRMP Yield Assessment (MI/d) 1 in 20	
	Average	Peak	Average (ADO)	Peak (PDO)
Northbrook and Lower Upham	20.51	31.50	18.6	31.0
West Meon	0.46	0.46	0.4	0.5
Soberton and Newtown	9.02	15.00	9.0	14.5
West Street	9.12	13.60	7.7	10.7
Maindell	6.83	8.00	4.4	7.4
River Itchen	45.50	45.50	36.1	41.1
Worlds End	22.73	25.20	11.5	14.5
Lovedean	11.37	13.64	9.5	12.3
Havant and Bedhampton	98.00	137.00	62.0	79.2
Walderton Group	65.04	94.60	53.3	80.0
Eastergate Group	28.38	41.00	28.3	38.8
<b>Company Total</b>	<b>316.96</b>	<b>425.50</b>	<b>245.8</b>	<b>330.0</b>

There are limited opportunities for “conjunctive use” in Portsmouth Water’s area of supply because of the characteristics of the chalk aquifer. The Company has no raw water storage and cannot manage sources in the winter to provide more water in the summer.

Five licences were the subject of Post Implementation Monitoring Work which was required by the Environment Agency as part of the Habitats Regulations Assessment. The outcome from these investigations was included in the Final Water Resources Management Plan in 2014 and the Maindell Licence was revised in May 2015.

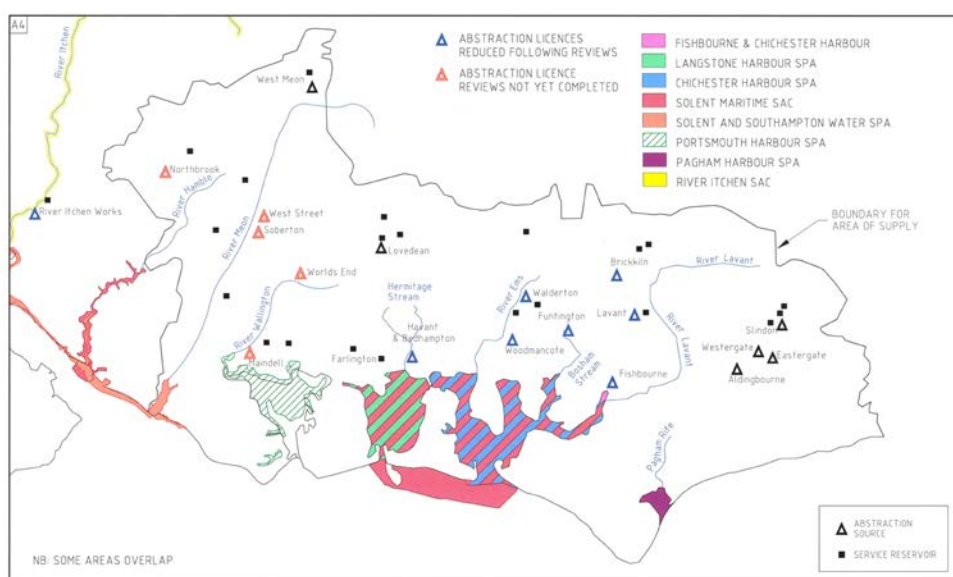
## 2.2 Outage

The Annual Review tables are based on actual outage figures calculated for 2015/16. These include long term outages at Woodmancote and Westergate, for water quality reasons, and the reduction in the Maidell Licence.

## 2.3 Bulk Supplies

Portsmouth Water has a single bulk supply to Southern Water Services. This supplies water from Slindon to Whiteways Lodge and on to Hardham Water Treatment Works. The system has a capacity of 15 Ml/d with a sweetening flow of 1.0 Ml/d required at all times. The original agreement, which expired in 2014, allowed for a peak supply of 15.0 Ml/d and an average supply of 4.45 Ml/d. The bulk supply is still available on an informal basis on the same terms until a new agreement is concluded.

## 2.4 Sustainability Schemes



Portsmouth Water's area of supply includes numerous protected rivers, harbours and coastlines. The Company has complied with all previous sustainability reductions and voluntarily reduced abstraction licences.

The following sections set out progress on the current National Environmental Programme which is due to be completed by March 2018. This is a Company commitment and the legal requirement, under the WFD, is for this to be completed by March 2021.

### 2.4.1 The River Ems Restoration Scheme

Portsmouth Water has completed a river restoration scheme on the River Ems. This scheme included revisions to the abstraction licence in relation to the volume and location of the river augmentation. The original restoration scheme, as proposed by the Environment Agency, was modified to reflect the ecology found on site. An off-line pond was de-silted to enhance water vole habitat and high flows were diverted to the main river to enhance the chalk stream habitat. With further downstream modifications this section should be suitable for migratory fish.

### 2.4.2 The River Hamble Restoration Scheme

The restoration brief for the River Hamble scheme was provided by the EA in February 2015. The project now requires the restoration of three reaches with cattle fencing and channel modifications. A start has now been made on ecological monitoring and an ecological survey. Landowners have been contacted and the Arun and Rother Rivers Trust are acting as our agents.

We are hoping to deliver the river restoration scheme and fencing in 2016/17. With downstream modifications this section of river should then be suitable for migratory fish by 2018.

### 2.4.3 Titchfield Haven

In 2015 Portsmouth Water renewed its time limited licence at Soberton. This source is on the River Meon and abstraction can influence the harbour of Titchfield Haven. Although the Post Implementation Monitoring (PIM) Investigation concluded that there was no adverse effect on the harbour, at current abstraction rates, the EA imposed a new augmentation clause.

Portsmouth Water do not accept that this is a practical solution given the combined effects of local spray irrigation licences. Further work is required and a stakeholder meeting has already taken place. The augmentation clause is to be reviewed by December 2017.

