

# BASIX Monitoring Report Water savings for 2007-08

Final Report  
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Prepared by Sydney Water for the  
NSW Department of Planning as part of the  
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## Glossary

ABS – Australian Bureau of Statistics.

Analysed sample – the final sample taken from of the telephone survey sample. The analysed sample satisfied appropriate criteria and were monitored for the purposes of the BASIX Monitoring Project. The final number of the analysed sample was 834.

BASIX Benchmark – the average NSW potable water consumption from the residential sector, measured on a per capita basis (247.5 litres of potable water per person per day). BASIX calculates the benchmarks using average dwelling occupancy from ABS 2001 Census data based on the location of the dwelling, dwelling type and number of bedrooms.

BASIX certificate – document specifying the sustainability measures that the proposed development will install to meet BASIX.

BASIX predicted consumption – the potable water consumption of the dwelling estimated by the BASIX tool based on the benchmark minus the BASIX Target of 40%.

BASIX Target – minimum reduction requirement for all new dwellings. The BASIX Target for water in Sydney Water's area of operation is 40% less than the average NSW dwelling (BASIX Benchmark).

BASIX Water Score – the dwelling's estimated percentage potable water savings relative to the BASIX benchmark as estimated by the BASIX tool based on the sustainability measures nominated. The BASIX Water Score must be a minimum of 40.

DoP – NSW Department of Planning.

EP&A – NSW Environmental Planning & Assessment Act 1979.

Multi-unit dwellings - one or more dwellings or buildings above or below it, such as flat, unit or apartment.

Representative year –average rainfall and evaporation used in the BASIX tool.

Single dwelling – BASIX defines it as a dwelling which is separated from all other dwellings and other buildings (excluding a garage or carpark) by at least 0.5m.

Telephone sample – the BASIX compliant Sydney Water customers (single dwellings) who participated in the telephone recruitment survey for the purposes of the BASIX Monitoring Project. A total of 1,703 single dwellings comprised the telephone sample.

BASIX Monitoring Report: Water Savings for 2007-08

November 2008

## Executive summary

BASIX, the Building Sustainability Index, is a planning policy requiring all new houses and residential units to be designed to use 40% less potable water and emit up to 40% fewer greenhouse gases than the average NSW dwelling. The BASIX policy is one of the NSW Government's key initiatives in promoting a water efficient future for New South Wales.

To ensure that BASIX is implemented as intended and to its full potential, Sydney Water and the Department of Planning are undertaking an in depth monitoring study under a data sharing agreement. The monitoring study will be conducted in several stages including analysis of compliance trends, water savings and on-ground site verification.

Sydney Water has prepared the *BASIX Monitoring Report: Water Savings for 2007-08* to present the findings of the first round of water consumption monitoring and the BASIX water savings. The monitoring included analysis of 12 months of water consumption for a sample of verified BASIX occupied single dwellings, located within Sydney Water's area of operation.

The sample of BASIX dwellings achieved the 40% BASIX water reduction target during 2007-08.

The monitoring results indicate BASIX is achieving the intended target. BASIX water savings will be monitored on an annual basis to confirm the long term policy achievements and determine the impacts of water restrictions, dwelling age and BASIX compliance measures.

BASIX water savings will be monitored and reported on an annual basis using the framework established during this first round of analysis.

# 1. Introduction

In 2004 the NSW Government introduced BASIX, the Building Sustainability Index, a key planning policy requiring all new houses and units to be designed to use less potable water and emit fewer greenhouse gases. Reduction targets of 40% less water use and 40% fewer greenhouse gas emissions than the average NSW dwelling were set by BASIX.

BASIX was introduced in stages, commencing on 1 July 2004 for single dwellings in Sydney. In 2005, all single dwellings and multi-unit dwellings in NSW were incorporated into the scheme, and in 2006, BASIX was expanded to include renovations.

BASIX is managed by the NSW Department of Planning (DoP) under the *Environmental Planning and Assessment Act 1979* and was developed in consultation with industry groups, local government and utilities.

## 1.1 Background to monitoring project

The BASIX policy is one of the NSW Government's key initiatives in promoting a water efficient future for NSW. As with any other regulatory policy, the challenge with BASIX is to ensure that it is implemented as intended and to its full potential. To ensure that the outcomes of BASIX are in line with the desired outcomes, Sydney Water is working with the NSW Department of Planning on an in depth monitoring study.

