



# **DOMESTIC CONSUMPTION MONITORING DATABASES ANNUAL REPORT 2006/2007**

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# DOMESTIC CONSUMPTION MONITORING DATABASES

## ANNUAL REPORT 2006/2007

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## EXECUTIVE SUMMARY

The Company has developed a number of domestic consumption databases which are used to measure peak and average demands in representative samples of households charged on both the Company's Unmeasured and Measured tariffs. The data is used to confirm annual water balance calculations but, more importantly, it is used to predict future changes in water demands from households. This plays an important role in preparing water resources plans.

### Unmeasured Property Databases

For households charged on unmeasured tariffs a database of around 500 properties is maintained which is representative of the proportions of different Property Types within the overall Company customer database. It is also representative of the Company's three Water Resource Zones (geographical areas). The properties are surveyed by questionnaires from time to time in order to collect occupancy data. Meters have been installed at these properties purely to enable consumption data to be collected.

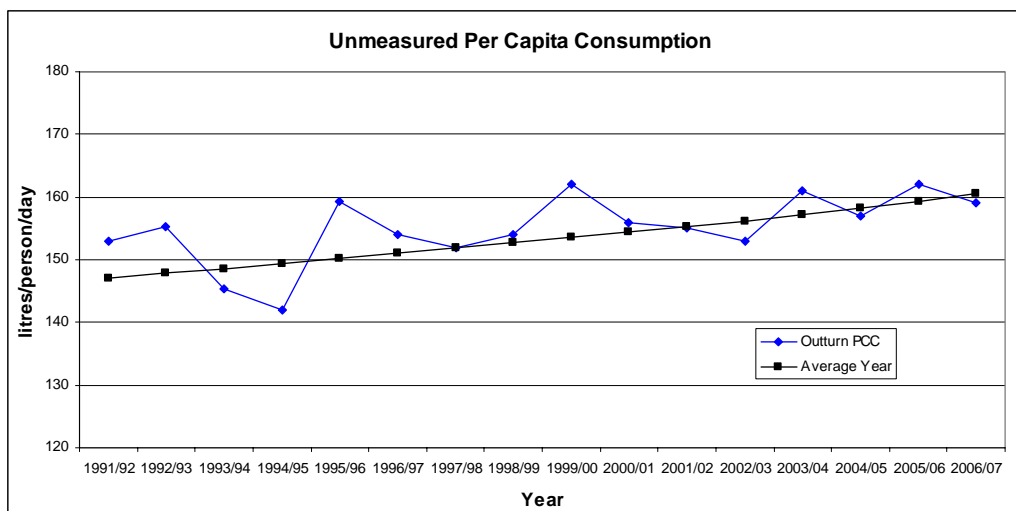
### Measured Databases

Domestic customers now have the right to change to a measured tariff without paying the cost of meter installation. 6,791 properties converted to a measured tariff during 2006/07 and these have been added to the 'Full' Measured Property Database for which annual consumption information is available.

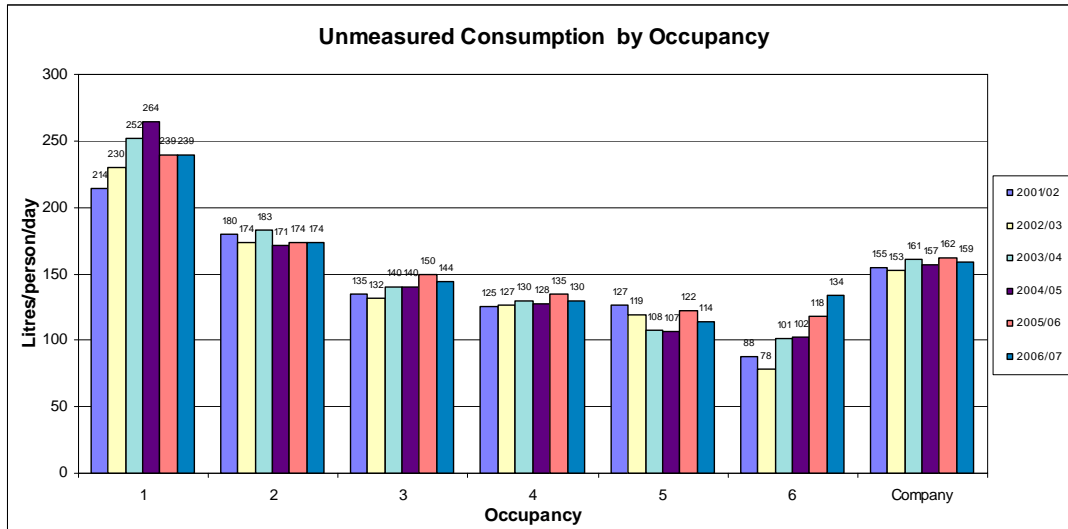
### Results from the Annual Average Consumption Databases

#### *Unmeasured Database*

Consumption in the Unmeasured Average Consumption Database fell from 162 l/h/d in 2005/06 to 159 l/h/d in 2006/07. Although 2006 was a dry summer and a rise in consumption might have been expected, per capita consumption was constrained by the publicity associated with the drought in other parts of the South East and the Company's own water efficiency advice despite the fact that the Company did not need to impose hosepipe restrictions.



