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ABSTRACT

This guide examines typical water costs for schools and points out financial and environmental benefits of using water economically. The guide explains the make-up of a typical water bill, including standing charges and sewerage rates. Ways of saving water are described, including use of self-closing and spray taps and urinal flush controllers. A school water management checklist and background information on the water legislation are also provided. (GR)

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Managing school facilities

Guide 1

Saving water

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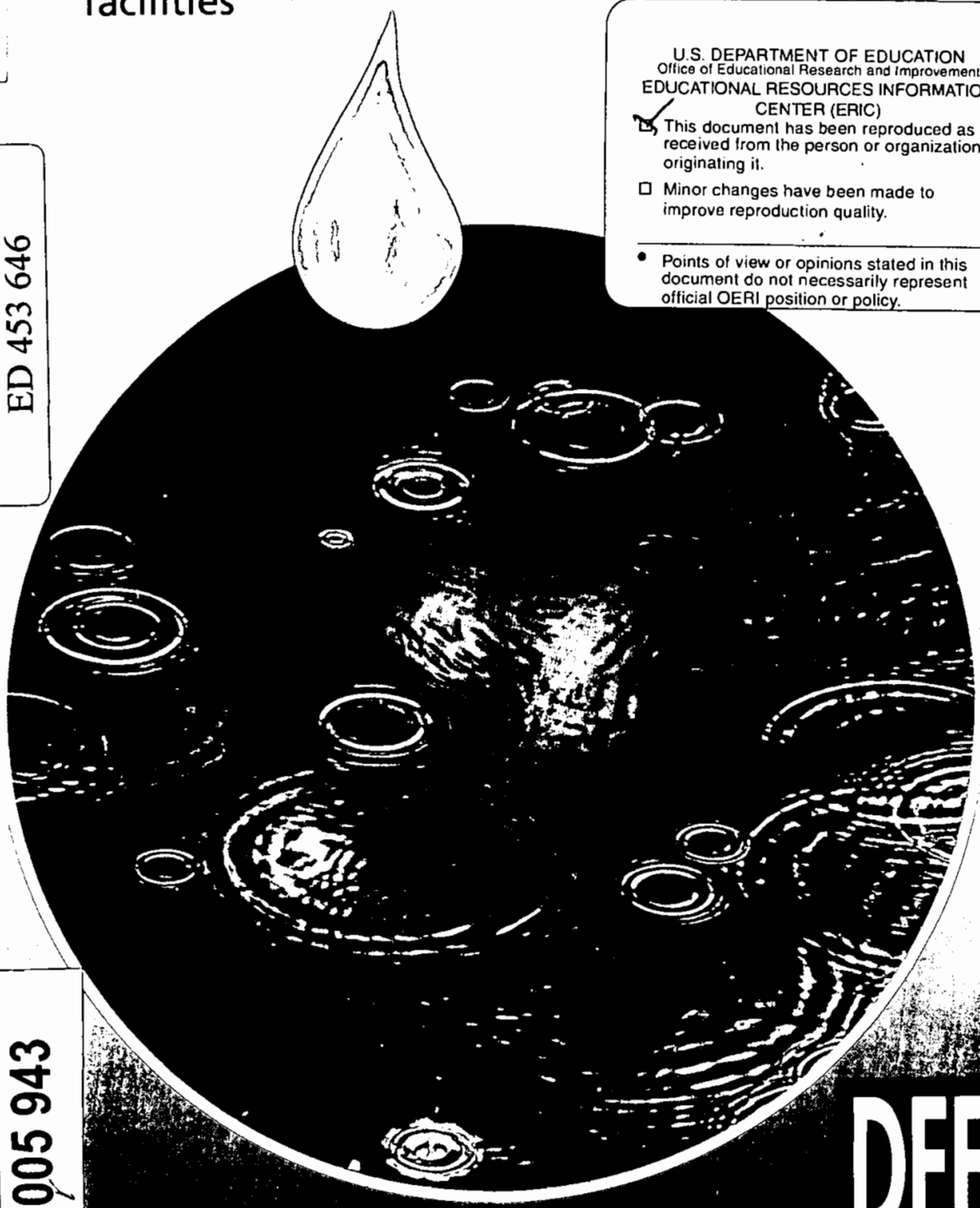

