
Water Use in Bromley Primary Schools 2005-07

An ech₂o report for Bromley Council • August 2011

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1. Introduction

- Bromley council had collected data for school's water use from 2005-2007 and asked ech₂o to analyse the figures and report on our findings. The information was in the form of an Excel spreadsheet listing annual water use, in m³/year, for seventy seven primary schools in the borough.
- To understand water use in schools, it is important to calculate use per pupil. Therefore, we first found pupil numbers for each school, the majority of which came from the Department for Education's website.¹ Water data was only consistently available for 2005 so most pupil numbers were used from this year.

2. Results Overview

- The annual means of water use per pupil for 2005-07 were calculated by summing all volume uses each year and dividing this by the total number of pupils. Table 1 shows the values found. The mean across all three years was 5.1 m³/pupil/year.

2005-07 Bromley Primary School Water Use			
Year	2005	2006	2007
Mean Water Use (m ³ /pupil/year)*	5.2	4.9	5.3
*Based on 2005 pupil numbers. ²			

Table 1

- Getting an overview of how the borough is performing is very useful as it allows you to compare it to benchmarks, as demonstrated in Table 2.
- The Department for Education and Skills (DfES) figure for 'Typical Practice' water use in UK primary schools without a swimming pool is 5.2 m³/pupil/year.³ (Appendix 1 (page 10) shows the figures for all school types.)
- The Bromley mean is very close to the DfES figure. Our analysis showed that 53% of primary schools in Bromley used equal to or less than the UK mean water use per pupil.

2005-07* Bromley Primary Schools Water Use Summary Statistics				
Bromley Primary Schools Mean (m ³ /pupil/year)	DfES Typical Practice (m ³ /pupil/year)	Bromley Primary Schools Better than or Equal to DfES Typical Practice (%)	DfES Good Practice (m ³ /pupil/year)	Bromley Primary Schools Worse than DfES Good Practice (%)
5.1	5.2	53	3.0	91
*Based on 2005 pupil numbers.				

Table 2

- Compared to the 'Good Practice' benchmark of 3.0 m³/pupil/year though, the Bromley mean is about 40% higher.⁴
- 91% of primary schools in Bromley use more water per pupil than the Good Practice benchmark; therefore only 9% of schools use less water per pupil than the same benchmark.
- Most school should be able to reach the Good Practice benchmark by using efficient water fittings, such as save-a-flush bags, urinal controls, low-flow taps, dual-flush toilets and/or have good practice, such as pupils turning off twist-taps after use and maintenance of push-taps by the school.

3. Variation in Water Use between Bromley Primary Schools and Over Time

- Table 1 shows that mean annual water use in primary schools in Bromley did not change significantly over the three years. However, if you look at each school individually, there are considerable differences between them. The comparison to DfES benchmarks suggests a range but does not explicitly show it. There are also some cases where water use changed from year to year.

3.1. Variation in Water Use between Bromley Primary Schools

- Figure 1 illustrates the variation in water use across primary schools in Bromley during 2005-07. Comparing values to a mean puts emphasis on the outliers, i.e. those schools using much more or less than average.
- The schools highlighted in red used more than twice the Bromley mean, i.e. greater than about 10 m³/pupil/year. These schools could have used significantly more water than average due to one, or a combination, of: leaks, uncontrolled urinals, inefficient water behaviour, un-maintained taps or old toilets.