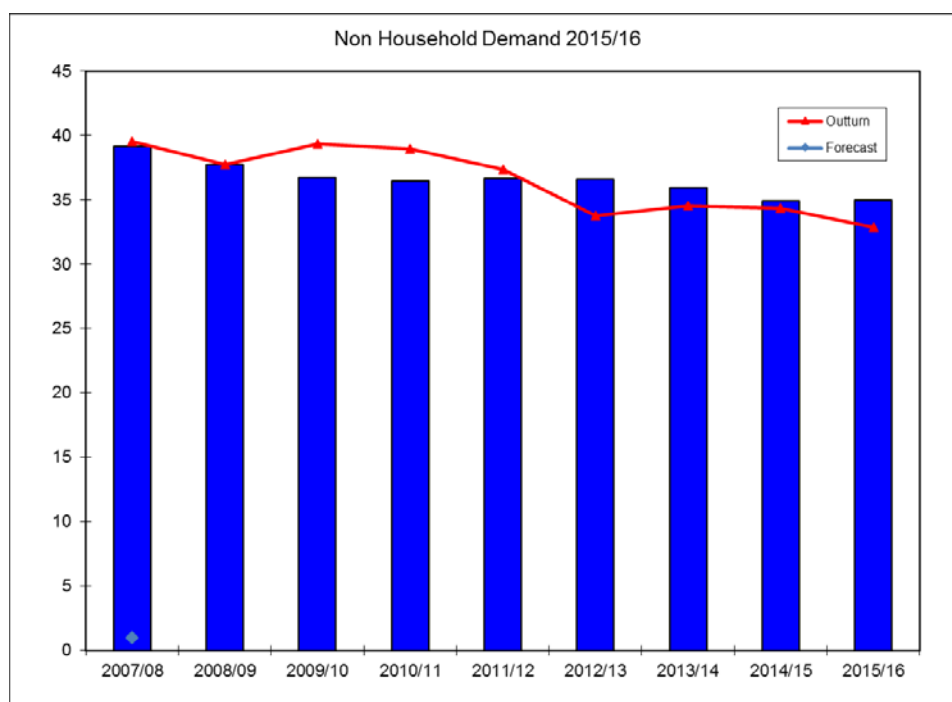
## 3 DEMAND

### 3.1 Demand Forecast

Portsmouth Water produced a range of demand forecasts for the Final Water Resources Management Plan 2014. 'Normal Year' forecasts are used for revenue forecasting and it is the 'Dry Year' forecast which is used for the supply demand balance. The population forecast was set in 2014 and will remain unchanged for each Annual Review. The only adjustment made is to the outturn household numbers, which are extracted from the billing system for the mid-year point.

The 'Dry Year' forecast was based on separate micro components and this is consistent with the additional water that is used for personal washing, clothes washing and garden use in warmer weather. The peak week forecast assumes demand based on a return period of 1 in 20 years (5% risk of failure). Fifty years outturn data was "normalised" and then statistics were used to calculate the household consumption with a 5% risk of exceedance. Non-Household demand and leakage were then added to give the overall peak demand.

Non-Household demand is based on econometrics and the outturn data over the last eight years. This outturn has been very close to the forecast, with a gradual reduction in demand. Non-Household demand in 2015/16 was 34.3 MI/d prior to adjustments for meter under registration and the Maximum Likelihood Estimation technique (MLE).



A revised Non-Household forecast was produced for the Final WRMP 2014. This used a similar approach to Water Resources Management Plan 2009 with outturn data, GDP, weather data and regression analysis.

### 3.2 Per Capita Consumption

Portsmouth Water use an individual household monitor to estimate unmeasured per capita consumption (PCC). In 2015/16 there were 997 properties which gave valid consumption data and this produced an occupancy adjusted per capita consumption of 151 l/h/d excluding supply pipe leakage.

Properties with consumptions above 454 litres/head/day (l/h/d) were excluded from the calculations because they are either likely to be leaking or to have changed occupancy. Properties with consumptions below 75 l/h/d are likely to be holiday homes, or to have been occupied for only part of the year, and they have been excluded from the calculations.

The outturn per capita consumption for measured properties is derived from the billing system. For 2015/16 the overall measured pcc was 119 l/h/d. The majority of measured customers are meter optants the measured pcc reflects this group of “low users”. In 2015/16 measured consumption was 21% lower, on average, than unmeasured consumption.

Per capita consumption is subject to the MLE adjustment carried out as part of the overall supply demand balance. This is covered in more detail in Section 6.

### 3.3 Optional Metering

The metering policy remained unchanged in 2015/16 with customers offered “free” optional meters as part of the baseline provision. The Final Water Resources Management Plan 2014 does not contain any proposals to introduce compulsory metering. This is because Portsmouth Water’s areas of supply is not classified as ‘Seriously Water Stressed’ by the Environment Agency. Compulsory metering is only allowed, under current legislation, in areas that are already short of water.



The baseline provision for metering was as follows:

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Portsmouth Water Target	5,000	5,000	5,000	5,000	5,000	5,500
Optional Meters Installed	3,604	4,046	4,857	4,873	3,544	3,344

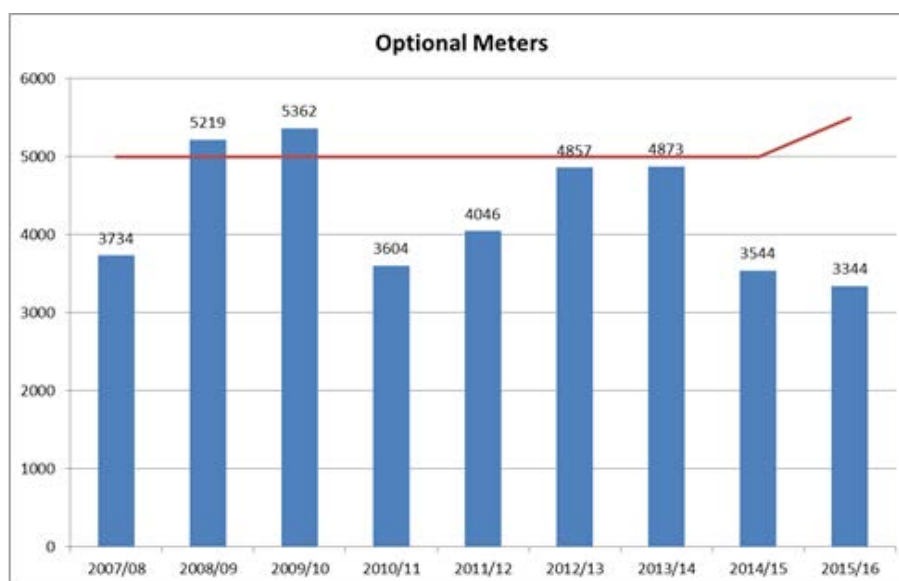
Following a drop off in the number of optional meters in 2010/11 the Company increased its publicity to promote switching to a meter. The publicity highlighted the savings that some customers are able to make through switching to a measured supply, focussing on the customers with higher than average unmeasured charges due to the size of their property. This was in addition to the usual advertising that we carry out to promote meter optants; on our website, in our annual newsletter and on our charges leaflet (which is included with all unmeasured bills).

Our Business Plan commitment was to promote metering to customers who would benefit from a financial point of view. The Company proposed to install 5,500 domestic meter options per year, and in 2015/16, 3,344 customers chose to switch to a measured supply as part of the optional metering programme.

In 2016/17 Portsmouth Water will:

- Promote metering over the phone to those customers that would benefit financially
- Send out leaflets via email to unmeasured customers promoting metering
- Put metering messages on our contractors vans
- Update the back of Portsmouth Water envelopes to promote metering
- Promote metering at events in the local area

At March 2016, domestic meter penetration for the Company was 27% of household customers, an increase of 2% from last year. The Water Resources Management Plan assumes that 70% metering penetration will be achieved by 2039/40.



