

H₂OME

A guide to permanent
water savings in your home



Department of Sustainability and Environment

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For more information please call 136 186
or visit www.ourwater.vic.gov.au

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Minister's foreword



The Government released *Our Water Our Future – The Next Stage of the Government's Water Plan* in June 2007, which announced that \$4.9 billion will be spent to provide the biggest boost to Victoria's water supplies in 25 years.

As well as these water supply initiatives, *The Next Stage of the Government's Water Plan* supports new and existing water conservation programs.

This new guide to permanent water savings in your home shows how water saving can be 'built in' to our lives.

The Guide is for people planning to build or buy a new home, renovate their home, or who simply want to make changes to save water where they live now.

The guide focuses on the decisions and choices we have when building, buying or extending a home. It shows how these choices can either help you save water, or potentially lock you into using more water than you need.

Introducing water efficiency at the design stage saves money, compared with retrofitting later.

And the guide shows it is possible to incorporate water efficiency without compromising liveability.

It brings together advice about a wide range of water conservation and alternative supply measures, so you can develop the best package of measures for your circumstances.

It will help all Victorians make water saving a way of life.

A handwritten signature in blue ink, appearing to read 'Tim Holding'.

Tim Holding
Minister for Water

Using less water, permanently

Water is essential to our everyday lives: we use it for drinking, washing and watering – the very basic human needs. Our communities thrive on it, our economy relies on it and our environment depends on it.

In Victoria, our water supplies are facing the growing challenges of climate change, which brings hotter weather, less rainfall and reduced streamflows, as well as an increasing population. This means less water for more people.

This guide is for Victorians who want to make saving water a permanent way of life.

It's for people planning to build or buy a new home, renovate their home, or who simply want to make changes to save water where they live now.





Building water saving into your new home

The Government now requires all new houses and apartments built in Victoria to include water saving measures such as water efficient showers and taps. Houses must also have either a rainwater tank, solar water heater or connection to recycled water.

These regulations spell out the minimum water saving measures to be built into new homes. But you can plan to do even more to save water. In the future, the Government will move to allow home builders to choose from a wider range of options and combine them in more flexible ways. These could include approaches such as using treated greywater for toilet flushing and rainwater for clothes washing.

Most new homes in Victoria have access to mains water supply. This guide outlines more efficient ways of using mains water, as well as alternative supplies like rainwater or recycled water.

Efficient water use is just as important for homes:

- without access to mains water, because of limited and/or uncertain supply
- without sewerage, because it reduces the cost and size of the systems needed to deal with wastewater.



Helping you choose to save water

This guide focuses on the decisions and choices people usually make when building, buying or extending a home, including

- whether to install a rainwater tank
- how to plan the kitchen and laundry
- whether to connect a hot water recirculator to the shower.

It shows how your choices can either help you save water, or potentially lock you into using more water than you need.

The regulations, products and practices described are current at the time of publication, but we recommend you consult the resources listed on page 26-27 for the latest information.

Where water goes at home

Most people use similar amounts of water for showering, washing clothes and flushing toilets. This indoor use of water stays the same all year round.

Outdoor uses like garden watering vary greatly because there are so many different sizes and types of gardens. Many homes have no gardens at all, although people living in flats often have outdoor plants on balconies.

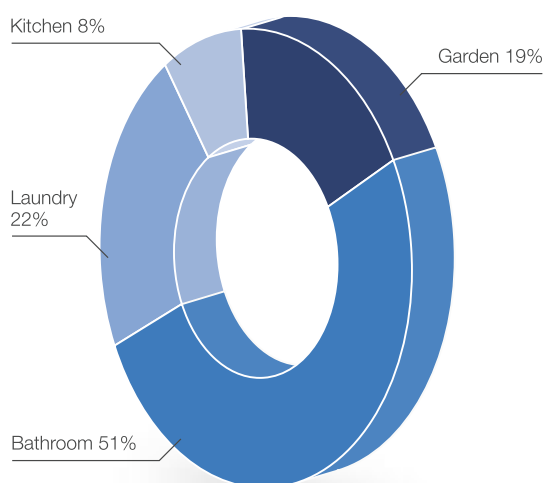
Some people water their gardens all year round while others rely more on natural rainfall. Outdoor water use is seasonal, peaking in the hotter and dryer months, and falling away in winter.

New homes approved since June 2004 must include a range of water saving measures, which means their indoor water use is lower than the average older home.

Even so, a family of four in a new house with a garden on a typical development site of 600 square metres, will buy and use nearly 240,000 litres (240 kilolitres, or kl) of water a year. This is enough to fill nearly five typical size swimming pools .



Figure 1 - Typical breakdown of water use in a new four person home with garden



This family will use around 50 per cent of their water in the bathroom, 22 per cent in the laundry, another 19 per cent in the garden and the final 8 per cent in the kitchen. And there is an energy cost as well because almost half the water they use is heated.



Using water inside the home

About 30 per cent of all indoor water and nearly 50 per cent of all hot water is used in showers.

Although new shower heads must be water efficient there is no real limit to the amount of water that people can use if they take long showers at full flow. It's essential to take shorter showers to save water.

Washing machines use the most water after showers.

Your choice of model and whether it is a top loader or front loader can make a big difference to how much water it uses, along with wash settings and whether you wash full or partial loads.

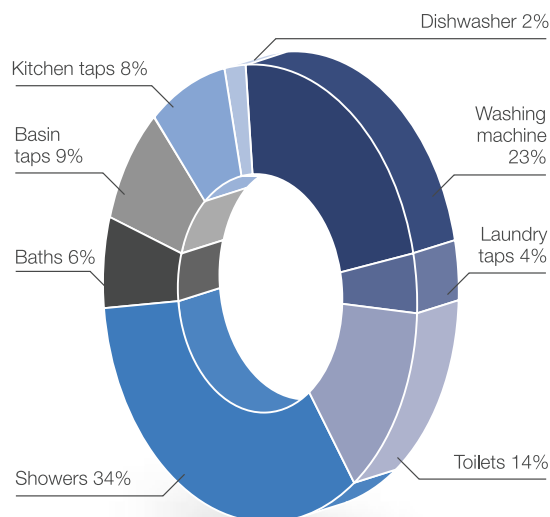
Toilet flushing uses the most bathroom water after showers, followed by hand basins and baths.