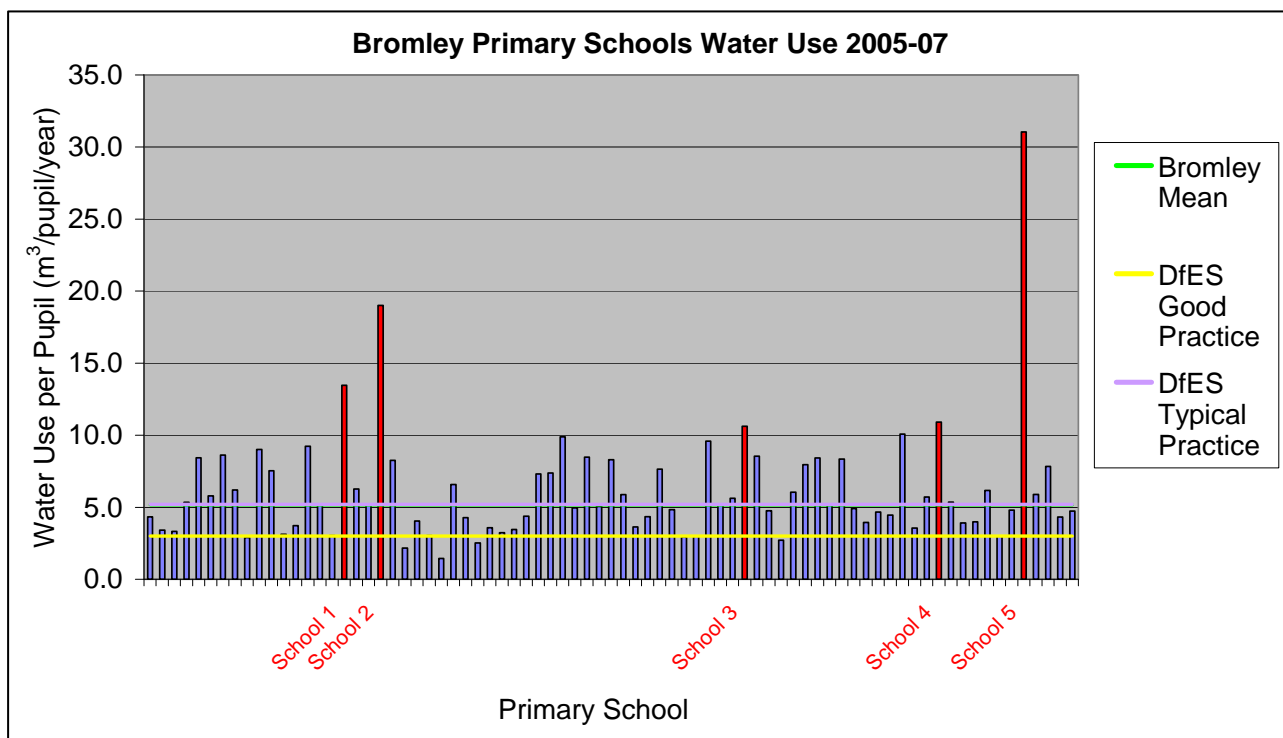


Figure 1 Note: 'Bromley Mean' does not appear on the chart because its value is so close to that of the 'DfES Typical Practice', it is therefore covered by it.

- Table 3 presents the data for the worst and best performing primary schools. The worst are the schools highlighted in Figure 2 and the best are those using less than or equal to 3.0 m³/pupil/year, i.e. lower than the DfES Good Practice value.

Highest and Lowest Water Users Bromley Primary Schools 2005-07	
Primary School	Mean Water Use 2005-07 (m ³ /pupil/year)
Highest Users	
School 1	13.5
School 2	19.0
School 3	10.6
School 4	10.9
School 5	31.0
Lowest Users	
School 6	2.9
School 7	2.2
School 8	1.5
School 9	2.5
School 10	2.9
School 11	3.0
School 12	2.7

Table 3

- In addition to the environmental costs of over-use of water, there are financial implications. Table 4 shows for the worst performing schools the estimated pupil and total costs and how much they will have been paying above the mean for Bromley primary schools. The highest users, School 2 and School 5 had estimated annual costs of around £25 and £46 per pupil, respectively, above the mean, equating to about £1,100 and £2,800 in total.