New houses constructed since April 2005 have been fitted with a meter and wall mounted boxes are now used. The outturn figure for 2015/16 was 2,152 and this is close to the forecast included in the Water Resources Management Plan 2014.

### 3.4 Leakage

Portsmouth Water's leakage target for 2015/16 is 30.0 MI/d. The outturn leakage figure was 28.2 MI/d and this decreased to 28.1 MI/d following the MLE adjustment. The reduction of leakage over the reporting year has been delivered by further optimisation of pressure management, improved detection of leaks and reduced repair times of leaks. Work has continued to refine the data and introduce 'best practice' for the assessment of leakage and further work is planned for the 2016/17 reporting year.

### 3.5 Water Efficiency

Portsmouth Water has an internal Water Efficiency Target of 0.29 MI/d per year based on a saving of 1 litre per property per day. The outturn figure for 2015/16 was 0.27 MI/d which was below the target.

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Portsmouth Water Target	0.29	0.29	0.29	0.29	0.29	0.29
Savings Achieved	0.25	0.36	0.35	0.32	0.24	0.27

Measures, such as distributing water saving devices, made up the majority of the total with a smaller allowance for educational initiatives. Promotion of the Free Water Saving Pack provides the biggest saving and is run in conjunction with the "Save Water Save Money" website.

## 4 CLIMATE CHANGE

The Annual Review is based on outturn data and so is not affected by climate change forecasts.

## 5 HEADROOM

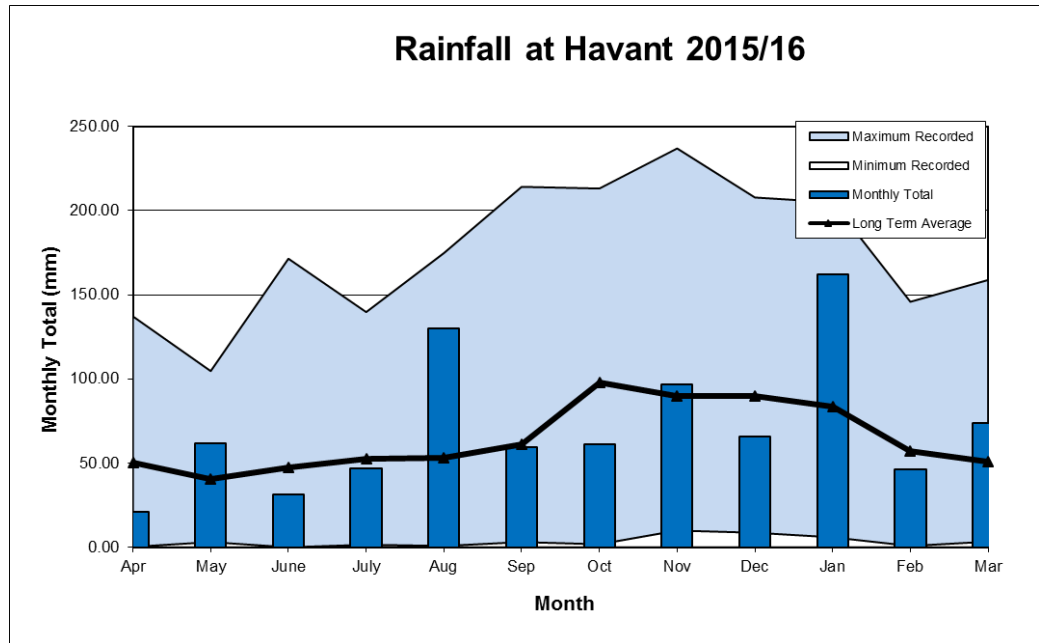
Portsmouth Water's current headroom methodology is set out in its Final Water Resources Management Plan 2014. It is a risk based methodology and the annual allowance is 9.3 MI/d and the peak week allowance is 7.0 MI/d.

## 6 SUPPLY DEMAND BALANCE

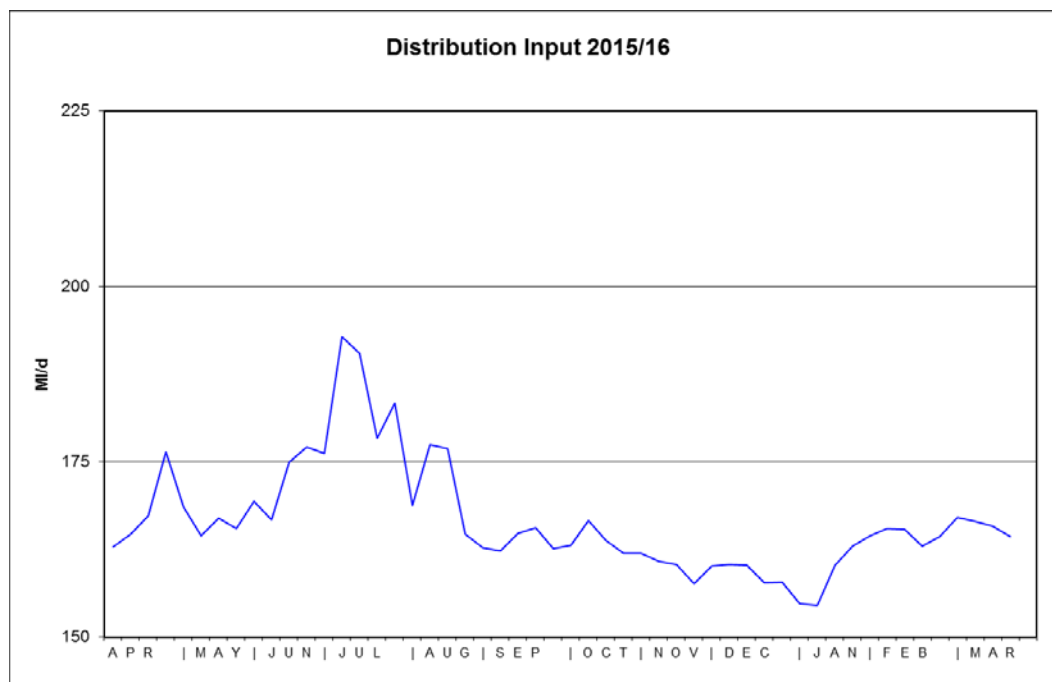
The Annual Review is based on outturn data with end of year water volumes and mid year property and population numbers.