BASIX is being monitored in 3 key stages:

### Stage 1: BASIX compliance trends

BASIX certificates were analysed by DoP to determine the water, energy and thermal efficiency measures being nominated to meet the BASIX targets. The program commenced in 2006 and the outcomes to date are outlined in the *2004-05 Outcomes BASIX Onground Monitoring Program*, *BASIX 2005/06 Snapshot* and the *2005-08 Single Dwelling Outcomes BASIX Ongoing Monitoring Program* available on the Department of Planning's website.

### Stage 2: BASIX water savings

DoP and Sydney Water are monitoring the water consumption of occupied BASIX dwellings using customer water bills to determine whether dwellings are meeting their water reduction targets. Analysis of the BASIX savings will be carried out on an ongoing basis to determine whether water savings are maintained and the effectiveness of specific compliance measures.

### Stage 3: BASIX on-ground truthing

Sydney Water and DoP will conduct site verification of a sample of BASIX occupied dwellings to identify whether the savings potential of BASIX (Stage 2 results) are being limited by difficulties experienced in the installation, operation and use of the BASIX compliance measures. The survey will be carried out in 2009 with the results to inform policy implementation and refinement of calculations.

## **1.2 Scope of the report**

The purpose of this report is to present the results of the first round of Stage 2 monitoring. The report covers the water savings analysis of a sample of BASIX occupied single dwellings with BASIX certificates generated in the first two years of the policy (2004-05 and 2005-06).

## **2. Method**

Sydney Water and DoP have established a data sharing agreement to facilitate the post implementation assessment of BASIX under the agreement. DoP provided the BASIX Benchmark, BASIX Target and BASIX Water Score (refer to the Glossary for definitions of these terms) information for each dwelling.

Sydney Water linked the BASIX data to quarterly water consumption information based on the addresses provided on the BASIX certificate. A number of challenges were encountered in identifying a suitable sample. If a property address has a BASIX certificate this does not confirm that the dwelling is BASIX affected, i.e. the dwelling may not have progressed to construction. Further, Sydney Water's processes do not identify new dwellings built on existing sites (knock-down rebuilds). To overcome these challenges, a telephone survey was conducted to recruit a representative verified sample of BASIX occupied dwellings.

The discussion below outlines the process used to select a sample, the representativeness and the analysis period.

### **2.1 Sample selection**

BASIX dwellings were selected for inclusion in the survey if the BASIX certificate addresses matched Sydney Water's billing database. The survey aimed to establish, among other things, the date the dwelling was completed and when it was first occupied. The property owner was interviewed as a tenant may not have been able to provide this information. The owner of the property was identified from the billing address for the property, which, in the case of owner occupied properties is the same as the property address.

The telephone recruitment survey was subsequently carried out, and the following information was gathered:

- Year the dwelling was completed.
- Month and year it was first occupied.
- Number of occupants (in case of owner occupied properties only).

A total of 1,703 interviews were completed. Of those, 1,633 property owners gave permission to the research company to pass the data back to Sydney Water in an identifiable matter, i.e. by property address.

Only those property owners who gave permission for their details to be passed on were included in the analysis. In addition, at least one full year of consumption data was required for a property to be included in the analysis; a shorter period may have introduced seasonal bias.

The selection criteria for the properties in the study were:

1. Permission of the property owner to pass on details to Sydney Water.
2. Dwelling must be completed.
3. Dwelling was not occupied before January 2005 (to ensure only BASIX dwellings have been included).
4. The number of dwellings on the property is no greater than one (multiple dwellings on one property excluded from this stage of analysis).
5. The property is classified with the appropriate property type on Sydney Water's billing database (eg, not classified as a master strata or agricultural property).
6. The dwelling was occupied before July 2007.
7. The dwelling has a full 12 months of consumption data from July 2007 to June 2008.

In total, 835 properties satisfied all of the selection criteria above (see Table 1). However, the BASIX benchmark consumption was not available for one of the 835 single dwellings. The final number of single dwellings for the 2007-08 water consumption analysis was therefore 834. The terminology used throughout this report to refer to the 834 dwellings is "analysed sample".

The size of the analysable sample will increase over time as more properties satisfy selection criteria 6 and 7 outlined above. Eventually, most of the properties will be included in the analysis. Based on Table 1, the ultimate sample size should be close to 1,400. The 834 properties that currently meet the selection criteria represent 51% of the initial 1,633 properties.

## **2.2 Sample characteristics**

To ensure the sample of 834 was representative of the total survey sample, the two samples were compared in terms of the following characteristics:

- Number of bedrooms.
- Number of occupants (estimates from BASIX tool and actual occupancy).
- BASIX benchmark consumption.
- Proportion of dual reticulation.
- Proportion of 2004-05 BASIX certificates.