Cost of Excessive Water Use in Bromley Primary Schools 2005-07				
Primary Schools using more than 80% above Mean	2005-07 Mean* (m ³ /pupil/year)	Water Cost** (£/pupil/year) (all pupils)	Water Use Above 2005-07 Mean* (%)	Cost of Water Use Above Mean** (£/pupil/year) (all)
School 1	13.5	23.81 (1,548)	162	14.71 (956)
School 2***	19.0	33.65 (1,548)	270	24.54 (1129)
School 3	10.6	18.79 (1,146)	106	9.69 (591.07)
School 4	10.9	19.31 (3,631)	112	10.21 (1919.37)
School 5***	31.0	54.95 (3,297)	504	45.84 (2750.53)
*Based on 2005 pupil numbers. **Based on Thames Water 2011/2012 price of £1.77/m ³ . ⁵ *** Water use data only available for these schools in 2005 so this value is used to determine the 2005-07 mean.				

Table 4

3.2 Variation in Water Use between Bromley Primary Schools Based on Pupil Numbers

3.2.1 Bromley Primary Schools – the Relationship between Water Use and Pupil Number

- We also analysed the way in which pupil number was related to water user per pupil. Figure 2 shows this relationship. There is clear correlation between these variables: above around 150 pupils, there is moderate negative correlation, meaning that as pupil number increases, there is a proportional decrease in water use per pupil; below 100 pupils, there is a rapid increase in the slope of the graph, telling us that beyond this point, use per pupil rises quickly as pupil numbers decrease.
- The reasons for this pattern could be numerous, with links to economy of use, the age and efficiency of fittings and any undiagnosed, usually underground, leakage; for example, uncontrolled urinals flush every few minutes, regardless of how many pupils have used them. In a smaller school, i.e. with fewer pupils, the rate of urinal use by boys per urinal is likely to be lower on average than in a larger school. Another reason is that any leakage is spread across a lower number of pupils.