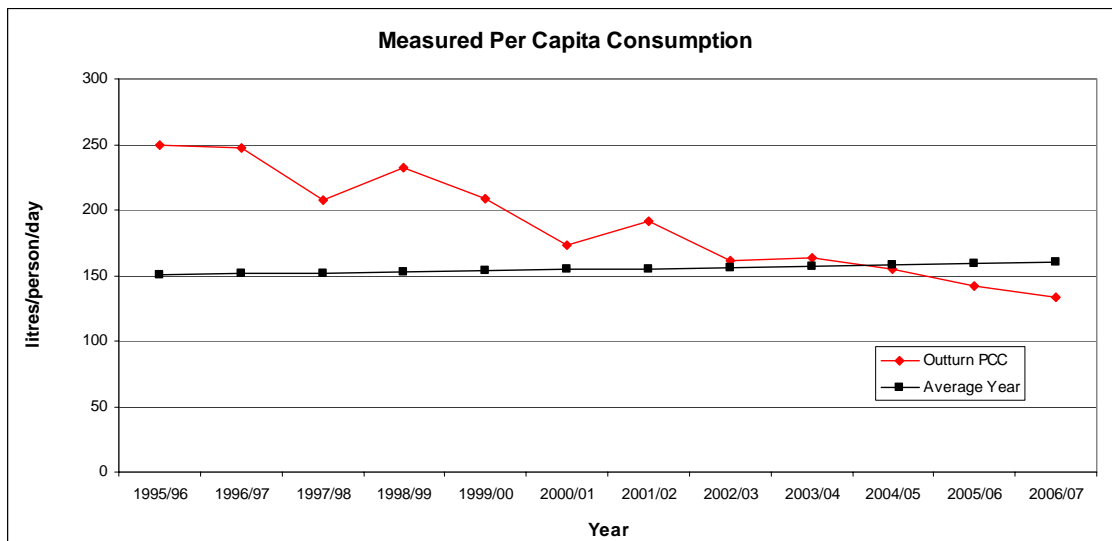
The upward trend in per capita consumption was predicted by Herrington and others in the 1990s. As well as an increase in the use of labour-saving devices such as dishwashers, the principal reason for the upward trend is the reduction in occupancy with time.



Consumption continues to be heavily influenced by occupancy rates with a single person household using nearly twice as much per person as a four person household.

**Measured Property Databases**

A review of data provided by meter optants in the Fixed Measured Property Database has revealed a low level of occupancy in those households transferring from the unmeasured to the measured tariff. As a result, an occupancy level of 1.75 persons per household has been applied to consumption figures for the Full Measured Property Database of 24,825 properties which grew by 6,791 properties in 2006/07. Per capita consumption data from all of the Company's measured domestic households is shown below.



Measured per capita consumption has fallen from the very high levels recorded in the mid-1990s when the database was heavily influenced by sprinkler users who were required to transfer to the measured tariff. Per capita consumption in measured properties is now 133 l/h/d which is below the average unmeasured per capita consumption of 161 l/h/d. The results from the database suggest that per capita consumption is significantly influenced by the occupancy levels of properties which opt for a meter.

### **Conclusions and Proposals**

#### ***Conclusions***

6,791 properties have opted to transfer from the unmeasured to the measured tariff in 2006/07, many of whom are believed to be low occupancy households with little financial incentive to further reduce consumption. The consumption data from these properties has been collected within the 'Full' Measured Property Database.

Annual Average Consumption in the unmeasured property database fell to 159 l/h/d as a result of demand management publicity. The measured property database also fell, recording a per capita consumption of 133 l/h/d in 2006/07.

#### ***Proposals***

The Unmeasured Database will continue to collect data in order to support the end of year water balance calculations as well as help the Company to refine its future demand forecasts. During 2007/08 the unmeasured properties will be re-surveyed to confirm their current occupancy and water uses.

The 'Full' Measured Database will continue to collect data and provide zonal and property type summary information. A new Measured Property Database of 500 measured properties is expected to be established with a similar zonal and property mix as the unmeasured database.

## **1. BACKGROUND TO THE DOMESTIC CONSUMPTION MONITORING DATABASES**

Portsmouth Water has developed a number of databases which have enabled it to measure the demand patterns of various groups of domestic customers. It uses the information from these databases to identify the impacts of its different tariffs as well as using the information to plan its water resources strategy to meet future demands.

In total the Company has over 270,000 domestic customers and it is therefore important that an accurate indication of the level of consumption can be determined. Since their initial inception in 1997 the Company has continued to develop its monitoring databases to improve the level of confidence in its reporting and forecasting.

