

Rainwater Tanks in Schools – every drop counts Water Audit



A comprehensive teaching resource
for Stage 3 students

Rainwater Tanks in Schools – every drop counts Water Audit

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Introduction

The Rainwater Tanks in Schools Rebate Program

Water is precious and local schools and communities can play a significant part in protecting water supplies for the future. It has been estimated that more than 1,500 million litres of water – or 1,500 Olympic swimming pools – can be saved each year if schools across Sydney became more water efficient.

To encourage long-term water efficiency, Sydney Water has introduced a Rainwater Tanks in Schools Rebate Program. Schools that achieve a sustained 15 per cent water saving will be eligible for a rebate of up to \$2,500 to help purchase and install a rainwater tank. The Rebate Program is available to all primary and secondary schools, public and private that are connected to a Sydney Water main.

How to qualify

To be eligible for the Rebate a school needs to:

- be a public or private, primary or secondary school connected to the Sydney Water supply network.
- take part in a water conservation education program, or have done so in the last two years. *
- undertake a water audit of how much water is being used in and around the school and develop a water conservation action plan.
- achieve a sustained 15 per cent water saving or meet the water saving target of 15 litres of water per student, per day or less over a month. If a school is already water efficient it may automatically qualify for the Rainwater Tanks in Schools Rebate.

*Eligible water conservation programs include **every drop counts in Schools**, **Sustainable Schools** or **Rainwater Tanks in Schools – every drop counts Water Audit**.

Contacts

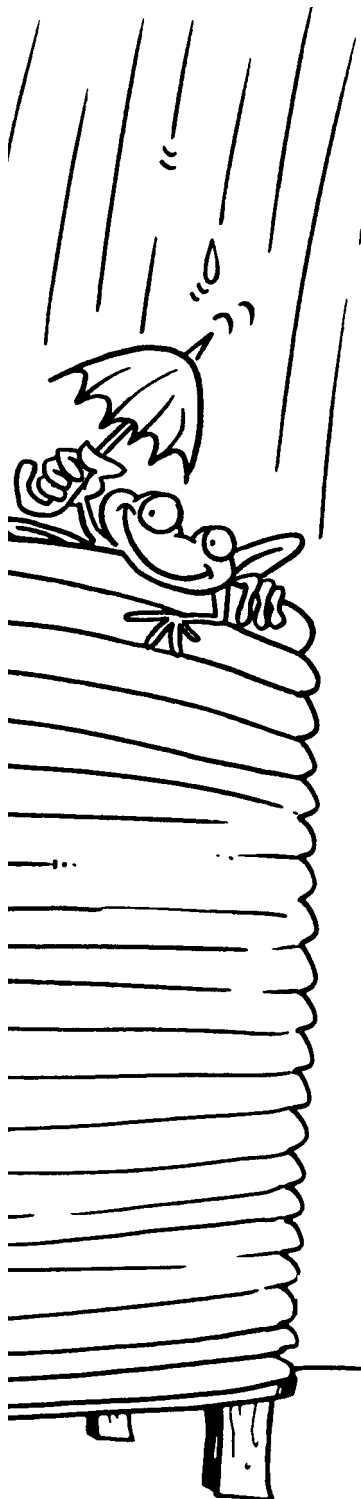
For further assistance with the water audit lessons or the Rebate Program contact Sydney Water on 1800 724 650.



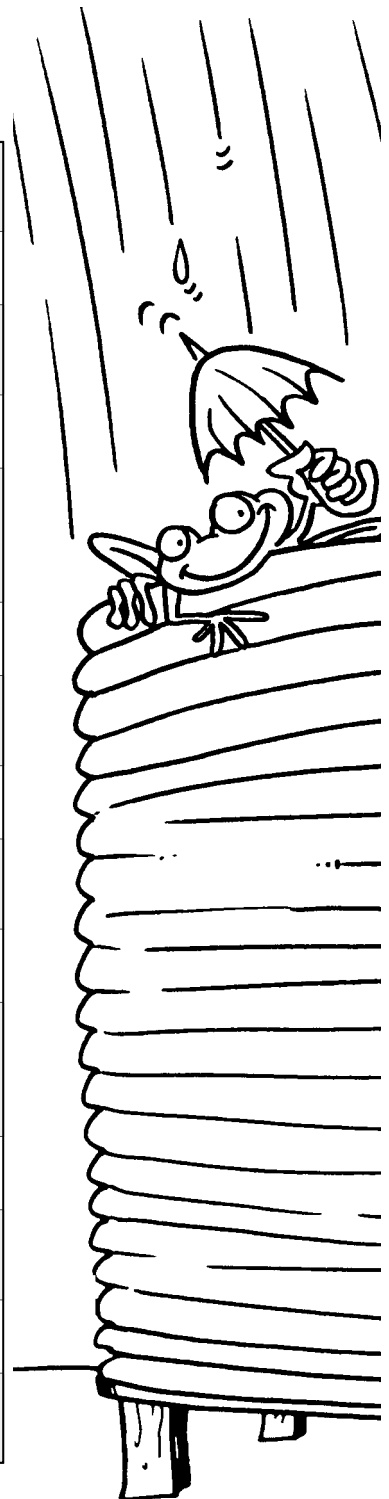
Ways to obtain the rainwater tank rebate

Participate in the **every drop counts in Schools** or **Sustainable Schools Program**.

Complete the five lessons in this **Rainwater Tanks in Schools – every drop counts Water Audit** teaching resource.



| |
|---|
| Develop, implement and evaluate a school water action plan |
| ↙ |
| Demonstrate the required reduction in water consumption over at least one month |
| ↙ |
| Complete the Eligibility Form for a rainwater tank rebate at www.sydneywater.com.au |
| ↙ |
| Receive confirmation from Sydney Water of eligibility |
| ↙ |
| Purchase and install a rainwater tank |
| ↙ |
| Complete and return the <i>Rainwater Tanks in Schools</i> Rebate Application to Sydney Water |
| ↙ |
| Sydney Water will inspect the tank to ensure it is correctly installed |
| ↙ |
| Once your tank is correctly installed you will receive the rebate |



About this teaching resource

The Rainwater Tanks in Schools – every drop counts Water Audit teaching resource provides a series of lessons to help schools reduce water consumption and become eligible for the rainwater tank rebate.

The lessons in this teaching resource help students understand the need for sustainable water efficiency. Students will audit their school's current water use and then plan and implement ways to reduce water consumption.

Level

The lessons in this teaching resource target Stage 3 students.

The lessons

There are five lessons:

1. Water for the future
2. Reading the school water meter
3. The school water audit
4. Our plan to reduce water use
5. Putting our plan into action.

Each lesson consists of teaching and learning activities linked to appropriate NSW syllabus outcomes. The lessons are fundamentally related to Science and Technology outcomes although an HSIE outcome is addressed in Lesson 1. Links to the objectives in the NSW Department of Education and Training's Environmental Education Policy for Schools* are also made.

Worksheets and background notes accompany the lessons.

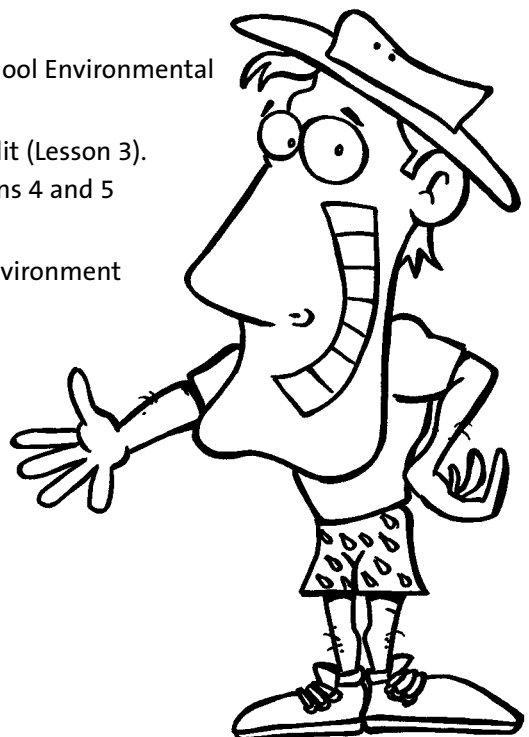
Implementation ideas

There are several ways to implement this teaching resource in class and school programs:

- As a five week integrated teaching unit.
- As one of the audits related to development of the School Environmental Management Plan (SEMP)*.
- As a special day event centred on the school water audit (Lesson 3). Lessons 1 and 2 are taught before the event and Lessons 4 and 5 as follow up.
- As special interest activities e.g. through the School Environment Club, Student Representative Council.

If more than one class is involved in implementing the lessons ensure there is school coordination.

* Relates to public schools only.





WATER FOR THE FUTURE

Lesson 1

WATER FOR THE FUTURE

Teaching and learning activities

In class discussion, pose the question *'what will we need to do if each person's water use remains the same as Sydney's population increases?'*

Two main responses are:

- Get more water e.g. through recycling, using rainwater tanks, desalination (converting sea water to fresh water).
- Use less water e.g. mend leaking pipes, install water-efficient showerheads, turn taps off.

What would be the difficulties with both these options? Establish that there is a need for elements of both these responses to be adopted for water use to be sustainable.

Divide the class into three large groups each representing:

- Businesses and schools
- Home inside
- Home outside

Students, individually or in small groups, research their allocated topic and how water can be saved in that area. Information for this research can be found at www.sydneywater.com.au

Students write a brief report on their research. In class discussion, summarise ways that water can be saved in each water use. Highlight the use of rainwater tanks in this context.



NSW Syllabus outcomes and indicators

HSIE ENS3.6 Explains how various beliefs and practices influence the ways in which people interact with, change and value their environment.