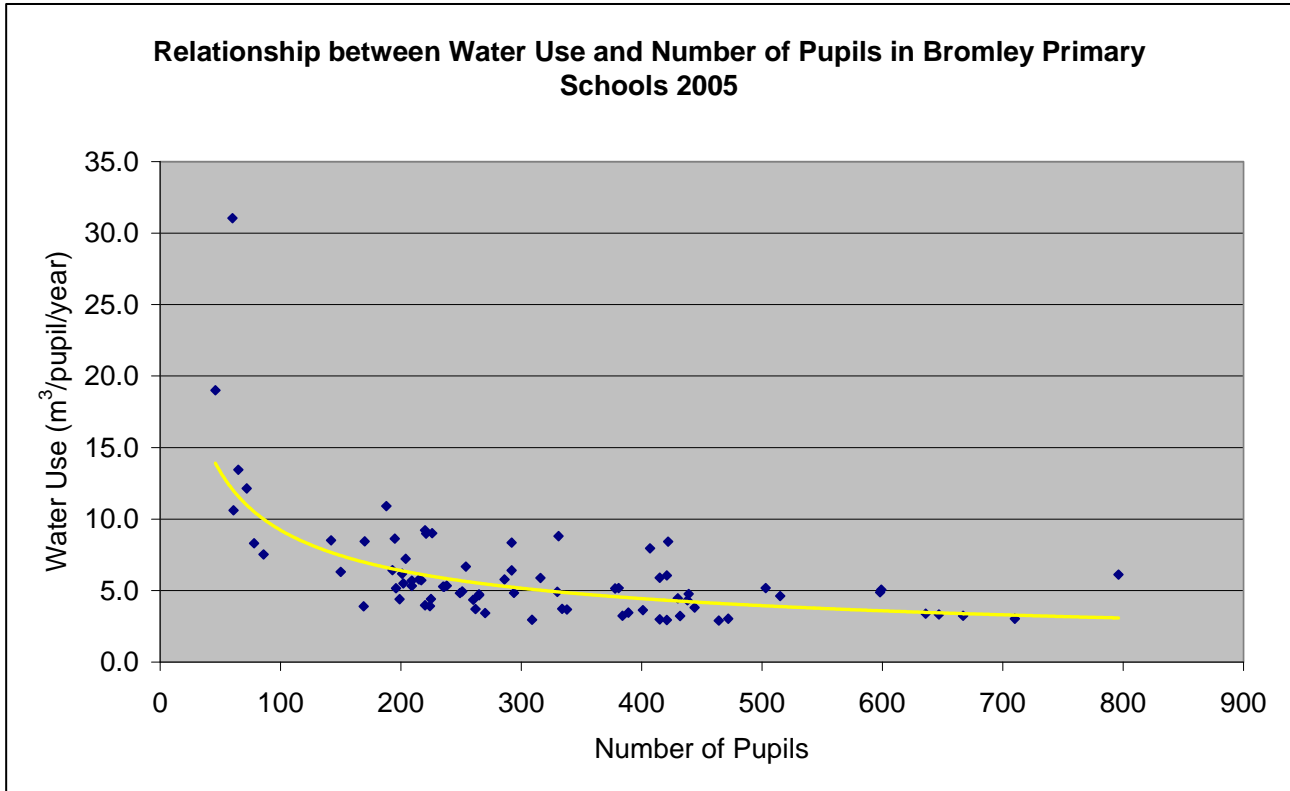


Figure 2

3.2.2 Changing Pupil Numbers in the Highest Water Users

- As highlighted earlier, School 2 and School 5 had the highest per pupil water use annually in the borough in 2005. This was likely caused by extremes of the reasons mentioned in section 3.1, i.e. uncontrolled urinals, undiagnosed leakage, etc.
- Following on from section 3.2.1, the next two tables show what would happen if water use stayed at the 2005 value but pupil numbers changed.
- In School 2, as pupil numbers did not change significantly, the water use per pupil did not either.

Excessive Water Use in Bromley Primary Schools – the Highest Users	Primary school: School 2		
	Total Water Use (m ³ /year)* = 874		
Year	2005	2006	2007
Pupil No.	46 ⁶	48**	51**
Water Use per Pupil (m ³ /pupil/year)**	19	18	17
*Water use data only available for this school in 2005 so this value is used for the years 2006 and 2007.			
**Extrapolated from 2005 and 2008 data. Pupil numbers in 2008 were 53. ⁷			

Table 5

- The number of pupils in School 5 more than doubled between 2005 and 2007. If total water use remained the same, (as shown in Table 6) it would have resulted in a halving of water use per pupil.⁸
- However, the use per pupil is still excessive at 15m³/pupil/year

Excessive Water Use in Bromley Primary Schools – the Highest Users	Primary school: School 5		
Total Water Use (m ³ /year)* = 1863			
Year	2005	2006	2007
Pupil No.	60	90	122
Water Use per Pupil (m ³ /pupil/year)*	31	21	15
*Water use data only available for this school in 2005 so this value is used for the years 2006 and 2007.			

Table 6

3.3 Variation in Water Use between Bromley Primary Schools 2005-07

- As the previous sections have shown, there is considerable variation between water use in primary schools in Bromley. Although the analysis used data from all three years when available, the results did not show how use changed for individual schools over the three years. Figures 3-5 show an 'average' primary school, i.e. one that stays around the mean for the borough, and 'increasing' and 'decreasing' schools. With relatively stable pupil numbers, the latter two cases may be due to, for example, deterioration of facilities (increasing use) or improvement in water behaviour (decreasing use).