A bath generally uses up much more water than a shower, but these days many people take more showers than baths, except in households with young children.

The kitchen sink tap is turned on dozens of times every day for drinking, filling kettles and pots, food washing and preparation and washing up.

Many homes now have dishwashers that can use less water than washing up by hand when you program them efficiently.

Figure 2 - Typical breakdown of indoor water use in a new four person home with garden



Using water through the seasons

In the garden

The water it takes to maintain a garden depends on the:

- total area of lawn, which is usually the most water-intensive form of planting
- total area planted with indigenous or drought resistant plants
- soil characteristics
- local climate, especially temperature and rainfall
- extent of shading by trees, buildings or other structures.

How much water people choose to use on their gardens depends as much on their preferences as what the garden realistically needs.

Some people let lawns dry out slightly in summer, while others want green lawns all year round. Also people may be more inclined to water if they have a rainwater tank, recycled water supply or can use greywater from the laundry.

Watering systems like sprinklers or drippers can be more efficient than hand watering, or else very wasteful, depending on how they are designed and controlled.

When you are planning your watering system it is important to be aware of current water restrictions in Victoria. You can do this by contacting your local water business or the DSE Customer Service Call Centre on 136 186, email ourwater@dse.vic.gov.au or visit www.ourwater.vic.gov.au



Swimming pools and spas

How water restrictions affect the filling of pools and spas

We recommend that you check the current level of water restrictions that apply across Victoria when you are considering installing a pool or spa. You can check current water restrictions at www.ourwater.vic.gov.au or by calling your local water business or the DSE Customer Service Centre on 136 186.

Swimming pools and spa pools use up large volumes of water.

Swimming pools are rarely emptied completely after they are first filled, but they lose water through evaporation and have to be topped up regularly in hot weather. Water is also lost to the drain during filter cleaning and backwashing.

A 50 kl swimming pool in Melbourne may need 20 to 30 kl of top-up water in a typical year. This is as much as the average new home uses for toilet flushing each year. In hotter parts of Victoria the pool can lose its full volume of water each year.

Stand-alone spa pools are becoming popular for smaller backyards. Their average volume is less than 4 kl, with some ranging up to 20 kl with swim jets.

Although spa pools generally lose very little water to evaporation, many are regularly emptied and refilled.

Research shows that Victorians refill their spa pools an average 7.5 times per year, which suggests an annual water demand of 28 kl per year, comparable to a full size swimming pool.

Many homes also have spa tubs in the bathroom. These tend to be much bigger than standard bathtubs with a volume of up to 1,000 litres, compared with 120 to 150 litres for a bath.

Bathroom spas are emptied after each use, so their water consumption depends on how often they are used. If you plan to use a bath often, especially for young children, it's worth considering the water demand of a normal bath compared with a spa bath.

Evaporative coolers

In many parts of Victoria a well-designed home will stay cool with good orientation, window shading and natural ventilation or ceiling fans.

For homes that do need cooling there is a choice between refrigerative air conditioning and evaporative cooling. Air conditioners tend to use more energy but do not need water to run.

Evaporative coolers cool the air by passing it through water-saturated filters. They work best in hot, dry conditions when humidity is low.

They have a reservoir or sump which needs to be refilled as water evaporates, and as it is 'bled off' to maintain water quality. The sump is emptied completely at the end of operating cycles, which can last for several days.

The amount of water evaporative coolers use depends on the unit's size and how long it operates. The typical cooling water used over a Victorian summer is about 10 kl, but it can be far higher in the state's north.

The amount of water bled off from the reservoir varies widely depending on the water management system's design. Typical water use for reservoir management is about 8 kl per year, but some designs use much less.



How to use less water

You can use water more efficiently in your home by planning for low water use, buying and installing water smart fittings and appliances, and considering alternative water supplies for toilet flushing and garden watering.

Planning ahead for new homes

When you are planning for low water use, some decisions are easy to make when you build your home but hard to reverse later.

You can plan for smarter water use in a renovated or existing home.

All new homes, including flats, must have water efficient showers and taps to comply with Victoria's 5 Star building standard.

New houses or townhouses (Class 1 dwellings) must also have one of these features:

- a rainwater tank
- a solar water heater or
- be connected to a supply of recycled water provided by a water authority.



The 5 Star standard also includes requirements for the building fabric thermal performance. Go to www.buildingcommission.com.au for more information.

Rainwater tanks

If you choose a rainwater tank it must have a storage volume of at least 2,000 litres and drain a roof area of at least 50 square metres. It must also be connected to all the toilet cisterns in the house, with special valves so that if the tank supply runs out the toilets will be flushed with mains water.

Solar hot water

Where a solar water heater system is the chosen compliance option and a reticulated gas supply is available for connection to the building, the system must be a gas boosted solar water heater.

Recycled water

Many new subdivisions are now connected to recycled water. You can check whether a house already has a recycled water supply by looking for a separate meter and special outdoor taps, all coloured purple, or by contacting the local water authority.

Smarter water saving

You can do even more to save water and cut energy costs and greenhouse gas emissions by:

- installing both a solar water heater and a rainwater tank or connecting to a recycled water supply
- installing a rainwater tank larger than 2,000 litres to use rainwater for garden watering, clothes washing and toilet flushing. You will probably need to drain a larger roof area than the minimum 50 square metres to keep a bigger rainwater tank topped up
- planning the layout of your home so the water heater is closer to where hot water is used, and wasting less water before the tap or shower runs hot. If your bathroom is a long way from the main water heater, consider installing a separate bathroom water heater or a hot water recirculation system (see page 12-13).

Buying and installing water smart fittings and appliances

Showers, baths and taps

Low flow showers

Homes with mains water

All shower heads installed in new homes with a mains water supply must have a flow rate between 7.5 and 9 litres per minute under standard test conditions.¹

This corresponds to the 3 stars on the new Water Rating label.

The Water Rating of every shower head is usually labelled on the product, printed on its packaging or displayed at the point of sale. You can check the rating of models at www.waterrating.gov.au. No shower heads currently have a rating of more than 3 stars.

Homes without mains water

Several shower heads with 2 star ratings and unrated models which carry Water Warning labels can be legally installed in existing homes and new homes without mains supply, where tank water pressure is usually low.