- Evaluates alternative views about the use of natural and built environments.
- Identifies ways that different people can protect the environment.

ENGLISH WS3.9 Produces a wide range of well-structured and well-presented literary texts for a wide variety of audiences using increasingly challenging topics, ideas, issues and written language features.

- Writes an information report about an environmental issue.

Objectives of the NSW Environmental Education Policy for Schools *

Students will develop knowledge and understanding about the impact of people on environments (K2).

Students will develop skills in resolving environmental problems (S4).

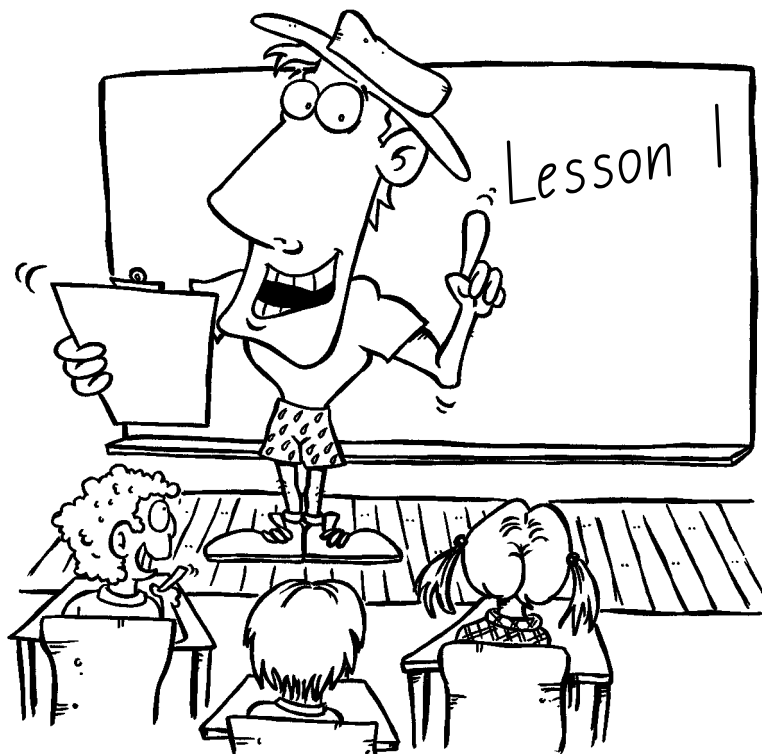
Resources required

- Internet to use web sites such as Sydney Water's site www.sydneywater.com.au
- Other library resources such as books, pamphlets, journal articles

Suggested lesson duration

Two hours.

* Relates to public schools only.





READING THE SCHOOL WATER METER

Lesson 2

READING THE SCHOOL WATER METER

Teaching and learning activities

Prior to the lesson, find out the location of the school water meter(s). Check the school's Sydney Water bill to see how many meters there are. Inform the Principal and General Assistant that you will be reading the water meter(s) with the class.

Explain to the class that a water meter is used by Sydney Water to measure the amount of water consumed by the school over a period of time. The school then receives a water bill based on the cost of water multiplied by the amount of water used.

Take the class out to the water meter **close to the end of the school day (e.g last 15 minutes)**. Use the *How to Read a Water Meter* worksheet to help record the current water meter readings.

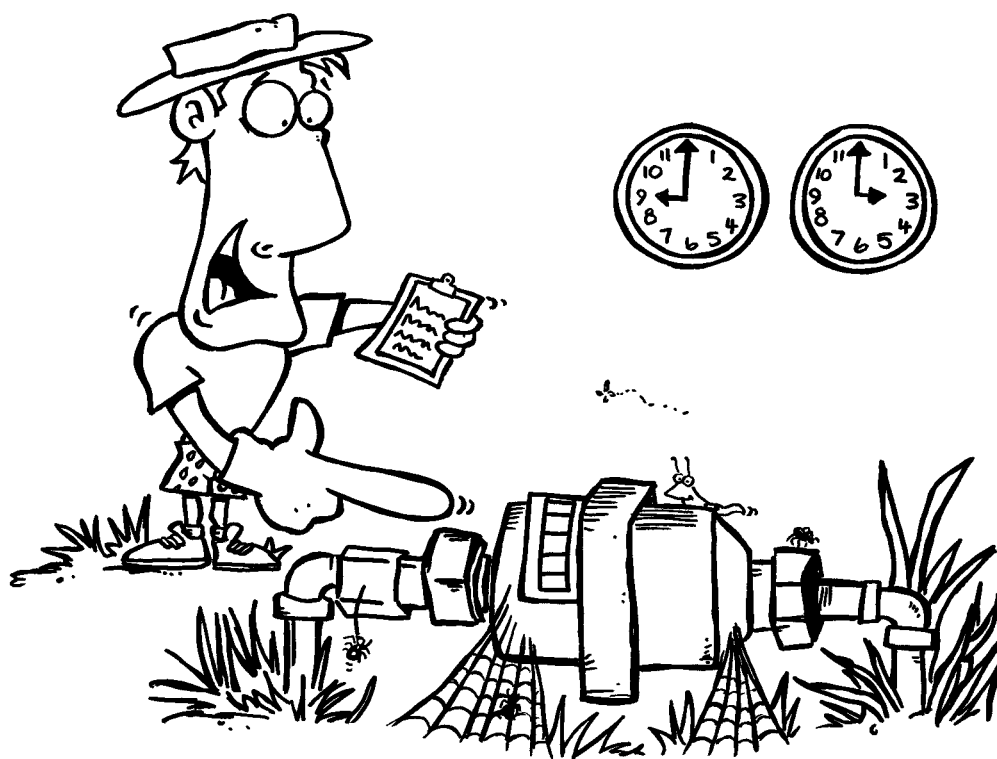
Take the class (or a group of students) back to the water meter(s) **at the start of school the next morning**. Record the water meter readings on *Our School's Daily Water Use* worksheet.

In class discussion, note if there was a difference between the *school finish* reading and the *school start* reading. If there was a change consider reasons for this (e.g. leaking taps, cleaning, watering grounds, after school care). The *Guide to investigating problems using the water meter* will help with this process.

The class should further investigate aspects of water consumption by reading the water meter(s) daily **over at least a week**. Use *Our School's Daily Water Use* worksheet.

List any problems that are identified and use this list in Lesson 4.

The class should also begin recording the school's weekly water use by comparing Monday morning and Friday afternoon readings. Use *Our School's Daily Water Use* worksheet



NSW Syllabus outcomes and indicators

SCIENCE AND TECHNOLOGY

INVS 3.7 Conducts their own investigations and makes judgements based on the results of observing, questioning, planning, predicting, testing, collecting, recording and analysing data, and drawing conclusions.

- Collects raw data.
- Records data using a recording sheet.
- Analyses data to identify environmental issues.
- Draws conclusions about environmental issues.

BES3.1 Creates and evaluates built environments, demonstrating consideration of sustainability and aesthetic, cultural, safety, and functional issues.

Evaluates the sustainability of the school's water consumption.

Objectives of the NSW Environmental Education Policy for Schools *

Students will develop skills in:

- Applying technical expertise within an environmental context (S1).
- Identifying and assessing environmental problems (S2).

Resources required

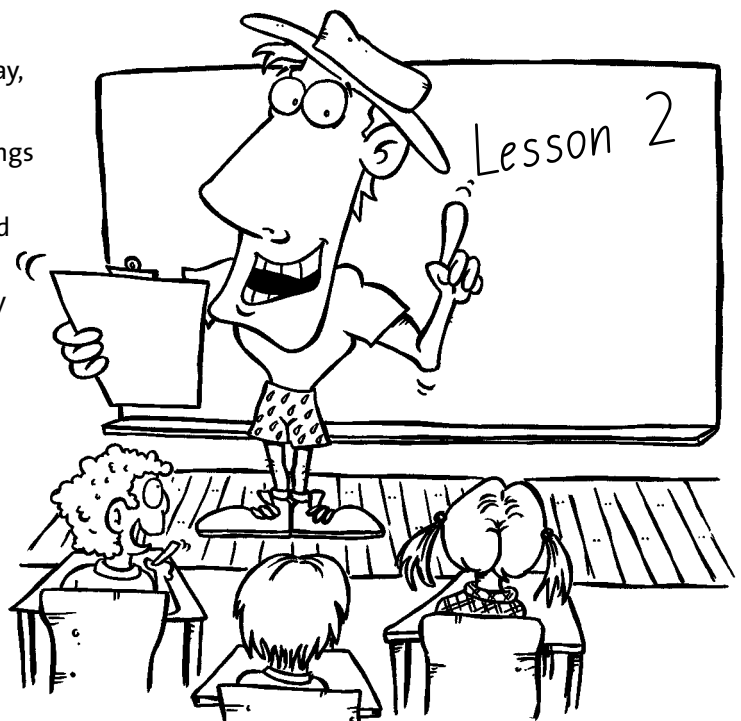
- *How to Read a Water Meter* worksheet (page 12)
- Clipboard or folder to rest worksheet on
- *Our School's Daily Water Use* worksheet (page 13)
- *Guide to investigating problems using the water meter* (page 14)
- *Our School's Weekly Water Use* worksheet (page 15)
- Red and black pens or pencils

Suggested lesson duration

One hour (30 minutes at the end of the school day, 30 minutes at the start of the next day).

NOTE: You will need to record daily meter readings for at least one week. To qualify for the rebate you will need to continue to record weekly meter readings over at least a month after lesson 5. The school's Sydney Water bill can also be used to assess whether you have reached your school's target.

* Relates to public schools only.