This is only a check on the representativeness of the analysed sample relative to the telephone survey sample, not all BASIX affected dwellings. In the absence of any population statistics for single dwellings covered by BASIX, it is not possible to check the representativeness of either the telephone survey sample or the analysed sample relative to the population of all single dwellings covered by BASIX.

Table 2 shows that the analysed sample was representative of the telephone survey sample. Significant variation was recorded within both samples with respect to the proportion of 2004-05 certificates. This variation is a result of a higher proportion of 2004-05 BASIX certificates satisfying selection criteria 7, which requires a full 12 months of consumption.

**Table 1: Survey selection criteria and sample sizes**

Survey completed	1) Pass on details	2) Dwelling completed	3) Occupied before Jan 05	4) No. of dwellings	5) Valid property type	6) Occupied before July 07	7) Consumption data for July 07 - June 08	n			
Yes (1,703)	No							70			
	Yes (1,633)	No							196		
		Yes (1,437)	Yes / unknown							38	
			No (1,399)	> 1							26
				1 (1,373)	No						
			Yes (1,358)		No					No	
		Yes (1,003)		No					No		168
	Yes					Yes		835			

**Table 2: Comparison of sample characteristics – telephone and analysed samples**

Survey Characteristic	Telephone Survey (n = 1,703)	Analysed Sample (n = 834)
BASIX Benchmark (L)	325.6	324.5
Average no. of bedrooms	4.3	4.3
Average ABS occupancy	3.6	3.6
Average survey occupancy	3.8	3.8
Proportion of dual reticulation (%)	11.2	13.3
Proportion of 2004-05 certificates (%)	43.8	54.3

### **2.3 Water consumption analysis**

To assess the performance of BASIX, the actual water consumption of the most recent 12 month period for which consumption data is available, July 2007 to June 2008, was analysed. The analysis of consumption and savings is therefore based on those properties for which consumption data is available for the whole of this period.

To determine if BASIX achieved its objective, the actual potable water consumption of the analysed sample was compared with the BASIX predicted consumption. Actual percentage savings were also calculated. The BASIX predicted consumption is based on the BASIX benchmark minus the BASIX Target. BASIX calculates the benchmarks using average dwelling occupancy from ABS 2001 Census data based on the location of the dwelling, dwelling type and number of bedrooms. The BASIX target for greater Sydney is 40%.

To further test the outcomes of BASIX, actual water consumption was also compared to the:

- savings based on actual occupancy.
- BASIX Water Score.

These results are presented in Section 3.

To test the representativeness of 2007-08 rainfall and evaporation, actual consumption was compared to the BASIX Water Scores reproduced for the sample using actual rainfall and evaporation data from 2007-08 rather than average annual rainfall and evaporation. Results are discussed in detail in Appendix 1.

### 3. Performance of BASIX dwellings

Monitoring of the water consumption for 2007-08 shows that on average the analysed sample achieved the 40% BASIX water reduction target during this period.

The average metered potable water consumption of the analysed sample was 192 kL during 2007-08.

The following sections outline the analysis of water consumption in relation to the BASIX assumptions (section 3.1), the actual occupancy of the dwelling (section 3.2) and the performance in relation to the water score (section 3.3). Table 3 summarises the key findings of the BASIX monitoring.

**Table 3: Summary of the BASIX monitoring results for the analysed sample**

Based on	BASIX Benchmark (kL/dwelling/year)	BASIX predicted consumption (kL/dwelling/year)	Actual water consumption (kL/dwelling/year)	Actual saving
BASIX assumed occupancy rates	324 kL/yr	195 kL/yr	192 kL/yr	40.5%

#### 3.1 BASIX predicted consumption

The BASIX modelling tool estimates dwelling occupancy from ABS 2001 Census data based on the location of the dwelling, dwelling type and number of bedrooms. Using the BASIX assumption of dwelling occupancy, the average BASIX benchmark consumption for the analysed sample was 324 kL per year<sup>1</sup>. From this benchmark the BASIX 40% reduction target results in an average BASIX predicted consumption of 195 kL/year for the analysed sample.

The analysed sample achieved an average 40.5% saving from the BASIX benchmark, marginally higher than the target potable water reduction. The majority of the analysed dwellings (60.9%) achieved savings of 40% or more (Figure 1) relative to the BASIX benchmark.