¹The test conditions are set out in Australian and New Zealand Standard AS/NZS 6400:2005 *Water efficient products - Rating and labelling*

Water Efficiency Labelling and Standards (WELS) Scheme

The national Water Efficiency Labelling and Standards (WELS) scheme applies mandatory water efficiency labelling and minimum performance standards to household water-using products.

WELS Water Rating label

The WELS Water Rating label is mandatory across Australia for showers, clothes washing machines, dishwashers, toilet equipment, urinal equipment and tap equipment.



The WELS Water Rating label includes:

- A star rating that gives a quick comparative assessment of the model's water efficiency
- A water consumption figure that provides an estimate of the water consumption of the product based on its tested water consumption

Labels display from 1 to 6 stars, with more stars meaning the product is more water efficient. Some products may also be labelled with a 'Zero Star Rated' label, which indicates that the product is either not water efficient or does not meet basic performance requirements.

Minimum Water Efficiency Standards

WELS also applies minimum mandatory water-efficiency standards to some products. Currently minimum water efficiency standards are specified for toilet equipment.

For more information visit www.waterrating.gov.au



Wasting water while the temperature rises

When you turn on a hot tap there is often a delay before the water reaches an acceptable temperature. The delay varies with the type of water heater, the distance to the outlet and the pattern of drawoffs, but it's usually from 15 seconds to three minutes.

When water flows from a cold pipe start at a rate of 8 litres per minute, between 2 and 24 litres is lost in this delay.

People either let the sub-temperature water run to waste, especially for showers, or accept it when filling baths and sinks. Dishwashers and washing machine will accept the colder water, but may use their heaters to raise the temperature.

A family of four with water efficient fittings can lose from 10 to 20 kl of water this way each year, comparable to the 20 kilolitres they are likely to use in the kitchen for a year.

Avoiding water waste

You can cut waiting time and water loss by installing products that use these methods:

- circulating hot water by pumping or natural thermosyphon action during peak periods of water use in the morning and night. Hot water flows past every hot tap and there is no waiting time when it is turned on. The circulating pump is controlled by a time clock and temperature switch so that if water in the loop is hot from a recent drawoff, the pump stops operating.
- 'conscious' or 'on-demand' pump circulation where you press a button on a control panel next to the shower or tap to start a pump and wait for a light that shows hot water is available at the tap. In the meantime the pump circulates water by a return loop through the water heater to bring it up to temperature. If the water is still hot from the last use, the light comes on immediately and the pump is not needed.
- automatic diversion of sub-temperature water into the cold water supply, so water only comes out of the hot tap when it reaches the desired temperature. The diverted water can go back into the mains cold supply if the system allows it, or to flexible bladders or a rainwater tank. Some designs work by differences in pressure while others require pumps.

'On demand' and automatic diversion methods produce water savings with the lowest energy costs.

Several manufacturers offer on demand recirculators designed to work with the electronic controls of their gas water heaters. These add about \$800 to the initial cost if they are installed when you are building your home.

Taps

All taps installed in the bathrooms, kitchen and laundry of a new home with a mains water supply must have a flow rate of between 7.5 and 9 litres per minute.

This corresponds to 3 stars on the new Water Rating label.

The Water Rating of every tap is usually labelled on the tap, printed on its packaging or displayed at the point of sale. You can check the rating of all models at www.waterrating.gov.au

Although there are many taps with star ratings above 3, keep in mind that:

- the lower flow rate is no advantage for taps used to fill basins, sinks or baths because they use the same volume of water and it simply takes longer to fill
- very low flow rates may not activate some instantaneous gas water heaters and you may not get any hot water from the tap. This is not such a problem if you plan to have a storage water heater.

Baths

If you plan to use a bath every day for yourself or your children, a standard bathtub will need less water for bathing depth than a spa bath.

How you fill the tub affects how much water you use. Many people use trial and error to balance hot and cold and often have to add more water than they need to get the temperature right.

Some water heaters have electronic controllers with a 'bath fill' function, which you can program to deliver, say 120 litres at 42°C. This fills the bath exactly to the right temperature and then stops automatically to prevent overflow.

Water heaters

The two main kinds of water heater are:

- the storage heater which keeps a tank full of water heated ready for use at any time
- the 'instantaneous' or 'continuous flow' heater which only heats water as it's needed.



Electric water heaters are usually storage heaters with tanks ranging from 50 to 400 litres. Some small instantaneous electric units heat water on demand for a single sink or basin, but cannot supply general hot water to the whole house.

You can get gas water heaters in both storage and instantaneous types.

Solar water heaters with electric boosting have a storage tank usually located on the roof next to the solar collectors or at ground level. Electric heat pump water heaters are also of the storage type.

Where solar water heaters are boosted by gas, the booster is either an instantaneous gas water heater or a gas storage heater, in which case there may be two storage tanks in the system.

Choosing your water heater

In Victoria water heaters are the second highest home energy users after space heating, so it's important to think carefully about how much energy each heater uses.

Your choice of water heater also affects water use.

Storage water heaters supply water at any flow rate and water pressure you want, no matter how low. In contrast, instantaneous water heaters need minimum flow rates and pressures.

When you're selecting a heater consider that:

- the amount of water wasted while the hot water gets from the water heater to the shower or tap depends on the distance from the water heater to the outlet
- some instantaneous water heaters are designed for 'rapid start' to minimise water loss while water is reaching the desired temperature, and electronic controllers with 'bath fill' features can help save water.

Toilets

Lower flush volumes

Most toilet cisterns sold in Australia have two buttons - a 6 litre full flush button and a 3 litre partial flush button. This gives them an average flush volume of 3.6 litres, rated 3 stars on the Water Rating label.

You cannot buy a toilet suite designed for higher flush volumes because Victoria's plumbing regulations now require the installation of water efficient dual flush toilets and most manufacturers have changed their entire production to 6/3 types.

Some manufacturers recently introduced 4.5/3 litre dual flush toilets, with an average flush volume of 3.3 litres. These rate 4 stars on the Water Rating label and work just as well as the 6/3 types. They cost the same or only slightly more, and can save about 5 kl of water per year in a home occupied by four people.



Waterless toilets

Waterless toilets are dry sanitation systems that do not use water to treat or transport human waste. They don't need water for flushing and are not connected to the sewer because adding water would disrupt the decomposition of waste.

In continuous composting toilets the waste is deposited in a single container. It decomposes as it moves slowly through the container and is then removed as compost from the end-product chamber.

