

**Portsmouth  
Water**



**WATER RESOURCES  
MANAGEMENT PLAN**

**ANNUAL REVIEW 2019**

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**TABLE OF CONTENTS**

1	GENERAL .....	1
1.1	Introduction .....	1
1.2	Water Resources Zones .....	1
1.3	Levels of Service .....	2
2	SUPPLY .....	2
2.1	Actual Deployable Output .....	2
2.2	Actual Outage .....	4
2.3	Bulk Supplies .....	4
2.4	Sustainability Schemes .....	4
2.4.1	The River Ems Restoration Scheme .....	5
2.4.2	The River Hamble Restoration Scheme .....	5
2.4.3	Titchfield Haven .....	5
3	DEMAND .....	5
3.1	Demand Forecast .....	5
3.2	Per Capita Consumption .....	6
3.3	Optional Metering .....	6
3.4	Leakage .....	7
3.5	Water Efficiency .....	8
4	CLIMATE CHANGE .....	9
5	HEADROOM .....	9
6	SUPPLY DEMAND BALANCE .....	9
6.1	Outturn Data .....	9
6.2	Water Balance Reconciliation .....	11
6.2.1	Unmeasured Household Demand .....	11
6.2.2	Measured Household Demand .....	11
6.2.3	Unmeasured Non Household Demand .....	11
6.2.4	Measured Non-Household Demand .....	11
6.2.5	Distribution Losses .....	11

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6.2.6	Distribution System Operational Use (DSOU).....	12
6.2.7	Water Taken Unbilled .....	12
6.2.8	Distribution Input.....	12
6.2.9	Final Water Balance .....	12
6.3	Annual Average Table .....	12
6.4	Peak Week Table .....	12
6.5	Security of Supply Index (SOSI).....	13
6.5.1	Peak Demand .....	13
7	PROGRESS ON OPTIONS .....	14
7.1	Havant Thicket Winter Storage Reservoir .....	14
7.2	Source J Boreholes .....	14
7.3	Other Options .....	15
8	FORWARD LOOK.....	15
9	CONCLUSION .....	16
10	TABLES.....	16

## 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 fourth Annual Review. Updated guidance published in May 2019<sup>1</sup> 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.

The Company publish a specific document on its website discussing ODI performance. In this Annual Review we note the performance on leakage and PCC specifically.

### 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 in the supply area shown in Figure 1 experience the same level of service.



Figure 1: Portsmouth Water's supply area

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<sup>1</sup> Water resource management plan annual review and annual data return, Guidance for water companies in England and Wales. Developed by the Environment Agency and Natural Resources Wales (May 2019)

The Company's boundary has not changed but some customers on new housing estates are supplied by New Appointments and Variations (NAV).

### 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 200

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 200.

## 2 SUPPLY

### 2.1 Actual Deployable Output

A full review of deployable output was carried out for the Final Water Resources Management Plan 2014. This Annual Review is based on a comparison between the WRMP14 and the Deployable Output for 2018/19 assuming it was a Dry Year.

Since the Water Resources Management Plan was published in 2014 the Source I Licence has been revised and the Sources U and G converted to raw water augmentation. Sources U and G are no longer included in the deployable output calculation. The Actual Deployable Output calculated for 2018/19 includes additional long term outages at Source I, Source F and Source H for water quality reasons. These reductions are shown below in Table 1.

	Reductions since WRMP14 (MI/d)	
	Average	Peak
Source I: Licence reduction	2.9	5.9
<b>Total licence reductions</b>	<b>2.9</b>	<b>5.9</b>
Source F: Long term outage	5.2	7.9
Source G: Raw water reduction	2	3.4
Source H: Long term outage	7.2	9.1
Source I: Long term outage	4.4	7.4
Source U: Raw water reduction	3	3.9
<b>Total DO reductions</b>	<b>21.8</b>	<b>31.7</b>

Table 1: Licence variations and reductions in DO since WRMP14

Table 2 and Table 3 below show the 2018/19 Licences and DO for each source compared to the WRMP and the subsequent Company totals.

Source	Abstraction Licences (MI/d)			
	WRMP14		2018/19	
	Average	Peak	Average	Peak
Source C	20.51	31.50	20.51	31.50
Source D	-	-	-	-
Source E	0.46	0.46	0.46	0.46
Source F	9.02	15.00	9.02	15.00
Source G	-	-	-	-
Source H	9.12	13.60	9.12	13.60
Source I	6.83	8.00	3.93	2.1
Source A	45.50	45.50	45.50	45.50
Source J	22.73	25.20	22.73	25.20
Source K	11.37	13.64	11.37	13.64
Source B	98.00	137.00	98.00	137.00
Source Group LMNOPU	65.04	94.60	65.04	94.60
Source Group QRST	28.38	41.00	28.38	41.00
<b>Company Total</b>	<b>316.96</b>	<b>425.50</b>	<b>314.06</b>	<b>419.6</b>

Table 2: Abstraction licence variations and total licence DO amendments since WRMP14

Source	Dry Year DO Assessment (MI/d)			
	WRMP14		2018/19	
	Average (ADO)	Peak (PDO)	Average (ADO)	Peak (PDO)
Source C	17.5	28.1	17.5	28.1
Source D	1.1	2.9	1.1	2.9
Source E	0.4	0.5	0.4	0.5
Source F	7.3	11.10	2.1	3.2
Source G	1.7	3.4	0	0
Source H	7.7	10.7	0.5	1.6
Source I	4.4	7.4	0	0
Source A	36.1	41.1	36.1	41.1
Source J	11.5	14.5	11.5	14.5
Source K	9.5	12.3	9.5	12.3
Source B	62.0	79.2	62.0	79.2
Source Group LMNOPU	58.3	80.0	55.3	76.1
Source Group QRST	28.3	38.8	28.3	38.8
<b>Company Total</b>	<b>245.8</b>	<b>330.0</b>	<b>224.3</b>	<b>298.33</b>

Table 3: Deployable Output amendments since WRMP14

## 2.2 Actual Outage

Actual Outage is derived from 2018/19 data for short term incidents. Outages for longer than 90 days, such as Source I, Source F and Source H are not included in this figure but are removed from Deployable Output. The actual outage for 2018/19 was:

Actual Outage (average)            8.8 MI/d

The actual outage for the peak week in 2018 was:

Actual outage (Peak Week)        10.98 MI/d

Typically, the Company has had a reactive approach to managing outage. This reflected the surplus of water and treatment capacity we have available. However, we understand the need to manage this issue carefully, and indeed it will be an important component of our plans to provide Southern Water with additional bulk supplies in the period 2020-2030.

Finally, we have a proactive programme with customers in our higher risk zones to mitigate the risks of oil spills from their domestic oil tanks.