### 6.1 Outturn Data

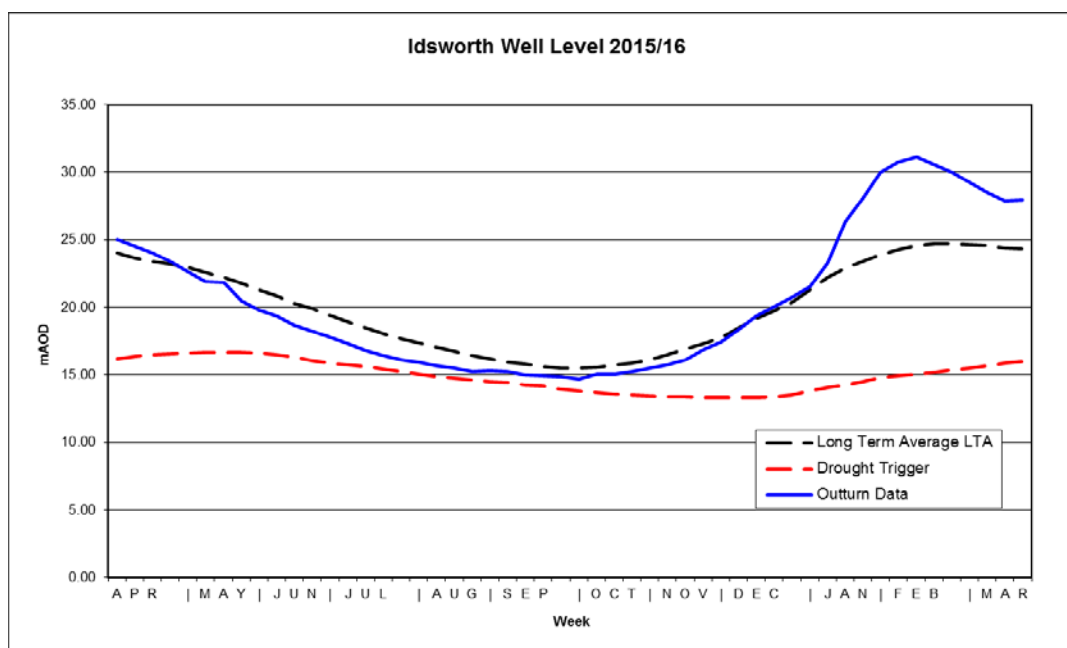
The weather during 2015/16 was relatively normal overall with 111% of the Long Term Average (LTA) rainfall. There were periods of drier weather in April and June contrasting with a very wet August. A relatively dry December was followed by a very wet January.



Distribution Input was relatively low for the whole year but the dry weather in June produced a peak in demand at the beginning of July.



Groundwater levels are an indication of the water available to Portsmouth Water from the chalk aquifer. 2015/16 started with groundwater levels above the long term average but the relatively dry early summer resulted in levels below the long term average at the end of autumn. There was a rapid recovery in the winter due to heavy rainfall in January.



The Bulk Supply to Southern Water normally runs with a “sweetening” flow of 1.0 Ml/d. In 2015/16 the bulk supply ran slightly above this level and the annual average was 1.32 Ml/d.

## 6.2 Water Balance Reconciliation

For the outturn year the “macro components” of demand, such as unmeasured demand and measured demand, do not add up exactly to the Distribution Input. The Ofwat June Return required this imbalance to be “reconciled” using the Maximum Likelihood Estimation (MLE) methodology. A confidence grade is assigned to each volume depending on the source of the data and the accuracy of the readings.

The confidence grade is made up from two elements, reliability and accuracy, with reliability graded from A to D and accuracy from 1 to 4. Where an entry is zero our very small the accuracy is given as X

### 6.2.1 Unmeasured Household Demand

Unmeasured demand is estimated from per capita consumption (see Section 3.2) and population. This means that it cannot have a high confidence grade and the MLE calculation is based on  $\pm 10\%$  so a grade of B3 is deemed appropriate. The outturn per capita consumption (pcc) was 151 l/h/d and this fell to 150 l/h/d following the reconciliation.

### 6.2.2 Measured Household Demand

Measured household demand is taken from the outturn billing data and there is an adjustment for meter under registration. The confidence grade is A2 and the MLE calculation uses  $\pm 5\%$ . The outturn measured per capita consumption was 119 l/h/d (see Section 3.2). This remained at 119 l/h/d following the

reconciliation. The majority of measured households are meter optants who will on average be low users.

### 6.2.3 Unmeasured Non Household Demand

Unmeasured non-household demand is uncertain and is based on comparable measured non-households. Measured ½" meters have been used in the past but this year the volume is based on the median rather than the average. An accuracy of  $\pm 25\%$  has been set and this gives a confidence grade of B4. The volume of demand is now assumed to be 0.18 MI/d and then gives a consumption of 116 l/p/d after the reconciliation.

### 6.2.4 Measured Non-Household Demand

Measured non-household demand is taken from the billing system with an adjustment for meter under registration. With an accuracy of  $\pm 5\%$ , and a confidence grade of A2, the outturn water delivered of 35.67 MI/d decreases to 35.57 MI/d following the reconciliation. This is close to the non-household demand forecast included in the Final Water Resources Management Plan 2014.

### 6.2.5 Distribution Losses

In Table 10 Ofwat separated Distribution Losses from Underground Supply Pipe Leakage (USPL). The leakage target is set for "Total Leakage" and leakage control does not make a distinction between distribution leaks and larger supply pipe leaks. The outturn figure for distribution losses is 19.69 MI/d and this decreases to 19.57 MI/d following the reconciliation.

An accuracy of  $\pm 10\%$  gives a Confidence Grade of A3.

### 6.2.6 Distribution System Operational Use (DSOU)

Operational use is a small part of the overall water balance and has a low confidence grade of B4 due to the number of assumptions made. The calculated figure for 2015/16 was 0.46 MI/d and this reduced to 0.45 MI/d following the reconciliation.

### 6.2.7 Water Taken Unbilled

By definition water taken unbilled can only be an estimate and the initial figure of 2.44 MI/d represents less than 2% of Distribution Input. With a confidence grade of B4 the outturn figure decreases to 2.40 MI/d following reconciliation.

### 6.2.8 Distribution Input

The outturn figure for 2015/16 was based on meter readings from reservoirs and pumping stations and this represents more than 95% of the Company's area of supply. This means that the confidence grade can be high with an accuracy of  $\pm 5.0\%$  with a confidence grade of A2 for the overall balance. Distribution Input was increased by the MLE process from 166.59 MI/d to 166.78 MI/d.

### 6.2.9 Overall Water Balance

The overall Water Balance is unlikely to have a confidence grade of 'A' because of the extensive monitoring systems that this would require. Portsmouth Water has allocated an accuracy of  $\pm 10\%$  with a confidence grade of B3 for the overall balance.