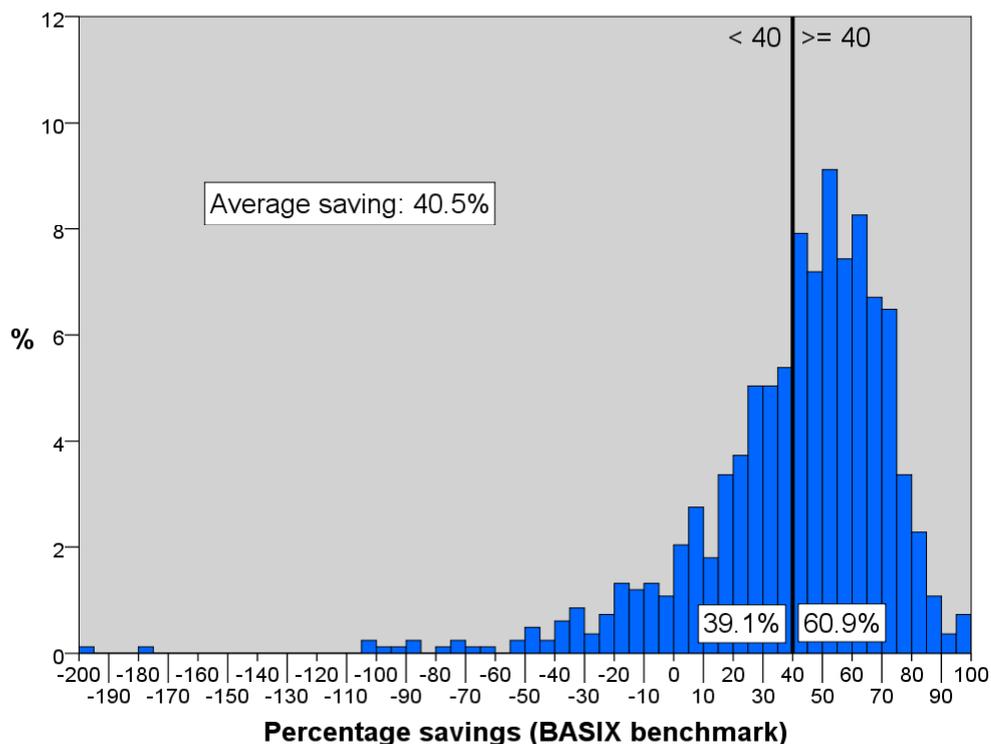
The 95% confidence interval approximation<sup>2</sup> of the average potable water saving is within the range of 38% to 43% ( $\pm 2.27\%$ ) relative to the BASIX benchmark.

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1 Based on annual baseline consumption for a 366-day year, as 2008 was a leap year. Refer to Appendix 1.

2 Confidence interval is an approximation as the distribution is not normal and the formulas for a 95% confidence interval are based on a normal distribution.

The distribution of the percentage savings relative to the BASIX Target is shown in Figure 1. A negative number indicates consumption higher than the BASIX benchmark, i.e. a negative saving. The sample distribution is highly skewed and truncated at the right, with 100% savings being the maximum upper limit. Negative savings extend well beyond the BASIX benchmark.