### **1.1 Unmeasured Properties**

#### **1.1.1 Overall Average Consumption for Unmeasured Properties**

With the intention of identifying the consumption of domestic properties charged on its unmeasured tariff, Portsmouth Water set up a Domestic Consumption Database of 500 households in 1997. The properties were selected from roads in which the water mains and services had recently been rehabilitated and which had the necessary meter boxes to enable meters to be easily fitted. The objective was to set up a significantly sized sample which was representative of the property types which existed in the Company's overall domestic customer database. To assist with this CACI Area Data (see Appendix 1) was used to identify the overall proportions of different property types across the whole Company area.

Properties were carefully selected to try to match the proportions of property types, as well as to ensure that geographical coverage was proportional to the size of each of the Company's Resource Zones. This would ensure that the representation of the overall customer base was as accurate as possible.

At the same time the householders were contacted in order to identify information about the level of household occupancy and the range of water-using appliances installed. Meters were installed at the property boundary to record overall consumption but not used for charging purposes.

Ofwat's (Office of Water Services) reporting requirements confirmed that a minimum sample size of 500 properties was needed and this has been maintained from time to time by recruiting small batches of additional properties as and when required. In 1999 the existing properties within the database were all resurveyed to check on occupancy and numbers of water-using appliances. Additional properties were selected at that time to improve coverage in Bishop's Waltham, Chichester and Gosport. In 2003 the properties within the database were surveyed again to check on occupancy. Properties are occasionally deleted because of continued problems with leakage or frequent changes of occupier (rented property). The total in the database at April 2007 now stands at 495.

Overall consumption data from each property is collected by manually reading meters every six months. Aggregated consumption data can be analysed by both property type and resource zone since per capita consumption is influenced by the type of property as well as its location. It is also very heavily influenced by the occupancy rate, since single person households generally use much more water per person than those in multi-occupancy.

***Distribution of the Monitoring Database by Property Type***

The actual numbers of each property type in the database is shown below. The 'representative number' relates to the proportion of the database for each property type which has been identified from the CACI data for the overall Company domestic customer database.

<b>Property Type</b>	<b>Representative Number</b>	<b>Actual Number</b>
Detached	113	118
Semi-Detached	114	131
Terraced	167	186
Purpose Built Flat	83	33
Converted Flat	18	27
<b>Total</b>	<b>495</b>	<b>495</b>

***Distribution of the Database by Resource Zone***

In order to determine the impact of consumption upon local water resources as well as to identify local differences in customer behaviour, the database is used to measure variations in water use within three separate water resource zones (geographical areas).

Again, the representative number relates to the proportion in the database related to the proportion of the overall property database in each of the Company's three Water Resource Zones.

<b>Water Resources Zone</b>		<b>Representative Number</b>	<b>Actual Number</b>
1	Gosport & Waterlooville	191	185
2	Portsmouth & Havant	169	197
3	Chichester & Bognor Regis	135	113
<b>Total</b>		<b>495</b>	<b>495</b>

The Company's area consists of a wide mix of properties. The coastal plains in Portsmouth (Zone 2) and Gosport (Zone 1) are heavily populated with many small terraced properties and flats. The towns of Fareham (Zone 1), Havant (Zone 2) and Waterlooville (Zone 1) were largely developed after the Second World War with a significant proportion of social housing. The rural areas to the north of Fareham (Zone 1) and those in and around Chichester and Bognor Regis (both Zone 3) tend to be larger properties, often occupied by more affluent households.

**1.2 Measured Properties**

By comparison with other water industry companies, Portsmouth Water has a relatively low proportion of measured households. This is believed to be due to the Company's low water charges which offer little financial incentive for customers to change tariffs. However, changes in policy and legislation in the 1990s has resulted in an increasing number of domestic households choosing to pay for their water by meter.

Until 1999 those customers wishing to change to the measured tariff had to pay for a meter to be installed. In the latter part of the 1990s the Company required those customers wishing to use unattended garden watering devices, such as sprinklers, to be metered. As a result a significant number of gardeners with sprinklers had meters installed. Since April 1999 the provision of domestic meters has been free of charge to customers resulting in a migration of high rateable value and low occupancy households to a measured tariff. Savings in water charges are made by these customers principally by a change of tariff without necessarily changing their consumption habits.

Those opting for a measured tariff have differing reasons for doing so, and consequently may have very different consumption habits. The Company has therefore been monitoring 'sprinkler' and 'economic' optants separately for some time. Recent data is as follows:

	Sprinkler Optants		Other Optants		Total	
	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
Prior to 1999		511		1849		2360
1999/00	28	539	1687	3536	1715	4075
2000/01	52	591	1667	5203	1719	5794
2001/02	125	716	1374	6577	1499	7293
2002/03	153	869	1217	7794	1370	8663
2003/04	178	1047	2869	10663	3047	11710
2004/05	179	1226	2241	12904	2420	14130
2005/06	92	1318	3812	16716	3904	18034
2006/07	6	1324	6785	23501	6791	24825

Since those paying by measured tariff may be expected to display different consumption habits to those on an unmeasured tariff, the Company has used information from its billing databases to calculate the per capita consumption.