The error in the initial water balance was 1.02 MI/d and this represents 0.61% of the outturn distribution input. This is within acceptable band for the use of the MLE methodology which is  $\pm 5\%$ .

### 6.3 Annual Average Water Balance Tables

The annual average water balance figures were used to populate the table supplied by the Environment Agency (see Section 10).

### 6.4 Peak Week Water Balance Table

The peak week table represents an estimate of the water balance in the peak week in July 2015. The peak week can be the critical period for the supply/demand balance (see Section 10).

The peak week balance can only be an estimate because many of the “macro components” of demand are not measured on a weekly basis. Data is available for Distribution Input, Leakage and the Bulk Supply. Several of the smaller items, such as DSOU and water taken illegally are assumed to be the same as the average balance. The peak week occurred in July and the outturn volume was 196.88 MI/d. The average distribution input was 166.78 m/d giving an overall peaking factor of 1.18.

If the measured household peaking factor is assumed to be 5% less than the unmeasured and the unmeasured non-household factor is assumed to be 15% less than the unmeasured then it is possible to estimate what the peaking factors might have been in the peak week:

Unmeasured Household	1.26
Measured Household	1.20
Unmeasured Non-Household	1.07
Measured Non-Household	1.07
Distribution Losses	1.00
Water Taken Unbilled	<u>1.00</u>
Overall Factor	<u>1.18</u>

This assumption gives an unmeasured pcc of 193 l/h/d and a measured pcc of 145 l/h/d during the peak week.

During the peak week the bulk supply transferred 7.64 MI/d to Southern Water.

### 6.5 Security of Supply Index (SOSI)

The Security of Supply Index was set up by Ofwat and was reported in the June Return for many years. It represents the water balance and therefore security of supply, in a ‘dry year’. If SOSI is going to be used as a ‘Environmental Performance’ indicator it is important to continue publishing the results for each outturn year.

#### 6.5.1 Average Demand

If 2015/16 has been a dry year, with average demand associated with a 1 in 20 year return period, then the following average SOSI would have been calculated.

Deployable Output (2015/16)	229.6	MI/d
Outage	9.3	MI/d
Process Losses	<u>6.6</u>	MI/d
Water Available for Use (WAFU)	<u>213.7</u>	MI/d

The outturn Distribution Input figure was 166.8 MI/d and this was representative of a 'normal' year. If it has been a 'dry' year then the WRMP 2014 forecast for 2015/16 indicates that demand would have been 181.7 MI/d.

WAFU	213.7	MI/d
Dry Year Demand	181.7	MI/d
Bulk Supply Demand	<u>1.0</u>	MI/d
Available Headroom	<u>31.0</u>	

The target headroom in the WRMP 2014 for 2015/16 was 10.4 MI/d and this gives a surplus of 20.6 MI/d in a dry year. With a total population of 716,990 the SOSI for 2015/16 was 100.

### 6.5.2 Peak Demand

If 2015/16 has been a dry year and the peak week had a return period of 1 in 20 then the following peak SOSI would have been calculated.

Deployable Output (July 2015)	306.0	MI/d
Outage	4.6	MI/d
Process Losses	<u>7.0</u>	MI/d
Water Available for Use (WAFU)	<u>294.4</u>	MI/d

The outturn Distribution Input Figure was 196.9 MI/d but the dry year forecast for 2015/16 peak week in the WRMP 2014 was 233 MI/d.

Water Available for Use (WAFU)	294.4	MI/d
Dry Year Peak Week Demand	233.0	MI/d
Peak Week Bulk Supply	<u>15.0</u>	MI/d
Available Headroom	<u>46.4</u>	MI/d

Target headroom in the WRMP 2014 at the peak week in 2015 was 13.8 MI/d and this gives a surplus of 32.8 MI/d. With a total population of 716,990 the SOSI for July 2015 was 100.

Portsmouth Water did not apply any customer restrictions in 2015/16.

## 7 PROGRESS ON OPTIONS

The Final Water Resources Management Plan 2014 contained the following key feasible water resources options:

- Farlington Washwater Recovery
- Havant Thicket Winter Storage Review
- Bulk Supply from South East Water
- Relocating the River Itchen Abstraction
- Worlds End Group Licence
- Portsmouth Harbour Desalination
- Budds Farm Effluent Re-Use
- Compulsory Metering
- Water Efficiency

The Final Determination 2014 did not include any of these options because there was no overall supply/demand deficit.

As part of the development of the Water Resources Management Plan 2014 and the Business Plan 2014 Portsmouth Water reviewed the option selection process. An unconstrained list of options was developed and discussed with the Environment Agency and other Stakeholders. A Strategic Environmental Assessment (SEA) was carried out and the Environmental Report was included with the published Plan.

#### **7.1 Farlington Wastewater Recovery**

Wastewater recovery is being implemented at Farlington as part of a Water Quality scheme and will be complete by March 2017.

#### **7.2 Havant Thicket Winter Storage Reservoir**

Since the Final Water Resources Management Plan 2014 was published in August 2014 the Local Councils have confirmed the reservoir site as a "Strategic Location". This does not pre-judge the Water Resources Management Plan process, but does preserve the site from other developments. The SEA process indicated that Havant Thicket Reservoir would have a low overall impact on the environment.

#### **7.3 Worlds End Boreholes**

The provision of additional boreholes at the existing Worlds End Water Treatment Works was included in the range of options for the Final Water Resources Management Plan 2014.

The WFD Investigation concluded that more water could be abstracted from the confined chalk at this location. The existing licence would have to be varied to include satellite boreholes but the licensed volume would not need to be increased.

#### **7.4 Other Options**

The Portsmouth Desalination Option was considered to have "significant" negative impacts on the environment but was included in the 2014 WRMP range of options to satisfy the regulators.

Budds Farm Effluent re-use scheme was also considered to have "significant" impacts on the environment but was included in the 2014 WRMP range of options.

Compulsory metering is not possible in Portsmouth Water's area of supply history because the area is not classified as "Seriously Water Stressed" by the EA.

Water efficiency activity is included in our Business Plan and the 'Normal Year' demand forecast in the 2014 plan assumes a fall in overall per capita consumption from 146.63 l/h/d in 2015/16 to 143.93 l/h/d in 2019/20.

Relocating the River Itchen abstraction is no longer a feasible option. No additional fish data has been collected and the EA are preparing to modify the Woodmill Control Structure.



## 8 FORWARD LOOK

Portsmouth Water has started work on the next Water Resources Management Plan. This work includes a re-assessment of Deployable Output with Deepest Advisable Pumped Water Level. Headroom and outage will be re-assessed and consultants will look at drought scenarios and the impact of climate change.

Consultants have been appointed to re-assess the options included in the WRMP and the associated SEA and HRA. This work will involve stakeholder groups and a pre-consultation process. An unconstrained list of options will be produced and this will be refined into a feasible list of options for the WRMP.