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Saving water

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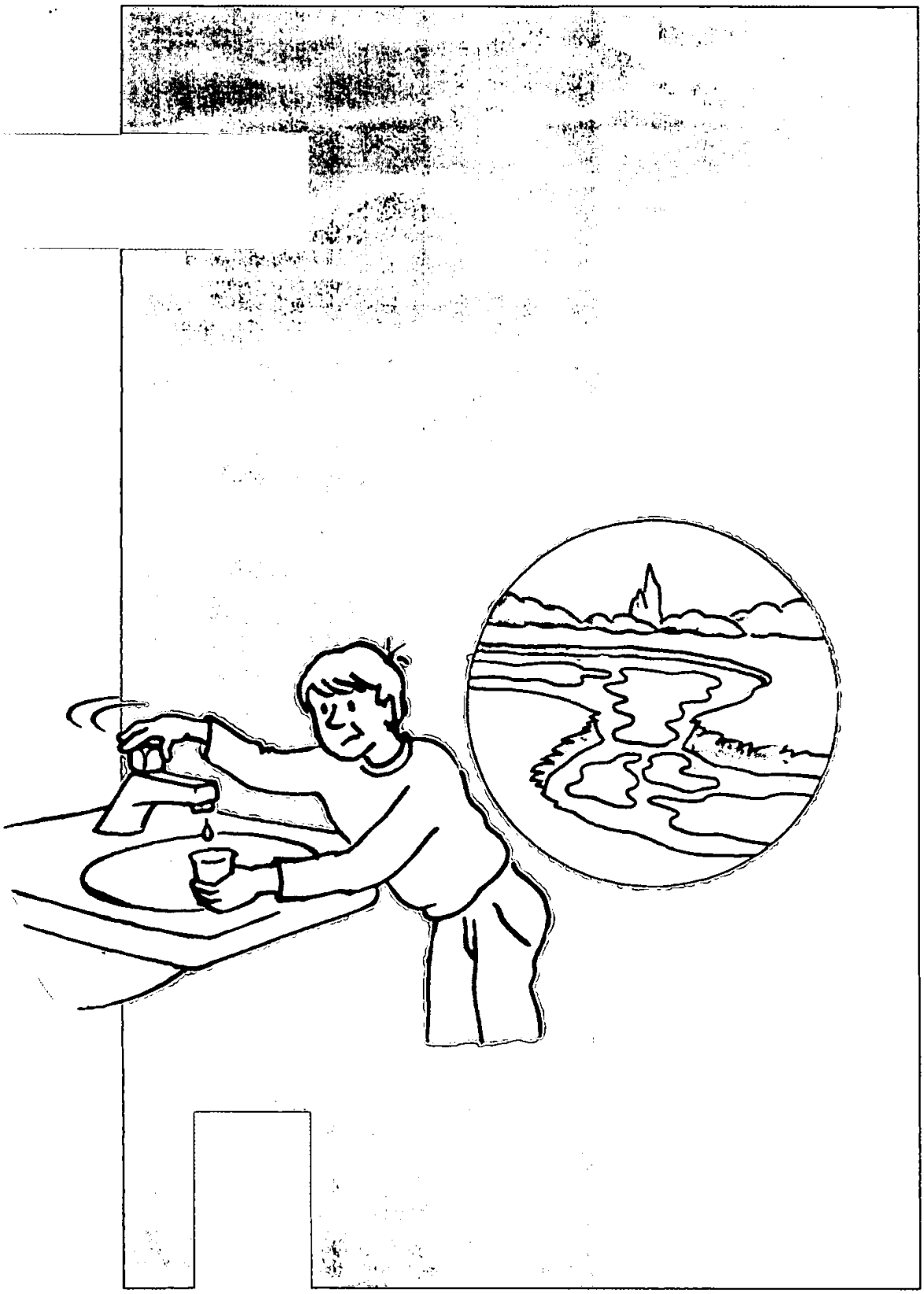

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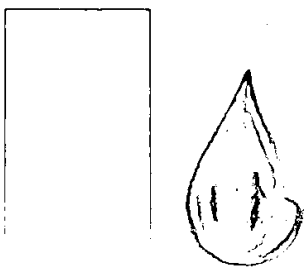
Saving water

Schools spend a total of around £70 million a year on water. Simple measures to reduce the amount of water used and wasted can easily be taken and this can led to substantial savings as well as environmental benefits. Some methods of cutting down waste call for a small level of investment which can pay for itself in a short period of time. Major savings can be achieved simply through an education programme aimed at avoiding wastage of water.

