

Help for other schools

Southern Water has designed a water efficiency booklet especially for schools. This contains a self-audit check list (easy-to-follow steps to conduct a water audit), advice on improvements, and a list of suppliers specialising in water efficient products. The booklet will be available free of charge to all schools in Southern Water's supply area in the near future.

For details contact the Water Efficiency Co-ordinator at Southern Water, Southern House, Yeoman Road, Worthing, BN13 3NX. Telephone: 0845 278 0845.

More information on water efficiency can be found on www.southernwater.co.uk

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Chesswood School water efficiency project

A case study



ENVIRONMENT AGENCY



This study is a joint initiative between Southern Water, West Sussex County Council and the Environment Agency, which all have a common interest in saving water.

Southern Water's work with schools in the region has shown that big savings can be made in the amount of water used - and thus in the school's water bill - by installing water efficient equipment.

Yet until recently, it was not clear which equipment could save the most water and money.

The objective of the Chesswood School Project was to measure the water savings achieved by different types of equipment, to define the financial paybacks, and thus help other schools understand how they can reduce water wastage and save money on their bills.

This case study will give you advice on low budget, cost effective retrofit water efficiency measures that can be easily be adopted by other schools.

The school

Chesswood Middle School in Worthing is a mixed school with 480 pupils aged between nine and 13, and 43 teaching and office staff.

Before the project started, the school was using 8746 litres on an average school day, and at weekends 5922 litres a day. During the preceding summer holidays, the average consumption was 3585 litres a day.

West Sussex County Council's benchmark figure for water consumption per pupil in the county schools is 4000 litres a year. In Chesswood School the consumption to April 1999, at 5750 litres per pupil, was over 40% greater than this benchmark figure.

The project

We started to monitor water consumption closely in July 1999, and began installing water efficiency equipment in October 1999. Installation of each product

was followed by a three-week monitoring period to determine changes in water consumption. The project concluded in April 2000.

The equipment purchase and the installation costs were jointly funded by Southern Water, West Sussex County Council and the Environment Agency. The project was managed by Southern Water, which provides the water supply and sewerage services to the school.

All washroom, classroom, and outside water use was included within the scope of the project. Measurements of water saved were taken from the main meter on the assumption that, if there was no visible reduction in consumption following installation of the product, it would not be cost effective for schools to install.

We carried out a detailed audit of all water-using facilities and fittings before the project began and discussed water usage with the caretaker to eliminate areas where changing fittings would not have been cost effective (eg the showers, which in Chesswood School are rarely used).

The audit identified urinals, toilets, and taps in washrooms and classrooms as the largest water users. In the summer, water was also used for garden watering.

The measures used

• Passive infrared urinal controls

The school already had pressure drop urinal controls fitted, but these were not working properly and so the urinals were flushed far more than necessary. Passive infrared urinal controls, installed as part of the project, detect people entering the washroom and are set to flush 20 minutes after the first person has used the urinals. During long periods of non-use (at night or during the holidays), the controls are set to provide a hygiene flush every 9-10 hours.

• Retrofit push taps in washrooms

The existing taps were sometimes left running by pupils, causing unnecessary waste and nuisance because of washroom flooding. Push taps, installed during the project,

prevented this problem. We opted for retrofit taps, as only the top part of the tap needs to be changed, and the cost is therefore lower than for standard push taps. These taps have an in-built flow restrictor, so both the flow rate and duration can be adjusted by the fitter. In Chesswood School this was set at six litres a minute and six seconds, providing sufficient flow and time to wash hands without wasting water.

• Flow restricting valves in classrooms

Push taps would have been unsuitable in classrooms, where pupils need water for washing brushes and filling containers, so we used flow restricting valves instead. These are fitted to each pipe supplying taps and can be adjusted to provide the required flow of water. The valves also work as isolating controls allowing maintenance work on a tap without having to turn off the whole supply. In Chesswood School the valves were adjusted to give a flow of six litres a minute.

Where they were missing, we also provided standing plugs - these are hollow tubes that fit into plug holes, so if a tap is accidentally left running, the excess water overflows into the tube and down the drain without flooding the classroom.

• Cistern displacement devices (Hog Bags) in toilets
Changing toilets for a more water efficient design is expensive and only economical if the washrooms are being refurbished. A quick and easy retrofit option, widely promoted by the water industry, is the cistern displacement device. We used the Hog Bag, a small bag with water-retaining polymer inside. The bag is dropped into the cistern and the polymer absorbs water, reducing every flush by one litre. These bags are offered free by Southern Water to all its customers.

• Water butts to collect and store rainwater for garden watering

These are very useful for reducing water use during hot weather when demand is greatest and can be easily fitted to down pipes to collect rainwater from roof areas. Rainwater is better for plants and the water butt also serves as a visible water efficiency 'icon' in the garden,

reminding everyone of the need to conserve water.

The urinal controls, taps and flow restricting valves were provided and fitted by Flow Control. Hog Bags were fitted by the caretaker and water butts by a local plumbing company.