Population numbers will be derived from Government statistics and the associated property numbers will be checked against Local Authority Housing Forecasts. There is a risk that the Local Plans will not be produced in time to influence the WRMP 2019. The Draft WRMP is due to be published in April 2017 with the Final WRMP submitted in April 2018.

Although the guiding principles and the WRMP guidelines have now been published there are risks associated with the late delivery of the tables and the table guidance.

Portsmouth Water is involved in the Water Resources in the South East modelling work and will take account of any regional solutions proposed. There is a risk that the national resilience modelling project will not be consistent with the WRSE modelling. Portsmouth Water are concerned that a regional solution will require a formal SEA.

Portsmouth Water has, or is in the process of, formally varying all its abstraction licences. This means that they are fully compliant with all current environmental legislation and have a common format. Publication of the NEP 5 spreadsheet and the list of sources at risk of 'deterioration' raises many concerns. The use of the 'serious damage' criteria is of particular concern because it is not part of the WFD process.

Portsmouth Water's WRMP 2014 contains information on multiple scenarios from the 'dry' year at 1 in 20 to the 'serious drought' at 1 in 200. The presentation of a range of resilience scenarios is a challenge and there is a need to agree a critical period and a critical scenario for each Company. Bulk supplies between companies will need to reflect these scenarios as will the commercial arrangements with non-household customers.

Non-household competition, in 2017, may make it more difficult to forecast commercial demand in the future. Commercial companies will need to develop drought plans and the impact of inset appointments on security of supply will need to be considered. Single points of supply to large housing developments may create problems for customers in the future.

Portsmouth Water has not received any feedback on the Annual Reviews so it is assumed that the format is acceptable. A series of six months strategic meetings are now taking place with EA Managers and quarterly meetings are planned with local EA staff. This should help co-ordinate the WRMP process and in particular the delivery of the final NEP elements.

## **9 CONCLUSION**

Portsmouth Water draws the following conclusions from the Annual Review 2016:

- 2015/16 was a normal year with average demand and per capita consumption.
- A healthy surplus was retained at average and peak demand and the Security of Supply Index was 100.
- The bulk supply to Southern Water was provided despite the agreement running out in 2014.
- Total leakage of 28.1 MI/d is below the Portsmouth Water target of 30.0 MI/d.

## **10 TABLES**

The tables are provided in a different format to last year. The individual line definitions are not included in the EA guidance but the lines are similar to the ones covered by the former Ofwat guidance for Tables 7, 10 and 10B.

The EA tables are based on outturn data which has been adjusted using the MLE process to achieve a water balance. For this "Annual Review" tables have been provided for average or peak conditions. A full set of confidence grades has been included to help explain the MLE process and the accuracy of the "macro components" of demand.

Further table commentaries are provided to explain individual lines.

## ANNUAL AVERAGE WATER BALANCE

Row numbering in line with WRMP structure	Component	Units	DP	Data requirement	Water company total data	Confidence Grade
<b>SUPPLY</b>						
<b>Resources</b>						
1 <sub>AR</sub>	Raw water abstracted	Ml/d	2dp	Required	171.01	A2
2 <sub>AR</sub>	Raw water imported	Ml/d	2dp	Required	0	AX
3 <sub>AR</sub>	Potable water imported	Ml/d	2dp	Required	0	AX
4 <sub>AR</sub>	Raw Water Losses and Operational Use	Ml/d	2dp	Required	0	AX
5 <sub>AR</sub>	Raw water exported	Ml/d	2dp	Required	0	AX
5.1 <sub>AR</sub>	Non potable water supplied	Ml/d	2dp	Required	0	AX
6 <sub>AR</sub>	Potable water exported	Ml/d	2dp	Required	1.32	A2
7 <sub>AR</sub>	Deployable output	Ml/d	2dp	Optional	229.6	B3
<b>Process Losses</b>						
9 <sub>AR</sub>	Treatment works losses and operational use	Ml/d	2dp	Optional	2.91	B3
10 <sub>AR</sub>	Outage Allowance	Ml/d	2dp	Required	9.3	B3
<b>DEMAND</b>						
11 <sub>AR</sub>	Distribution input	Ml/d	2dp	Required	166.78	A2
<b>Consumption</b>						
23 <sub>AR</sub>	Measured non household - consumption	Ml/d	2dp	Required	35.57	A2
24 <sub>AR</sub>	Unmeasured non household - consumption	Ml/d	2dp	Required	0.18	B4
25 <sub>AR</sub>	Measured household - consumption	Ml/d	2dp	Required	20.36	A2
26 <sub>AR</sub>	Unmeasured household - consumption	Ml/d	2dp	Required	88.25	B3
29 <sub>AR</sub>	Measured household - poc	l/h/d	0dp	Required	119	B2
30 <sub>AR</sub>	Unmeasured household - poc	l/h/d	0dp	Required	150	B3
31 <sub>AR</sub>	Average household - poc	l/h/d	0dp	Required	142	B3
32 <sub>AR</sub>	Water taken unbilled	Ml/d	2dp	Required	2.4	B4
33 <sub>AR</sub>	Distribution system operational use	Ml/d	2dp	Required	0.45	B3
<b>Leakage</b>						
34 <sub>AR</sub>	Measured non household - uspl	Ml/d	2dp	Required	0.28	B3
35 <sub>AR</sub>	Unmeasured non-household - uspl	Ml/d	2dp	Required	0.05	B3
36 <sub>AR</sub>	Measured household - uspl	Ml/d	2dp	Required	1.57	B3
37 <sub>AR</sub>	Unmeasured household - uspl	Ml/d	2dp	Required	6.3	B3
38 <sub>AR</sub>	Void properties - uspl	Ml/d	2dp	Required	0.29	B4
39 <sub>AR</sub>	Total mains and trunk mains leakage	Ml/d	2dp	Required	19.57	A3
40 <sub>AR</sub>	Total leakage	Ml/d	2dp	Required	28.06	A3
41 <sub>AR</sub>	Total leakage	l/prop/d	2dp	Required	89.36	A3
<b>CUSTOMERS</b>						
<b>Properties</b>						
43 <sub>AR</sub>	Unmeasured household - properties	000's	3dp	Optional	210.156	A2
42 <sub>AR</sub>	Measured household - properties	000's	3dp	Optional	78.509	A2
46 <sub>AR</sub>	Unmeasured non household - properties	000's	3dp	Optional	1.563	A2
45 <sub>AR</sub>	Measured non household - properties	000's	3dp	Optional	14.189	A2
44 <sub>AR</sub>	Void household - properties	000's	3dp	Optional	6.983	B3
47 <sub>AR</sub>	Void non households - properties	000's	3dp	Optional	2.615	B3
48 <sub>AR</sub>	Total properties	000's	3dp	Optional	314.005	A2
<b>Population</b>						
50 <sub>AR</sub>	Unmeasured household - population	000's	3dp	Optional	545.2	B3
49 <sub>AR</sub>	Measured household - population	000's	3dp	Optional	157.811	B3
52 <sub>AR</sub>	Unmeasured non household population	000's	3dp	Optional	1.379	B3
51 <sub>AR</sub>	Measured non household - population	000's	3dp	Optional	12.6	B3
53 <sub>AR</sub>	Total population	000's	3dp	Optional	716.991	B3
<b>Occupancy</b>						
55 <sub>AR</sub>	Unmeasured household - occupancy rate	h/pr	2dp	Optional	2.59	A2
54 <sub>AR</sub>	Measured household - occupancy rate	h/pr	2dp	Optional	2.02	A2
<b>Metering</b>						
57 <sub>AR</sub>	Total Household Metering penetration (incl. voids)	%	2dp	Required	26.55	A2
	Total numbers of household meters installed	000's	3dp	Required	5.496	A2