## 2.3 Bulk Supplies

Portsmouth Water currently has a single bulk supply to Southern Water Services. This supplies water from our North Arundel Source to Whiteways Lodge storage reservoir and on to Southern Water's Pulborough Source. The system has a capacity of 15 MI/d with a sweetening flow of 1.0 MI/d required at all times. The original agreement, which expired in 2014, allowed for a peak supply of 15.0 MI/d and an average supply of 4.45 MI/d. The bulk supply was reviewed in 2016 and is now available on the basis of 15.0 MI/d being available at all times.

## 2.4 Sustainability Schemes

Portsmouth Water's area of supply includes numerous protected rivers, harbours and coastlines, highlighted in Figure 2.

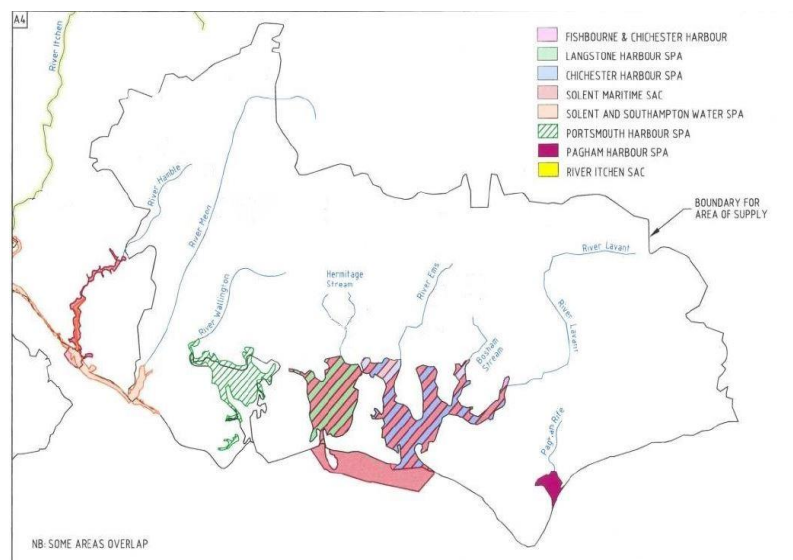


Figure 2: Protected areas within Portsmouth Water's area of supply

The Company has complied with all previous sustainability reductions and voluntarily reduced abstraction licences.

The following sections set out what activities were included in the Water Industry National Environmental Programme (WINEP) which was completed in June 2017. This was significantly earlier than the legal requirement which was for completion 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 original scheme included cattle fencing and channel modifications. Unfortunately the landowners did not want bankside fencing because of increased flood risks. Portsmouth Water provided a silt trap and hard surfaced cattle crossings to improve water quality instead. Additional work was carried out in 2017/18 and this involved the removal of an existing weir.

#### **2.4.3 Titchfield Haven**

In December 2015 Portsmouth Water renewed its time limited licence at Source F. This source is on the River Meon and abstraction may also influence the harbour at Titchfield Haven. Although the Habitats Regulations Investigation concluded that there was no adverse effect on the harbour the EA imposed a new augmentation clause on Source F based on the use of raw water from Source G. This reduction in deployable output is considered in Section 2.1.

### **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 were used for revenue forecasting and ODI's but it is the 'Dry Year' forecast that is used for the supply demand balance. The population forecast was set in 2014 and has remained unchanged for each Annual Review. The only adjustment made is to the outturn household property 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.

The Non-Household demand forecast was based on econometrics and the outturn data between 2007/8 and 2012/13. The outturn demand since 2013/14 has been very close to the forecast, with a gradual reduction in demand over



time. Non-Household demand in 2018/19 was 34.08 Ml/d after adjustments for meter under registration and the Maximum Likelihood Estimation technique (MLE).

### **3.2 Per Capita Consumption**

Portsmouth Water use an individual household monitor to estimate unmeasured per capita consumption (PCC). In 2018/19 there were 856 properties (out of 1178 on our monitor) which gave valid consumption data and this produced an occupancy adjusted per capita consumption of 162 l/h/d excluding supply pipe leakage.

Properties with consumptions above approximately 450 litres/head/day (l/h/d) were excluded from the calculations because they are either likely to be leaking or to have increased 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 2018/19 the overall measured PCC was 128 l/h/d. Measured customers are meter optants and new homes built since 2005. In 2018/19 measured per capita consumption was 21% lower, on average, than unmeasured per capita 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 where the revised figures are provided.

The PCC described in this report is based on our historic methodology. We have an action plan in place to implement the new methodology in the year 2019/20.

### **3.3 Optional Metering**

The Final Water Resources Management Plan 2014 does not contain any proposals to introduce compulsory metering. This is because Portsmouth Water's area of supply is not classified as 'Seriously Water Stressed' by the Environment Agency.

Our WRMP14 commitment was to promote metering to customers who would benefit from a financial point of view. The Company proposed to install 5,000 domestic meter options per year, but in 2018/19 only 2580 customers chose to switch to a measured supply as part of the optional metering programme. Figure 3 shows the optionally installed metering figures compared to Portsmouth Water's yearly targets.

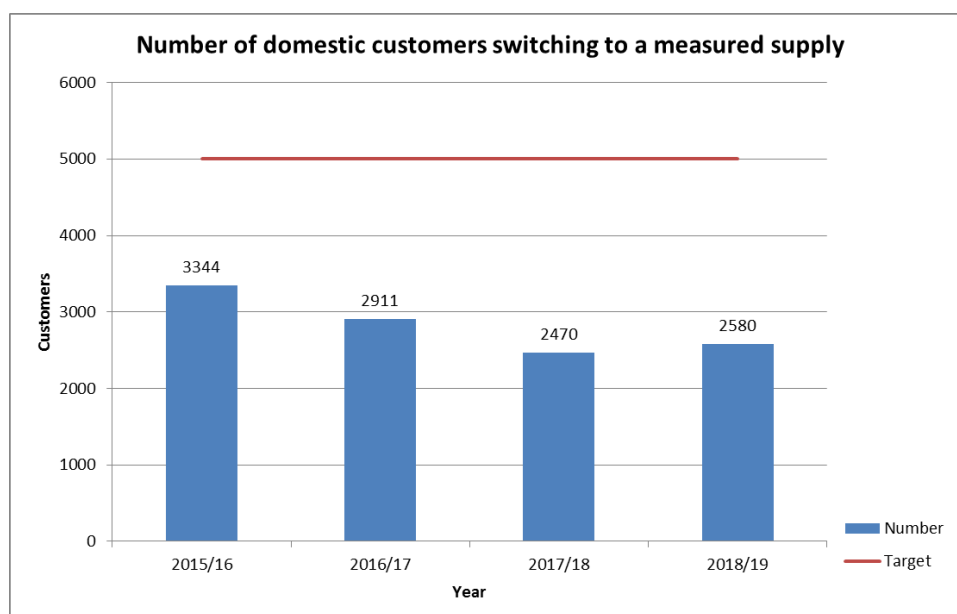


Figure 3: Optionally installed metering figures compared to Portsmouth Water's yearly targets

At March 2019, domestic meter penetration for the Company was 32% of household customers, an increase of 2 percentage points from last year. The Water Resources Management Plan assumed that 70% metering penetration would 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 household outturn figure for 2018/19 was 1,979 and this is close to the forecast included in the Water Resources Management Plan 2014.

