



WATER WISE

A Water Saving Guide
for NRA Offices

National Rivers Authority
Information Centre
Head Office
Class No
Accession No APXK/1

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ENVIRONMENT AGENCY



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WATER WISE

A Water Saving Guide for NRA Offices

The NRA spends a total of £90,000/year on water and sewerage charges. In the NRA's Water Resources Development Strategy for England and Wales '*Water - Nature's Precious Resource* (1994)' demand management and water conservation was recognised as having a key role to play in an environmentally sustainable strategy.

The NRA is currently requesting that water companies consider domestic metering and leakage reduction as an alternative to traditional source development.

Against this background, the NRA must make its own strenuous efforts to reduce water consumption, not only to be consistent with its demand management principles, but also because saving water is good management practice. It has been NRA environmental policy for some years to reduce water consumption in NRA premises by 10% from 1991/92 levels.

The cost of water and sewerage services

Charges contain a rate per cubic metre used and a standing charge. As sewerage charges are based on the amount of clean water used (normally 95% is assumed) each bill includes:

- A standing charge for water supply which depends on the size of the water meter (the larger the meter, the greater the standing charge).
- A charge for the amount of water used.
- A standing charge for sewerage services (also based on the size of the water meter).
- A charge for the amount of water passed to the sewer (95% of the volume of water metered).

Typical charges (Southern Water 1994/95) are:

standing charge

Water meter size (mm)	St. charge water (£/year)	St. charge sewerage (£/year)	Min. flow (m ³ /hr)*	Max. flow (m ³ /hr)*
25	113.00	143.00	0.03	5
50	381.00	476.00	0.1	20
75	785.00	1042.00	2.0	100
100	1362.00	1799.00	2.5	150

* figures are approximate. If consideration was being given to changing the meter, the demand flow rate would need to be checked against the manufacturers' specification.

volume charge

	p/m ³
Water	48.9
Sewerage	71.4
Total	120.3

Hence, a typical NRA office which uses say 853 m³/year with a 50mm water meter will have an annual bill of:

Standing charge	water	£381.00
	sewerage	£486.00
Volume charge	water	£417.12
	sewerage	£578.60
Total		£1852.72

Information & monitoring

A commitment to securing regular detailed information about water consumption is an essential prerequisite for the management of water use. Maintaining accurate records and reporting regimes is a principal requirement of the two British Standards 5750 and 7750 which are being considered for introduction to the NRA.

The first step in determining whether it is practical to consider water saving measures is by an assessment of water use. In order to do this it is essential to have a meter. If the premises do not have a meter contact the local water company to make arrangements to have one installed. For any activities that use high volumes of water consideration should be given to separate metering and management.

The average per person water use figure for offices and factories is 50 litres/head/day. By dividing the water use of the office by the number of employees a comparison with this figure can be made.

For example: a typical office with 53 staff

water use	= 200m ³ /quarter
no. of staff	= 53
no. of days in a quarter	= 65
per person consumption	= $200 \times 1000 / 53 \times 65 = 58$ litres/head/day

This is higher than the average and so it is worth considering some water conservation measures. The meter reading can also be compared with the design flowrate of the meter, bearing in mind that this will be the average flow and that the meter at its maximum design flowrate will have to accommodate the peak which can be considered to be no more than twice the average flowrate. If the meter is oversized a considerable annual saving can be made by opting for a smaller meter with a lower standing charge.

Patterns of use

A high proportion of NRA locations are offices. Typically the pattern of water use in offices is as follows:

WC flushing	43%
Urinal flushing	20%
Washing	27%
Cleaning	1%
Canteen use	9%

From these figures it can be seen that the priority for savings in offices should be WC and urinal flushing systems which together account for 63% of typical use. Reduction of use in this area by $\frac{1}{3}$ achieves a 20% saving overall. This assumes there is no leakage on the NRA owned pipework. If leakage does exist larger savings can be realised.

Options to Reduce Water Use

1. Leakage

If a leak exists on the supply pipe between the meter and the premises the NRA will be billed for this water as the leaking pipe is the responsibility of the property owner (see Fig.1). If meter readings are taken on a regular basis a sudden increase in consumption is likely to be a leak.

In the Southern region of the NRA savings were made at the following offices by the detection and repair of leaks.

Case study Chicester site.