Environmental issues

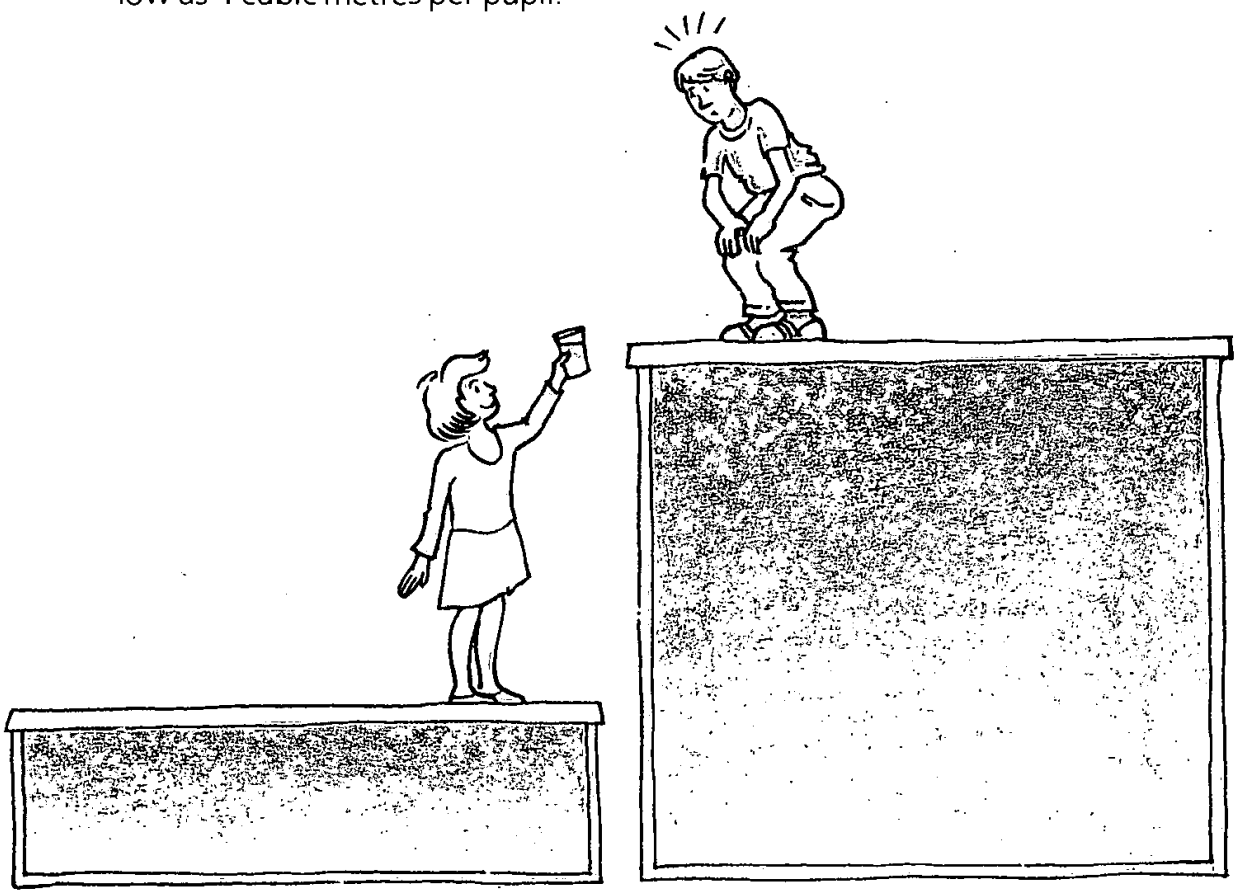
Saving water is not just about saving money. Water is an important, natural resource vital for human, animal and plant life and a sufficient supply of clean water is essential for public health. The raw material may appear to be plentiful but water shortages do occur.

Water for public supply must be collected, stored, treated and distributed before it can be used. This takes money and uses energy. Avoiding wastage of water therefore forms a key part of conserving and enhancing our environment. Involvement of staff and pupils in saving water can help raise their awareness of environmental issues. A water saving campaign in schools can form a practical case study for pupils.



How much water is used in schools?

The difference in water usage between schools can be very large. At one end of the scale every pupil in a school can use up to 12 cubic metres a year while at a carefully managed school water consumption may be as low as 4 cubic metres per pupil.



Although these figures may seem small 12 cubic metres is 12,000 litres – about 2,600 gallons or 12 tonnes per pupil. As secondary schools have showers, swimming pools, laboratories and other high water-usage facilities water bills will be larger than for primary schools. A typical annual water bill for a primary school of 250 pupils would be between £1,000 and £1,500. At a secondary school with four times the number of children the annual spend on water could reach between £6,000 and £8,000.

The cost of water and sewerage services

Water charges in schools are broken down into several elements but each contains a unit rate per cubic metre used and a standing charge. There are separate charges for water supply and sewerage services. As sewerage charges are based on the amount of clean water used each bill includes:

- A standing charge for water supply which depends on the size of the water meter (larger meters mean significantly higher standing charges).
- A charge for the amount of water (m^3) used.
- A standing charge for sewerage services (also based on the size of the clean water meter).
- A charge for sewerage services based on the amount of clean water used.

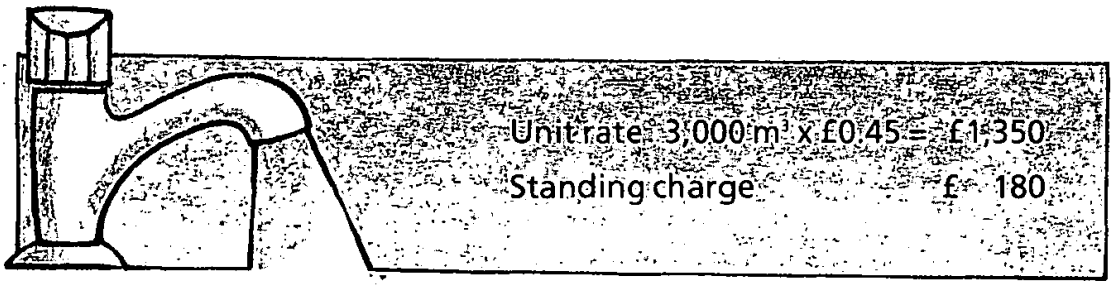
Water companies' metered water charges vary but each company's rate for water and sewerage is the same for all users. However, the standing charges vary according to meter size. Meter size in a school would depend on the anticipated water consumption when the school was designed. If for some reason the consumption has reduced, eg, closure of a part of school, then the school could end up having an oversized meter, which could cost more in standing charges. Typical standing charges are:

STANDING CHARGES

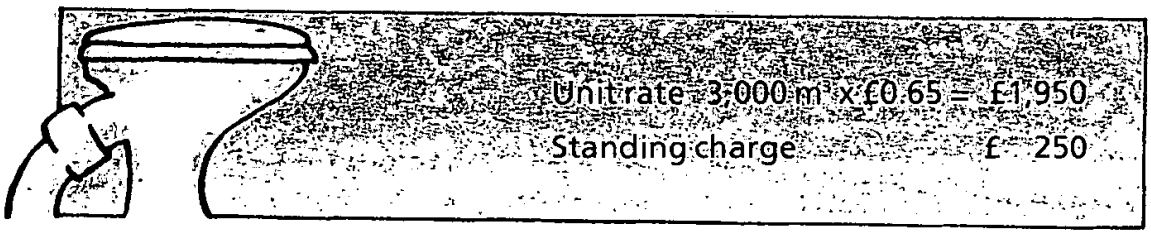
Water meter size (mm)	Standing charge (£/year) Water	Sewerage	Design flowrate litre/hour min	max
20	68	38	18	5,000
40	180	250	75	20,000
100	1,000	1,723	1,800	120,000

Average (1993) unit rates are 45 pence per cubic metre for water supply and 65 pence per cubic metre for sewerage services. For instance, a school which uses 3,000 cubic metres of water a year with a 40mm water metre will have an annual bill of:

Water



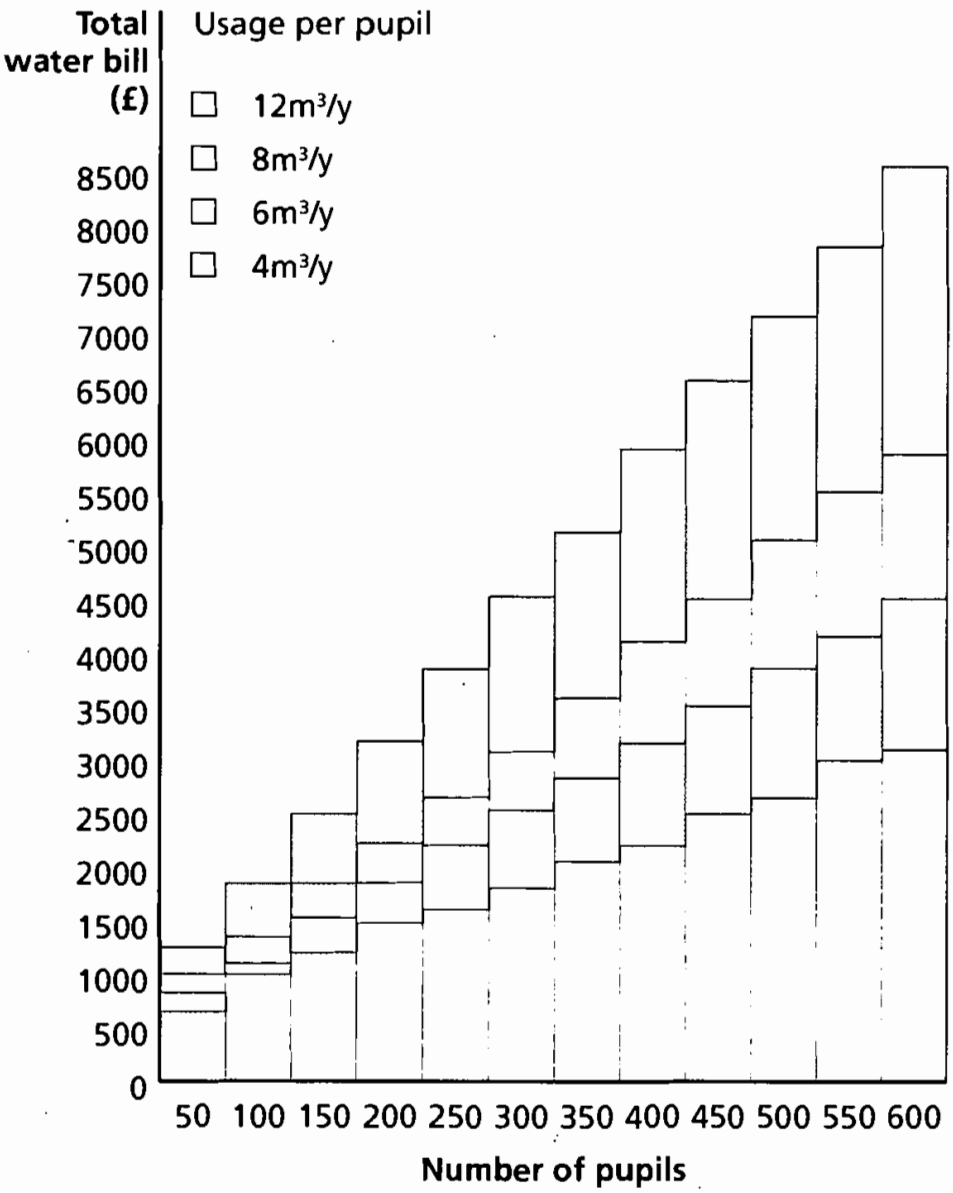
Sewage



Total **£3,730**

Schools often have oversized meters which were used to supply more than one school or community building on the same site. Smaller meters can be fitted to reduce the standing charge. The water supply to fire hose points and dry risers should be designed to by-pass the meter as water for firefighting is exempt from charges. Clearly savings can be made if a smaller meter is considered adequate. It is also well worth checking that water from the meter only goes to the one school – no-one wants to pay for someone else's water.

The graph below shows the approximate water costs for various school sizes and a range of consumption per pupil:



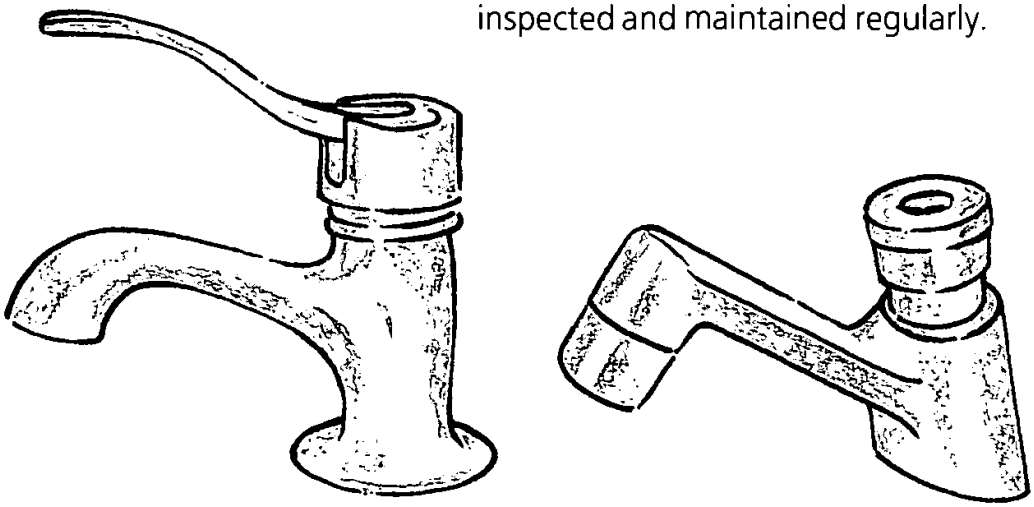
How to save water

Water in schools is wasted in a number of ways, for example:

- Leaks in the system – obvious inside a building but difficult to detect underground (a leak of ten litres a minute could cost more than £5,000 a year). Also, energy is wasted when hot water leaks occur.
- Leaking taps – one drip a second wastes 1,200 litres a year so check for leaks and replace washers on dripping taps.
- Urinal flushing – especially automatic flushing cisterns.

Self-closing taps and spray taps

Taps left running can waste enormous amounts of water. There are various types of self-closing, push operation taps which are effective in cutting the supply off after a short time but may waste water if they fail in the open position. They need to be inspected and maintained regularly.



Spray taps can save up to 50 per cent in water consumption but regular attention is needed to make sure the spray head does not become blocked by soap, grease or limescale. The slow rate of flow on hot water taps can mean a long wait for warm water resulting in minimal savings. Point-of-use heaters could be the answer.

Hot water supplies

Hot water taps and showers in schools can be a major source of wasted water particularly if pipes are too long and not lagged properly. A great deal of tepid water may be lost before the hot water comes through.

Where poorly lagged hot water pipes run close to drinking water taps the cold water will warm up and the user will waste water trying to get a cool drink. It is, therefore, important to keep runs of pipework short and to lag pipes properly.

It is worth considering installing small point-of-use water heaters, separate from the central hot water supply, at points which would otherwise require very long pipe runs.

Automatic Flushing Systems

If urinals are flushed by an automatic cistern, Water Byelaws (see Information Box page 16) insist that there must be a means of controlling the flow of water at a set rate per hour. The table below shows the shortest period between flushes for a combination of urinals and cistern volumes.