#### **1.2.1 'Full Measured Property Database'**

To date the analysis of water consumption by measured domestic properties from 1999 onwards has been based on the 'Full' measured household database, i.e. all domestic households which have transferred to a measured tariff. However, it is clear that the number and profile of property types and the consumption habits of those in the database changes from year to year.

The current annual average charge for an unmeasured household is around £80 and so the level of saving which can be achieved by being charged by meter is relatively small when compared to overall household running costs. It is possible that those who have opted for a meter may not display consumption patterns which would be representative of all customers.

#### **1.2.2 'Fixed' Measured Property Database**

Since the proportions of different user types in the 'Full' measured database changes from year to year, this makes it difficult to identify changes in consumption due to changing weather conditions. It is also impossible to identify occupancy levels and therefore per capita consumption data cannot be accurately calculated. The Company decided that it needed a stable database from which it could monitor and predict measured household consumption for different weather conditions.

In April 2003 the measured billing system was used to identify properties that had filled in a measured agreement form and declared a property type and occupancy. From a total of 8,663 domestic properties, which had opted for the measured tariff at that time, 1,495 were selected to set up a new database.

The billing system was then used to produce a summary report split by zone and property type.

**Numbers of Properties in the 'Fixed' Measured Database**

Water Resources Zone		Property Type				Total
		Detached	Semi-Detached	Terraced	Flats	
1	Gosport & Waterlooville	305	124	64	62	555
2	Portsmouth & Havant	107	58	73	69	307
3	Chichester & Bognor Regis	356	111	78	88	633
<b>Company</b>		<b>768</b>	<b>293</b>	<b>215</b>	<b>219</b>	<b>1495</b>

The database is considered to be of sufficient size to enable the selection of properties to be representative of the whole Company area, albeit that it is not entirely representative of the distribution of property types across the entire Company area.

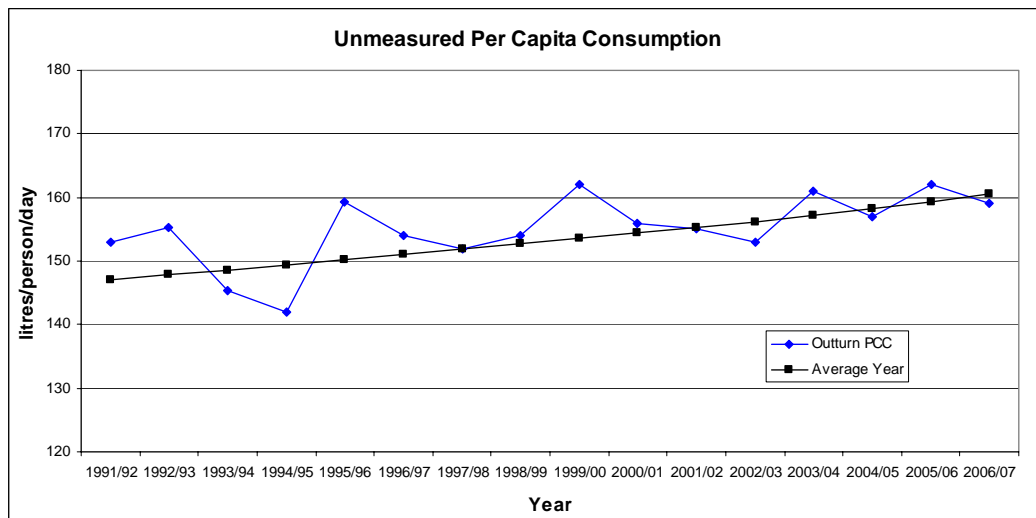
Low occupancy households potentially derive the greatest benefit in changing to a measured tariff, so not surprisingly the occupancy rate of the 'Fixed' database was 1.65 persons, per household, when surveyed in 2002/03. This is assumed to have risen to 1.75 for the Company as a whole in 2006/07 but is still considerably below the average of 2.38 for unmeasured households.

## 2. ANNUAL AVERAGE CONSUMPTION FOR 2006/07

Weather conditions for the early part of 2006/07 were drier than average but this was followed by a wetter than average autumn. The winter started dry but February was much wetter.