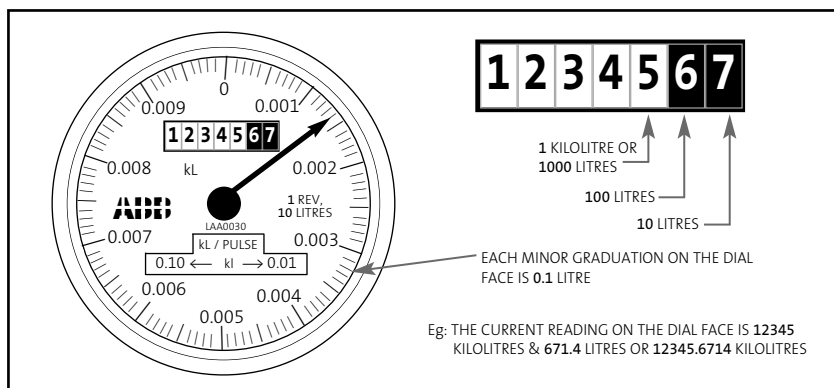


How to Read a Water Meter worksheet

The first thing you will need to do is locate your school water meter(s). Your water meter will look something like the picture below:



On the face of the meter you will see a series of numbers. The numbers measure the amount of water used in kilolitres and litres. On most water meters the numbers in black measure kilolitres (thousands of litres) and the red numbers measure fractions of a kilolitre. The diagram below gives an example of how to read a meter.



Location of your school water meter(s)

Type of meter/s

6 digit

7 digit

8 digit

Record in the blank spaces below the numbers displayed on the school's meter(s). Use a black pen for the kilolitres (1000s of litres) and a red pen for the litres (fractions of kilolitres).

○ ○ ○ ○ ○ ○

SIX DIGIT METER

○ ○ ○ ○ ○ ○ ○ ○

SEVEN DIGIT METER

○ ○ ○ ○ ○ ○ ○ ○ ○ ○

EIGHT DIGIT METER

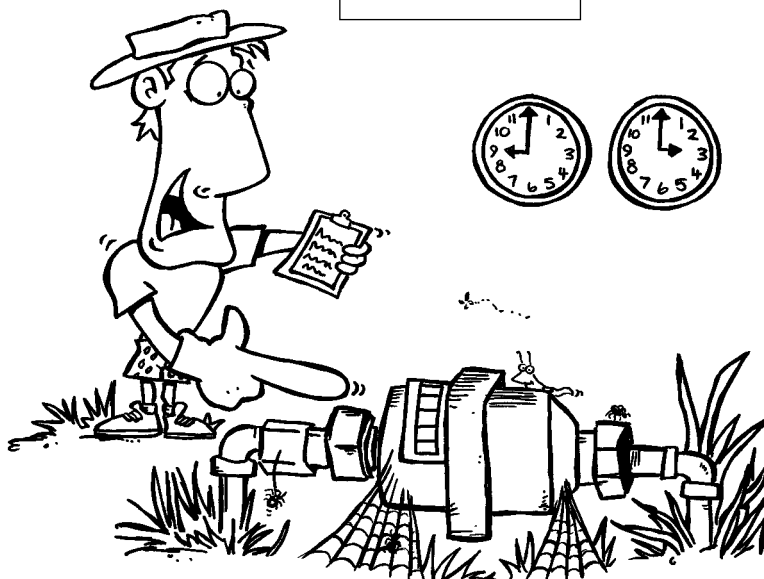
Our School's Daily Water Use worksheet

Use the school water meter(s) to measure the amount of water used over one week. If you have more than one water meter, use multiple worksheets.

| | Monday | Tuesday | Wednesday | Thursday | Friday |
|---|--------|---------|-----------|----------|--------------|
| 2nd reading (school finish) | | | | | |
| 1st reading (school start) | | | | | |
| Daily usage (2nd reading — 1st reading) | | | | | |
| | | | | | TOTAL |

Weekend usage

| | | |
|--|---|---------------------------------------|
| | <input style="width: 100%;" type="text"/> | Monday morning reading from next week |
| — | <input style="width: 100%;" type="text"/> | Friday afternoon reading |
| <hr style="border: 1px solid black;"/> | | |
| = | <input style="width: 100%;" type="text"/> | Weekend usage |



IMPORTANT: Was there any water use at night? (This means that your school finish reading would be different to your school start reading for the next day). Could this water be explained by cleaning or irrigation? If not this could mean that taps have been left on overnight or the school has leaking pipes.

Guide to investigating problems using the water meter

Students should complete at least **one week** of daily water meter readings. Overnight usage should be discussed in class. To determine overnight usage, students should take the water reading at the end of the school day and compare it with the reading at the beginning of the next school day. They can compare the daily school amounts of water used by subtracting the *school start* reading from the *school finish* reading on the same day.

It is important to also take readings over the weekend (i.e. take reading at end of school Friday and compare it with reading taken at start of school the next Monday).

Unusual patterns to look out for when taking the readings include:

- **High water use on a particular day of the week.** Determine the activities that might use large amounts of water on a particular day. For example, some schools find that usage is higher on sports days, or when the toilets are cleaned or when the oval is watered.
- **High water use overnight.** It should be determined whether this occurs consistently or as an isolated occurrence. Regular overnight use when there is no activity in the school suggests a leak or water theft. An isolated instance suggests a tap left running or overnight watering of school grounds.
- **High weekend water use.** Investigate what activities are being conducted in the school at weekends which use large amounts of water, including unauthorised use by passers-by and authorised groups using school facilities.

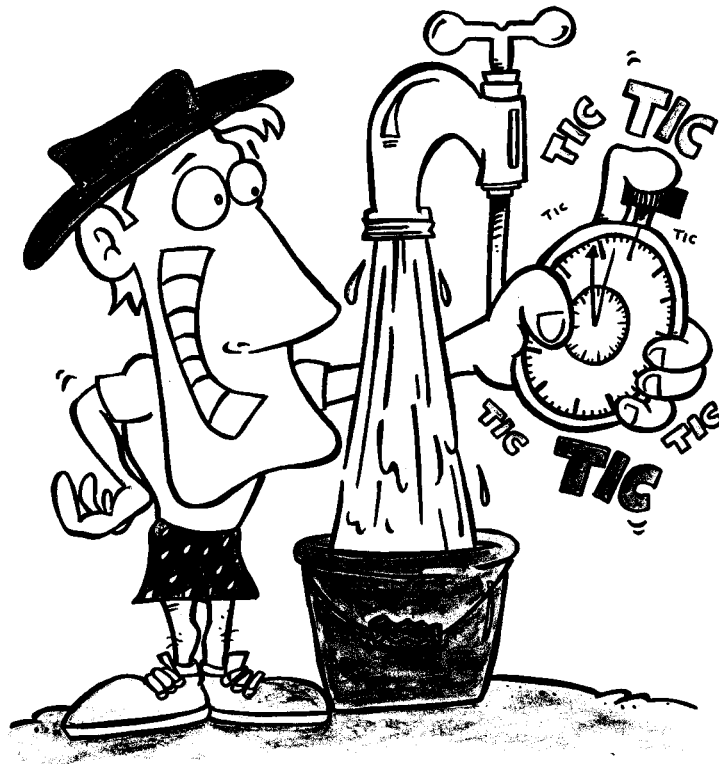
List the different sources of the problems discovered and use this list to determine actions to solve them in Lesson 4.



Our Weekly Water Use worksheet

After recording the school's daily use for at least one week, continue to record the weekly use below. Watch for the changes in water use from week to week. Discuss why there are changes e.g. rainy weather, water leaks. To apply for the Rainwater Tanks in Schools rebate you must show that you have maintained your water saving target for 5 weeks or that your Sydney Water bill shows that you have been at target over a full billing cycle. You can then fill in the Rebate Eligibility form at www.sydneywater.com.au

| | Week 1 Date: | Week 2 Date: | Week 3 Date: | Week 4 Date: | Week 5 Date: |
|----------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Monday morning | | | | | |
| Friday afternoon | | | | | X |
| Water use during the week | | | | | X |
| Water use over the weekend | X | | | | |





THE SCHOOL WATER AUDIT

Lesson 3

THE SCHOOL WATER AUDIT

Teaching and learning activities

Explain to students that a water audit is required to establish where water is being used in the school and where water is being wasted.

The audit will show how students can contribute to water conservation in the school and how this in turn contributes to water conservation in Sydney.

Advise students of health and safety rules (e.g. not to run in wet areas, hygiene around toilets). Inform the Principal and other teachers that the class is conducting the school water audit.

Divide the class into five groups and allocate each group to one of the following audit areas:

- Boys' toilets
- Girls' toilets
- Staff amenities
- Classroom and canteen
- Bubblers and outdoor taps

Use the *School water audit guide notes* (page 20) to describe each group's activities in the selected audit area. Students record their findings using the relevant *School Water Audit worksheet*. The students also note any problems with water use they observe and consider possible solutions.

When groups finish their audit, they should complete their calculations before reporting their findings specifying any water conservation problems to the class. A class list of all water use problems observed in the audit is compiled and used in Lesson 4.

Collect information about outdoor irrigation and cleaning. Discuss this information with the students before reporting their findings and water use problems after their audit.



NSW Syllabus outcomes and indicators

SCIENCE AND TECHNOLOGY

INVS 3.7 Conducts their own investigations and makes judgements based on the results of observing, questioning, planning, predicting, testing, collecting, recording and analysing data, and drawing conclusions.

- Observes and identifies environmental issues.
- Collects raw data.
- Records data using a recording sheet.
- Analyses data to identify environmental issues.

BES3.1 Creates and evaluates built environments, demonstrating consideration of sustainability and aesthetic, cultural, safety, and functional issues.

Evaluates the sustainability of the school's water consumption.