With the reduction in the number of meter options, over time, it has been decided to change policy in the WRMP2019. 'Change of Occupier' metering will be introduced in 2020/21, starting with properties with an existing meter pit, and then moving on to universal change of occupier metering in 2025/26. This should achieve 90% meter penetration by 2045.

### 3.4 Leakage

For the year 2018/19 average leakage is calculated (post MLE) at 28.12 MI/d. This is against the target of 29.85 MI/d. 2018/19 was a good year for leakage control with the introduction of new technology and new techniques.

The graph below shows the long term trend in leakage performance and the significant improvement in 2018/19. Portsmouth Water's 4-year average is 29.9 MI/d. The Company is on track to meet its 5-year target of 29.9 MI/d.

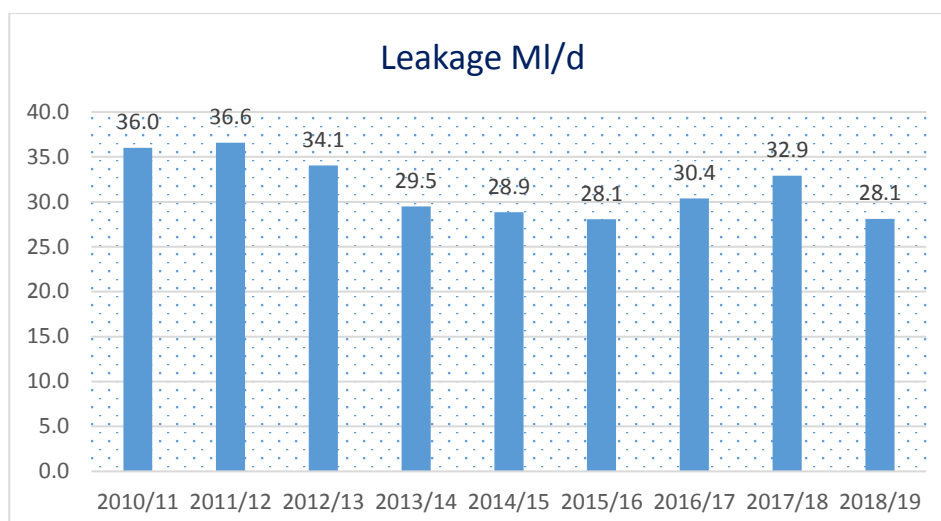


Figure 4: Portsmouth Water yearly leakage volumes since 2010/11

The harsh winter of 2018 led to a 4.0 MI/d rise in leakage in late 2017/18 that would need to be recovered during 2018/19. Consequently, a successful leakage recovery plan was put in place aimed at innovating through collaboration to reduce leakage by 7.0 MI/d from April 2018 to March 2019. Specifically:-

- Noise correlators to improve leakage detection efficiency, listening for leaks in real-time on 25% of its network.
- Flow and pressure logging and software to improve network understanding.
- Specialist leakage detection technician resources
- Leakage management, analysis and consultancy
- Improvements to repair processes and techniques

Work has continued to refine the data and introduce 'best practice' for the assessment of leakage. For the next WRMP the new leakage methodology will be used and this will add additional water to the leakage total and reduce overall PCC.

The Company can confirm that there is no difference between the leakage figures reported in this document and the information we will be submitting to Ofwat in July as part of our PR14 reporting. The new methodology applies from April 2020.

### 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 2018/19 was 0.19 MI/d which was below the target.

	2015/16	2016/17	2017/18	2018/19
Target	0.29	0.29	0.29	0.29
Savings Achieved	0.27	0.26	0.22	0.19

Table 4: Savings achieved through water efficiency measures

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 for 2018/19 was 10.17 MI/d and the peak week allowance was 13.71 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 2018/19 was typical of a ‘Dry Year’ with low rainfall in June and July. Over the whole year rainfall was 87% of the long term average but rainfall in November and December was sufficient to ensure full groundwater recharge in January. The graph below shows recorded rainfall as a blue bar and the Long Term Average (LTA) rainfall as a black line.

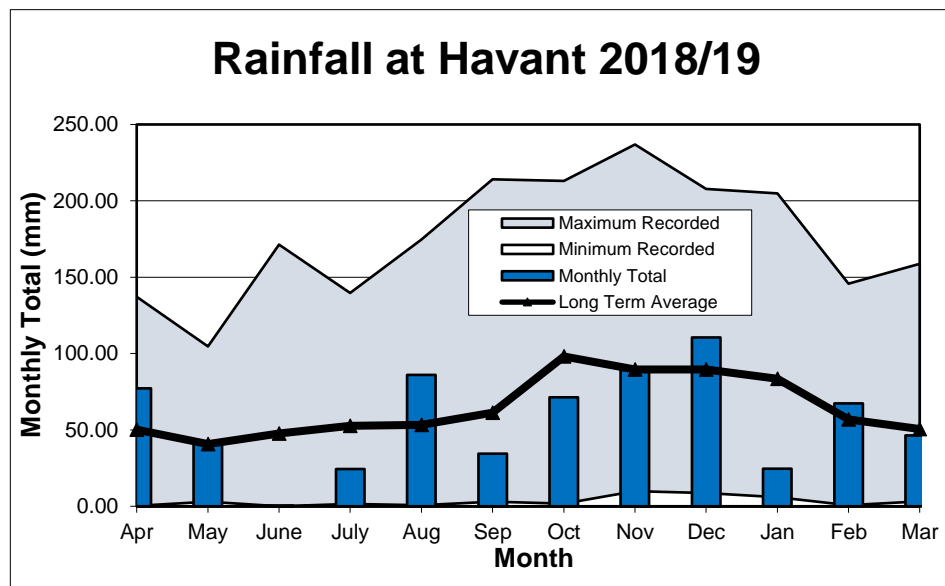


Figure 5: Rainfall at Havant during 2018/19 compared to long term average

The dry weather in June and July produced an early peak in demand and a longer than average period of high demand. There was a dry Autumn but ground water levels recovered well in the Winter. January was very dry and the ground water recession started early. Luckily there was above average rainfall in February and ground water levels recovered for a second time to above average conditions. Average demand for the year was 174.58 MI/d but this consists of high domestic demand and low leakage levels. Figure 6 below shows distribution input throughout the year.