### 2.1 Unmeasured Household Monitor

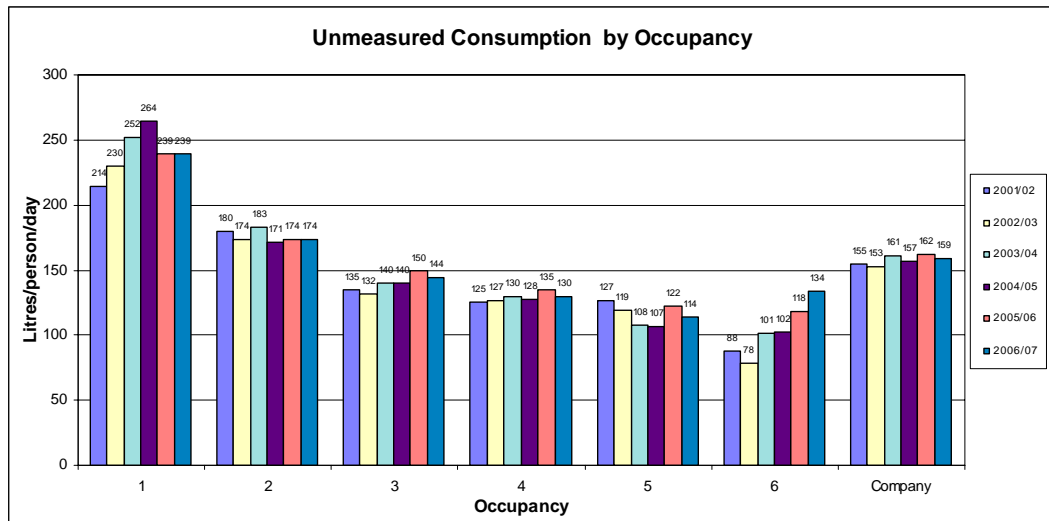
In April 2007 all of the consumption monitor meters were manually read and based upon occupancies provided for household questionnaires the database annual average consumption for 2006/07 was calculated at 159 l/h/d. Data on per capita consumption is plotted below for the last sixteen years. Consumption during 2006 was heavily influenced by the drought affecting much of South East England. In all 13 million people were affected. Although Portsmouth Water did not need to impose restrictions, it was very involved with regional publicity which encouraged customers to be conservative in their use of water. Thus, although the summer of 2006 was drier and hotter than average, demand was suppressed by water efficiency messages and the national coverage regarding the drought.



The upward trend in per capita consumption was predicted by Herrington and others in the 1990s. As well as an increase in the use of labour-saving devices such as dishwashers, the principal reason for the upward trend is the reduction in occupancy levels with time. This reduction in occupancy is likely to be due to more people living alone and family size reductions.

#### 2.1.1 Average Consumption by Occupancy

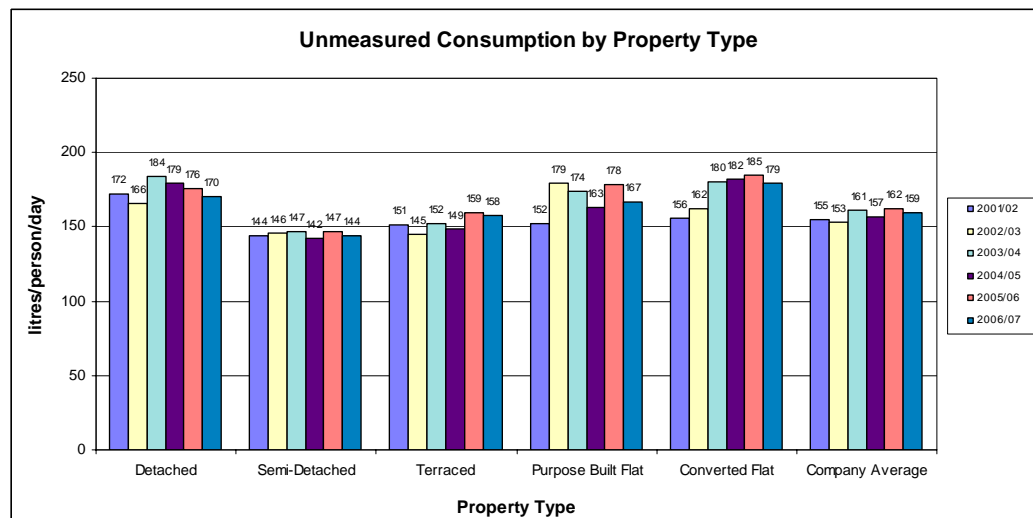
Using occupancy data from household questionnaires, the results have also been analysed to calculate per capita consumption for different occupancy rates in the database properties.



Results for 2006/07 were generally consistent with previous years and consumption is clearly shown to be influenced by occupancy rates with a single person household using nearly twice as much water per person as a four person household. Single occupants may possibly be more affluent and have more water-using appliances; it is also assumed that many low occupancy households may use appliances with part loads, rather than higher occupancy households using full loads.