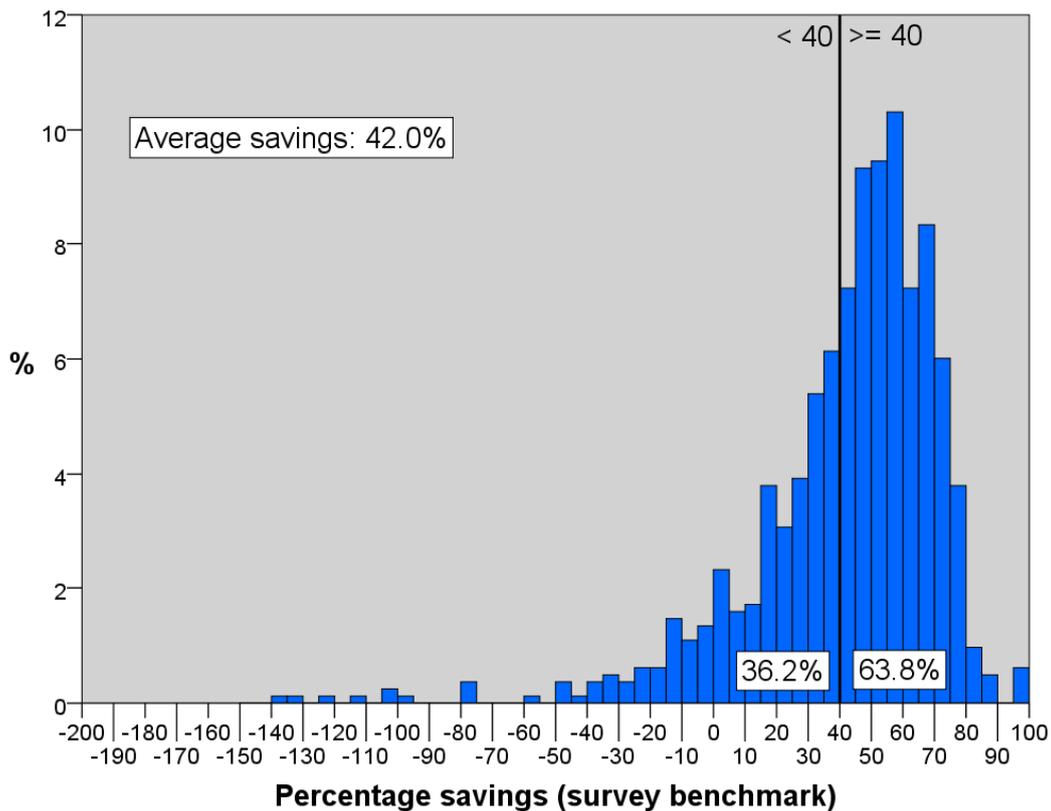


**Figure 1: Distribution of actual percentage potable water savings relative to BASIX benchmark**

### 3.2 Savings based on actual occupancy

The telephone survey identified the actual number of occupants living at the respective dwellings for owner occupied properties. The average actual occupancy was found to be higher than estimated by BASIX (see Appendix 2 for a comparison of the BASIX predicted occupancy and the actual occupancy obtained from the survey).

The BASIX benchmark and target consumption was calculated based on the actual occupancy and compared to the dwelling's consumption. The benchmark based on actual occupancy was 347 kL/year<sup>1</sup>, about 24 kL/year higher than the benchmark calculated by the BASIX tool. From the benchmark based on actual occupancy, the average saving was 42% (Figure 2).



**Figure 2: Distribution of actual occupancy savings relative to benchmark consumption**

### 3.3 Savings relative to BASIX Water Score

When completing a BASIX certificate, the BASIX tool produces a Water Score that represents the expected percentage potable water saving of the individual dwelling relative to the BASIX benchmark. To generate a certificate the score must be at least 40%. But for many dwellings the BASIX commitment resulted in higher savings and a higher BASIX Water Score.

The percentage savings based on actual consumption was compared to savings as predicted by the BASIX Water Score.

While the analysed sample achieved the BASIX target saving of 40%, the actual savings of the sample were slightly lower than the average BASIX Water Score of 42.6 (see Appendix 1 for further details).

In 2007-08 the sample dwellings achieved the BASIX target of 40%, on average, however they did not achieve the average BASIX Water Score. When the sample is split by the year the BASIX certificate was generated, the reason for this shortfall becomes more apparent. On average, 2005-06 applicants achieved higher savings than predicted by their BASIX Water Score, while 2004-05 applicants did not achieve their BASIX Water Score.

Significant improvements to the BASIX tool were implemented in 2005-06, which could explain the improvement in the BASIX tool's capability to predict water savings. If these results are an outcome of improvements to the BASIX tool and policy implementation then the results for 2005-06 may be more representative for BASIX in the long term.

## **4. Analysis considerations**

The results indicate BASIX is achieving the intended target. However, ongoing monitoring is critical to understand the long term policy outcomes and the impact of water restrictions, weather variability, dwelling age and BASIX compliance measures.

The weather conditions and the application of water restrictions during the monitoring period need to be considered when reviewing the results as they may be contributing to the water savings.

### **4.1 Annual variability of savings**

The 2007-08 weather was characterised by high summer rainfall. Relative wet and cool weather conditions tend to result in lower irrigation demand and higher rainwater tank yields. Dwellings with rainwater tanks will experience greater variability in savings due to their rainfall dependence. The great majority of BASIX dwellings rely on a rainwater tank to achieve the BASIX Target (87% of the 834 dwellings had a rainwater tank).

The analysis of the impact of the 2007-08 weather conditions is outlined in detail in Appendix 1. This analysis confirms that savings of the sample for 2007-08 is likely to be slightly higher than long term average savings as a result of the rainfall and evaporation experienced in 2007-08.

Savings during 2007-08 were considerably higher than during 2006-07 for BASIX dwellings that had a full 12 months for both 2006-07 and 2007-08. This is likely to be due to the relatively wet conditions during 2007-08. Refer to Appendix 4.