In batch composting toilets two or more containers are alternated. The active container is filled while the waste pile in the fallow container/s has time to compost without the risk of recontamination.

The compost produced by waterless toilets is either a useful by product or a disposal burden, depending on your view.

Waterless toilets are not direct substitutes for conventional toilets. They require the householder or a contractor to do regular maintenance, including moving or rotating the bins, removing compost and adding supplementary material to the waste to help decomposition. You may also have to pay energy costs for ventilation fans and electric heaters to help with decomposition in colder areas.

The cost of waterless toilets typically ranges from \$1,500 to \$5,000 per unit, depending on design. This does not include installation or extra building costs to accommodate the chamber/s under the toilet. You have to get a septic tank permit from the local council before you install a waterless toilet.

Visit www.epa.vic.gov.au/water/wastewater/onsite.asp for more information about getting approval for waterless toilet systems.

Waterless toilets are often used where water is limited or waste disposal is expensive, in areas generally not served by mains water or sewers.

If you live in an area like this with a limited supply of tank, dam or bore water, conserving up to 28 kl in toilet flushing water each year - the average for a family of four - will be an important and valuable saving.



Washing machines

Save water with a front loader

The two main types of washing machines are front loaders and top loaders.

Front loaders use less water because the clothes are tumbled through a pool of water at the bottom of a drum. On average they use about half as much water as a top loader for the same wash load.

If you wash in warm or hot water you halve your energy use because most of the energy used in washing a load of clothes goes to heat the water, rather than the motor and pumps.

Of course you can save all this heating energy by washing in cold water.

Your critical decision to save about 20 to 25 kilolitres of water each year for a family of four is to buy a front loader washing machine.

Choosing a water efficient model

Not all front loaders or top loaders have the same water efficiency. You can compare the water rating of all models at www.waterrating.gov.au.

The most water-efficient clothes washing machines on the market have at least a 4 star water rating.

It is even more important for people who prefer top loader washing machines to look at the water rating label. Because top loaders use more water and there is a wide range from highest to lowest water efficiency, you can easily save 50 to 80 litres a wash - or 18 to 29 kl a year if you wash daily - by choosing a more water efficient machine.

Think about your washing machine's capacity. Most machines let you select a lower water level for a smaller wash load, but the amount of water used per kilogram of clothes increases if the machine is not fully loaded.

You can also consider using an alternative water supply for clothes washing like a rainwater tank, greywater or recycled water (see page 18).

Dishwashers

Washing dishes by hand or machine

Running a dishwasher once a day uses no more water than washing and rinsing dishes by hand in the sink. Dishwashers are now more water efficient and use between 15 and 20 litres per cycle, equal to two to three sinks full of water.

If you wash or rinse dishes under running water, then using a fully loaded dishwasher is likely to save water.

The key to using a dishwasher efficiently is to run it only when it is full. A partial load uses exactly the same amount of water as a full load. Rinsing dishes before you put them in a modern dishwasher wastes water. Just scrape off the leftover food, and use the right setting and detergent.

Most standard size dishwashers are about 600mm wide and take 12 to 14 place settings.

However, there are now several models designed for smaller families, couples or one-person households. These narrow 450 mm wide machines or half-height 'dish drawer' models are designed for six to nine place settings.

If you do not fill the machine up in one day you can run the rinse and hold function which removes large food particles and prevents odours from building up until you do a full wash.

Choosing a water efficient dishwasher

You can compare the water rating of all dishwasher models at www.waterrating.gov.au.

The most water efficient dishwashers on the market have a water rating of at least 3.5 stars.



Save water and enjoy your garden

Garden design

Choosing drought resistant plants is the best way to reduce the water demands of your garden. You can get advice on this from the Accredited Water Saving Garden Centres listed at www.ourwater.vic.gov.au. This website also lists drought resistant plants.

Keeping up-to-date with water saving rules

It is vital to have up-to-date knowledge of Victoria's Permanent Water Saving Rules when you are planning and selecting your watering system. You can check current water restrictions at www.ourwater.vic.gov.au or by calling your local water business or the DSE Customer Service Centre on 136 186.



**Smart
Approved
WaterMark**



Irrigation methods

Garden irrigation methods and systems range from watering cans and hand-held hoses to whole-garden irrigation systems. Some are controlled by computers linked to moisture sensors and weather stations, so that you can manage your watering by anticipating the weather.

No irrigation system is more water efficient than all others in all circumstances.

Efficiency and performance depend on:

- design quality and how the system suits the plants and soil
- whether water is applied on the surface or at the plant roots
- how watering is controlled
- durability and maintenance of the equipment.

When you plan to install a fixed irrigation system it's important to have a good system design before you select the hardware. You can get lists of designers and advisors from the Irrigation Association of Australia at www.irrigation.org.au or the Smart Approved WaterMark at www.wsaa.asn.au/smartwatermark/approved.htm.

Emitters

Emitters are the irrigation system parts that spray or drip water over, onto or under grass, trees and plants. Their potential to improve water efficiency and reduce waste depends on:

- consistent and even water distribution at any pressure to prevent over-watering
- some form of check valve so water is retained in the lines after flow stops, because if it drains away the first flow on restart must be used to fill the lines again.

You will find products with these features at www.savewater.com.au and at www.wsaa.asn.au/smartwatermark/approved.htm



Evaporative coolers

Evaporative coolers vary in how much water they 'bleed' or send to waste while they are operating.

Some units have an adjustable bleed valve set by the installer according to experience with the local water quality – in Melbourne this is about 10 litres per hour.

Other units have a dump cycle where the installer sets the period between dumps, often setting higher bleed rates and more frequent dumps to minimise problems.

Units with both water quality conditioning and sensor control usually have the lowest rate of bleed loss, estimated to be up to 6 kilolitres per year in Melbourne.

If you plan to install an evaporative cooler in your home remember that:

- bleed methods pre-set by an installer - whether constant or timer-controlled - are likely to lead to the highest rate of water loss in use
- sensor-controlled bleed methods will use less water
- sensor control with water pre-conditioning uses the least water
- the volume of water in the sump determines end-of-cycle water loss.

Swimming pools and spas

Reducing evaporation in pools

Evaporation causes most of the water loss from an outdoor pool. The evaporation rate depends on the pool's exposure to sun and wind.