AUTOMATIC FLUSHING CISTERN FLUSH RATE

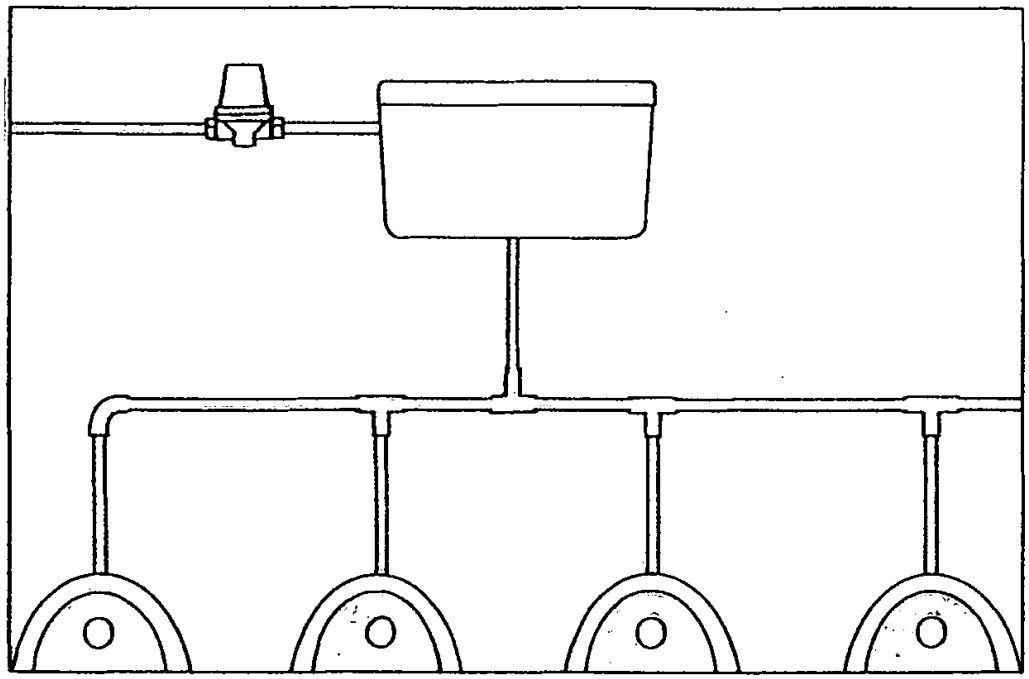
Number of bowls	Maximum consumption litres/hour	Volume of cistern (litres) 4.5	9	13.5	18
		Shortest period between flushes (minutes)			
1	10	27	54	81	108
2	15	18	36	54	72
3	22.5	12	24	36	48
4	30	9	18	27	36
5	37.5	7	14	21	28
6	45	6	12	18	24

Even for systems which meet the requirements, a nine litre (two gallon) cistern flushing a bank of four urinals may flush every 18 minutes using 30 litres of water every hour. At night, weekends and during holidays when the urinals are not in use the current bylaws require a means of stopping the cistern from filling. However, many of the older schools do not have any control devices on their urinal tanks. These schools could benefit considerably by installing cistern flush controllers.

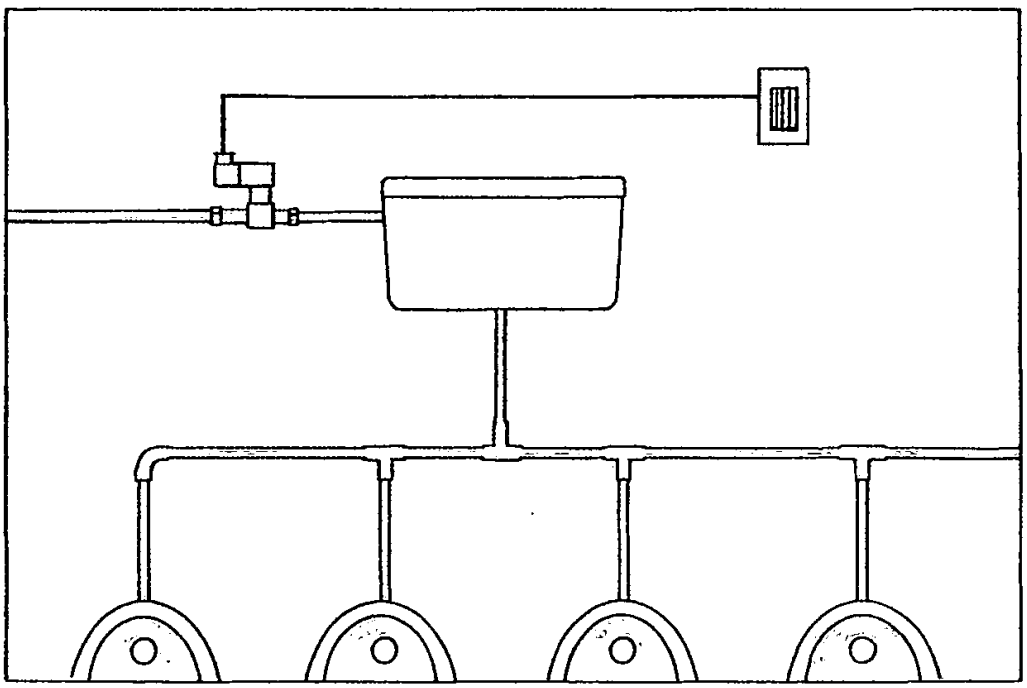
There are various types of cistern flush controllers to cut down the amount of water used and they vary from simple timer devices to 'people detectors'. Timers mean the cistern is ony filled during school hours but the more sophisticated detecting systems sense a person using the urinal then activate the filling of the cistern. However, it is important these devices are used with a delay timer to make sure the cistern does not flush every time a person is detected. These type of detectors can also be used to control lighting or ventilation. The controllers on the devices normally have a 'hygienic flush' every 12 or 24 hours to prevent offensive odours when the urinal is not being used. The main types of controllers and approximate costs are illustrated on page 13.