Objectives of the NSW Environmental Education Policy for Schools*

Students will develop skills in:

- Applying technical expertise within an environmental context (S1).
- Identifying and assessing environmental problems (S2).

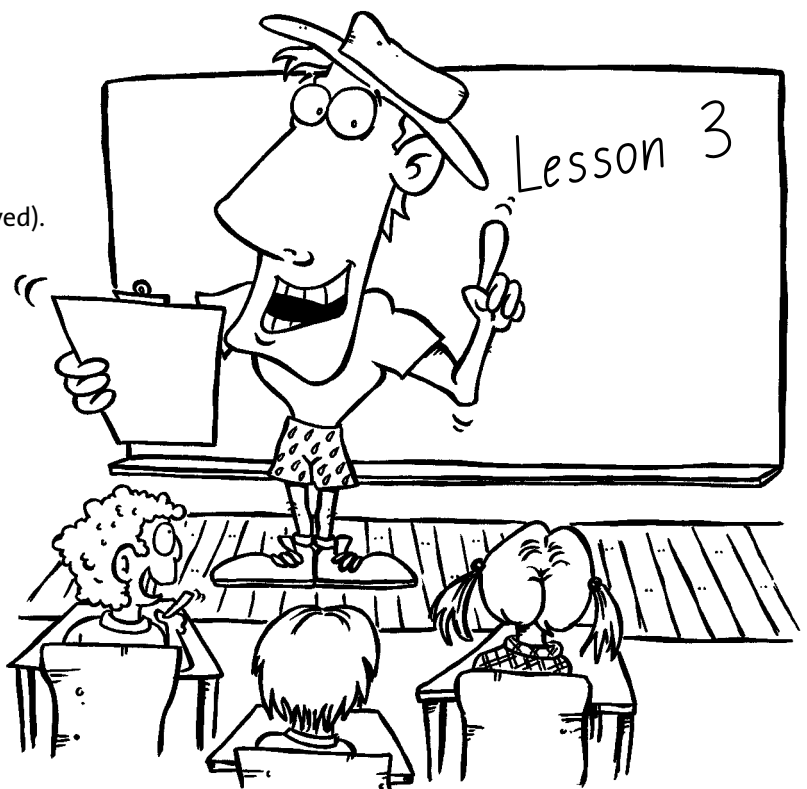
Resources required

- 5 buckets
- 5 one litre jugs
- 5 stop watches
- 3 tape measures
- 1 calculator
- Copy of worksheets
- Pens or pencils
- Scrap paper

Suggested lesson duration

Two hours (one hour for audit, one hour in class to report findings and problems observed).

* Relates to public schools only.



School water audit guide notes

These notes are designed to assist teachers by sharing knowledge gained by Sydney Water staff who have conducted water audits in schools.

Although the tasks on the worksheets are relatively simple, some clarification of terms is required, as well as a reminder of some mathematical basics and their application. It will also make the experience more meaningful for students if it is explained **why** they need to determine the different elements on the worksheets and given reference points to know whether results are acceptable or not. Lesson 4 will consider the actions that can be taken to deal with areas of water waste identified in the water audit.

General

Before beginning the school water audit, remind students of basic safety and hygiene practices, such as not running in wet areas, washing hands after visiting toilet areas etc. Students **MUST** be instructed not to test hot water taps.

It is also important to clarify for students which area they are investigating and that questions like ‘number of taps’ refer only to the specific area they are testing. Students should be reminded to turn all taps off properly during the audit.

Consider taking photographs or a video of the students doing the water audit to inform the rest of the school of what has been done.



■ Toilets

Toilets are investigated on the *Boys' Toilets, Girls' Toilets, and Staff Amenities* worksheets. If there are toilets that are used by students and staff it must be clarified which group will investigate them.

Number of toilets

Count the number of toilet stalls not the number of toilet blocks.

Type of toilet

Explain to students that a dual flush cistern uses less water than a single flush cistern because it gives people the option to use half the quantity of water.

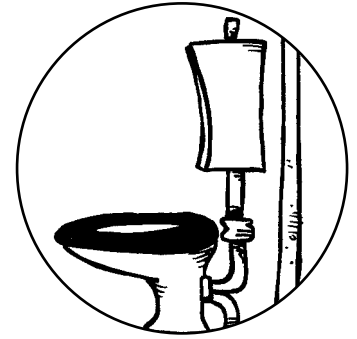
Estimated volume of toilet cistern

Firstly, explain to students that the cistern is the box at the back of the toilet that holds the water, which is used to flush the toilet.

Use a tape measure to measure length, width and breadth in centimetres. Tell students they **must** write down the three measurements and determine the final answer in the classroom later. This will enable you to check their results.

The multiplication should give you a figure of between 15,000 and 40,000 cubic centimetres. Divide this answer by one thousand to give you how many litres the cistern would roughly hold if full to the brim (1 litre = 1000 cm³). As cisterns are not filled to the brim, round down to the nearest multiple of five. Even this may give you an over estimate, because of the difference between the size of the entire cistern and the water held.

Where your measurements suggest cisterns hold 20 litres or more, the school should undertake some action to reduce water use in this area. This is only an estimate due to airspace between the top of the water level and the cistern lid.



■ Urinals

Urinals are investigated on the *Boys' Toilets* and *Staff Amenities* worksheets. If there are no urinals do not answer that section of the worksheet.

Number of urinals

Count the number of cisterns used to flush the urinal trough(s).

Type of urinal -

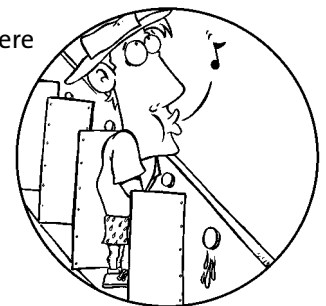
- 'Pull chain' – flushes a single cistern manually – usually the most water efficient.
- 'Motion sensor' – flushes automatically when someone uses them.
- 'Continuous flush and fill' – runs day and night filling the cisterns and flushing the water.

Estimated volume of urinal cistern

Instructions for determining cistern volume are the same as for toilets. Ensure students measure cisterns and not troughs.

Number of leaking/running urinals

Count per cistern not per water outlet.



■ Hand basin and sink taps

Hand basin and sink taps are tested on the *Boys' Toilets*, *Girls' Toilets*, and *Staff Amenities* and the *Classroom* and *Canteen* worksheets.

Number of taps

Count the number of taps in hand basins only. Any cleaning tap on the wall should be listed separately.

Average tap flow rate

To determine the average flow rate you will need to test at least three taps but the more taps you test the more accurate your water audit will be.

Extra measurements may be written on a piece of scrap paper. There is space for three measurements on the worksheet.

First determine the flow rate of each tap using the 1 litre jug and the stopwatch. Have one person operating the stop watch and another person turning on the tap. Turn the tap on full and start the stopwatch as the jug is placed under the running water. Students must communicate to do this effectively. Measure how long it takes to fill the 1 litre jug. This will give you a reading of 1 litre per the number of seconds as shown on the stopwatch. Round the results to the nearest second.

To ensure consistency of measurement across all taps they must be turned on full during the test. (If the tap rate is very fast the water will splash out making it very difficult to measure. If you can fit a bucket under the tap you can use the method described below for testing outdoor and cleaning taps. If you cannot do this it should be assumed that the tap is running too fast and action should be taken to reduce the flow rate).

You should check at least three taps in a bank of taps. They should all have a similar flow rate. It should be noted on the problem section of the worksheet if one tap in a bank of taps is running much faster than the others.

Return to the classroom to convert all your measurements to litres per minute. Calculate the average flow rate by adding the results together and dividing by the number of taps tested. An average flow rate for water-efficient taps used indoors is 6 litres per minute. Action should be taken to reduce flow of taps which run at more than 10 litres per minute.

Compare and discuss the different tap flow rates from different parts of the school.

Number of leaking/dripping taps

There are two types of leaking taps, those that are broken or stiff and those that have been left on by mistake. Note on the problems section of the worksheet if either of these problems exists and specify the cause of the leak.



■ Cleaning taps

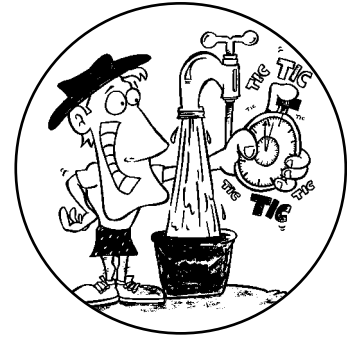
Cleaning taps are tested on the *Boys' Toilets* and *Girls' Toilets* worksheets.

Number of taps

Count the taps in the toilet areas, which are not over the hand basins.

Type of tap

A vandal proof tap has a removable handle and is designed to prevent the unauthorised use of the tap. It does not prevent damage to the actual tap.



Average tap flow rate

Determine the flow rate of one cleaning tap using the bucket, stopwatch and the measuring jug. One person should hold the bucket under the tap. Another person should turn on the tap at the same moment as the stopwatch is started. Fill the bucket for five seconds. To ensure consistency of measurement across all taps in the school they must be turned on full during the tests. Use the measuring jug to determine how much water is in the bucket. If possible measure the water near a garden and water the plants as you measure, rather than pouring the water down the drain. If the bucket is very full do not attempt to carry it outside.

Return to the classroom to convert all your measurements into litres per minute so you can compare to other taps.

Cleaning taps generally have high flow rates, often running at over a litre per second as they need sufficient pressure for hosing. These taps SHOULD NOT be accessible to students.

Number of leaking/dripping taps

There are two types of leaking taps, those that are broken or stiff and those that have been left on by mistake. Note on the problems section of the worksheet if either of these problems exists and specify the cause of the leak.