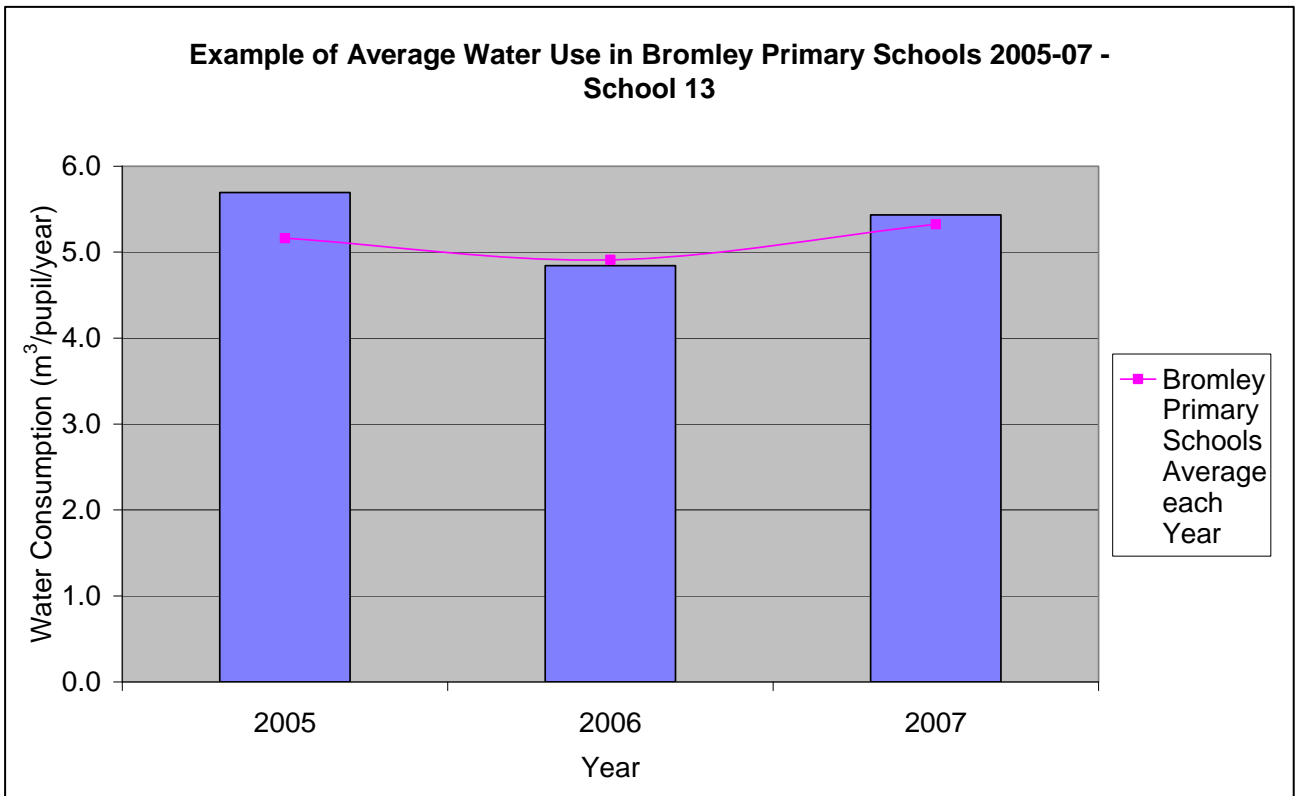


Figure 3

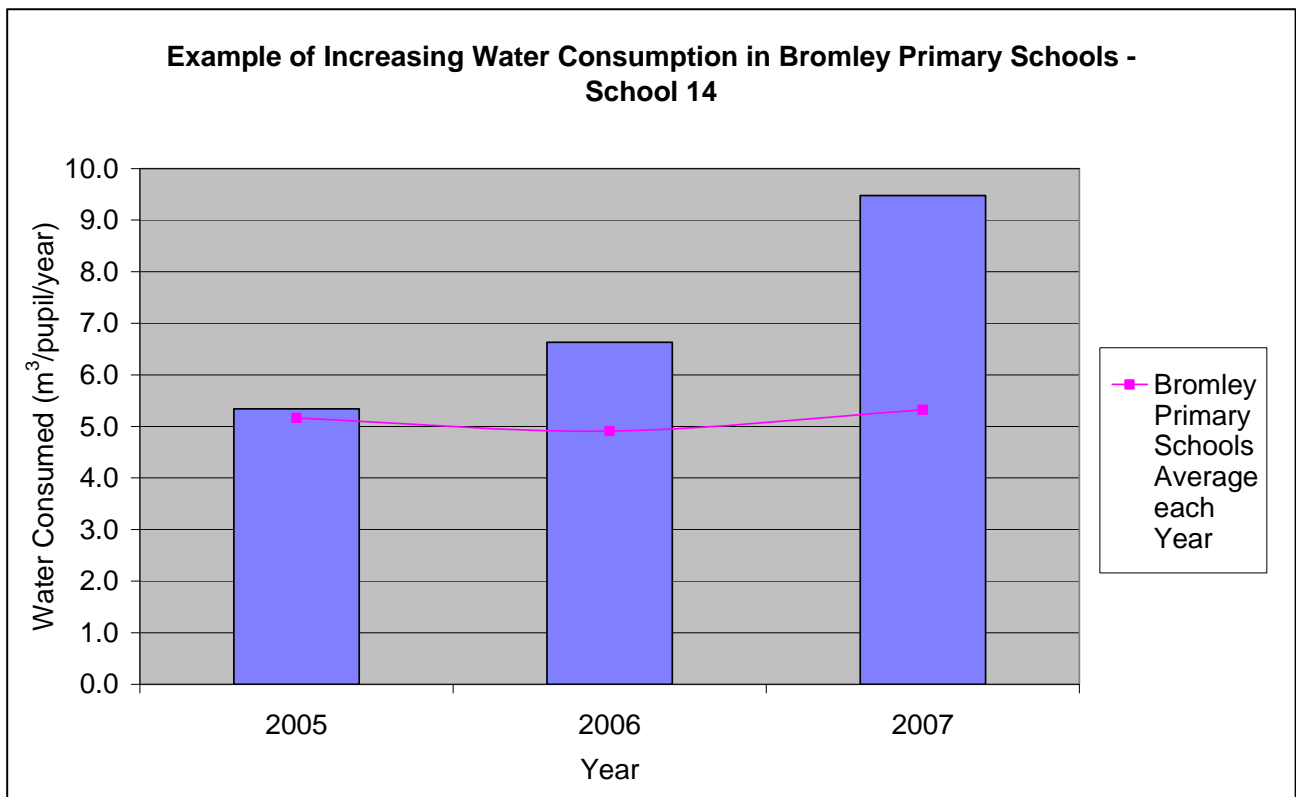


Figure 4

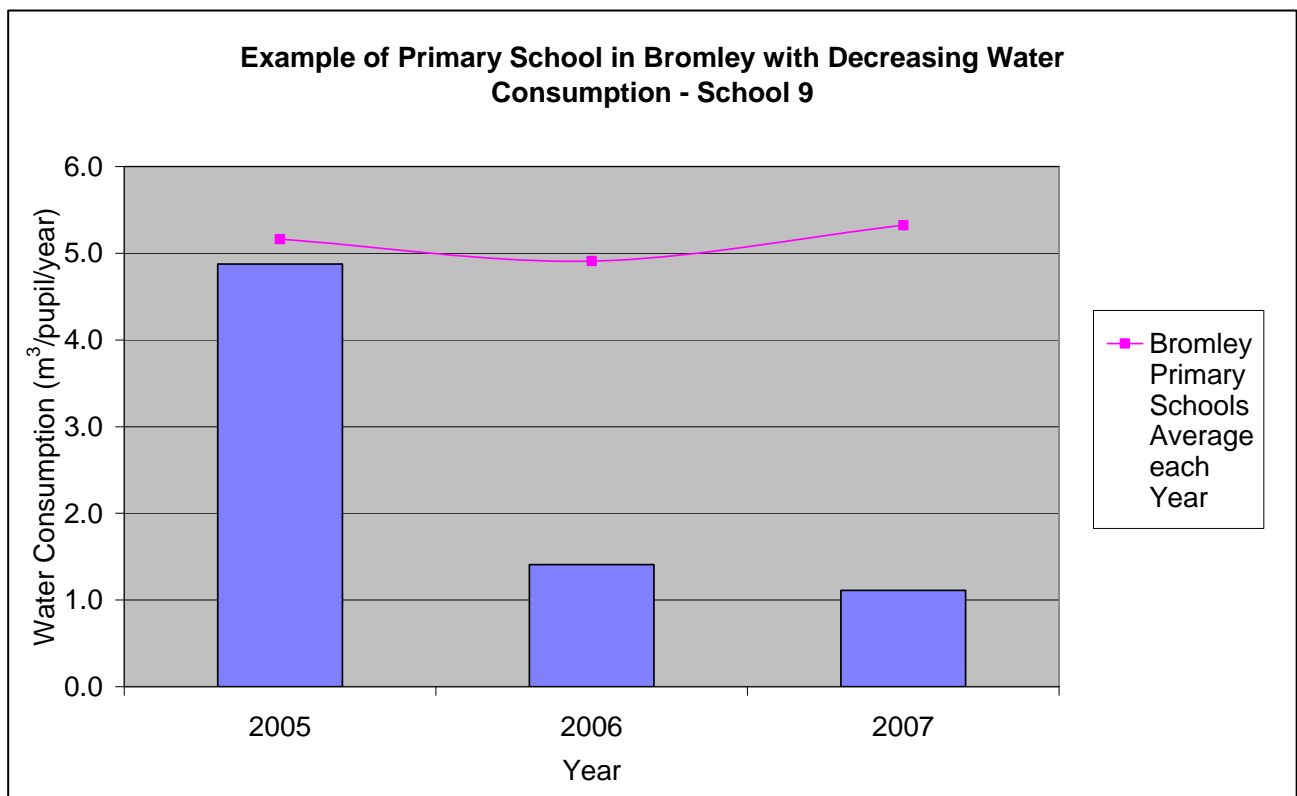


Figure 5

4. Conclusions

- The following conclusions were made based on data for water use in primary schools in Bromley from 2005-07.
 - Mean water use was 5.1 m³/pupil/year.
 - 53% of schools used less than or the same as the DfES 'Typical Practice' benchmark of 5.2 m³/pupil/year; 91% of schools used more than the 'Good Practice' benchmark of 3.0 m³/pupil/year.
 - There was significant variation in water use amongst schools.
 - The worst performing schools were School 2 and School 5, using, in 2005, 19 and 31 m³/pupil/year, respectively.
 - The annual cost implications for this excessive water use was around £1100 and £2800 over the cost if the schools had been using water at the Bromley mean figure.