You can reduce evaporation from a swimming pool by

- installing a pool cover to keep dust and leaves out, cut down on filter and chemical use and retain heat, helping to extend the swimming season by up to three months
- solid fencing and planting on the side of the prevailing wind
- shade cloth or permanent structures over part of the pool.

Plan your pool's shape for easy covering. A more complex shape is more expensive to cover and harder to roll and unroll.

Motor-driven rollers are available and can be located underwater so there is no intrusion into the above-pool area at all. These systems are more expensive but have safety advantages.

For information about pool products contact the Swimming Pool and Spa Association of Victoria at www.spasavic.com.au

Spas

Avoid frequent emptying and refilling of your spa and keep it covered to retain heat and prevent evaporation.

As spa users generally prefer higher temperatures than swimmers, the value of the energy savings alone makes it worthwhile to have a well-insulated cover for your spa.

Save water with alternative water supplies

Very high quality water is supplied from the mains and by law it must be potable, or fit for drinking. But not all household activities need water of this quality, especially toilet flushing and garden watering. The most widely available alternatives to potable mains water are rainwater, untreated greywater, treated greywater and recycled water.

Rainwater and stormwater

Rainwater is collected directly from roof runoff and stored in a rainwater tank.

Supplies of rainwater and stormwater depend on

- how much it rains
- the size of the collection area
- the volume of the holding tank.

Rainwater tanks installed to meet the 5 Star building standard must be connected to toilets. Toilet flushing and clothes washing use water consistently, ensuring that the tank level falls and there is storage capacity to receive more runoff from new rainfall.



Garden watering tends to be more seasonal and intermittent. If you plan to use a rainwater tank only for watering it is managed better with a larger tank than a smaller one. This helps to provide enough water through the hot summer months.

Capturing stormwater runoff

When you are choosing an alternative water supply consider whether it can help to retain stormwater runoff. A well-designed rainwater tank system can reduce the adverse impacts of stormwater discharges and give you an alternative water supply.

When land is in its natural state much of the rainfall soaks into the soil, and runoff to creeks, rivers and stormwater channels is slowed by plants and variations in ground slope.

However building roofs and paved areas do not retain water and much of the stormwater runs off immediately, causing problems for the built and natural environments.

Many councils now require developers and builders to pay attention to stormwater retention.



Rainwater tanks

The size of your tank and the roof catchment area depend on:

- rainfall in your area
- how you plan to use the rainwater
- whether you have access to mains water.

Calculating the exact tank size you will need to meet your year-round water demand can be complicated, because how often and how heavily it rains varies from place to place in Victoria.

But we do know that the bigger the tank you install, the more reliably and effectively it will meet your water needs, especially through dry periods.

Everyone's situation is unique and we recommend you seek expert advice for your special requirements from your local water authority, licensed plumber or rainwater tank retailer.

Remember to check with your local council to clarify the rules and regulations for installing and using rainwater tanks.

More information about estimating rainwater tank size for specific uses in different parts of Victoria is available in the Appendix on pages 28-29.

Individual rainwater tanks or greywater reuse systems may not be practical for apartments, but it may be possible to collect rainwater and stormwater in communal tanks.

The cost of tanks, pumps and accessories varies depending on the materials, volume and shape of the tank and how it is installed and connected. Tanks are available in polyethylene, concrete or galvanised steel and there are models for every purpose and application – on stands, on the ground or below the ground.

Installation

A licensed plumber must install the rainwater tank and its associated fittings.

If your rainwater tank is supplying water to flush toilets or for other indoor use, you must install:

- a system to bring backup mains water to the toilets if the tank runs dry
- a backflow prevention device to prevent rainwater entering the reticulated water supply.

We recommend you also install a first flow diversion device so that leaves and roof pollution are not washed into the tank.

The typical cost of a 2,000 litre tank installation connected to all toilets ranges from \$2000 to \$4000. It's cheapest to install tanks when the house is first built. This does not include the cost of roof guttering and plumbing or any design and construction costs for arranging the roof layout to maximise water flow to the tank.

The quality of the rainwater you collect depends on:

- the roof catchment's design and maintenance
- how you filter the water that flows in to the tank
- preventing contamination and infestation of the stored water.

These issues are more critical if you plan to drink the rainwater than if you use it for less sensitive purposes like garden watering.

We recommend that:

- your roof collection area does not contain lead-based paints, bitumen or tar coatings, treated timbers or other potential sources of contamination
- gutters are regularly inspected and cleaned of dirt and debris
- you install a diverter and maintain it regularly to stop the first surge of water flushing remaining debris into the tank
- you screen inflow and outlets to the tank to stop vermin and insects getting in
- the tank is desludged every few years, through an inspection hatch which is secured to prevent child access.

To provide more information on the safe use of rainwater, the Government has published the booklet *Rainwater use in and around the home*. You can obtain a copy from EPA Victoria's website, www.epa.vic.gov.au, from EPA's Information Centre at the HWT Tower, Podium Level, 40 City Road, Southbank, or by telephoning (03) 9695 2722.

Greywater

Untreated greywater is household wastewater collected from sources other than the toilets and kitchen, and used directly - often for garden irrigation - or stored for later use. Untreated greywater must not be stored for more than 24 hours because of the risk of bacterial growth.

Greywater which has been treated may be stored before use.

The availability of greywater and its benefits depend on how much is collected and whether it can be stored.

If you collect all the potential greywater from your home - the wastewater from the laundry and bathrooms, excluding toilets - this amounts to about three quarters of all indoor water use. Generally this is far more than you need to water the garden.

As normal household water use continues to produce greywater when it is raining or the garden is saturated with water, you must be able to divert unwanted greywater to the sewer.

There are potential health risks for you and your neighbours from unsuitable or excessive use of untreated greywater in garden irrigation. To minimise risks:

- any untreated greywater must be used within 24 hours or dumped to the sewer
- any greywater used in gardens must be distributed by subsurface irrigation and in conditions where nutrients or toxins cannot accumulate or be washed from the site
- untreated greywater should not be used on herbs or vegetables.



Untreated greywater

It is better to use less water and ultimately produce less greywater than to have to find uses for greywater.

The simplest way to use greywater is to install a diverter that fits under the laundry tub and receives water from the washing machine. Depending on how you set the selector lever, the diverter sends the greywater either to the sewer or septic tank system or to a sub-surface irrigation system in your garden.