Installation costs can vary between about £80 for non-electrical or battery-powered equipment to around £120 for systems needing mains electricity supply. One device is required for each cistern and maintenance costs are likely to be minimal although it is important to make regular checks. Some controllers have counters showing the number of flushes.

MAIN TYPES OF FLUSH CONTROLLERS



Activated by change in water pressure, eg, from use of hand basin taps.



Activated by infra-red or ultrasonic person detector.

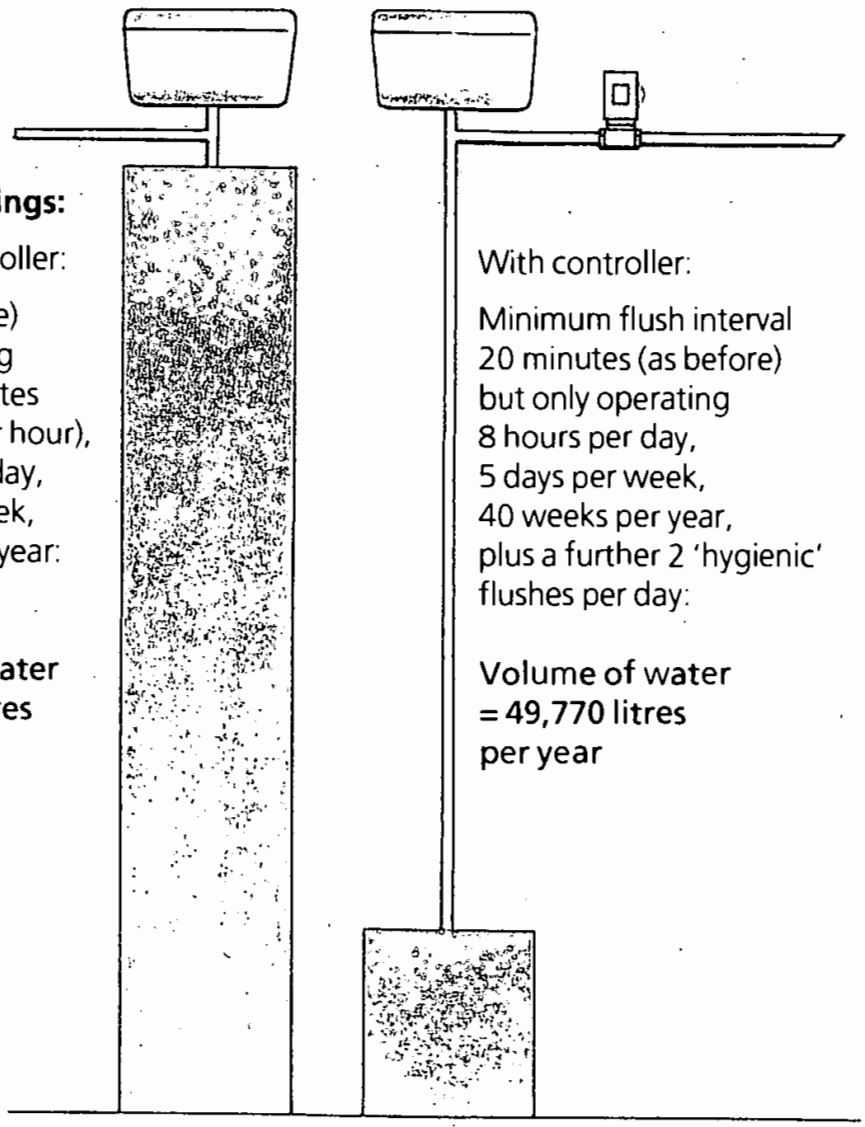
Choice of the type of controller depends on the plumbing system, water pressure and size of cistern and it should be bought from reputable companies perhaps after getting advice from your local authority or other schools in your area. Products conforming to the Water Byelaws should be used and it is essential they are properly installed.