### 2.1.2 Average Consumption by Property Type

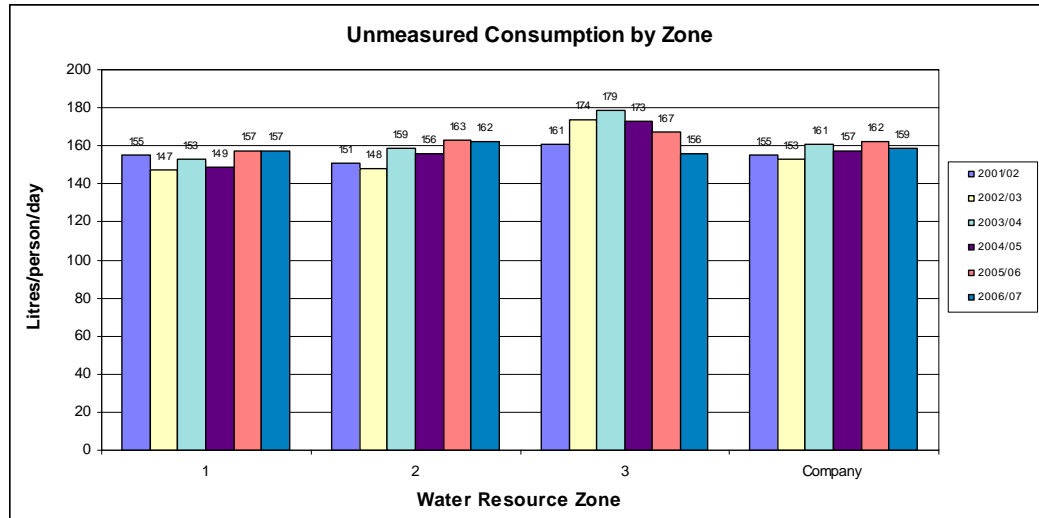
The results for 2006/07 were analysed by property type and a graphical representation is shown below:



It is interesting to note that per capita consumption in converted flats is generally higher than the average for all properties; this is believed to be due to the fact that lower occupancy levels occur in that type of property. Low occupancy households often use washing machines and dishwashers with part loads resulting in them being generally less efficient than larger households using full loads.

**2.1.3 Average Consumption by Resource Zone**

Analysis of the results according to the Company's three Resource Zones shows significant variations in per capita consumption across the Company's area.

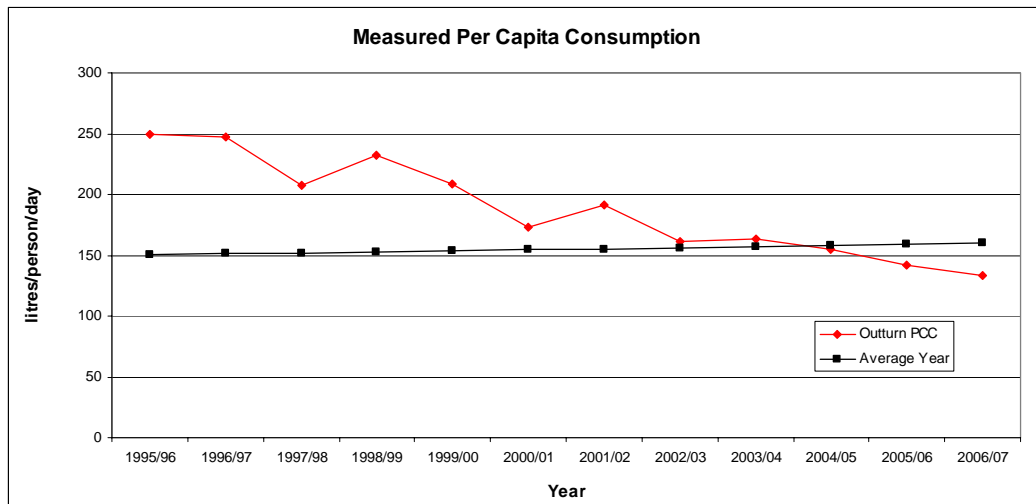


Per capita consumption can be influenced by property type and size as well as affluence and garden size. Zone 3, Chichester & Bognor Regis, is generally more affluent than Zones 1 and 2 and has shown higher consumption than the other two zones in the past. In 2006/07, however, it showed a significant fall in consumption. Zone 3 covers the Company's West Sussex area and since all other parts of Sussex were affected by hosepipe restrictions, it is believed that the water conservation messages probably had greater impact in Zone 3.

**2.2 Measured Households**

The readings from all domestic measured properties have been collected during 2005/06. Per capita consumptions have been calculated for the database using an assumed occupancy level of 1.75.

