Practice Note #2

RAINWATER TANKS

Water Smart design is the effective planning, design and building of homes, subdivisions, suburbs, towns and cities that are sensitive to the ecological needs of the waterways that are impacted by them.

Water Smart developments aim to mimic natural processes which reconnect neighbourhoods with local waterways and improve visual amenity and quality of life, make better use of all water within our urban areas, seek to protect the ecological health of urban waterways from the potential negative impacts of urban development, and to add value to our water and waterway management activities.

Each Practice Note in this series is designed to give greater detail and specific advice on different aspects of Water Smart developments and devices. The Practice Notes provide reviews of the main design features, advice on installation and maintenance issues, include diagrams and pictures to assist with implementation, and reference useful websites to assist with further research into Water Smart developments.

Rainwater tanks are now a popularly used element from the suite of contemporary Water Smart solutions available. This Practice Note provides you with details on how you can utilise water tanks to satisfy a range of objectives in your Water Smart development, and how you can effectively maintain them.

BACKGROUND

Urban areas traditionally secure potable water by piping large amounts of treated water from distant catchments through mains water supply systems. This comes at considerable capital, environmental and operational costs.

Whilst mains water is treated to drinking water standards, typically less than 10% of domestic water is actually used for drinking and cooking. Toilet flushing, laundry, hot water and outdoor uses represent the bulk of domestic water needs. Many of these uses do not require water to be treated to such a high standard.

At the same time, large volumes of roof water are discarded, unused, into our urban stormwater drains, often contributing to downstream flooding, increased infrastructure needs and increased pollution in creeks and waterways. It is now recognised that roof water, when harvested through a properly installed and maintained rainwater tank, is a viable alternative to supply water to homes for select 'non drinking' purposes.

Rainwater tanks are now commonly installed in new developments due to the mandatory water efficiency requirements set by the NSW Building Sustainability Index (BASIX) scheme for new homes and major renovations. (refer to Practice Note No 1 for further information on BASIX and rainwater tanks).

Various types of rainwater tanks that are available

WHY USE RAIN WATER TANKS?

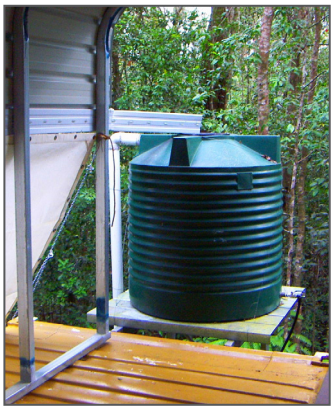
Benefits obtained from the installation of rainwater tanks for household internal and external use are:

- Direct savings in potable water use
- Reduced water bills
- Satisfies the State's mandatory water and energy efficiency planning legislation BASIX (www.basix.nsw.gov.au)
- Helps cater for future population growth by deferring the need for new expensive infrastructure such as dams and water treatment facilities
- Contributes to wider system efficiencies - decentralised water supply schemes are more efficient and less costly for owners and operators as opposed to the traditional large centralised schemes that were implemented during the late 1900's
- Reduces the frequency of discharge from urban areas to creeks and wetlands resulting in reduced erosion impacts on creek banks and damaging of sensitive aquatic ecosystems. This in turn reduces the need for expensive maintenance and rehabilitation works.

IS USING MY RAINWATER TANK FOR THE GARDEN ONLY, ENOUGH?

Supplying rainwater for garden irrigation alone may result in little use of the tank water during winter periods when outdoor demand is small. A large tank may remain full and unused during winter and it will be unable to accept regular winter rainfall (and it may overflow creating other problems). The aim is to have the tank continually drawn-down and this will allow rainfall all year round to be captured and re-used, resulting in the environmental benefit of reducing urban runoff to creeks and waterways.

For these reasons, installing a tank just for outdoor watering is unlikely to give you a good return on investment and it will probably not significantly reduce annual stormwater runoff from the property.