A leak was repaired which was costing the NRA £1500/year.
Of the 1857m³/annum consumed at the site 84% was attributed to this leak.

Case study Allington lock cottages.

The annual consumption was 10,000 m³/annum at a cost of £5,000 per year.
When the leak was located and repaired the consumption fell to less than 1,000m³/annum and the annual charge to around £500.

How do I find out whether there is a leak on the premises ?

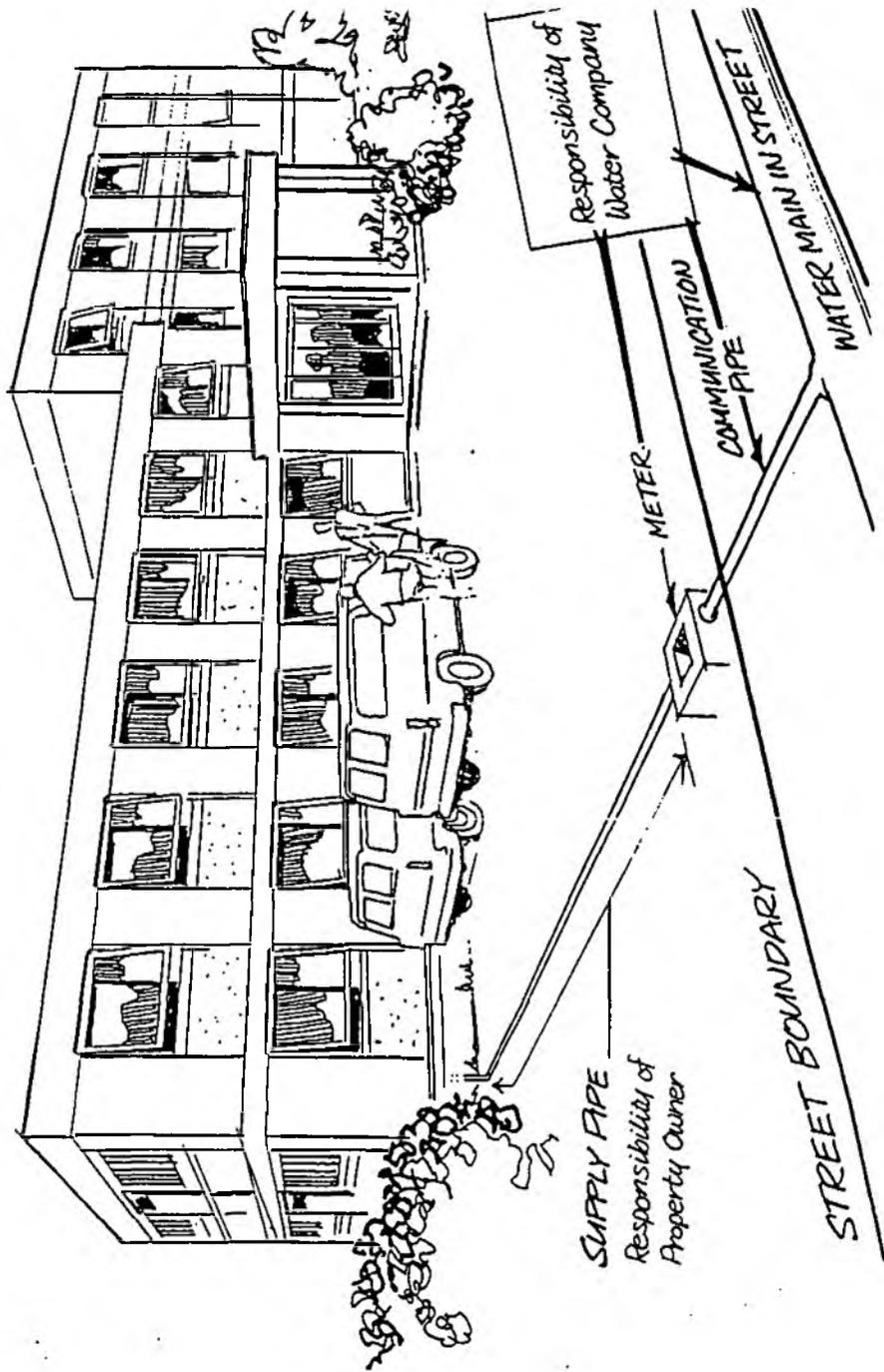
Detecting leaks is a skilled job and would require the services of either the local water company or a specialist contractor. But before requesting their services a simple and cheap test (the night flow test) can be carried out to determine whether there are any leaks on the premises;

- Read the main water meter after everyone has left the office.
- Read the meter again the following morning before anyone starts work.