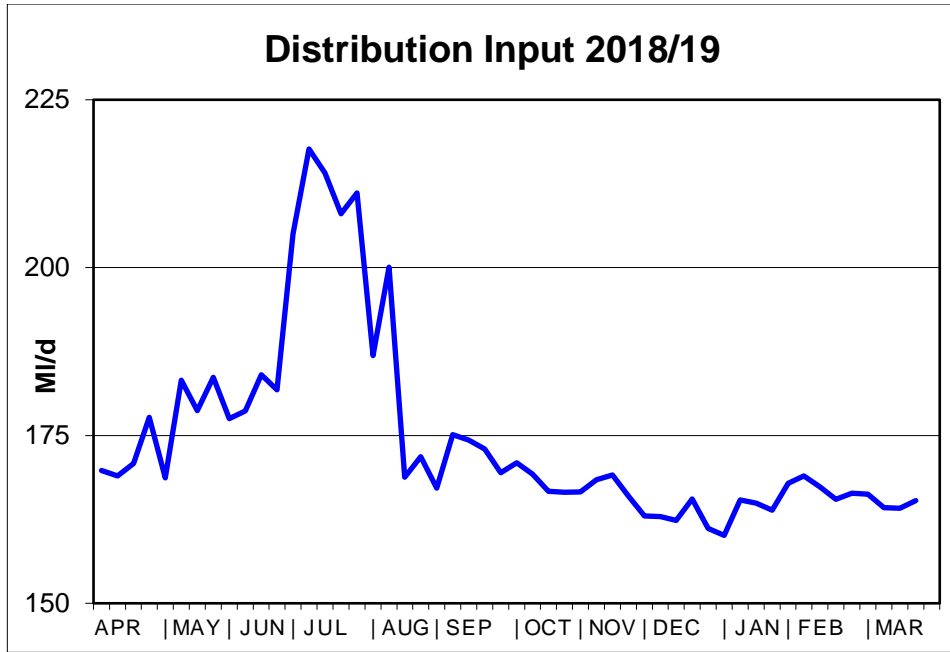


Figure 6: Distribution Input 2018/19

Groundwater levels are a good indicator of the water available to Portsmouth Water from the chalk aquifer. 2018/19 started with groundwater levels above the long term average but they fell to below average in November as a result of the dry summer. Rainfall in November and December resulted in a strong groundwater recovery. There was well below average rainfall in January but

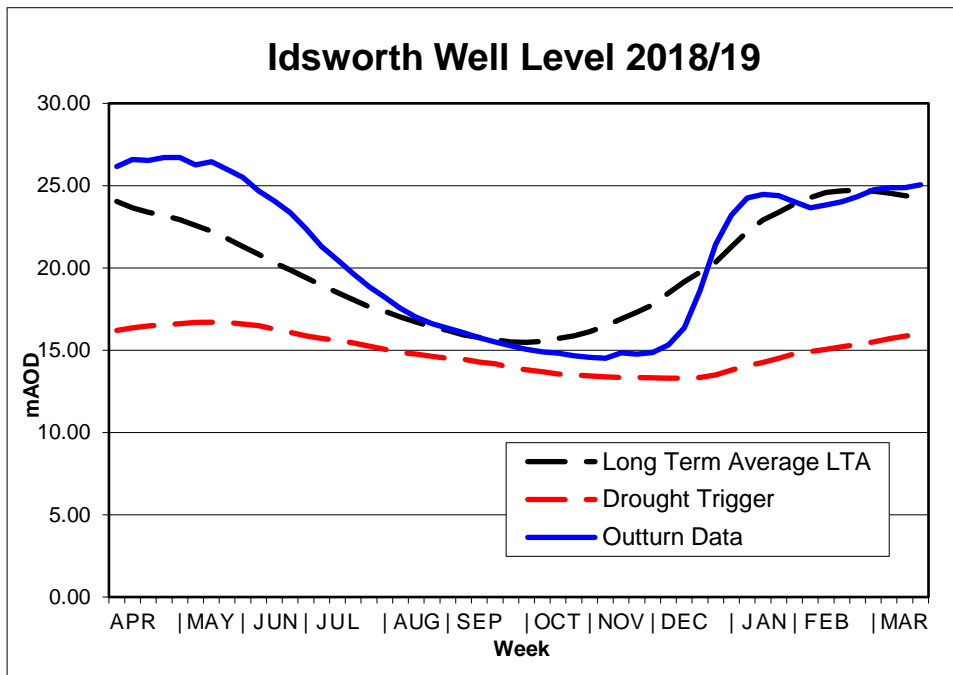


Figure 7: Groundwater levels in 2018/19 compared to long term average

rainfall in February caused a second rise in ground water levels.

The Bulk Supply to Southern Water normally runs with a “sweetening” flow of 1.0 MI/d. In 2018/19 the bulk supply ran significantly above this level for several periods equating to an annual average Bulk Supply to Southern Water of 5.5 MI/d.

## 6.2 Water Balance Reconciliation

For most outturn years the 'Macro Components' of demand, such as unmeasured demand and measured demand, do not add up exactly to the 'Distribution Input'. The Annual Review process requires any 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 or 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 was 162 l/h/d and this reduced to 161 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 128 l/h/d (see Section 3.2). This reduced to 127.5 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 difficult to estimate and a nominal per property consumption of 500 l/prop/d has been used to calculate the volume. An accuracy of  $\pm 25\%$  has been set and this gives a confidence grade of B4. The volume of unmeasured demand is calculated to be 0.85 MI/d which remains at 0.85 MI/d after the reconciliation.

### 6.2.4 Measured Non-Household Demand

Measured non-household demand is taken from the independent MOSL database. With an accuracy of  $\pm 5\%$ , and a confidence grade of A2, the outturn water delivered figure of 34.12 MI/d decreases to 34.08 MI/d following the reconciliation. This is close to the non-household demand forecast included in the Final Water Resources Management Plan 2014. (see Section 3.1)

### 6.2.5 Distribution Losses

Distribution Losses are separated 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 was 19.64 MI/d and this decreased to 19.60 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 2018/19 was 0.44 MI/d and this remained at 0.44 MI/d following the reconciliation.

### 6.2.7 Water Taken Unbilled

By definition water taken unbilled can only be an estimate. The figure for water taken legally unbilled is based on 1% of Distribution Input and it represents water used for fire-fighting practice.

Water taken illegally unbilled is based on the assumption that 33 % of void properties are actually occupied but not paying for water. The estimated figure for this is 0.84 MI/d. With a confidence grade of B4 the outturn figure is reduced to 0.83 MI/d following reconciliation.