Example savings:

Without controller:

2 gallon (9 litre) cistern flushing every 20 minutes (= 27 litres per hour), 24 hours per day, 7 days per week, 52 weeks per year:

Volume of water = 235,872 litres per year



With controller:

Minimum flush interval 20 minutes (as before) but only operating 8 hours per day, 5 days per week, 40 weeks per year, plus a further 2 'hygienic' flushes per day:

Volume of water = 49,770 litres per year

This means a controller for just one cistern could save a school 186,102 litres of water a year which is over £200 at current prices. A controller costing about £200, including installation, would therefore pay for itself within one year.

MAIN TYPES OF FLUSH CONTROLLERS

Type	Price Guide
Pre-set (non-adjustable) timer/controller with stopvalve and flow controller	excluding VAT and installation approx £80
Adjustable timer, stopvalve and flow controller	£90-250
Water pressure sensing valve (activated by, eg, use of handbasin tap)	£60-100
Detector (eg, infra red, ultrasonic), control circuitry and stopvalve.	£10-230
Thermal sensor and valve (detects increase of temperature of drain from bowl when urinal is used)	approx £80

Frost protection

Adequate frost protection is vital to prevent burst pipes and leaks. It is important that caretaking staff visit the school when frost is expected especially over weekends and holidays. Special attention should be given to incoming cold water mains. Cold water tanks should be insulated, pipework lagged and clustered together to reduce the risk of freezing. An outside thermostat set at 2°C should be used to start all heating and hot water pumps. An internal thermostat in a normally heated room should turn on the boilers and heating when the internal temperature falls below five degrees centigrade.

Other issues

- Swimming pools should not be drained and refilled more than necessary. However, sufficient filter backwashing and dilution must be carried out for hygiene purposes. Discharges of swimming pool water should qualify for a discount against normal effluent charges. A reduction in sewerage charges may also be made for water loss through pool evaporation. Local water service companies will be able to give further advice.
- If a significant amount of water is used for watering playing fields or other similar uses this supply should come from a separate meter so the school will not have to pay the normal sewerage charges. Once again water companies can advise.
- Ballvalves and overflows on WC cisterns should be checked regularly and there are devices available to reduce the WC cistern volume. However, any reductions in volume depend on the WC pan design and should not be carried out at the expense of effective flushing.

SCHOOL WATER MANAGEMENT CHECKLIST

- [ ] Map out the school water system checking for leaks, long pipe runs and unlagged pipes. Arrange modifications or maintenance where necessary.
- [ ] Check your water meter size to ensure it is appropriate for your water usage.
- [ ] Monitor water consumption through regular meter readings and act quickly if there are any increases, or if meter stops working.
- [ ] Check for leaks by checking the water meter when water is not being used, eg, at night or at weekends; and consider installing one or more meters to identify consumption in certain areas, such as, kitchens, swimming pools.
- [ ] Ensure that urinal cisterns flush at the minimum frequency and consider installing control devices.
- [ ] Regular checks and repairs made to leaking taps and consideration given to fitting self closing taps or spray heads.
- [ ] Pupils should be encouraged to save water by using plugs in basins, drawing cold water before hot and turning off taps properly. They should be made aware of the possible savings and the conservation of a precious resource.
- [ ] Ensure that caretakers and at least one other member of staff, know how and where to shut off the water supply to different buildings or areas. It is important that they are instructed never to turn off supplies to firemains.

THE WATER BYELAWS

Schools, like any other building, have to comply with Water Byelaws which are aimed at preventing undue consumption, waste, misuse or contamination.

The Byelaws are not retrospective but all fittings installed before January 1989 should meet the Byelaws then in force. It is not necessary to modify fittings or systems installed before 1989. However, if part of the plumbing system is extensively repaired or renewed than the new part of the installation should meet the present Byelaws.

Schools should be aware of particular points concerning Byelaws:

- Urinal flush controls (see pages 9–13).
- Risk of back-siphonage which can happen when drinking water supplies are contaminated through water flowing in the 'wrong' direction. Equipment, such as potato peelers in kitchens, must be fitted with suitable air gaps and taps used for hose connection should have non-return valves fitted to avoid this problem. There are various types of anti-back flow devices available.
- It is essential that cisterns used to store water for cooking, etc. are in good condition with tight fitting lids, protected against contamination by insects, vermin and dust and also effectively insulated.
- Overflows, or warning pipes as they are now called, including those fitted to water cisterns, should be visible at the point of discharge as they signal problems to be tackled.

FURTHER READING

1. *Water Supplies Byelaws Guide,* 2nd edition 1989, ISBN 0 902156 71 3 **(£7.95)**.

2. *The Water Fittings and Materials Directory* (WRC) **(£20)** contains details of the official list of fittings which comply with the byelaws.

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This guide is the first in a new DFE series 'Managing School Facilities' aimed at school headteachers and governors. It looks at typical water costs for schools and points out financial and environmental benefits of using water economically.

It explains the make-up of a typical water bill including standing charges, sewerage rate etc. and then goes on to describe ways of saving water including leak detection and urinal flush controllers. A school water management check-list and background information on the water byelaws is also provided.

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