If there is an automatic flushing urinal that normally flushes at set time intervals throughout the night this must be switched off for the duration of the test.

Because there is no legitimate consumption between these times the two meter readings should be the same. If not, the difference in readings must be due to leakage and knowing the time interval between the readings the leak can be quantified.

Figure 1. PIPELINE RESPONSIBILITIES



If there is a leak what is the best way to tackle it ?

First, check that there are no visible leaks or (overflows) within the building. If there are get them repaired and then repeat the night flow test.

If the night flow test registers consumption and a thorough check for visible leaks has been made then it is likely that the leak will be on the incoming supply pipe (assuming, of course that the meter is externally located and the supply pipe is downstream of it) and specialist leakage contractors (or your local water company if they provide such a service) should be engaged to detect it.

If final confirmation is required as to whether the leak is internal or external this can be determined by repeating the night flow test with the stop tap at the point where the supply pipe enters the property turned off. If the readings still change then the leak is external, if they don't then it is internal. Remember that a leak on a hot water pipe wastes energy too.

2. Urinal flushing

If urinals are flushed by an automatic cistern, the water byelaws insist 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.

No. of bowls	Maximum consumption (litres/hr)	Vol of cistern (litres)			
		4.5	9	13.5	18
1	10	27	54	81	108
2	15	18	36	54	72
3	22.5	12	24	36	27
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 urinals may flush every 18 minutes using 30 litres of water every hour. At night, weekends and during bank holidays when the urinals are not in use the current byelaws (which are not applied retrospectively) require a means of stopping the cistern from filling. Urinal systems without '*flush controllers*' would certainly benefit from them. There are various types of flush controllers available, from simple timer devices to '*people detectors*'.

A list of manufacturers can be found in Appendix A.

Choice and type of controller depends on the plumbing system, water pressure and type of cistern and it should conform to the water byelaws.

Examples of savings

without controller :

2 gallon (9 litre) cistern flushing every 20 minutes (=27 litres per hour)
Operating 24 hours per day, 7 days per week, 52 weeks per year.
volume of water used = 235,872 litres per year.

with controller:

Minimum flush interval 20 minutes (as before)
Only operating 10 hours per day, 5 days per week, 50.5 weeks per year.
volume of water used = 68,175 litres per year.

So a controller for just one cistern could save 167,697 litres of water a year which is £195.74 of water and sewerage charges. A controller costing about £200, including installation, would therefore pay for itself in almost one year.

Case study British Telecom

British Telecom have installed infra-red urinal controls in 2,000 buildings and reduced demand by 1136 ML/year.

Case Study The Land Registry

Water consumption (urinals) has been reduced by 80% following installation of infra-red detectors.

3. Leaking W.C.'s and taps

Taps one drip a second wastes 1200 litres a year so it is important to check for leaks and replace washers on dripping taps (see Figure 2).

W.C's Toilets can leak without anyone being aware of it. To check for leaks, put a little food colouring in the tank. If, after about fifteen minutes and without flushing the colour begins to appear in the bowl there is a leak and this should be repaired as a matter of high priority.

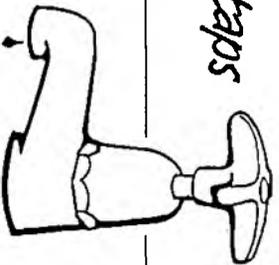
4. External Use

Should be avoided wherever possible. If any vehicle washing is done on the premises ensure that buckets rather than hosepipes are used.

5. Awareness

Because the price of water is so low, the public regard it almost as a free good, and it is possible that some NRA staff will have similar attitudes. A campaign that makes staff aware of a water saving initiative and the importance of water saving measures can help in keeping down consumption. For example, notices in the toilets asking staff to report dripping taps or W.C.'s. Publication of water saving achievements in newsletters will also help.