**TABLE COMMENTARY****Annual Average Water Balance**Supply

Rows 1 - 7 Resources (A)

Raw Water Abstracted

2015/16 was a "normal" year with abstraction well below the dry year deployable output

Raw Water Exported/Imported

There were no raw water exports or imports.

Potable Water Exports

Potable water exported represents the Bulk Supply to Southern Water.

Deployable Output

Deployable Output is calculated for "dry" conditions and has no direct link to the outturn year water balance. An allowance has been made for the loss of the Woodmancote Source, the Westergate Source and the recent licence variation at Maidell.

Rows 9 - 10 Process Losses (B)

Treatment Works Operational Use

Treatment Works Operational use is related to backwash water at works which is not recycled.

Outage Allowance

Outage is now based on a full statistical analysis of recorded data including Monte Carlo simulation with up to 1,000 iterations. This risk based approach assumes that no outage events last longer than 90 days and that the peak demand period occurs during June or July.

Demand

Rows 11 - 33 Consumption (C)

Distribution Input

Distribution Input has been derived from the total measured flow minus the Bulk Supply to Southern Water.

Measured Non-Household Consumption

Measured non-household consumption is taken from the billing system with an adjustment for meter under-registration and supply pipe leakage. The outturn figure is close to the forecast included in the Water Resources Management Plan 2014.

The final adjusted figure is 35.57 MI/d.

### Water Taken Unbilled

This volume represents water taken illegally in properties that Portsmouth Water believes are "void" but are actually occupied. In addition, a small amount of water is taken legally unbilled for firefighting and fire practice. It is not possible to measure these volumes so estimates are used.

### Unmeasured Household Per Capita Consumption

The unmeasured per capita consumption is based on the Company's own Consumption Monitor which contains 997 individual properties. The main text explains that the results have been adjusted to exclude a number of properties with very low per capita consumptions. The outturn per capita consumption of 151.2 l/h/d is reduced by the MLE process to 150.3 l/h/d.

All figures used in the per capita consumption calculation are assumed to be excluding supply pipe leakage but include an allowance of 2.9% for meter under-registration.

### Measured Household Per Capita Consumption

Overall Measured Household per capita consumption is lower than unmeasured household per capita consumption. This is due to the influence of meter optants who on average use less water and have a financial incentive to change to the measured tariff. There are measured domestic properties with an outturn per capita consumption of 119.4 l/h/d based upon an occupancy of 2.02 and an underground supply pipe leakage allowance of 20 litre/property/day. This figure is reduced to 119.0 l/h/d by the MLE process.

### Unmeasured Non-Household Consumption

Unmeasured Non-Household Consumption is based on the measured consumption of non-household properties with ½" meters. The figure is lower this year because we have used the median rather than the mean.

### Distribution System Operational Use (DSOU)

Distribution System Operational Use represents water taken from hydrants for things like flushing to maintain water quality. DSOU has a low confidence grade (B3) because it is based on estimates.

Rows 34 - 41 Leakage (D)

### Distribution Losses

Distribution losses are subjected to the MLE process and have fallen from 19.69 MI/d to 19.57 MI/d.

### Total Leakage

Total Leakage has been adjusted to remove summer legitimate use and has been subjected to the MLE process. The figure of 28.1 MI/d is below the Ofwat target of 30.0 MI/d.

### Customers

Rows 43 - 48 Properties (F)

Properties

The property data shown is for the mid-year but it is based on end of year data from the billing system. The number is rising gradually as new properties are added.

Rows 50 - 53 Population (G)

Population

Total population was re-calculated for the Final WRMP 2014 and the number used in the Annual Review matches this forecast.

Rows 54 - 55 Occupancy (G)

Occupancy

Occupancy will vary from year to year and this reflects changing housing trends such as more young adults staying in the parental home.

Measured occupancy is expected to increase as new properties make up a greater proportion of the total.

Rows 56 - 57 Metering (H)

Meter Penetration

Meter penetration continues to increase as customers opt for a 'free' meter and new properties are added to the system. The current figure is 27% as shown in the tables.