### **4.2 Water restrictions**

The most important caveat on the BASIX results is that they have not been corrected for water restrictions.

While virtually all dwellings had an alternative water supply, either from recycled water or a rainwater tank, this does not mean that demand is not affected by water restrictions.

If a rainwater tank has potable water top up, water from the tank is still subject to water restrictions. And even though recycled water is exempt from the restrictions, Sydney Water has observed a sympathetic reduction in recycled water consumption when water restrictions are in place.

For these reasons it is reasonable to assume the estimated savings include some impact from restrictions. Determining the impacts of water restrictions on the savings of BASIX dwellings is extremely difficult due to the lack of knowledge of the:

- proportion of dwellings that are exempt but where residents still comply with the restrictions (either voluntarily or because they are simply not aware they are exempt).
- proportion of dwellings aware that restrictions apply to a rainwater tank with potable water top up and their compliance to the restrictions.
- The extent to which behaviours adopted during water restrictions will revert to pre-restrictions practices.

For these reasons, the results have not been corrected for water restrictions. Ongoing monitoring of the BASIX savings is critical to understanding the impact of water restrictions.

## **5. Conclusions**

The BASIX policy is one of the NSW Government's key initiatives in promoting a water efficient future for NSW. To ensure that BASIX is implemented as intended and to its full potential, Sydney Water and DoP are undertaking an in-depth monitoring study.

Monitoring of the 2007-08 water consumption of a sample of 834 BASIX occupied single dwellings showed they achieved the 40% BASIX water reduction target during this period.

Improvements to the BASIX tool and policy implemented in 2005-06 appear to have resulted in higher certainty in achieving the long term policy objectives.

BASIX water savings will be monitored on an annual basis to confirm the long term policy achievements and determine the impacts of water restrictions, dwelling age and BASIX compliance measures.

## Appendix 1 – 2007-08 rainfall and evaporation impact on predicted consumption compared to actual savings

To investigate the impact of rainfall and evaporation on the BASIX predicted potable water consumption and determine the representativeness of 2007-08 results, DoP used the BASIX tool to reproduce the BASIX Water Scores for the sample using actual rainfall and evaporation data from 2007-08. The BASIX Water Score as analysed in Section 3.3 is based on rainfall and evaporation patterns in a representative year. They can be considered a longterm projected average BASIX water saving.

To calculate the BASIX Water Scores specifically for 2007-08 climatic conditions, DoP used the BASIX tool to input the actual daily rainfall and evaporation data for that analysis period. If this results in a higher water score than the “original” BASIX Water Score, higher than normal savings would be expected during that year.

Rainfall and evaporation locations used in the BASIX tool are shown in Table 4.

**Table 4: Rainfall & evaporation data locations**

Climatic Variable	Version of the BASIX tool	Weather Station
Rainfall	2004-05	Sydney Airport, Parramatta, Richmond
	2005-06	Wollongong, Sydney Airport, Prospect Dam, Murwillumbah
Evaporation	2004-05	Sydney Airport, Prospect Dam, Richmond
	2005-06	Riverview, Lucas Heights, Griffith, Coffs Harbour

(Note: Lucas Heights evaporation was not updated, as evaporation records for that period are not available.)

Water scores specific to 2007-08 were available for 799 of the 834 dwellings in the sample. Table 5 shows the BASIX Water Score, the 2007-08 specific water score, and the actual percentage savings for 2007-08 presented by the year of the BASIX certificate and as a total.

**Table 5: BASIX Water Score, 2007-08 specific water score and actual savings for 2007-08**

Year of BASIX application	n	Average BASIX Water Score	Average 2007-08 water score	Average actual 2007-08 savings
2004-05	452	42.1	41.5	36.7
2005-06	347	43.2	46.6	45.1
Total	799	42.6	43.7	40.4

The average water score specific to 2007-08 is higher than the average “original” BASIX Water Score, with a difference of 1.1. This implies that actual savings in 2007-08 may provide an overestimate of the long term average savings of about 0.8%.

It is interesting to note the difference in performance between the BASIX certificates generated in 2004-05 and certificates generated in 2005-06. The 2004-05 sub-sample did not meet the target and the 2007-08 rainfall and evaporation produced a slightly lower water score. On the other hand, average percentage savings for the 2005-06 applications are well above the target. The average 2007-08 water score was higher than the average BASIX Water Score.

Significant improvements to the BASIX tool were implemented in 2005-06, which could explain the improvement in the BASIX tool’s capability to predict water savings. If these results are an outcome of improvements to the BASIX tool and policy implementation, the results for 2005-06 may be more representative for BASIX in the long term.