 - With moderate correlation, as pupil numbers decreased, water use per pupil increased.
 - A number of schools showed significant changes in water use between 2005-07, suggesting marked changes in facilities and behaviour.

Appendix 1

School benchmark water consumption figures DfES data 2005-06					
Type of School	Best practice (Top 10 percentile) m ³ /pupil/year	Good practice (Top 25 percentile) m ³ /pupil/year	Typical (Mean water consumption) m ³ /pupil/year	Poor Practice (Bottom 25 percentile) m ³ /pupil/year	Worst case scenario (Bottom 10 percentile) m ³ /pupil/year
Without pool					
Nursery	1.9	2.4	5.0	6.0	9.3
Primary	2.2	3.0	5.2	6.0	9.3
Secondary	1.9	2.6	4.4	4.9	6.3
With pool					
Primary	3.0	3.8	5.8	6.9	8.7
Secondary	2.9	4.1	6.0	7.7	9.0

References

¹ Department for Education, 'School and college performance tables', available from:

<http://www.education.gov.uk/performance/tables/>, accessed on 04/04/11;

² *ibid*;

³ DfES 2005/06 data;

⁴ *ibid*;

⁵ Thames Water, available from: <http://www.thameswater.co.uk/>, accessed on 03/05/11;

⁶ London Borough of Bromley, Primary Schools' Development Plan, available from:

<http://www.bromley.gov.uk/NR/rdonlyres/D99E8C8A-E4A3-4731-BD2C-34DE4E100218/0/CommitteeReportDE05127.pdf>, accessed on 04/04/11;

⁷ Ofsted, 'School 2', available from: www.ofsted.gov.uk, accessed on 03/05/11.

⁸ Bromley Council had not collected data for School 5 for 2006 or 2007 so we cannot confirm this assumption. However, in our view it gives a more likely current view of School 5 than the picture provided in 2005.

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