### 6.2.8 Distribution Input

The outturn figure for 2018/19 was based on meter readings from reservoirs and pumping stations and this represents more than 95% of the Company's area of supply. An accuracy of  $\pm 5.0\%$  gives a Confidence Grade of A2. Distribution Input was increased by the MLE process from 174.51 MI/d to 174.58 MI/d.

### 6.2.9 Final Water Balance

The final water balance is made up from the various components of demand.

The error in the initial water balance was 0.39 MI/d and this represents 0.22% 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 Table

The annual average water balance components table sets out the supply and demand data for 2018/19. It also shows the customer information with property, population and occupancy numbers for mid-year. The supply/demand balance is provided in the following section on the security of supply index. (Section 6.5)

## 6.4 Peak Week Table

The peak week water balance components table gives the supply and demand data for the critical period in July 2018. The supply/demand balance is provided in the following section on the security of supply index. (Section 6.5.1).

Many of the components of the peak week demand can only be an estimate because they 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 data. The peak week occurred in July and the outturn volume, excluding the bulk supply to Southern Water was 217.12 MI/d. The average distribution input was 174.58 MI/d giving an overall peaking factor of 1.24.

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

Unmeasured Household	1.34
Measured Household	1.27
Unmeasured Non-Household	1.14
Measured Non-Household	1.14
Distribution Losses	1.00
Distribution System Use	1.00
Water Taken Unbilled	<u>1.00</u>
Overall Factor	<u>1.24</u>

This assumption gives an unmeasured PCC of 231.2 l/h/d and a measured PCC of 174.6 l/h/d during the peak week.

During the peak week the bulk supply transferred 9.5 MI/d to Southern Water in West Sussex. The bulk supply to Hampshire South was not fully commissioned in 2018/19.

## 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 supply/demand balance, and therefore security of supply, in a 'Dry Year'. If 2018/19 had been a 'dry year', with a 1 in 20 year return period, then the average SOSI would have been:

Deployable Output (2018/19)	224.3 MI/d
Outage Allowance	-8.76 MI/d
Process Losses	<u>-2.4 MI/d</u>
Water Available for Use (WAFU)	<u>215.54 MI/d</u>

The report year distribution input figure was 174.58 MI/d but if it had been a 'Dry Year' then the WRMP 2014 forecast for 2018/19 indicates that demand would have been 180.90 MI/d.

Water Available for Use (WAFU)	215.54 MI/d
Dry Year Demand	-180.90 MI/d
Bulk Supply Demand	<u>-15.0 MI/d</u>
Available Headroom	<u>19.64 MI/d</u>

The target headroom in the WRMP 2014 for 2018/19 was 10.2 MI/d and this gives a surplus of 9.44 MI/d in a dry year. With a total population of 730,710 the SOSI for 2018/19 is 100 and the system is resilient.

### 6.5.1 Peak Demand

If 2018/19 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.

Actual Deployable Output (July 2018)	298.3 MI/d
Outage	-10.98 MI/d
Process Losses	<u>-2.4 MI/d</u>
Water Available for Use (WAFU)	<u>287.35 MI/d</u>

The outturn Distribution Input figure was 217.17 MI/d but the dry year forecast for 2018 peak week in the WRMP 2014 was 233 MI/d.

Water Available for Use (WAFU)	287.35 MI/d
Dry Year Peak Week Demand	-233 MI/d
Peak Week Bulk Supply	<u>-15.0 MI/d</u>
Available Headroom	<u>39.35 MI/d</u>



Target headroom in the WRMP 2014 at the peak week in 2018 was 13.7 MI/d and this gives a surplus of 25.65 MI/d. With a total population of 730,710 the SOSI for June 2018 was 100.

## 7 PROGRESS ON OPTIONS

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

- Havant Thicket Winter Storage Review
- Bulk Supply from South East Water
- Relocating the Source 'A' Abstraction
- Source 'J' 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 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.

This option plays a significant part of our WRMP19 and allows significant further trades to Southern Water.

### 7.2 Source J Boreholes

The provision of additional boreholes at the existing Source J 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.

This option features in our WRMP19 and allows further trades to Southern Water.

### 7.3 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.

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 because the area is not classified as “Seriously Water Stressed” by the EA.

## 8 FORWARD LOOK

Portsmouth Water has completed work on the next Water Resources Management Plan. This work included a re-assessment of Deployable Output with Deepest Advisable Pumped Water Level. Headroom and outage have been re-assessed and consultants have looked at drought scenarios and the impact of climate change.

Consultants have re-assessed the options included in the WRMP 2014 and the associated SEA and HRA. This work has involved stakeholder groups and a pre-consultation process. An unconstrained list of options was been produced and this was refined into a feasible list of options for the WRMP 2019.

Population numbers have been derived from Government statistics and the associated property numbers checked against Local Authority Housing Forecasts.

The Draft WRMP was published on the 5<sup>th</sup> March 2018 and the Draft Final WRMP was submitted on the 31<sup>st</sup> August 2018. The Company has recently submitted an addendum to our plan in response to comments from DEFRA and are currently awaiting direction to publish the final WRMP.

Portsmouth Water is involved in the Water Resources in the South East modelling work and has taken account of the regional solutions proposed.

Portsmouth Water’s WRMP 2014 contains information on multiple scenarios from the ‘Dry Year’ at 1 in 20 to the ‘Severe Drought’ at 1 in 200. The WRMP 2019 is based on the new ‘Reference Level of Service’ or ‘Design Drought’ with a return period of 1 in 200.

A series of six months strategic meetings are now taking place with EA Managers and quarterly meetings are taking place with local EA staff.

The key differences between the WRMP 2014 and the WRMP 2019 are:

- Havant Thicket development re-started.
- Additional bulk supplies to Southern Water.
- Change of Occupier Metering.
- Additional leakage control.
- Additional water efficiency.
- Reference level of service adopted.
- Potential groundwater developments included.
- New leakage methodology applied
- Southern Water Drought Order for the River Itchen.

**9 CONCLUSION**

Portsmouth Water draws the following conclusions from the Annual Review 2019:

- 2018/19 was an unusual year with a dry June and July but a wet August.
- A surplus was retained at peak and average demand.
- The bulk supply agreement was renewed in 2016 and the average flow allowance increased to 15.0 MI/d.
- Total leakage of 28.12 MI/d was below the Portsmouth Water target for 2018/19 due to the introduction of new technology and new techniques. Under the new leakage methodology the total leakage figure would be 28.48 MI/d. The impact of the change in leakage methodology is less than that experienced in 2017/18.

**10 TABLES**

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.