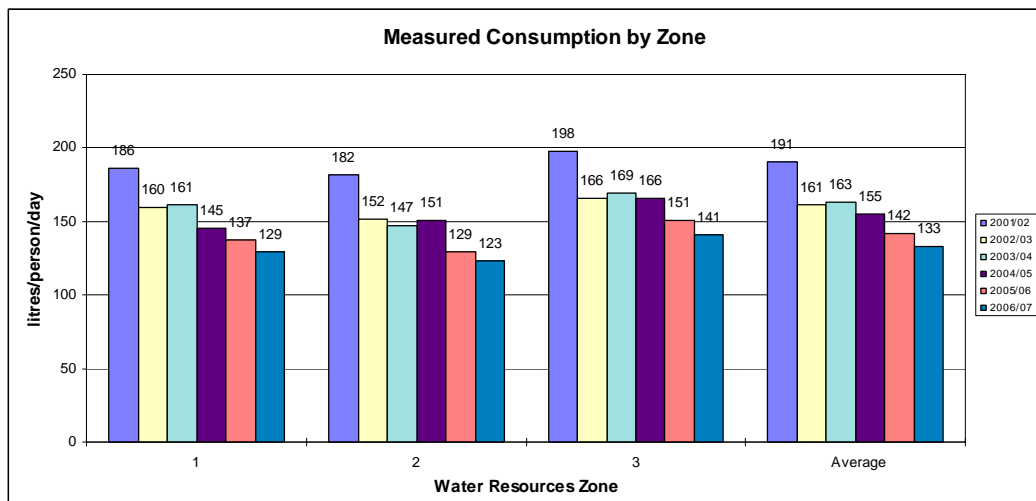
Historical data from the Company's Measured Database has enabled consumption from measured households to be calculated back to 1995/96 and the trend is represented below.



In 2006/07 average measured per capita consumption fell from 142 l/h/d to 133 l/h/d. Previously per capita consumption of the Company's measured domestic customers was consistently higher than the results from the unmeasured database. This was believed to be due to a high proportion of optants being sprinkler users in the early years. Prior to 1999 there were 511 sprinkler users out of a total of 2,360 optants representing 22% of metered users. By 2006/07 the number of sprinkler users had grown to 1,324 but the total number of optants had grown to 24,825, the sprinkler users now only representing 5% of metered customers.

### 2.2.1 Average Consumption by Resource Zone

Average consumption for the 'Full' Measured Property Database by Resource Zone is as follows:



There is a downward trend in consumption in all three zones. This is opposite to unmeasured consumption but is explained by the changing balance between sprinkler optants and economic optants. The variation between zones is also less than the unmeasured monitor and this is probably due to similar types of customer opting for a meter in all three areas.

### **3. CONCLUSIONS FROM THE RESULTS OF 2006/07**

As with previous years, the various Domestic Consumption Monitoring Databases have produced useful information on the level of unmeasured and measured domestic consumption. The data was used in the 2007 June Return to Ofwat.

#### **3.1 Modifications to the Databases**

During 2003 the properties in the Unmeasured Consumption Database was resurveyed and the occupancy levels were updated. The number in the database is now 495 which meets the minimum requirements for reporting data to Ofwat.

The freedom for customers to change to a measured tariff resulted in a further 6,791 properties being added to the overall measured consumption database in 2006/07. There are now 24,825 domestic properties in the database but only 5% of these are sprinkler users. It is believed that a large number of meter optants are either low occupancy or high rateable value households principally saving money on water and sewerage charges by changing tariff.

A 'Fixed' monitoring database with 1,495 properties was set up in April 2003. Data on occupancy levels has been collected from these properties and has been used to estimate the current occupancy rate of 1.75 persons per household, significantly lower than the unmeasured consumption database which has 2.38 persons per household.

#### **3.2 Annual Average Consumption for 2006/07**

##### **3.2.1 Unmeasured Database**

Despite a dry summer overall average per capita consumption fell from 162 to 159 l/h/d in 2006/07. This is believed to be due to the effects of the Company's water efficiency publicity and the impacts of the drought in other parts of the South East.

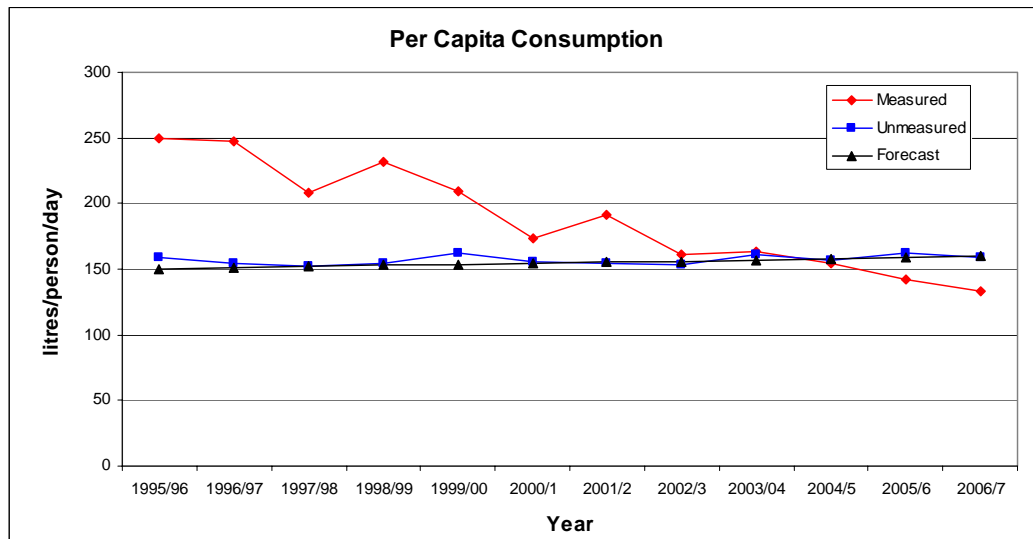
Analysis by property type confirmed yet again that per capita consumption in flats is higher than semi-detached and terraced houses. This is principally a result of low occupancy levels in flats.