■ Showers

Showers are tested on the *Staff Amenities* worksheet.

Number of showers

Count the number of showerheads installed.

Flow rate

DO NOT TEST HOT WATER

To determine the flow rate of a shower use the bucket, stopwatch and the measuring jug. One person should hold the bucket under the shower. Another person should turn on the cold water in the shower at the same moment as the stopwatch is started. Students should hold the bucket as close to the showerhead as possible so they will not get wet. Fill the bucket for five seconds. To ensure consistency of measurement across all showers they must be turned on full during the tests. Use the measuring jug to determine how much water is in the bucket. If possible measure the water near a garden and water the plants as you measure, rather than pouring the water down the drain. If the bucket is very full do not attempt to carry it outside.

Return to the classroom to convert all your measurements into litres per minute. A water-efficient showerhead uses 9 litres of water per minute or less.



■ Bubblers

Bubblers are investigated on the *Bubblers and Outdoor Taps* worksheet.

Number of bubblers

Count all individual bubblers around the school.

Type of bubbler

- Spring-loaded bubbler - you turn the handle to turn the water on and it springs back, turning the water off when you let go.
- Push button - turns itself off but has a button rather than a handle.
- Other - refers to any bubbler that you need to physically turn off.

Number of leaking and dripping bubblers

These may be broken or they may be left on, or for spring loaded or push button taps they may be stuck. Students should note on the problem section of the worksheet whether they are leaking due to being left on by accident or whether they are broken.



■ Outdoor Taps

Outdoor taps are measured on the *Bubblers and Outdoor Taps* worksheet.

Outdoor taps are often very accessible and can result in high usage if the school is used as a thoroughfare after hours. Large amounts of water can be wasted as these taps often have high flow rates. If the school is easily accessible after hours, vandal proof taps should be installed to prevent unauthorised persons from using the taps.

Number of outdoor taps

Count all outdoor taps. Advise students of the existence of any vandal proof taps and make sure they include them in the audit. If you have any vandal proof taps, make arrangements for the students to have access to the tap “key” during the audit.

Average tap flow rate

To determine the average flow rate you will need to test at least three taps but the more taps you test the more accurate your water audit will be.

First determine the flow rate of each tap using the bucket, stopwatch and the measuring jug. One person should hold the bucket under the tap. Another person should turn on the tap at the same moment as the stopwatch is started. Fill the bucket for five seconds. To ensure consistency of measurement across all taps they must be turned on full during the tests. Use the measuring jug to determine how much water is in the bucket. If possible measure the water near a garden and water the plants as you measure, rather than pouring the water down the drain. If the bucket is very full do not attempt to carry it outside.

Return to the classroom to convert all your measurements into litres per minute. Calculate the average flow rate by adding the results together and dividing by the number of taps tested.

Outdoor taps generally have high flow rates, often over a litre per second. Discuss with the students whether they think the high tap flow is necessary – reasons include high pressure hosing and watering systems.

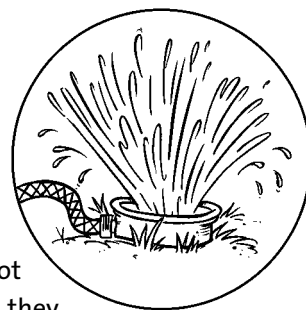


■ Outdoor irrigation

Teacher to collect information and share with students after they have finished their audit.

Are the majority of plants native or exotic?

Explain what the terms mean as some students may think the word exotic means from a tropical island rather than being the opposite to native. It should also be noted that not all native plants are water efficient and that not all exotic plants require extra water. Local native plants are recommended as they are accustomed to local conditions. Where new gardens are being planted investigate the water needs of the plants and ensure gardens are properly mulched.



How are the gardens watered?

The large grounds at a school can make watering with a hand held hose difficult and time consuming but sprinklers can be forgotten and remain on long after the plants have enough water. A tap timer may be used to turn off sprinklers after a specified time. If an automatic watering system is used it is important that plants with particular watering needs are grouped together and watered appropriately. It is also important that automatic watering systems can be adjusted to take into account daily conditions so they do not come on if it is raining. Students should consider whether the installation of a rainwater tank will be of benefit to the school for irrigation.

What parts of the ground are watered regularly?

This question is intended to make the students consider the watering needs of different parts of their school.

How often are they watered?

It is important to know whether grounds are watered daily, weekly or occasionally. Plants can be trained to use less water by gradually reducing the frequency and duration of watering.

What time of day are they watered?

Plants watered in the early morning or the late afternoon will require less water than if watered in the middle of the day, due to evaporation. Plants watered in the middle of the day can also suffer leaf burn as water sitting on the leaves can magnify the impact of the sun's rays browning the leaves.

■ Cleaning

Teacher to find out information and share with students after they finish their audit.

How often are the toilets cleaned?

While toilets should be cleaned every day they may not necessarily need to be hosed every day. Where possible a broom or mop should be used in preference to a hose. Cleaners should be asked not to leave taps running when cleaning hand basins.



How many times a week are the amenities blocks hosed out?

Only the toilet areas should be hosed and only when necessary for health reasons. Hosing should not be done as a matter of course if it is not required.

Hard surfaces other than toilets should not be hosed except in exceptional circumstances. Where possible use a broom or a mop. A blower vac is an affordable option for cleaning playground areas.

School Water Audit - Boys' Toilets worksheet

List of equipment

1 x 1 litre measuring jug, 1 x bucket, 1 x stopwatch, 1 x measuring tape, scrap paper.

Toilets

Count the number of toilets _____

Type of toilet single flush dual flush

Estimated volume of toilet cistern length _____ cm X breadth _____ cm X height _____ cm = _____ cm³
÷ 1,000 = _____ litres (1,000 cm³ = 1 litre)

Count the number of leaking/running toilets _____

Urinals

Count the number of urinals _____

Type of urinal pull chain motion sensor continuous flush and fill

Estimated volume of urinal cistern length _____ cm X breadth _____ cm X height _____ cm = _____ cm³
÷ 1,000 = _____ litres (1,000 cm³ = 1 litre)

Count the number of leaking/running urinals _____

Hand basins

Count the number of taps _____

What is the average tap flow rate
(Test at least 3 taps) _____ litres in _____ seconds
_____ litres in _____ seconds
_____ litres in _____ seconds

Average tap flow rate
_____ litres in one minute

Count the number of leaking/dripping taps _____

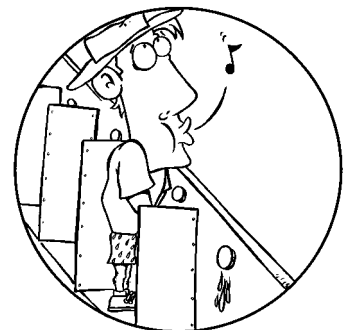
Cleaning taps

Count the number of taps _____

Type of tap vandal proof other

What is the tap flow rate _____ litres in _____ seconds

Count the number of leaking/dripping taps _____



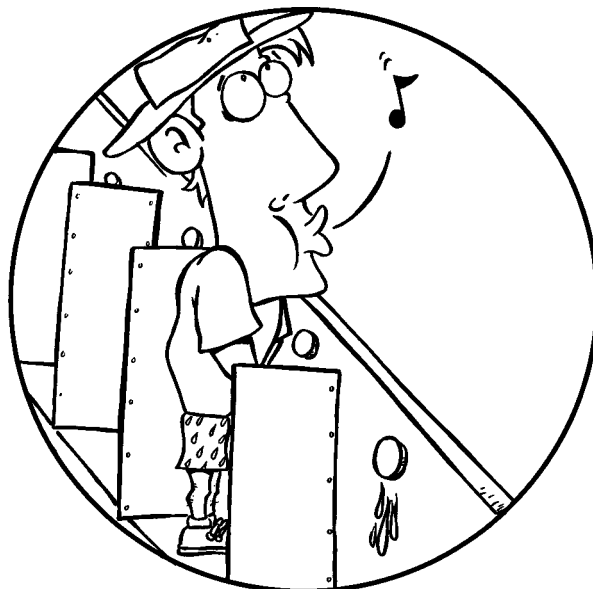
School Water Audit - Boys' Toilets worksheet

(continued)

Problems observed

List the problems observed (e.g. leaking taps) and suggest solutions

| Problem | Solution |
|---------|-------------|
| | <hr/> <hr/> |
| | <hr/> <hr/> |
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| | <hr/> <hr/> |



School Water Audit - Girls' Toilets worksheet

List of equipment

1 x 1 litre measuring jug, 1 x bucket, 1 x stopwatch, 1 x measuring tape, scrap paper.