## WRMP 2014 ANNUAL REVIEW - WATER BALANCE COMPONENTS - ANNUAL AVERAGE

Water Company: Portsmouth Water  
 Number of resource zones: One  
 Year of data submission: 2019

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	MI/d	2dp	Required	183.05	A2
2 <sub>AR</sub>	Raw water Imported	MI/d	2dp	Required	0.00	AX
3 <sub>AR</sub>	Potable water Imported	MI/d	2dp	Required	0.00	AX
4 <sub>AR</sub>	Raw Water Losses and Operational Use	MI/d	2dp	Required	0.52	A2
5 <sub>AR</sub>	Raw water exported	MI/d	2dp	Required	0.00	AX
5.1 <sub>AR</sub>	Non potable water supplied	MI/d	2dp	Required	0.00	AX
6 <sub>AR</sub>	Potable water exported	MI/d	2dp	Required	5.55	A2
7 <sub>AR</sub>	Actual Deployable Output	MI/d	2dp	Optional	224.30	B3
<b>Process Losses</b>						
9 <sub>AR</sub>	Treatment works losses and operational use	MI/d	2dp	Optional	2.40	B3
10 <sub>AR</sub>	Actual Outage	MI/d	2dp	Required	8.76	B3
<b>DEMAND</b>						
11 <sub>AR</sub>	Distribution Input	MI/d	2dp	Required	174.58	A2
<b>Consumption</b>						
23 <sub>AR</sub>	Measured non household - consumption	MI/d	2dp	Required	33.80	A2
24 <sub>AR</sub>	Unmeasured non household - consumption	MI/d	2dp	Required	0.79	B4
25 <sub>AR</sub>	Measured household - consumption	MI/d	2dp	Required	24.15	A2
26 <sub>AR</sub>	Unmeasured household - consumption	MI/d	2dp	Required	85.06	B3
29 <sub>AR</sub>	Measured household - pcc	l/h/d	0dp	Required	127.69	B2
30 <sub>AR</sub>	Unmeasured household - pcc	l/h/d	0dp	Required	161.31	B3
31 <sub>AR</sub>	Average household - pcc	l/h/d	0dp	Required	152.40	B3
32 <sub>AR</sub>	Water taken unbilled	MI/d	2dp	Required	2.52	B4
33 <sub>AR</sub>	Distribution system operational use	MI/d	2dp	Required	0.44	B3
<b>Leakage</b>						
34 <sub>AR</sub>	Measured non household - uspl	MI/d	2dp	Required	0.28	B3
35 <sub>AR</sub>	Unmeasured non-household - uspl	MI/d	2dp	Required	0.06	B3
36 <sub>AR</sub>	Measured household - uspl	MI/d	2dp	Required	1.86	B3
37 <sub>AR</sub>	Unmeasured household - uspl	MI/d	2dp	Required	6.05	B3
38 <sub>AR</sub>	Void properties - uspl	MI/d	2dp	Required	0.29	B4
39 <sub>AR</sub>	Total mains and trunk mains leakage	MI/d	2dp	Required	19.60	A3
40 <sub>AR</sub>	Total leakage	MI/d	2dp	Required	28.13	A3
41 <sub>AR</sub>	Total leakage	l/prop/d	2dp	Required	87.87	A3
<b>CUSTOMERS</b>						
<b>Properties</b>						
43 <sub>AR</sub>	Unmeasured household - properties	000's	3dp	Optional	201.667	A2
42 <sub>AR</sub>	Measured household - properties	000's	3dp	Optional	92.945	A2
46 <sub>AR</sub>	Unmeasured non household - properties	000's	3dp	Optional	1.942	A2
45 <sub>AR</sub>	Measured non household - properties	000's	3dp	Optional	14.018	A2
44 <sub>AR</sub>	Void household - properties	000's	3dp	Optional	7.736	B3
47 <sub>AR</sub>	Void non households - properties	000's	3dp	Optional	1.860	B3
48 <sub>AR</sub>	Total properties	000's	3dp	Optional	320.168	A2
<b>Population</b>						
50 <sub>AR</sub>	Unmeasured household - population	000's	3dp	Optional	527.307	B3
49 <sub>AR</sub>	Measured household - population	000's	3dp	Optional	189.120	B3
52 <sub>AR</sub>	Unmeasured non household population	000's	3dp	Optional	1.738	B3
51 <sub>AR</sub>	Measured non household - population	000's	3dp	Optional	12.546	B3
53 <sub>AR</sub>	Total population	000's	3dp	Optional	730.710	B3
<b>Occupancy</b>						
55 <sub>AR</sub>	Unmeasured household - occupancy rate	h/pr	2dp	Optional	2.61	A2
54 <sub>AR</sub>	Measured household - occupancy rate	h/pr	2dp	Optional	2.03	A2
<b>Metering</b>						
57 <sub>AR</sub>	Total Household Metering penetration	%	2dp	Required	31.5	A2
58	Total numbers of household meters installed	000's	3dp	Required	4.559	A2

**ANNUAL AVERAGE WATER BALANCE COMPONENTS****TABLE COMMENTARY****Annual Average Water Balance Components****Supply****Line 1 - Raw Water Abstracted**

2018/19 was a 'Dry Year' but abstraction was limited by leakage control activity.

**Line 4 - Raw Water Losses**

The seasonal augmentation of the River Ems is now shown as a raw water loss in the table rather than a process loss.

**Line 6 - Potable Water Exported**

Potable water exported represents the Bulk Supply to Southern Water in West Sussex.

**Line 7 – Actual Deployable Output**

Actual Deployable Output is calculated from the Outage Register. An allowance has been made for licence variations since 2014, the temporary loss of three sources due to groundwater pollution and the conversion of one source to a raw water augmentation.

**Process Losses****Line 9 - Treatment Works Operational Use**

The Treatment Works Operational Use volume is backwash water which is not recycled. This number has significantly reduced because the membranes at Source 'B' have been replaced with UV treatment.

**Line 10 – Actual Outage**

Actual Outage is derived from outturn data for 2018/19 only and this is not the same as the statistical approach included in the WRMP. Both approaches assumes that no outage events last longer than 90 days.

**Demand****Line 11 - Distribution Input**

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

Line 23 – Measured Non-household Consumption

Measured Non-Household Consumption is calculated by removing underground supply pipe (USPL) from the water delivered figure.

Line 24 – Unmeasured Non-household Consumption

Unmeasured Non-Household Consumption is calculated by removing underground supply pipe (USPL) from the water delivered figure.

Line 25 – Measured Household Consumption

Measured Household Consumption is calculated by removing underground supply pipe (USPL) from the water delivered figure.

Line 26 – Unmeasured Household Consumption

Unmeasured Household Consumption is calculated by removing underground supply pipe (USPL) from the water delivered figure.

Line 29 – 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 had a financial incentive to change to the measured tariff. Measured domestic properties have an occupancy of 2.02 and an underground supply pipe leakage allowance of 20 litre/property/day.