The results

The project delivered very significant savings of around 73% of the pre-trial consumption, with the estimated annual use dropping from 2760 m³ to 730 m³ per year - that is an equivalent, in current charges, of a reduction in bills of over £3200!

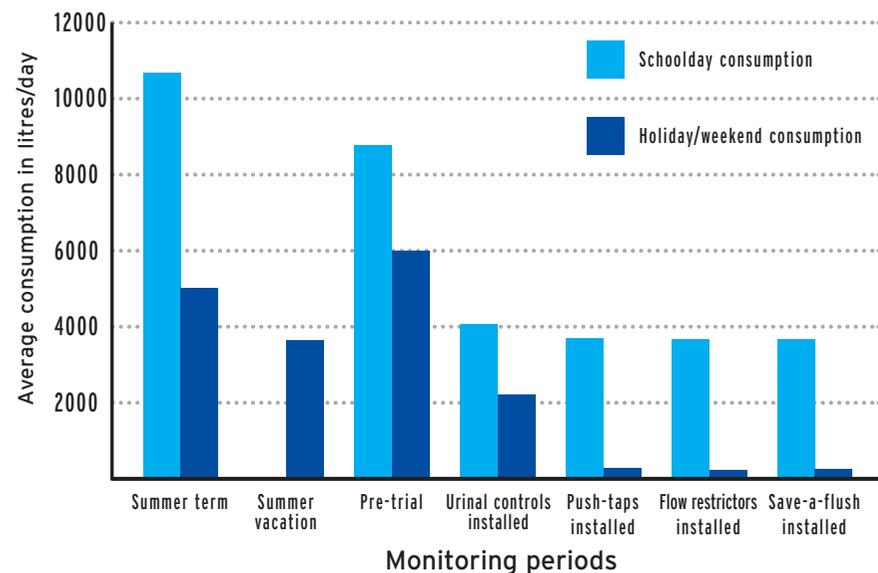
The school is now using less water during a full school day (3420 litres a day - down from 8746 litres), than it was during the summer holidays before the project began (3585 litres a day).

At 1520 litres per pupil per year, the school is now significantly below the County benchmark and we believe it sets a new best practice standard.

Note: The relatively high holiday/weekend consumption following the installation of urinal controls was due to a problem with one of the units which, although it was rectified promptly, nevertheless contributed to higher use than anticipated. The reduction in holiday/weekend use visible after the installation of push taps, was therefore partially due to urinal controls. This has been taken into account in savings calculations.

The graph below illustrates the effects of each fitting.

Changes in water consumption during the project



Costs, savings and paybacks

Urinal controls

The single most cost-effective water saving measure was the installation of passive urinal controls. Savings were made mainly from the drastically reduced night levels, when previously the urinals were flushing at a constant rate.

The urinal controls cut the overall water consumption by 68% of the pre-installation level. At £135 per unit, including installation, they would pay for themselves in less than nine months.

Washroom Push Taps

Although not on the same scale as the urinal controls, the reduction achieved by changing the taps was significant, at 13% of the total pre-installation consumption. At a cost of £18 per tap, the payback in Chesswood School is nine years. However, in schools where taps being left running is a problem, push taps may provide a cost-effective solution to washroom flooding and pay for themselves in a shorter period of time.

Classroom Sink Flow Restrictors

In-line flow restrictors, fitted to all classroom taps, did not provide detectable savings in this project. This was because classroom water use formed only a small part of the total water use and savings were too tiny to be detected by the main meter. However, the restrictors double up as maintenance valves and judicious installation as part of other work would avoid high installation costs and bring benefits. The restrictors could also be used instead of push taps to reduce flows to washroom taps. The benefit of easier maintenance has then to be weighted against the risk of taps being left on.

Cistern Displacement Devices

The majority of toilet cisterns in Chesswood School were 7.5 litre capacity. Save-a-flush bags (Hog Bags) are normally recommended for use with larger cisterns, but were

nevertheless fitted in all toilets, with close monitoring of the performance by the caretaker. The flush quality was not affected by the installation of the bags.

The bags saved between 3.5% and 6.4% of total water use in Chesswood School but, because of large variation in daily use, these savings were not statistically significant. However, these devices are provided free by Southern Water, have been proved effective in other projects, and are an easy way to save water.

Water Butts

Two water butts were installed at Chesswood School, on the down pipes next to the garden area. The garden is cultivated by pupils and mains water has been used for watering in previous years. The butts were installed early in the year to allow rainwater to collect before the watering season.

However, savings in consumption due to rainwater use for summer garden watering are likely to be small in schools, and are not expected to show up as a measurable reduction in the overall consumption. Analysis of garden watering during the summer did not form part of this project.

Maintenance Costs

Regular checks and servicing should form part of every school's maintenance routine. For the savings to be sustained, all fittings must be maintained in good working order. At the levels of savings demonstrated in Chesswood School it makes economic sense to spend a small amount of money regularly on maintenance to ensure that large amounts are saved year on year. For example, the annual maintenance of urinal controls in Chesswood School would cost under £200, and ensure the annual savings from the urinals, of around £1300, are sustained year on year.