If the outflow to the irrigation system is blocked from a build up of material on the filter, the diverter automatically discharges to the sewer or septic tank.

If you use untreated greywater from the laundry you need to:

- minimise the potential adverse effects of greywater on plants by choosing low salt liquid detergents which have much lower salt levels than powders
- keep track of what is in the wash – for example, the wash water from soiled nappies should not be sent to the garden
- divert the wash water to the sewer and reuse the rinse water which is much less contaminated.

You can find out more about safely reusing greywater at www.savewater.com.au and www.epa.vic.gov.au/water/reuse/reuse.asp

The supply of untreated greywater from the laundry is often enough to meet garden watering needs.

Capturing greywater from showers and baths is more difficult because it is necessary to collect water from traps at floor level and the diverter cannot be located directly below the sources. The increased supply may be difficult to absorb usefully unless you have a very large garden.

Treated greywater

Treated greywater's main advantage is that can be stored for long periods and is more usable for garden watering and toilet flushing.

There are no restrictions on using it for garden watering as health risks are much lower. It's important to use low salt detergents to minimise adverse effects on plants because treatment processes do not remove salt from greywater.

Most greywater treatment systems use more than one tank, and can have up to three tanks. It typically costs at least several thousand dollars to install a system.

Features of treated greywater systems include:

- a combined tank volume similar to a rainwater tank serving a similar demand
- significantly higher costs than a rainwater tank
- more regular supply which does not vary with rainfall patterns
- higher plumbing costs as laundry and bathroom sub-floor wastes must be diverted to the greywater system, with overflows to the sewer
- a treatment unit, controller and pump, all connected to power.

Systems must be serviced regularly. Some suppliers will only sell a system if the householder enters a service agreement costing around \$200 to \$300 a year.

Treated greywater is typically suited for the same purposes as dual-pipe recycled water. Systems which use the treated greywater for outdoor purposes like garden irrigation require a council septic tank permit before they are installed.



Recycled water

Recycled water is distributed or reticulated from a central treatment plant where wastewater is treated to high Class A quality.

Users of recycled water have two separate metered water supplies to their property – one potable and the other recycled – and this arrangement is often called dual-pipe recycling.

Dual-pipe recycled water

You can use recycled water as a substitute for mains water in toilets and garden irrigation.

It may also be possible to use it for cold water supply to washing machines and for water features and evaporative coolers, subject to approval. We do not recommend using recycled water in swimming pools.

The water savings from recycled water are more predictable than from rainwater because it is available at all times.

Not all sources of alternative supply can deliver water whenever you want. Dual-pipe recycled water is the only alternative supply available at all times and where you do not need to think about the ongoing management of the system.

Dual-pipe recycled water supply is metered and you pay for the volume you use. The price varies but will be less than potable water.

The taps must have distinct purple colouring and removable handles to better control recycled water use and limit it to the intended purposes. You may prefer to remove the handles from recycled water taps to make sure that children don't come into contact with recycled water or drink it while they are playing in the garden.

Recommendations for using alternative water supplies

The Victorian Government has consistent recommendations for using alternative water supplies. These are included in the discussion paper *A Framework for Alternative Urban Water Supplies* (Victorian Government, 2006).

There is no alternative water supply which can be recommended without reservation for all household uses. We are extremely sensitive to the quality of the water we drink and cook with, less sensitive to the water we wash in and least sensitive to the water we rarely see or touch, such as that used in toilet flushing.

Rainwater is routinely used in rural areas for all purposes, but there is some risk that pollutants from motor vehicle exhausts or solid fuel heaters and pathogens from animal and bird droppings can be washed into the tank.

For this reason the Government does not recommend that rainwater be used for drinking or food preparation where reticulated potable water is available. There may also be environmental risks associated with poorly-managed use of some alternative water supplies like untreated greywater.



Table 1 - Use and benefits of alternative water supply options, Class 1 dwellings

End use		Rainwater	Recycled (Class A)	Greywater: untreated	Greywater: treated (c)	Stormwater
Least sensitive	Toilet flushing	Yes	Yes	No	Yes	Yes
	Sub-surface landscape irrigation	Yes	Yes	Yes	Yes	Yes
	Surface landscape irrigation	Yes	Yes	Possible ^(b)	Yes	Yes
	Food crop/vegetable irrigation	Yes	Yes	No	Yes	Yes
	Outdoor uses such as car washing	Yes	Yes	No	Yes	Yes
	Cold supply to clothes washer	Yes	Yes	No	Yes	Possible ^(b)
	Swimming pool and spa pools	Yes	No	No	No	Possible ^(b)
	Evaporative coolers, fountains	Yes	Possible ^(b)	No	No	Possible ^(b)
	Cold water supply to dishwasher	Yes	No	No	No	Possible ^(b)
	Personal washing (hot & cold)	Yes	No	No	No	Possible ^(b)
Most sensitive	Drinking, cooking (hot & cold)	Yes ^(a)	No	No	No	No
Provides stormwater retention benefits		Yes	No	No	No	Yes
Need for management by the user and regular drawoff to maintain storage capacity		High	No	High	Med	High

Consistent with (DSE 2006)

(a) Where a reticulated drinking water supply is available, it is recommended that the supply be used for this purpose

(b) These uses would be subject to controls to manage potential risks

(c) Greywater would need to be treated to minimum standards for certain uses



Alternative hot water supply

Rainwater is the only alternative water supply that could be considered for connection to a general hot water system.

The alternative water supplies described in this booklet do not need to be heated for uses like toilet flushing, garden irrigation or cold water supply to the washing machines. In these cases the alternative supply is connected to particular appliances or taps and cannot easily be extended or diverted.

But once you connect your alternative water supply to the hot water system, you cannot limit where it will be used and have to assume it can be used for any purpose, including drinking.

How much water you can save with smart water planning

The average annual water use of a four person family living in a new house with a garden is about 240 kilolitres (kl) a year in the examples we use in this guide.

The house described in this example is equipped with water efficient shower heads and taps to meet the 5 Star building standard, with 6/3 litre dual flush toilets and with a top loader washing machine.

Rainwater tank options

If the house met the 5 Star building standard by including a solar hot water heater instead of a rainwater tank, the occupants would use about 240 kl of mains water throughout the year.