In conclusion, while this analysis confirms that savings in 2007-08 are likely to be higher than the long term average savings, the difference appears to be fairly small. In that case, even after applying a rough correction for the relatively wet conditions in 2007-08, the 2005-06 BASIX dwellings appear to be meeting their target comfortably.

## Appendix 2 – Analysis by number of bedrooms

**Table 6: Average occupancy by number of bedrooms - survey responses vs. BASIX tool estimates**

Bedroom	Telephone survey sample		Analysed sample	
	Survey	BASIX tool	Survey	BASIX tool
	Average (n)	Average (n)	Average (n)	Average (n)
1	2.5 (2)	1.4 (3)	3 (1)	1.5 (2)
2	3.7 (3)	2.0 (3)	5 (1)	2.0 (1)
3	2.9 (118)	2.8 (121)	2.7 (62)	2.8 (64)
4	3.7 (729)	3.5 (748)	3.7 (460)	3.5 (469)
5	4.2 (469)	3.9 (479)	4.2 (290)	3.8 (297)
Unknown	4.5 (2)	3.6 (2)	5 (1)	3.6 (1)
<b>Total</b>	<b>3.8 (1323)</b>	<b>3.59 (1356)</b>	<b>3.8 (815)</b>	<b>3.6 (834)</b>

The number of occupants was only included in the survey data if the dwelling was owner occupied, as actual occupancy numbers could not be verified otherwise. The actual occupancy was on average higher than that assumed by the BASIX tool, which averages occupancy of owner occupied and rental properties. If owner occupied dwellings tend to have higher average occupancy than rented properties, this may help to explain the difference in survey estimates and the BASIX estimates.

Furthermore, it should be noted that part of the difference might simply reflect that BASIX occupancy is limited to approximately 4.2 whereas the survey occupancy responses allowed for “6 or more”.

Note: Estimates of average occupancy for 1 and 2 bedroom houses as obtained through the survey are based on only 1 to 3 observations and should be treated as statistically unreliable.

Table 7 shows average savings relative to the BASIX benchmark consumption by the number of bedrooms.

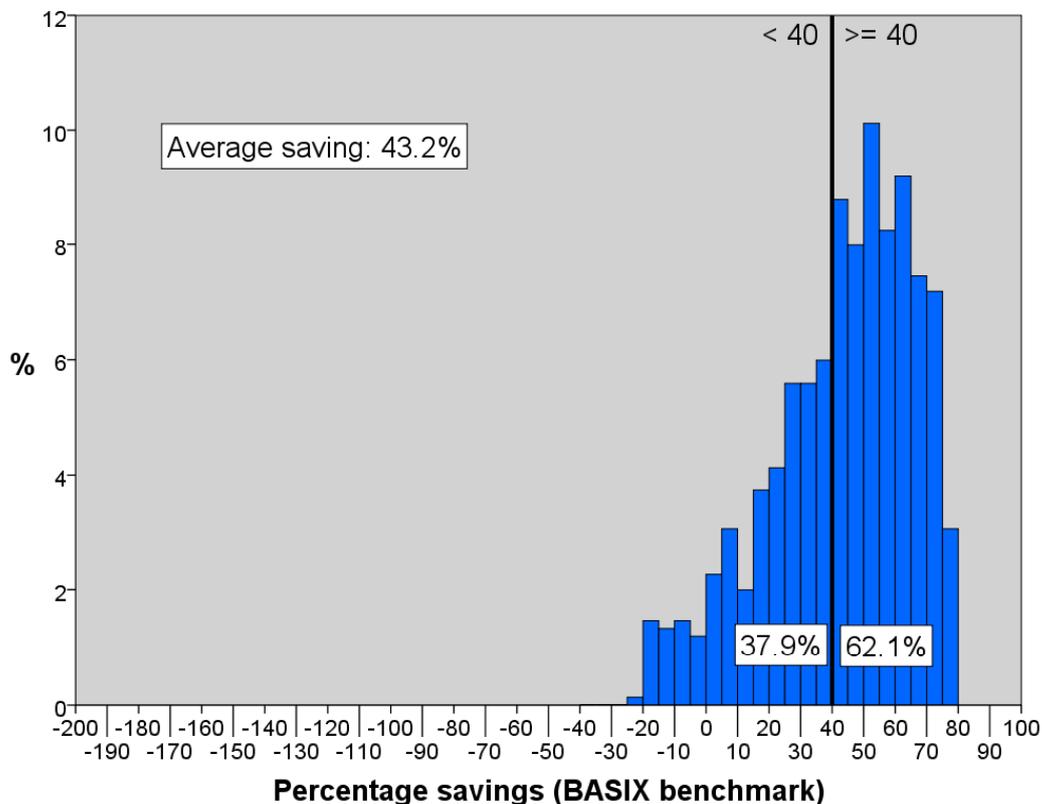
**Table 7: Average potable water savings relative to BASIX benchmark consumption by bedroom number**