Toilets

Count the number of toilets _____

Type of toilet single flush dual flush

Estimated volume of toilet cistern length ____ cm X breadth ____ cm X height ____ cm = ____ cm³
 ÷ 1,000 = ____ litres (1,000 cm³ = 1 litre)

Count the number of leaking/running toilets _____

Hand basins

Count the number of taps _____

What is the average tap flow rate
 (Test at least 3 taps) _____ litres in ____ seconds
 _____ litres in ____ seconds
 _____ litres in ____ seconds

Average tap flow rate
 _____ litres in one minute

Count the number of leaking/dripping taps _____

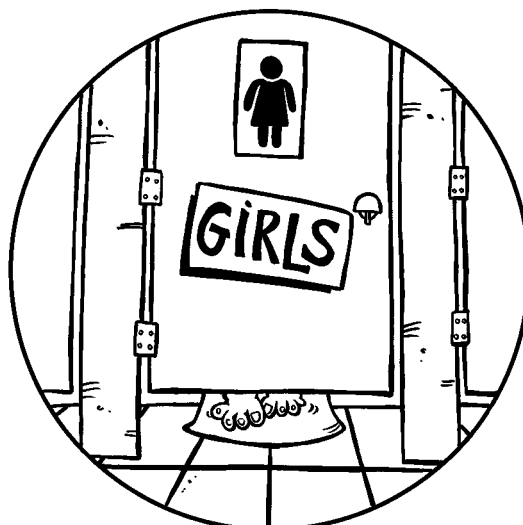
Cleaning taps

Count the number of taps _____

Type of tap vandal proof other

What is the tap flow rate _____ litres in ____ seconds

Count the number of leaking/dripping taps _____



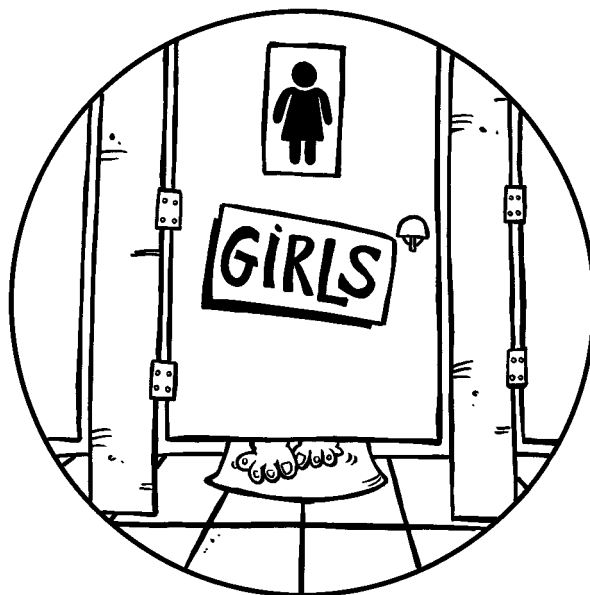
School Water Audit - Girls' Toilets worksheet

(continued)

Problems observed

List the problems observed (e.g. leaking taps) and suggest solutions

| Problem | Solution |
|---------|-------------|
| | <hr/> <hr/> |
| | <hr/> <hr/> |
| | <hr/> <hr/> |
| | <hr/> <hr/> |
| | <hr/> <hr/> |



School Water Audit - Staff Amenities worksheet

DO NOT TEST ANY HOT WATER TAPS

List of equipment

1 x 1 litre measuring jug, 1 x bucket, 1 x stopwatch, 1 x measuring tape, scrap paper.

Toilets

Count the number of toilets _____

Type of toilet single flush dual flush

Estimated volume of toilet cistern length _____ cm X breadth _____ cm X height _____ cm = _____ cm³
 ÷ 1,000 = _____ litres (1,000 cm³ = 1 litre)

Count the number of leaking/running toilets _____

Urinals

Count the number of urinals _____

Type of urinal pull chain motion sensor continuous flush and fill

Estimated volume of urinal cistern length _____ cm X breadth _____ cm X height _____ cm = _____ cm³
 ÷ 1,000 = _____ litres (1,000 cm³ = 1 litre)

Count the number of leaking/running urinals _____

Hand basins and staffroom sinks

Count the number of taps _____

What is the average tap flow rate
 (Test at least 3 taps) _____ litres in _____ seconds
 _____ litres in _____ seconds
 _____ litres in _____ seconds

Average tap flow rate
 _____ litres in one minute

Count the number of leaking/dripping taps _____

Staff showers (if applicable)

Count the number of showerheads _____

What is the shower flow rate
 _____ litres in _____ seconds

Count the number of leaking/dripping showers _____



School Water Audit - Staff Amenities worksheet

(continued)

Problems observed

List the problems observed (e.g. leaking taps) and suggest solutions

| Problem | Solution |
|---------|-------------|
| | <hr/> <hr/> |
| | <hr/> <hr/> |
| | <hr/> <hr/> |
| | <hr/> <hr/> |
| | <hr/> <hr/> |



School Water Audit - Classroom and Canteen worksheet

DO NOT TEST ANY HOT WATER TAPS

List of equipment

1 x 1 litre measuring jug, 1 x bucket, 1 x stopwatch, scrap paper.

Classroom taps

Count the number of taps _____

What is the average tap flow rate
(Test at least 3 taps)

_____ litres in _____ seconds
 _____ litres in _____ seconds
 _____ litres in _____ seconds

Average tap flow rate
 _____ litres in one minute

Count the number of leaking/dripping taps _____

Canteen taps

Count the number of taps _____

What is the average tap flow rate
(Test at least 3 taps)

_____ litres in _____ seconds
 _____ litres in _____ seconds
 _____ litres in _____ seconds

Average tap flow rate
 _____ litres in one minute

Count the number of leaking/dripping taps _____



Problems observed

List problems observed (e.g. leaking taps) and suggest solutions

| Problem | Solution |
|---------|----------------|
| | _____ _____ |
| | _____ _____ |
| | _____ _____ |
| | _____ _____ |
| | _____ _____ |

School Water Audit - Outdoor Irrigation System and Cleaning worksheet

(NOTE: Teacher to collect this information for post-audit discussion)

Outdoor irrigation

Are the majority of plants native or exotic?

native

exotic

How are the gardens watered?

hose

portable sprinkler

automatic sprinkler system

What part of the grounds are watered regularly? _____

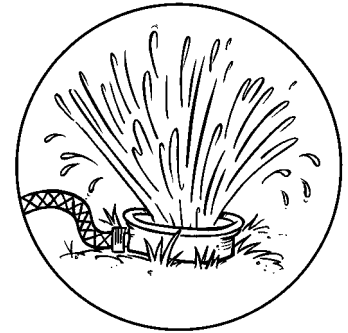
How often are they watered? _____

What time of the day are they watered? _____

Cleaning

How often are the toilets cleaned? _____

How many times a week are the amenities blocks hosed out? _____



Problems observed

List problems observed (e.g. leaking taps) and suggest solutions

| Problem | Solution |
|---------|----------------|
| | _____ _____ |
| | _____ _____ |
| | _____ _____ |
| | _____ _____ |
| | _____ _____ |



OUR PLAN TO REDUCE WATER USE

Lesson 4

OUR PLAN TO REDUCE WATER USE

Teaching and learning activities

Ensure that the class water action plan is linked to broader school resource management processes such as developing School Environmental Management Plans (SEMPs)*. The class plan could be amalgamated with other class plans to form a school water action plan.

The class will develop their water action plan to reduce water consumption based on information from two main sources:

- water meter readings (Lesson 2)
- observations from the school water audit (Lesson 3).

In class discussion, using the *Water Action Plan* worksheet, students consider the problems from their audit worksheets and determine where water can be saved in the school. (Refer to the *Guide to saving water at school*.) Prioritise the actions based on urgency and importance in reducing water consumption. Students should consider the consequences of not doing the actions in order to help determine priorities. The plan should also include a timeframe for actions, funds (if required), and responsibilities.

The class submits the draft water action plan for review (e.g. by Principal, School Environment Committee) and if necessary amends prior to Lesson 5.

* Relates to public schools only.



NSW Syllabus outcomes and indicators

SCIENCE AND TECHNOLOGY

INVS 3.7 Conducts their own investigations and makes judgements based on the results of observing, questioning, planning, predicting, testing, collecting, recording and analysing data, and drawing conclusions.

- Analyses data to identify environmental issues.
- Draws conclusions to investigations.
- Makes judgements on solutions to environmental issues.

BES3.1 Creates and evaluates built environments, demonstrating consideration of sustainability and aesthetic, cultural, safety, and functional issues.

- Plans actions to improve sustainability of school's water use.

Objectives of the NSW Environmental Education Policy for Schools *

Students will develop knowledge and understandings about the principles of ecologically sustainable development (K4).

Students will develop skills in:

- Identifying and assessing environmental problems (S2).
- Resolving environmental problems (S4).

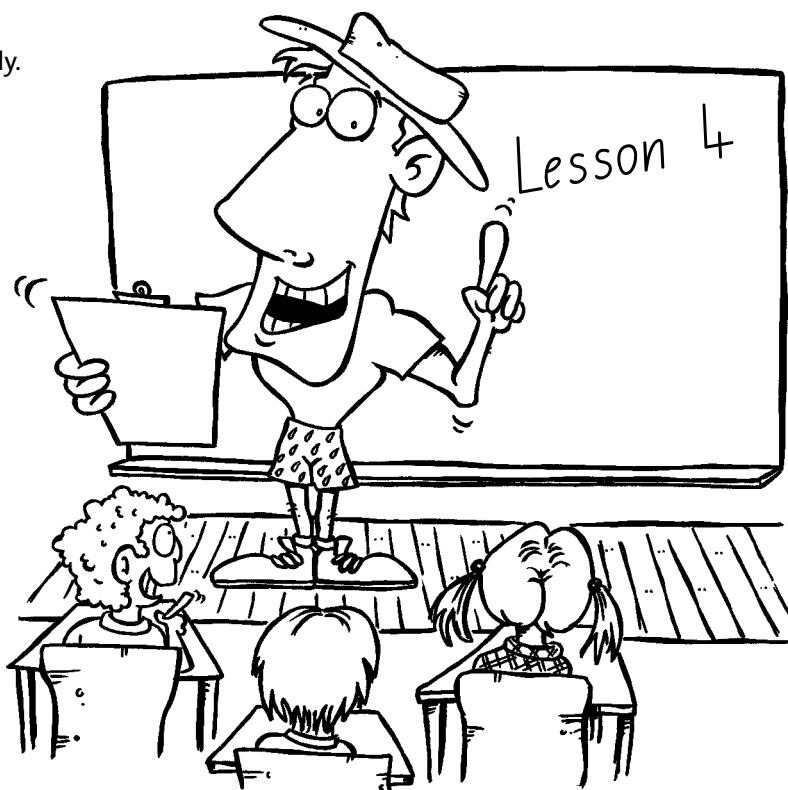
Resources required

- *Guide to saving water at school* (page 38)
- *Water Action Plan* worksheet (page 41)

Suggested lesson duration

Two hours.