Alternatively, a rainwater tank can be installed to meet the 5 Star standard. For a house in the Melbourne rainfall area, a minimum size rainwater tank of 2,000 litres fed from 50 square metres of roof and connected to the toilets would save about 28 kl of mains water per year. This would fully use the tank's collection and storage ability.

A larger tank of 4,500 litres, fed from 100 square metres of roof would have the capacity to supply the washing machine as well, but not the garden. The mains water saving would nearly double to 56 kl a year.



Water efficiency options

Home builders can increase water efficiency by installing:

- 4 Star toilets (4.5/3 litre dual flush) in place of 3 Star toilets (6/3 dual flush), saving nearly 5 kl per year
- a hot water recirculator so that people don't run water to waste while waiting for the shower to heat up, saving about 10 kl per year.

If the four person family living in a new house also chose a water efficient front loading washing machine in place of a top loader, there would be a further saving of nearly 19 kl per year.

These three efficiency measures combined will save nearly 34 kl per year, or 17 per cent of indoor use.

This is more than the mains water saved by a minimum size rainwater tank.



Table 2 - Examples of savings from more efficient water use

	Base Case kl/yr	Efficient Case kl/yr	kl/yr saved	% of Base Case saved
Washing Machine (a)	45.1	26.3	18.8	42%
Laundry taps	8.1	8.1	0.0	0%
Toilets (b)	27.6	23.0	4.6	17%
Showers (c)	65.3	55.1	10.2	16%
Baths	12.5	12.5	0.0	0%
Basin taps	16.8	16.8	0.0	0%
Kitchen taps	15.6	15.6	0.0	0%
Dishwasher	4.5	4.5	0.0	0%
All indoor	195.5	161.9	33.6	17%
Garden	45.0	45.0	0.0	0%
Total	240.5	206.9	33.6	14%

(a) Efficient case = front loader instead of a top loader

(b) Efficient case = 4.5/3 litre flush instead of 6/3 litre flush

(c) Efficient case = installation of a hot water recirculator



Further information

Information about household water use, Victoria's Permanent Water Saving Rules, Waterwise Gardening and other developments is available from the following sources. Information is provided in several languages.

www.ourwater.vic.gov.au

PH: 136 186

Museum Victoria's Water Smart Home is a community-based project that aims to engage, educate and inspire the public in how to reduce, reuse and revalue water in their daily lives. The project consists of three major elements: a water-activated exhibit, a website and an ongoing series of public programs. Information about the Water Smart Home is available from:

www.museum.vic.gov.au/watersmarthome/

PH: 13 11 02

Suppliers of rainwater tanks, greywater systems, water efficient irrigation products, hot water recirculators and other water saving equipment are available from the following website:

www.savewater.com.au

Information about the Water Efficiency Labelling and Standards (WELS) Scheme, including the Water Rating star ratings of clothes washers, dishwashers, taps, shower heads, toilets, urinals and flow control valves is available from:

www.waterrating.gov.au

PH: 1800 803 772 (toll-free)

The Commonwealth Government's Your Home Technical Manual provides information about designing and building a more comfortable home that is less expensive to run and more environmentally friendly. It includes information about water efficient practices in houses with and without mains water supply:

www.yourhome.gov.au

The Irrigation Association of Australia has prepared a Guide to Good Garden Watering. The Association has also prepared an Irrigation Directory, which lists irrigation system designers around Australia (the list including designers of systems for crop and horticultural irrigation, as well as domestic irrigation systems). Information is available from:

www.irrigation.org.au

PH: (02) 9476 0142

The Smart Approved WaterMark is a labelling program for outdoor water saving products and services:

www.wsaa.asn.au/smartwatermark/approved.htm

PH: (02) 9290 3322

EPA Victoria has released guidance on alternative water supplies and water recycling:

www.epa.vic.gov.au/water/

EPA Information Centre

PH: 9695 2722

The Swimming Pool and Spa Association of Victoria has issued fact sheets on all aspects of pool design and use, including pool covers and lists of suppliers.

www.spasavic.com.au

PH: 9872 4502

The Building Commission has released information about the water and energy saving building requirements in the 5 Star Standard for all new homes:

www.buildingcommission.com.au/www/html/390-5-star-standard-for-all-new-homes.asp

PH: 9285 6400

The Plumbing Industry Commission's Technical solutions sheets provide information about plumbing requirements for household water recycling and rainwater collection systems:

www.pic.vic.gov.au

PH: 1800 015 129 (toll-free)

The enHealth Council, a subcommittee of the National Public Health partnership, has released Guidance on Use of Rainwater Tanks, which includes comprehensive information about household rainwater tanks, including correct tank sizing:

http://enhealth.nphp.gov.au/council/pubs/documents/rainwater_tanks.pdf

Melbourne Water has released guidance on good household water conservation practices, which includes an interactive Home Water Investigator:

<http://conservewater.melbournewater.com.au>

Information about licensed GreenPlumbers® businesses which can provide services including environmentally sustainable plumbing, construction work, gas work, heating and cooling work or products using certified GreenPlumbers®. These plumbers are required to adhere to a code of ethics and warranty their work. They can also arrange onsite rainwater tank assessments to help you choose the best tank for your situation.

www.greenplumbers.com.au

PH: 1300 368 519

Detailed information about climate averages for all regions of Australia from the Bureau of Meteorology, including rainfall data useful in helping to estimate the size of the rainwater tank that will best suit your requirements.

www.bom.gov.au/climate/averages/

PH: 03 9669 4082

**For more information and updates visit
www.ourwater.vic.gov.au**

Appendix

- estimating the size of rainwater tanks

Choosing the size of your rainwater tank

Calculating the exact tank size you will need to meet your year-round water demand can be complicated, because how often and how heavily it rains varies from place to place in Victoria.

The larger the tank you install, the more reliably and effectively it will meet your water needs, especially through dry periods.

Everyone's situation is unique and we recommend you seek expert advice for your special requirements from your local water authority, licensed plumber or rainwater tank retailer.

Remember to check with your local council to clarify the rules and regulations for installing and using rainwater tanks.

There are some general rules of thumb you can use as a guide. The size of the rainwater tank that suits your situation best depends on:

1. Rainfall intensity and frequency in your area – you can check this on the extensive rainfall data on the Bureau of Meteorology's website: www.bom.gov.au/climate/averages.
2. Your home's roof catchment area and the percentage of this area that can be used to collect water.
3. The end use of the water – how much water you'll be using, what you'll be using it for and how reliable you need the supply to be.
4. Available space to install the tank
5. How much you are prepared to spend.