Number of bedrooms	BASIX Benchmark	BASIX predicted	Actual consumption	Average savings
1	141.3	84.8	172.1	-26.2%
2	185.1	111.0	250.1	-35.2%
3	258.3	155.0	148.6	42.7%
4	320.9	192.6	181.4	43.5%
5 or more	346.0	207.6	216.6	36.8%

## Appendix 3 – 5% Trimmed mean

One way of correcting for the impact of extreme values on the estimate of the average is by calculating the 5% trimmed mean, whereby the highest and lowest 5% of values is excluded from the sample. This approach is strictly speaking not suitable for this application because the 5% trimmed mean should only be applied to a symmetrically distributed sample. This sample is not symmetrically distributed, and the sample is truncated on one end at 100%. The analysis has been included for information only.

The distribution of percentage savings and the average savings after removing the highest and lowest 5% of the values are shown below.



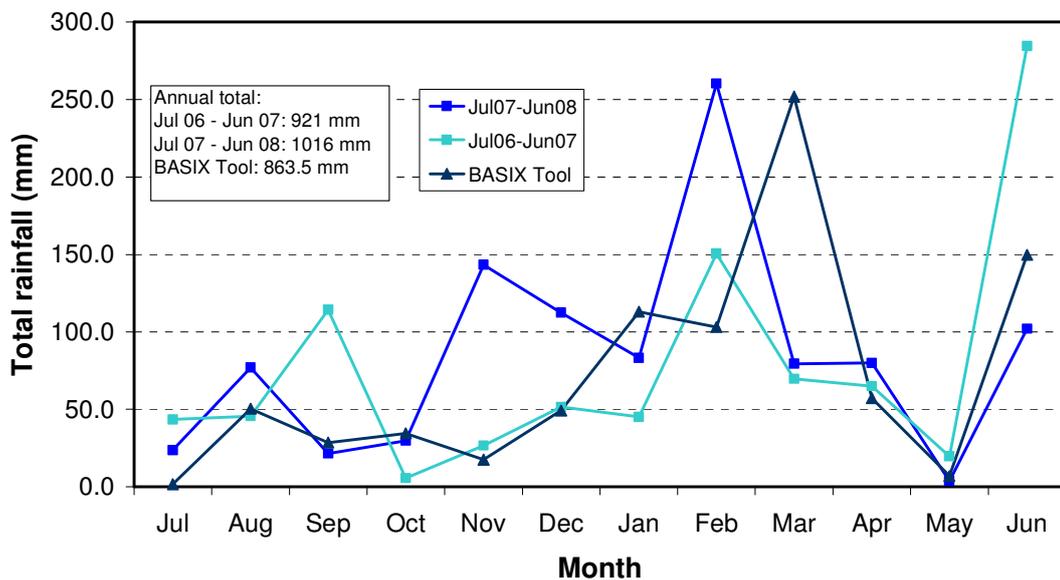
**Figure 3: Distribution of actual occupancy savings relative to benchmark consumption (5% trimmed mean)**

The 5% trimmed mean is 43.2%. The percentage of dwellings that achieve a savings of at least 40% relative to the BASIX benchmark increases slightly (from 60.9 to 62.1%) and the average saving also increases (from 40.5% to 43.2%).

## Appendix 4 – Comparison of 2006-07 and 2007-08 water savings

To illustrate the annual variability of savings, the consumption of BASIX dwellings that also had a full 12 months of consumption data for 2006-07 was compared to their 2007-08 consumption. Only 222 dwellings had both 2006-07 and 2007-08 consumption.

Average savings for these 222 dwellings during 2006-07 were 31% compared to 38% during 2007-08. A paired samples t-test confirmed this difference was statistically significant at the 95% confidence level.



**Figure 4: Monthly rainfall at Prospect Dam**

Savings during 2007-08 were considerably higher than during 2006-07. This is likely to be due to the relatively wet conditions during 2007-08, in particular during the summer months, as illustrated by the graph of monthly rainfall at the Prospect Dam weather station (Figure 4).