*Relates to public schools only.



Guide to saving water at school

Below is a list of actions to solve possible water use problems that are identified by reading the water meter and conducting the school water audit.

1. Reading the water meter

| Possible problems | Possible actions |
|-------------------------|--|
| Watering school grounds | <ul style="list-style-type: none"> ■ Ask General Assistant to water less if possible. ■ Water in early morning or late afternoon. ■ Turn off sprinklers after effective watering or use a tap timer. ■ Work out the watering needs of different parts of the school, and water appropriately. ■ Improve watering system e.g. drip irrigation system, install timer. ■ Install a rainwater tank to use on the gardens. ■ Mulch gardens to retain the moisture in the soil. ■ Plant local native plants. |
| Water leak | <ul style="list-style-type: none"> ■ School calls a plumber to fix leaks. ■ Students develop a system to report leaks. |
| Cleaning | <ul style="list-style-type: none"> ■ Ask cleaners to sweep or mop instead of hosing where possible. ■ Cleaners hose toilet areas only and use a trigger nozzle on hoses. |
| Weekend use | <ul style="list-style-type: none"> ■ Ask weekend school users to minimise water consumption. Communicators to consider how to do this in lesson 5. ■ Install vandal proof taps. |
| Taps left running | <ul style="list-style-type: none"> ■ Class members and General Assistant to check and turn off taps where possible. ■ Educate other students to turn off taps. |

2. School water audit

| Possible problems | Possible actions |
|---|---|
| Amount of flush in toilets | <ul style="list-style-type: none"> ■ Install cistern weights to reduce flush or adjust valve to reduce flush. ■ Replace cisterns with modern dual flush cisterns. ■ Connect toilets to a rainwater tank. |
| Leaking toilets (e.g. water leaking out of the cistern and into the bowl) | <ul style="list-style-type: none"> ■ School calls plumber to fix leak(s). ■ Students report leaks. |
| Amount of flush in urinals | <ul style="list-style-type: none"> ■ Install cistern weights to reduce flush or adjust valve to reduce flush. ■ Replace motion sensor or continuous flush with pull chain cisterns. ■ Connect urinals to a rainwater tank. |
| Leaking taps | <ul style="list-style-type: none"> ■ Report leaking and dripping taps. ■ Hire a plumber to fix leaks. ■ Turn off taps. |
| Flow from taps | <ul style="list-style-type: none"> ■ Adjust single control valve under basin so less water flows through. ■ Install inline flow restrictors. (6 litres per minute) ■ Install tap aerators. (6 litres per minute) ■ Don't leave taps running when not in use. ■ Don't turn taps on full. ■ Use bucket or ice cream container to wash art materials rather than washing items under running water. ■ Replace high flow taps with water efficient models i.e. that flow at 6 litres per minute. |
| Cleaning taps | <ul style="list-style-type: none"> ■ Students not to use cleaning taps (install vandal proof taps). ■ Cleaner to use trigger nozzle on hose when cleaning. ■ Report leaking taps. |

2. School water audit (continued)

| Possible problems | Possible actions |
|-------------------------|---|
| Flow from showers | <ul style="list-style-type: none"> ■ Shower only long enough to get clean. ■ Turn off showers after use. ■ Install AAA-rated showerheads. |
| Leaking showers | <ul style="list-style-type: none"> ■ Report leaking and broken showers. ■ School calls a plumber to fix leaks. |
| Flow from bubblers | <ul style="list-style-type: none"> ■ Turn off bubblers when finished. ■ Replace manual bubblers with spring-loaded or push button models. |
| Leaking bubblers | <ul style="list-style-type: none"> ■ Report leaking or broken bubblers. ■ School calls a plumber to replace or fix leaking or broken bubblers. ■ Install lock boxes over bubbler trough to minimise vandalism. |
| Flow from outdoor taps | <ul style="list-style-type: none"> ■ Students should not use outdoor taps (install vandal-proof taps). ■ Install flow restrictors. |
| Leaking outdoor taps | <ul style="list-style-type: none"> ■ Report leaking or broken outdoor taps. ■ School calls a plumber to replace or fix leaking or broken outdoor taps. |
| Watering school grounds | <ul style="list-style-type: none"> ■ See 'Watering school grounds' under <i>Reading the Water Meter</i> (page 38). |
| Cleaning | <ul style="list-style-type: none"> ■ See 'Cleaning' under <i>Reading the Water Meter</i> (page 38). |

Water action plan

List the problems in water use that you have found. For each problem, list the actions you have chosen to solve the problem. For each action list responsibility (who will complete action), timeframe (when it will be done) and if there are any funds required. Number the actions in order of priority from most urgent and important to least urgent and important. See example below. A blank table is provided on the next page. Copy more pages if required.

| Priority | Problem | Actions | Responsibility | Time Frame | Funds |
|----------|------------------------------|--|---|---|---|
| 2 | Leaking bubblers | <ul style="list-style-type: none"> ■ Report leaking or broken bubblers ■ School to replace or fix leaking or broken bubblers | Students and teachers General Assistant | Ongoing As soon as possible after report | Nil Plumber's fees if required |
| 1 | Amount of flush from toilets | <ul style="list-style-type: none"> ■ Don't flush more than necessary ■ Replace cisterns with modern dual flush cisterns ■ Connect toilets to rainwater tank | Students and teachers Principal/General Assistant Principal/General Assistant | Ongoing Write into SEMP* and assess when possible Assess connection to rainwater tank in relation to qualification for rebate | Nil To be investigated To be investigated |
| | | | | | |

Water action plan

| Priority | Problem | Actions | Responsibility | Time Frame | Funds |
|----------|---------|---------|----------------|------------|-------|
| | | | | | |



PUTTING OUR PLAN INTO ACTION

Lesson 5

PUTTING OUR PLAN INTO ACTION

Teaching and learning activities

Divide the class (or classes) into three groups to put the plan into action. The three groups are:

- Implementers
- Communicators
- Evaluators

Each group meets and decides how they will help to put the plan into action. They can refer to the *Guide to putting the plan into action* for ideas.

The groups should allocate responsibilities to individuals or pairs. For example,

- Implementers - some students are responsible for reporting leaks, others for turning off taps.
- Communicators - some students promote actions identified in the plan. This can be done through presentations to school assembly, writing reports for the school newsletter and web site. Students should be encouraged to come up with ideas.
- Evaluators - some students read the water meters. Meter reading should be done weekly to determine when the school has reached their water saving target. Use *Our Weekly Water Use* worksheet (page 15) to record weekly meter readings. Other students conduct a survey on whether the plan is working.

In upcoming weeks report on and coordinate the progress of each group through water action plan meetings.

When the water savings required by Sydney Water for the Rainwater Tanks in Schools Rebate have been made, the school can apply for eligibility at www.sydneywater.com.au (see details in *Information required to apply for rebate eligibility* (page 48)).

Encourage the class to continue implementing the plan after applying for the Rainwater Tanks in Schools Rebate to ensure that water savings are sustained.



NSW Syllabus outcomes and indicators

SCIENCE AND TECHNOLOGY

BES3.1 Creates and evaluates built environments, demonstrating consideration of sustainability and aesthetic, cultural, safety, and functional issues.

- Implements actions to improve sustainability of the school's water use.
- Evaluates the success of an action plan related to managing the school.

UTS3.9 Evaluates, selects and uses a range of equipment, computer-based technology and other resources to meet the requirements and constraints of investigation and design tasks.

- Selects appropriate technology to communicate environmental messages.
- Uses and evaluates technology to communicate environmental messages to different audiences.

Objectives of the NSW Environmental Education Policy for Schools*

Students will develop skills in:

- Communicating environmental problems to others (S3).
- Adopting behaviours and practices that protect the environment (S5).
- Evaluating the success of their actions (S6).

Students will develop values and attitudes relating to a commitment to act for the environment by supporting long-term solutions to environmental problems (V3).

Resources required

- *Water Action Plan* (page 41)
- *Guide to putting the plan into action* (page 46)
- *Our Weekly Water Use* worksheet (page 15)

Suggested lesson duration

Two hours initially, then implementing the plan until the school qualifies for the Rainwater Tank Rebate.

*Relates to public schools only.



Guide to putting the plan into action

This provides the three groups – Implementers, Communicators and Evaluators – with some ways to put the plan into action.

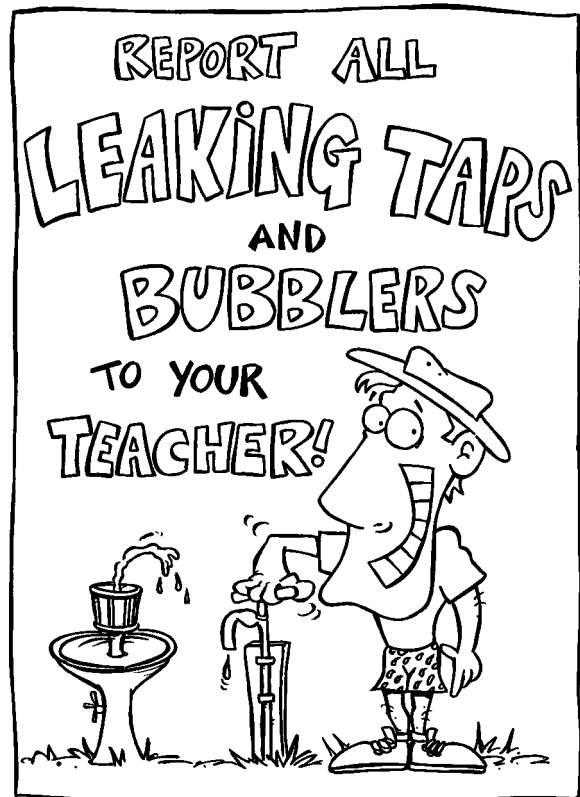
IMPLEMENTERS

- Show positive behaviour to other students e.g. turn off taps, only turn on taps to the flow needed.
- Set up a way to report leaking or broken taps, toilets, bubblers and showers.
- Talk to the Principal about making water devices more efficient e.g. install AAA-rated showerheads.
- Organise a working bee to plant local native plants and mulch gardens in school grounds.
- Organise buckets or ice cream containers for each classroom to reduce water use in art lessons.
- Check that taps are turned off at the end of recess and lunch and that showers are turned off after use on sports days.