Line 30 - Unmeasured Household Per Capita Consumption

The unmeasured per capita consumption is based on the Company's own Consumption Monitor and the main text explains that the results have been adjusted to exclude a number of properties with very low per capita consumptions. All figures used in the per capita consumption calculation are assumed to exclude supply pipe leakage but include an allowance of 2.9% for meter under-registration.

Line 31 - Average Household Per Capita Consumption

Average Household Per Capita Consumption has gone up this year due to the high summer demand. The overall trend is still downward with an aspiration to reach 138 l/h/d by 2030.

Line 32 - 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.

Line 33 - Distribution System Operational Use (DSOU)

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

**Leakage**Line 34 – Measured Non-household Underground Supply Pipe Leakage

Measured Non-household USPL is based on an allowance of 20 l/prop/d.

Line 35 – Unmeasured Non-household Underground Supply Pipe Leakage

Unmeasured Non-household USPL is based on an allowance of 30 l/prop/d.

Line 36 – Measured Household Underground Supply Pipe Leakage

Measured Household USPL is based on an allowance of 20 l/prop/d.

Line 37 – Unmeasured Household Underground Supply Pipe Leakage

Unmeasured Household USPL is based on an allowance of 30 l/prop/d.

Line 38 – Void Property Underground Supply Pipe Leakage

Void Property USPL is based on an allowance of 30 l/prop/d.

Line 39 – Distribution Losses

Distribution losses are derived from the total leakage figure minus supply pipe leakage.

Line 40 - Total Leakage

Total Leakage has been adjusted to remove summer legitimate use and has been subjected to the MLE process.

Line 41 – Leakage Per Property

Leakage per property is based on Total leakage divided by the total number of properties.

**Properties**

Line 43 – Unmeasured Household 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 falling gradually as properties convert to the measured tariff.

Line 42 – Measured Household Properties

Measured Household Properties come from the billing system and are converted to mid-year for the water balance.

Line 46 – Unmeasured Non-household Properties

Unmeasured Household Properties come from MOSL and are converted to mid-year for the water balance.

Line 45 – Measured Non-household Properties

Measured Household Properties come from MOSL and are converted to mid-year for the water balance.

Line 44 – Void Household Properties

Void Household Properties are estimated from the billing system and converted to mid-year for the water balance.

Line 47 – Void Non-Household Properties

Void Non-Household Properties are estimated from MOSL and converted to mid-year for the water balance.

Line 48 Total Properties

This is the sum of the properties including voids.

Line 50 Unmeasured Household Population

Unmeasured Household population is calculated from unmeasured properties multiplied by an assumed occupancy rate of 2.6.

Line 49 Measured Household Population

Unmeasured Household population is calculated from measured properties multiplied by an assumed occupancy rate of 1.9 for meter optants and 2.2 for new houses.

Line 52 Unmeasured Non-household Population

Unmeasured Household population is calculated from unmeasured properties multiplied by an assumed occupancy rate of 0.9.

Line 51 Measured Non-household Population

Unmeasured Household population is calculated from measured properties multiplied by an assumed occupancy rate of 0.9.

**Population**Line 53 – Total Population

Total population is calculated but matches this forecast included in the WRMP 2014.

**Occupancy**Line 55 – Unmeasured Household Occupancy

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

Line 54 – Measured Household Occupancy

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

**Metering**Line 57 – Total Household Meter Penetration (excl voids)

Meter penetration continues to increase as customers opt for a 'free' meter and new properties are added to the system.

Line 58 – Total Number of Household Meters Installed

This the sum of the meter optants and the new house meters.



## WRMP 2014 ANNUAL REVIEW - WATER BALANCE COMPONENTS - PEAK WEEK

Water Company: Portsmouth Water  
 Number of resource zones: One  
 Year of data submission: 2019

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	233.27	A2
2 <sub>AR</sub>	Raw water Imported	Ml/d	2dp	Required	0.00	AX
3 <sub>AR</sub>	Potable water Imported	Ml/d	2dp	Required	0.00	AX
4 <sub>AR</sub>	Raw Water Losses and Operational Use	Ml/d	2dp	Required	0.52	AX
5 <sub>AR</sub>	Raw water exported	Ml/d	2dp	Required	0.00	AX
5.1 <sub>AR</sub>	Non potable water supplied	Ml/d	2dp	Required	0.00	AX
6 <sub>AR</sub>	Potable water exported	Ml/d	2dp	Required	9.95	A2
7 <sub>AR</sub>	Actual Deployable Output	Ml/d	2dp	Optional	298.33	B3
<b>Process Losses</b>						
9 <sub>AR</sub>	Treatment works losses and operational use	Ml/d	2dp	Optional	2.40	B3
10 <sub>AR</sub>	Actual Outage	Ml/d	2dp	Required	10.98	B3
<b>DEMAND</b>						
11 <sub>AR</sub>	Distribution Input	Ml/d	2dp	Required	217.166	A2
<b>Consumption</b>						
23 <sub>AR</sub>	Measured non household - consumption	Ml/d	2dp	Required	38.48	A2
24 <sub>AR</sub>	Unmeasured non household - consumption	Ml/d	2dp	Required	0.91	B4
25 <sub>AR</sub>	Measured household - consumption	Ml/d	2dp	Required	31.16	A2
26 <sub>AR</sub>	Unmeasured household - consumption	Ml/d	2dp	Required	115.86	B3
29 <sub>AR</sub>	Measured household - pcc	l/h/d	0dp	Required	165	B2
30 <sub>AR</sub>	Unmeasured household - pcc	l/h/d	0dp	Required	220	B3
31 <sub>AR</sub>	Average household - pcc	l/h/d	0dp	Required	201	B3
32 <sub>AR</sub>	Water taken unbilled	Ml/d	2dp	Required	2.47	B4
33 <sub>AR</sub>	Distribution system operational use	Ml/d	2dp	Required	0.44	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	0.06	B3
36 <sub>AR</sub>	Measured household - uspl	Ml/d	2dp	Required	1.86	B3
37 <sub>AR</sub>	Unmeasured household - uspl	Ml/d	2dp	Required	6.05	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	19.60	A3
40 <sub>AR</sub>	Total leakage	Ml/d	2dp	Required	28.12	A3
41 <sub>AR</sub>	Total leakage	l/prop/d	2dp	Required	87.83	A3
<b>CUSTOMERS</b>						
<b>Properties</b>						
43 <sub>AR</sub>	Unmeasured household - properties	000's	3dp	Optional	201.667	A2
42 <sub>AR</sub>	Measured household - properties	000's	3dp	Optional	92.945	A2
46 <sub>AR</sub>	Unmeasured non household - properties	000's	3dp	Optional	1.942	A2
45 <sub>AR</sub>	Measured non household - properties	000's	3dp	Optional	14.018	A2
44 <sub>AR</sub>	Void household - properties	000's	3dp	Optional	7.736	B3
47 <sub>AR</sub>	Void non households - properties	000's	3dp	Optional	1.860	B3
48 <sub>AR</sub>	Total properties	000's	3dp	Optional	320.168	A2
<b>Population</b>						
50 <sub>AR</sub>	Unmeasured household - population	000's	3dp	Optional	527.307	B3
49 <sub>AR</sub>	Measured household - population	000's	3dp	Optional	189.120	B3
52 <sub>AR</sub>	Unmeasured non household population	000's	3dp	Optional	1.738	B3
51 <sub>AR</sub>	Measured non household - population	000's	3dp	Optional	12.546	B3
53 <sub>AR</sub>	Total population	000's	3dp	Optional	730.710	B3
<b>Occupancy</b>						
55 <sub>AR</sub>	Unmeasured household - occupancy rate	h/pr	2dp	Optional	2.61	A2
54 <sub>AR</sub>	Measured household - occupancy rate	h/pr	2dp	Optional	2.03	A2
<b>Metering</b>						
57 <sub>AR</sub>	Total Household Metering penetration	%	2dp	Required	31.50	A2
58	Total numbers of household meters installed	000's	3dp	Required	4.559	A2