## PEAK WEEK WATER BALANCE

Row numbering in line with WRMP	Component	Units	DP	Data requirement	Water company total data	Confidence Grade
<b>SUPPLY</b>						
<b>Resources</b>						
1 <sub>AR</sub>	Raw water abstracted	MV/d	2dp	Required	208.74	A2
2 <sub>AR</sub>	Raw water imported	MV/d	2dp	Required	0	AX
3 <sub>AR</sub>	Potable water imported	MV/d	2dp	Required	0	AX
4 <sub>AR</sub>	Raw Water Losses and Operational Use	MV/d	2dp	Required	0	AX
5 <sub>AR</sub>	Raw water exported	MV/d	2dp	Required	0	AX
5.1 <sub>AR</sub>	Non potable water supplied	MV/d	2dp	Required	0	AX
6 <sub>AR</sub>	Potable water exported	MV/d	2dp	Required	7.64	A2
7 <sub>AR</sub>	Deployable output	MV/d	2dp	Optional	306.0	B3
<b>Process Losses</b>						
9 <sub>AR</sub>	Treatment works losses and operational use	MV/d	2dp	Optional	4.22	B3
10 <sub>AR</sub>	Outage Allowance	MV/d	2dp	Required	7.0	B3
<b>DEMAND</b>						
11 <sub>AR</sub>	Distribution input	MV/d	2dp	Required	196.88	A2
<b>Consumption</b>						
23 <sub>AR</sub>	Measured non household - consumption	MV/d	2dp	Required	38.22	A2
24 <sub>AR</sub>	Unmeasured non household - consumption	MV/d	2dp	Required	0.19	B4
25 <sub>AR</sub>	Measured household - consumption	MV/d	2dp	Required	24.45	A2
26 <sub>AR</sub>	Unmeasured household - consumption	MV/d	2dp	Required	111.55	B3
29 <sub>AR</sub>	Measured household - poc	Vh/d	0dp	Required	145	B2
30 <sub>AR</sub>	Unmeasured household - poc	Vh/d	0dp	Required	193	B3
31 <sub>AR</sub>	Average household - poc	Vh/d	0dp	Required	180	B3
32 <sub>AR</sub>	Water taken unbilled	MV/d	2dp	Required	2.4	B4
33 <sub>AR</sub>	Distribution system operational use	MV/d	2dp	Required	0.45	B3
<b>Leakage</b>						
34 <sub>AR</sub>	Measured non household - uspl	MV/d	2dp	Required	0.28	B3
35 <sub>AR</sub>	Unmeasured non-household - uspl	MV/d	2dp	Required	0.05	B3
36 <sub>AR</sub>	Measured household - uspl	MV/d	2dp	Required	1.57	B3
37 <sub>AR</sub>	Unmeasured household - uspl	MV/d	2dp	Required	6.3	B3
38 <sub>AR</sub>	Void properties - uspl	MV/d	2dp	Required	0.29	B4
39 <sub>AR</sub>	Total mains and trunk mains leakage	MV/d	2dp	Required	19.57	A3
40 <sub>AR</sub>	Total leakage	MV/d	2dp	Required	28.06	A3
41 <sub>AR</sub>	Total leakage	l/prop/d	2dp	Required	89.36	A3
<b>CUSTOMERS</b>						
<b>Properties</b>						
43 <sub>AR</sub>	Unmeasured household - properties	000's	3dp	Optional	210.156	A2
42 <sub>AR</sub>	Measured household - properties	000's	3dp	Optional	78.509	A2
46 <sub>AR</sub>	Unmeasured non household - properties	000's	3dp	Optional	1.553	A2
45 <sub>AR</sub>	Measured non household - properties	000's	3dp	Optional	14.189	A2
44 <sub>AR</sub>	Void household - properties	000's	3dp	Optional	6.983	B3
47 <sub>AR</sub>	Void non households - properties	000's	3dp	Optional	2.815	B3
48 <sub>AR</sub>	Total properties	000's	3dp	Optional	314.005	A2
<b>Population</b>						
50 <sub>AR</sub>	Unmeasured household - population	000's	3dp	Optional	545.2	B3
49 <sub>AR</sub>	Measured household - population	000's	3dp	Optional	157.811	B3
52 <sub>AR</sub>	Unmeasured non household population	000's	3dp	Optional	1.379	B3
51 <sub>AR</sub>	Measured non household - population	000's	3dp	Optional	12.6	B3
53 <sub>AR</sub>	Total population	000's	3dp	Optional	716.991	B3
<b>Occupancy</b>						
55 <sub>AR</sub>	Unmeasured household - occupancy rate	h/pr	2dp	Optional	2.59	A2
54 <sub>AR</sub>	Measured household - occupancy rate	h/pr	2dp	Optional	2.02	A2
<b>Metering</b>						
57 <sub>AR</sub>	Total Household Metering penetration (incl. voids)	%	2dp	Required	26.55	A2
	Total numbers of household meters installed	000's	3dp	Required	5.496	A2

**TABLE COMMENTARY****Peak Week Water Balance**Supply

Rows 1 - 7 Resources (A)

Raw Water Abstracted

2015/16 was a "normal" year and the peak week occurred in July when the recreational use of water is higher. The amount of raw water abstracted reflects this.

Raw Water Exported/Imported

There were no raw water exports or imports.

Potable Water Exports

Potable water exported represents the Bulk Supply to Southern Water.

Deployable Output

Deployable Output is calculated for "dry" conditions and has no direct link to the outturn year water balance. An allowance has been made for the loss of the Woodmancote Source, the Westergate Source and the recent licence variation at Maidell.

Rows 9 - 10 Process Losses (B)

Treatment Works Operational Use

Treatment Works Operational use is related to backwash water at works which is not recycled.

Outage Allowance

Outage is now based on a full statistical analysis of recorded data including Monte Carlo simulation with up to 1,000 iterations. This risk based approach assumes that no outage events last longer than 90 days and that the peak demand period occurs during June or July.

Demand

Rows 11 - 33 Consumption (C)

Distribution Input

Distribution Input has been derived from the total measured flow minus the Bulk Supply to Southern Water.

Measured Non-Household Consumption

Measured non-household consumption is taken from the billing system with an adjustment for meter under-registration and supply pipe leakage.

Water Taken Unbilled

This volume represents water taken illegally in properties that Portsmouth Water believes are "void" but are actually occupied. In addition, a small amount of water is taken legally unbilled



for fire-fighting and fire practice. It is not possible to measure these volumes so estimates are used.

#### Unmeasured Household Per Capita Consumption

This line is based on an estimate of the peak week per capita consumption. The figure of 193 l/h/d is consistent with a "normal" summer with increased recreational water use.

All figures used in the per capita consumption calculation are assumed to be excluding supply pipe leakage but include an allowance of +2.9% for meter under-registration.

#### Measured Household Per Capita Consumption

The peak week per capita consumption of 145 l/h/d is consistent with a "normal" summer.

#### Unmeasured Non-Household Consumption

Unmeasured Non-Household Consumption is based on the measured consumption of non-household properties with ½" meters. The figure is lower this year because we have used the median rather than the mean.

#### Distribution System Operational Use (DSOU)

Distribution System Operational Use represents water taken from hydrants for things like flushing to maintain water quality. It has a low Confidence Grade (B3) because it is based on estimates.

Rows 34 - 41 Leakage (D)

#### Distribution Losses

It should be noted that the Total Leakage figure has a Confidence Grade of A3. This means that the estimate is only accurate to  $\pm 10\%$ .

#### Total Leakage

Leakage was 28.1 Ml/d during the peak week following the application of an adjustment for legitimate night-time use.

#### Customers

Rows 43 - 48 Properties (F)

#### Total Properties

Property numbers are based on end of year billing data but represent a mid-year calculation.

Rows 50 - 53 Population (G)

#### Total Population

Total population was re-calculated for the Final WRMP 2014 and the number used in the Annual Review matches this forecast.

Rows 54 - 55 Occupancy (G)

Occupancy

Given the fixed population forecast and the outturn property numbers, the occupancy will vary from year to year. This reflects changing housing trends such as more young adults staying the parental home.

Rows 56 - 57 Metering (H)

Meter Penetration

Meter penetration continues to increase as customers opt for a 'free' meter and new properties are added to the system. The current figure is 27% as shown in the tables.