General guidelines for areas with mains water

To get the most out of your rainwater tank, maximise the roof area you are draining to the tank and connect it to at least one consistent indoor use like toilet flushing or clothes washing.

The more uses you find for tank water, the more total quantity you'll use, saving more mains water and reducing the chances of tank overflow.

Toilet flushing and garden watering are the most obvious uses for rainwater because the water does not have to be treated to potable standard. Toilet flushing is considered the better option because it is a consistent year-round demand that increases the reliability of water supply and total water collected for a given size of tank.

Using the tank water only for garden watering will often lead to overflowing in the winter months and the tank running empty during summer.

You also have to consider the space that a tank will require and how to fit it on your property. If you have a long, narrow space, such as the space between your house and a fence, you may consider a series of smaller tanks.

Toilet flushing

In most of Victoria's southern regions where the average yearly rainfall is around 600 millimetres (mm) or more, a 2000 litre tank collecting from a 50 square metre roof catchment area (the current 5 Star Building specifications) will provide reliable year-round water for toilet flushing.

In regions with significantly lower annual rainfall, mainly in Victoria's north-west, you will need a larger tank or greater catchment area.

For example, around Mildura where annual average rainfall is below 300mm, a 5000 litre tank collecting from a 225 square metre roof area is the minimum necessary for year-round toilet flushing.

The bigger difference between summer and winter rainfall north of the Great Dividing Range compared with the rest of Victoria means that rainfall harvest from tanks is generally 10 to 20 per cent lower than areas of comparable rainfall south of the Divide (Plumbing Industry Commission).

For garden watering

The size of your garden and types of plants it contains affect the amount of water you will need to keep it growing.

Most people use tank water for garden watering during summer when rainfall is lowest. This puts strain on the tank reserve and means a larger tank is needed to store more water from wetter periods.

A garden hose connected to a rainwater tank has a typical flow rate of 300 to 600 litres per hour, so we recommend you buy the biggest tank you can afford that fits on your property.

For areas like Melbourne, Ballarat and Geelong with at least 600mm average annual rainfall, we suggest you install a tank of between 4000 and 5000 litres for a reliable supply to water your garden.

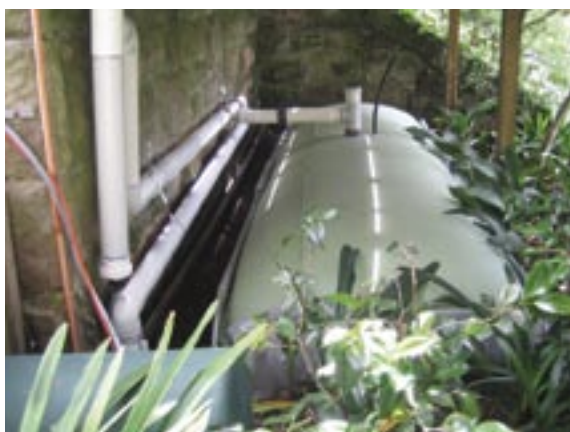
General guidelines – areas without mains water

The size of rainwater tanks and roof catchment area are even more important in homes not connected to mains water. Fortunately many of these locations offer more outdoor space for much bigger rainwater tanks.

Households relying entirely on collected rainwater to meet their water demands will need to consider a tank with a capacity of 50,000 to 100,000 litres.

Previous experience is always a useful guide and we recommend asking your neighbours' advice.

Bushfire protection is an important consideration in outer areas. The Country Fire Authority recommends rainwater tanks hold at least 22,000 litres of water with a pump that does not rely on the power supply.



Detailed calculations

Maximum annual availability of rainwater

The maximum annual rainwater available for collection can be calculated from the size of the catchment area (m²), the annual rainfall (mm) and the catchment efficiency (%). The catchment efficiency takes into account yield reduction due to surface saturation and evaporation, and for most of Victoria is around 85 per cent.

Annual yield (L) = annual rainfall (mm) x catchment area (m²) x catchment efficiency (%).

For example, if the average annual rainfall is 600 mm and the roof area is 250 m², then the potential annual yield will be:
600 x 250 x 0.85 = 127,500 L.

It's important when you calculate the potential yield of rainwater from your roof you are aware that certain factors can contribute to a lower harvest of rainwater. These include:

- Whether you can capture water from the entire roof catchment area
- How often and how heavily it rains – annual average rainfall can vary widely from year to year
- How you use the water you capture
- Limits on the size of your tank.

Household water use

Average annual household water consumption in Victoria is 209 kl (209,000 litres). But this varies between regions, with households around Mildura using about 550 kl and South Gippsland around 150 kl.

Within regions there are also big variations because of people's personal behaviour, what they do to save water, and the size and type of their gardens.

Typical rates of annual domestic garden water use

Garden Type	Litres per year
Native garden (no lawn)	1000 per sq metre
Lawn with shrubs	3000 per sq metre
Vegetable garden	5000 per sq metre

Glossary

5 Star

The collective term for the Victorian building and plumbing regulations which specify levels of thermal performance and water efficiency for new homes.

Alternative water supply

Water obtained from a source other than the potable mains supply.

Dual-pipe recycled water

Wastewater that has been treated to a high standard at a central treatment plant, then distributed in pipes separate from the mains water supply, for non-potable uses such as toilet flushing and garden watering.

Greywater

Water from the clothes washers, showers or other taps (but not toilets or kitchen taps) that is reused on the same property, for non-potable uses such as toilet flushing and garden watering.

Indoor water use

The water used inside a home, in bathrooms, laundries and kitchens.

kl

kilolitres (1,000 litres) – the standard unit for measuring and billing household water use – a kilolitre of water weighs 1 tonne.

Outdoor water use

All other water used around a home, including garden watering, swimming pools and evaporative coolers.

Potable

Suitable for drinking.

Rainwater

Rainwater collected from roofs and gutters before it comes in contact with the ground or other surfaces that people can walk or drive on.

Seasonal water use

Same as outdoor water use. As these water uses tend to peak in summer and fall to low levels in winter, they are seasonal.

Stormwater

Rainwater collected from the ground or other surfaces that people can walk or drive on.



www.ourwater.vic.gov.au