**PEAK WEEK WATER BALANCE COMPONENTS****TABLE COMMENTARY****Peak Week Water Balance Components****Supply**Line 1 - Raw Water Abstracted

The Peak Week was in July but abstraction was below the 'Dry Year' estimate in the WRMP 2014.

Line 4 - Raw Water Losses

The seasonal augmentation of the River Ems was not running in the Peak Week and the Raw Water Loss is zero.

Line 6 - Potable Water Exported

Potable water exported represents the Bulk Supply to Southern Water in West Sussex. Southern Water took more than the sweetening flow of 1.0 Ml/d during the Peak Week.

Line 7 – Actual Deployable Output

Actual Deployable Output is calculated for the peak week in 2018. An allowance has been made for loss of supply at three source works due to water quality problems, a licence variation at another source and the conversion of another source to a raw water augmentation.

**Process Losses**Line 9 - Treatment Works Operational Use

The Treatment Works Operational Use volume is backwash water which is not recycled. This number has significantly reduced because the membranes at Source 'B' have been replaced with UV treatment.

Line 10 – Actual Outage

Actual Outage is derived from outturn data for the Peak Week in July 2018 and is not the same as the statistical figure included in the WRMP. Both approaches assumes that no outage events last longer than 90 days. For longer events the Deployable Output in Line is reduced.

**Demand**Line 11 - Distribution Input

Distribution Input has been derived from the total measured flow minus the Bulk Supply to Southern Water for the peak seven day period.

Line 23 – Measured Non-household Consumption

Measured Non-Household Consumption is calculated by removing underground supply pipe (USPL) from the water delivered figure.

Line 24 – Unmeasured Non-household Consumption

Unmeasured Non-Household Consumption is calculated by removing underground supply pipe (USPL) from the water delivered figure.

Line 25 – Measured Household Consumption

Measured Household Consumption is calculated by removing underground supply pipe (USPL) from the water delivered figure.

Line 26 – Unmeasured Household Consumption

Unmeasured Household Consumption is calculated by removing underground supply pipe (USPL) from the water delivered figure.

Line 29 – Measured Household Per Capita Consumption

Peak Week Measured Household per capita consumption is lower than the estimate included in the WRMP.

Line 30 - Unmeasured Household Per Capita Consumption

Peak Week Unmeasured per capita consumption is lower than the estimate included in the WRMP.

Line 31 - Average Household Per Capita Consumption

Peak Week Household Per Capita Consumption has gone up this year due to the summer peak in demand.

Line 32 - 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.

Line 33 - Distribution System Operational Use (DSOU)

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

**Leakage**Line 34 – Measured Non-household Underground Supply Pipe Leakage

Measured Non-household USPL is based on an allowance of 20 l/prop/d.

Line 35 – Unmeasured Non-household Underground Supply Pipe Leakage

Unmeasured Non-household USPL is based on an allowance of 30 l/prop/d.

Line 36 – Measured Household Underground Supply Pipe Leakage

Measured Household USPL is based on an allowance of 20 l/prop/d.

Line 37 – Unmeasured Household Underground Supply Pipe Leakage

Unmeasured Household USPL is based on an allowance of 30 l/prop/d.

Line 38 – Void Property Underground Supply Pipe Leakage

Void Property USPL is based on an allowance of 30 l/prop/d.

Line 39 – Distribution Losses

Distribution losses are derived from the total leakage figure minus supply pipe leakage.

Line 40 - Total Leakage

Total Leakage has been adjusted to remove summer legitimate use and has been subjected to the MLE process.

Line 41 – Leakage Per Property

Leakage per property is based on Total leakage divided by the total number of properties.

**Properties**Line 43 – Unmeasured Household 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 falling gradually as properties convert to the measured tariff.

Line 42 – Measured Household Properties

Measured Household Properties come from the billing system and are converted to mid-year for the water balance.

Line 46 – Unmeasured Non-household Properties

Unmeasured Household Properties come from MOSL and are converted to mid-year for the water balance.

Line 45 – Measured Non-household Properties

Measured Household Properties come from MOSL and converted to mid-year for the water balance.

Line 44 – Void Household Properties

Void Household Properties are estimated from the billing system and converted to mid-year for the water balance.

Line 47 – Void Non-Household Properties

Void Non-Household Properties are estimated from MOSL and converted to mid-year for the water balance.

Line 48 Total Properties

This is the sum of the properties including voids.

Line 50 Unmeasured Household Population

Unmeasured Household population is calculated from unmeasured properties multiplied by an assumed occupancy rate of 2.6.

Line 49 Measured Household Population

Unmeasured Household population is calculated from measured properties multiplied by an assumed occupancy rate of 1.9 for meter optants and 2.2 for new houses.

Line 52 Unmeasured Non-household Population

Unmeasured Household population is calculated from unmeasured properties multiplied by an assumed occupancy rate of 0.9.

Line 51 Measured Non-household Population

Unmeasured Household population is calculated from measured properties multiplied by an assumed occupancy rate of 0.9.

**Population**

Line 53 – Total Population

Total population is calculated but matches this forecast included in the WRMP.

**Occupancy**

Line 55 – Unmeasured Household Occupancy

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

Line 54 – Measured Household Occupancy

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

**Metering**

Line 57 – Total Household Meter Penetration (excl voids)

Meter penetration continues to increase as customers opt for a meter and new properties are added to the system.

Line 58 – Total Number of Household Meters Installed

This is the sum of meter optants and new property meters.