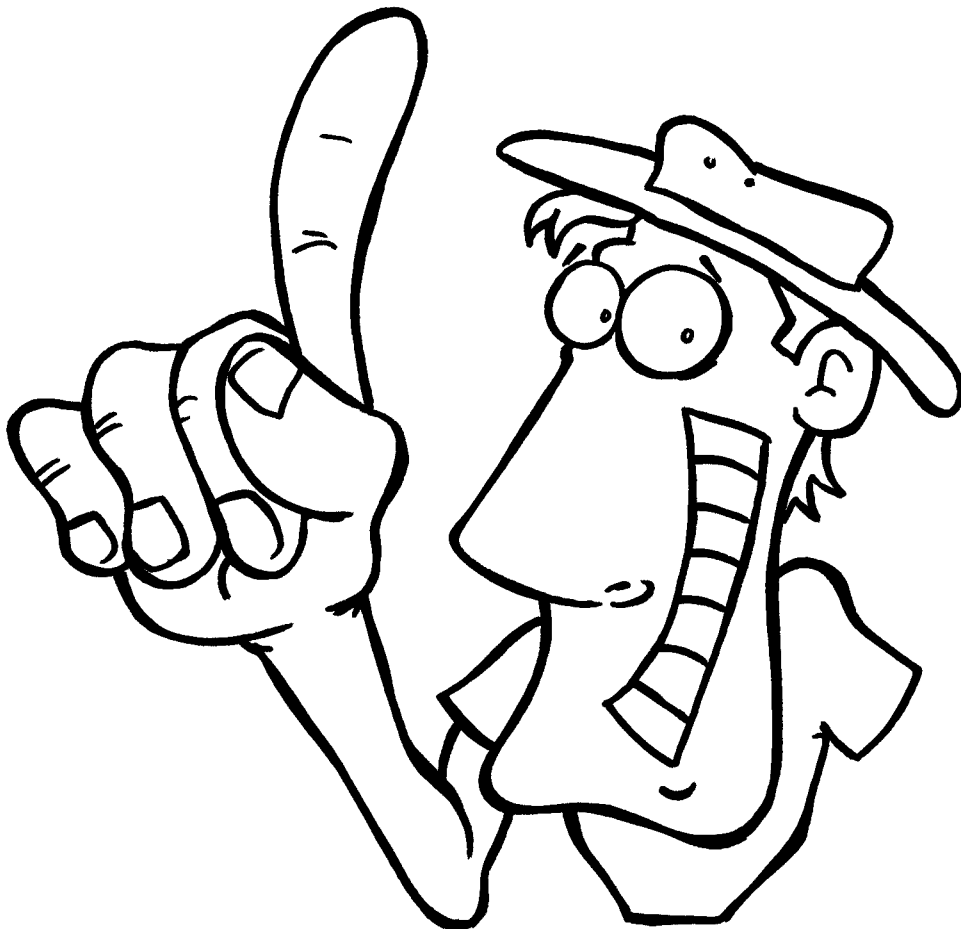
COMMUNICATORS

- Design and produce posters promoting appropriate behaviours e.g. turning off taps, using only enough water, reporting leaks. Locate posters in strategic parts of the school.
- Photograph students carrying out appropriate behaviours. Use the photographs in a report for the school newsletter or web site about implementing the water action plan.
- Present a message or water saving tip at the school assembly (e.g. use music, play).
- Write a submission to the Principal about installing better water saving devices in the school.
- Write a media release for the local media about the water action plan.
- Design and implement a PowerPoint presentation for a talk to the Parents and Citizens or a local community group about saving water.
- Produce a video on water conservation.
- Try to consider education methods which will be ongoing such as a weekly tip in the newsletter or weekly water report to school using data gathered by the Evaluators.



EVALUATORS

- Read the water meter on Monday morning and Friday afternoon each week and report to other groups any unusual water use.
- Track progress towards your water saving target over a month using *Our Weekly Water Use* worksheet (page 15). You may need to continue tracking until your school reaches the water saving target. Use the format in the *Information required to apply for rebate eligibility* (page 48). Report progress to other groups
- Survey other students on aspects of the plan e.g. their awareness of reasons for water saving actions, behaviours in saving water.
- Conduct a mini-water audit by re-inspecting the problem areas identified in Lesson 3 and check whether they are being fixed.
- Suggest changes to the action plan if progress is not being made.
- Discuss progress of action plan with Principal, Cleaners and General Assistant.



Information required to apply for rebate eligibility

To confirm your eligibility for the Rainwater Tank Rebate, visit www.sydneywater.com.au and complete the Rainwater Tanks in Schools Rebate Program Eligibility form on-line. You will require your school login and password and the information requested below.

Do not purchase or install your rainwater tank until you receive notification from Sydney Water that you are eligible for the rebate.

Water conservation program

Which water conservation education program did your school complete in the past two years?

- Rainwater Tanks in Schools
- every drop counts** in Schools
- Sustainable Schools
- Other (please specify) _____

Water efficiency initiatives implemented.

Below is a list of actions your school may have carried out to save water. Please tick those that your school has completed and provide a description. Please note it is not expected that a school complete all of these actions.

Taps

- Reduced flow in taps Description: _____

- Installed vandal proof taps Description: _____

- Fixed leaking taps Description: _____

- Replaced taps with water efficient model Description: _____

- Strategy in place to reduce water wastage through taps in the classroom (e.g. for washing paint brushes) Description: _____

- Other Description: _____

Toilets

- Fixed leaking toilets/urinals Description: _____

- Reduced toilet/urinal flush volume Description: _____

- Replaced toilets with water efficient model Description: _____

- Replaced urinals with water efficient model Description: _____

- Other Description: _____

Showers

- Reduced flow in existing showers Description: _____

- Fixed leaking showers Description: _____

- Replaced showers with water efficient model Description: _____

- Other Description: _____

Outdoors

- Mulched garden beds Description: _____

- Reduced irrigation Description: _____

- Cleaners use a mop, broom or blower vac rather than a hose where possible Description: _____

- Fixed leaking bubblers Description: _____

- Other Description: _____

General

- Water monitors check for water wastage in toilets, urinals, taps, showers and bubblers regularly Description: _____

- Water conservation education campaign at school Description: _____

- Water conservation education campaign for the community Description: _____

- Water monitors read the Sydney Water meter regularly and check consumption level Description: _____

- Other Description: _____

Date implementation complete ____/____/____

Water usage

There are two ways your school's water savings can be assessed. Please select one.

- Please assess my school's water savings based on the next two Sydney Water meter readings. (Please note Sydney Water normally undertakes meter readings quarterly which may delay the processing of your eligibility application).
- Please assess my school's water savings based on meter readings done by our school. If you choose this option, please provide your meter details and readings below.

How many Sydney Water meters does your school have? _____

When did you start recording the water usage? ____/____/____ (date of Monday morning week 1)

Please fill in the following table(s) by recording your school's meter reading data and calculated water consumption in kilolitres. This data should show that your school's water consumption has dropped to the target and remained at that level for one month. The month is of your own choosing. You may continue meter reading until you have one month at the target supplied by Sydney Water.

A guide to reading your water meter is available in Lesson 2 of the *Rainwater Tanks in Schools – every drop counts* Water Audit teaching resource.

| | Week 1 Date: | Week 2 Date: | Week 3 Date: | Week 4 Date: | Week 5 Date: |
|----------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Monday morning | | | | | |
| Friday afternoon | | | | | X |
| Water use during the week | | | | | X |
| Water use over the weekend | X | | | | |

How many students are currently enrolled at your school? _____

Is your school used after school hours during the week? yes no

If yes, what is it used for? _____

Is your school used over the weekend? yes no

If yes, what is it used for? _____



Rainwater Tanks in Schools – every drop counts Water Audit

Water is precious and local schools and communities can play a significant part in protecting water supplies for the future. It has been estimated that more than 1,500 million litres of water – or 1,500 Olympic swimming pools – can be saved each year if schools across Sydney become more water efficient.

A comprehensive teaching resource for Stage 3 students

The *Rainwater Tanks in Schools – every drop counts Water Audit* is a teaching resource developed and written specifically for Stage 3 students. It consists of five lesson plans, including a detailed water audit, in which students learn how precious water is and if it is being used efficiently at their school.

The resource guides teachers and students to use water audit results to develop, implement and evaluate a water management action plan. This plan will help schools reach the water conservation target required to qualify for Sydney Water's Rainwater Tanks in Schools Rebate Program.

A *Rainwater Tanks in Schools – every drop counts Water Audit* teaching resource is also available for Stage 4 students.

For more information about Rainwater Tanks in Schools or other Sydney Water education materials call **1800 724 650**, visit www.sydneywater.com.au or email education@sydneywater.com.au

This package is linked to the NSW School Curriculum.