Q2. How much water is lost due to leaking taps



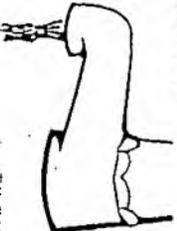
ONE DRIP PER SECOND WASTES **4 LITRES PER DAY**
(almost 1 gallon)



RIP BREAKING INTO STREAM WASTES **90 LITRES PER DAY**
(20 gallons)



.5 mm ($\frac{1}{16}$) STREAM WASTES **320 LITRES PER DAY**
(70 gallons)



3 mm ($\frac{1}{8}$) STREAM WASTES **985 LITRES PER DAY**
(216 gallons)



1 mm ($\frac{1}{4}$) STREAM WASTES **3,500 LITRES PER DAY**
(770 gallons)

6. Further measures

Other measures that can be taken to reduce water use include:

- **lagging of hot water pipes.** Long pipe runs and no or inadequate lagging can be a major source of water loss as cold and tepid water is wasted before the hot water comes through.
- **self closing and spray taps.** Taps left running can waste enormous amounts of water. There are various types of self-closing, push operation taps which cut off the supply after a short time. Spray taps can reduce water consumption by up to 50% but they require regular attention to make sure the spray head does not become blocked by soap, grease or limescale. The cost of replacement is approximately £4 per tap.
- **reducing WC cistern volume.** To measure the WC cistern volume shut off the valve in the cistern supply line and mark the water level. Flush the toilet. Then re-fill the cistern to the marked level using a graduated container. Having determined the flush volume if it is 9 litres or over water savings can be made by reducing it. By drilling a hole in the siphon the flush volume can be reduced to 7.5 litres (byelaw requirements for new W.C.'s. To get a plumber to do this would cost about £10/W.C. and would pay for itself within about a year.
- **Toilet bags or dams, or adjusting the ball valve arm** are common methods of reducing water consumption in response to a drought. Cistern dams cost only £5 per WC and bags are cheaper, but as a long term solution care needs to be taken to ensure that the volume displaced does not cause the flushing efficiency to be impaired.
- **Replacing W.C.'s with six litre flush models** will cost about £300/W.C. which will reduce water demand significantly but may take more than ten years to pay for itself.
- **showers.** If your NRA office has showers, consider fitting low volume shower heads which reduce consumption by about 10%.
- **external use.** Any garden should be planned using drought resistant plants so that watering will not be necessary.

Checklist

- From the latest water bill assess the per person per day consumption for your office.
- Carry out a night flow test if you suspect there are leaks.
- Take meter readings regularly (once/week). Act quickly if there are sudden unexplained increases.
- Check the water meter size to see if it is appropriate for your water usage.
- Ensure that urinal cisterns flush at the minimum frequency and consider installing control devices.
- Regular checks and repairs made to leaking taps and W.C.'s.
- Awareness campaign for staff.
- Consider other water saving measures e.g. reduced flush W.C.'s, self closing taps.
- Introduce a policy of specifying low consumption when purchasing water using appliances.

Appendix A

Manufacturers of Urinal Control Systems & other water saving devices.

Dart Valley Services

Cliff Works
Roundham Road
Paignton
Devon TQ4 6DS

Tel: 01803-529021

Flow Control Water Conservation Ltd.

National Westminster Bank Buildings
89 Brighton Street
Wallasey
Merseyside L44 6QJ

Tel: 0151-638-8811

Water Management Systems (UK)

Suite 1
Robin Enterprise Centre
Leeds Road
Idle
Bradford
West Yorkshire BD10 9TE

Tel: 01274-611131

Washroom Environmental Services Ltd.

Veitchii Barn
New Barn Road
Swanley
Kent BR8 7PW

Tel: 01322 614614

The NRA's Demand Management Centre (DMC), based at NRA Southern Region, Worthing, welcomes practical examples of water savings by the NRA.

The Centre produces a bi-monthly *Demand Management Bulletin* and is keen to promote good practice and publicise the significant savings that can be made by good management. The Bulletin gives the background to the DMC and gives information on all the latest developments in the field of demand management.

Please contact the DMC on tel: 01903-820692 (GTN 7.23.2073) or fax: 01903-821832 and share the good news.

The Environmental Policy Unit's role is to develop and promote sound environmental management throughout the functions of the NRA. The implementation of best environmental practice, including waste minimisation will enable the NRA to demonstrate that we practice that which we preach.

Further information is available from the EPU at Peterborough or through Regional Co-ordinators - Environmental Policy

*Produced by
the NRA's Demand Management Centre
& the Environmental Policy Unit*