As has been the case in previous years, per capita consumption in lower occupancy households is much higher than that in higher occupancy households. In 2006/07 a single person household used nearly twice as much water per head than a four person household.

Analysis of unmeasured consumption by Resource Zone showed a fall from the previous year in all the zones; contrary to previous years Zone 3, Chichester and Bognor Regis, recorded the lowest zonal per capita consumption but this is thought to be due to the impacts of regional publicity and the hosepipe restrictions in force across the remainder of Sussex.

##### **3.2.2 Measured Database**

The entire Company database of measured domestic properties grew by 6,791 properties during the year and the overall annual consumption based on 24,825 properties fell from 142 l/h/d to 133 l/h/d. The database has recorded a significant fall from 250 l/h/d when data was first collected in the mid-1990s. In the early years of the database, meter optants were heavily populated by gardeners with sprinkler licences. The proportion of sprinkler users has fallen from 22% of the database prior to 1999 to 5% in 2007.



The measured per capita consumption for 2006/07 is now 16% lower than unmeasured per capita consumption. This is consistent with low use households now opting for a 'free' meter.

#### **4. PROPOSALS FOR 2007/08**

The Company continues to value the data collected from its consumption monitoring databases. The results are circulated to the regulatory bodies such as the Environment Agency, Ofwat and the Consumer Council for Water where they have been well received. The data is also publicly available via the Environment section of the Company's website.

The Company will continue to record the data from its monitoring databases in 2007/08. Further development work is identified below.

##### **4.1 Average Consumption**

###### **4.1.1 Unmeasured Database**

The unmeasured database will continue to be used to calculate per capita consumption for unmeasured properties in Ofwat's June Return and the Company's Demand Forecasts for water resource planning purposes.

During 2007/08 the unmeasured properties will be re-surveyed to confirm current occupancy as well as water consumption activity.

###### **4.1.2 Measured Database**

The 'Full' Measured Property Database will continue to be used in order to calculate measured household consumption.

It is proposed to establish a new Measured Property Database. This will be based on the same principles as the unmeasured monitor with a sample of 500 measured properties. These will be selected to represent the overall proportion of property types and the split between the Water Resource Zones (geographical areas). The properties will be surveyed by questionnaire in order to collect occupancy and water use information.

Results from the new database will provide additional information on occupancy and consumption.

**APPENDIX 1: CACI AREA DATA**

Portsmouth Water				
CACI Area Data 2006/07				
Properties				
Property Type	Zone 1	Zone2	Zone3	Company
Detached	27248	8246	24754	60248
Semi-Detached	30451	12622	17899	60972
Terraced	28887	43509	16505	88901
Purpose Built Flat	14203	19466	10458	44127
Converted Flat	863	6074	2438	9375
Bedsit	20	127	53	200
<b>Total</b>	<b>101672</b>	<b>90044</b>	<b>72107</b>	<b>263823</b>
Proportions				
Property Type	Zone 1	Zone2	Zone3	Company
Detached	0.10	0.03	0.09	0.2283652
Semi-Detached	0.12	0.05	0.07	0.2311095
Terraced	0.11	0.16	0.06	0.3369721
Purpose Built Flat	0.05	0.07	0.04	0.1672599
Converted Flat	0.00	0.02	0.01	0.0355352
Bedsit	0.00	0.00	0.00	0.0007581
<b>Total</b>	<b>0.39</b>	<b>0.34</b>	<b>0.27</b>	<b>1</b>
Representative number of monitor properties				
Property Type	Zone 1	Zone2	Zone3	Company
Detached	51	15	46	113
Semi-Detached	57	24	34	114
Terraced	54	82	31	167
Purpose Built Flat	27	37	20	83
Converted Flat	2	11	5	18
Bedsit	0	0	0	0
<b>Total</b>	<b>191</b>	<b>169</b>	<b>135</b>	<b>495</b>
Actual Number of monitor properties in Zone				
Property Type	Zone 1	Zone 2	Zone 3	Company
Detached	61	19	38	118
Semi-Detached	66	25	40	131
Terraced	52	112	22	186
Purpose Built Flat	6	19	8	33
Converted Flat	0	22	5	27
Bedsit	0	0	0	0
<b>Total</b>	<b>185</b>	<b>197</b>	<b>113</b>	<b>495</b>