RAINWATER HARVESTING SYSTEMS BASICS

A typical rainwater harvesting system **(Figure 1)** consists of:

- The roof
- Roof gutters
- First flush device(s)
- The rainwater tank(s)
- A pump
- Filters and screens on tank inlets and overflows
- Filters within the piping to protect the pump
- Backflow prevention as required
- The tank overflow (to an existing stormwater drainage system)

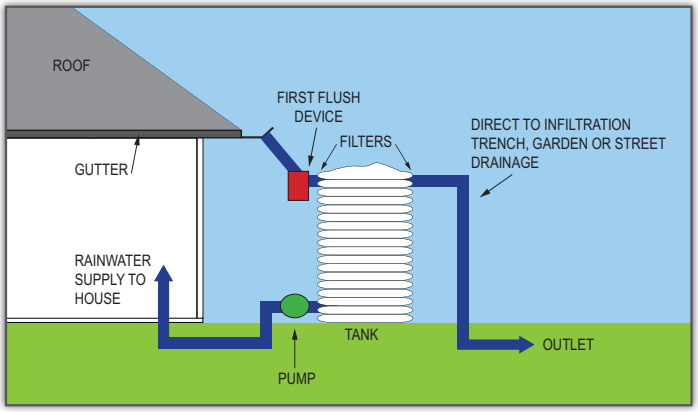


Figure 1: Key parts of a typical domestic rainwater system.

Such systems can be configured in a variety of different ways. Options are summarised below and discussed further in this Practice Note:

- Wet and dry systems
- Gravity pressure or dual supply systems
- Single or multiple above-or below-ground tanks of various sizes

WHAT KIND OF SYSTEM?

When designing your overall rainwater system configuration, consider:

- Your site - elevation, the material and shape of your roof
- Whether you will use the water indoors or just outdoors
- Your budget and available rebates
- How the tank relates to other Water Smart measures present
- Tank location - is there space above ground or do you need to go below ground? Do you have access to install the tank? Do you need approval (if tanks are too close to property boundaries etc)
- Approvals and standards
- How you will maintain the system
- How you can reduce the electricity costs of pumping rainwater

WHAT SIZE TANK?

Rainwater tanks come in all shapes and sizes. Consider your site's 'Water Balance' when selecting a tank size. Factors that influence the water balance are:

- The number of people in the home
- How you want to use the tank water
- The area of roof that drains to the tank (or tanks)
- If you want to use a number of tanks or just one
- Rainfall patterns in your area
- BASIX or additional Council requirements for tank size (see Approvals)

3,000 to 5,000 litres is generally sufficient for an average home in NSW coastal locations and your tank will only occupy an area of about 2 to 3m2.

FURTHER INFORMATION ON CHOOSING, SIZING AND DESIGNING RAINWATER TANKS AND TANK SYSTEMS IS CONTAINED UNDER **'USEFUL WEBSITES'** AT THE END OF THIS PRACTICE NOTE.

DEVISING A RAINWATER TANK HARVESTING SYSTEM

Rainwater tanks are available in a variety of shapes, sizes and materials. Factors that can influence the overall time of installation and the costs of installing a domestic rainwater tank include:

- If the tank needs to be underground
- If the tank needs to be constructed onsite (e.g. concrete tanks)
- If additional foundations are required for the tank
- The number, size and shape of tank(s)
- The tank material (plastic, cement, corrugated iron etc.)
- If the tank system is gravity or pressure based, and configuration of dual supply
- The size of the pump required (This can depend on the distance and height that water needs to be pumped)
- How much of the roof area is to be drained to the tank and if it is existing or new roof.

Note that government (Federal and State) rebates may be available to help offset costs, which reduces the payback period for a rainwater tank. Refer to your local water supply authority for rebate information.

RAINWATER HARVESTING CONFIGURATIONS

Rainwater can be collected from the roof and gutters in various ways depending on the slope of the land and the configuration of the building e.g. how many floor levels, roof layout etc. Once collected, the stored water can be delivered to the intended use(s) either by a gravity feed or pressure pump system. These various options are further explained below.

WATER COLLECTION SYSTEMS

Dry Systems

In dry systems, downpipes drain rainwater from the roof surface directly into the top of the tank inlet. They are designed so that there is a continual fall from the roof to gutters and into the tank. Dry systems are preferred as they avoid stagnant water and sediment build up in the pipes draining to the tank. **Figure 2** shows the schematic layout for a dry system

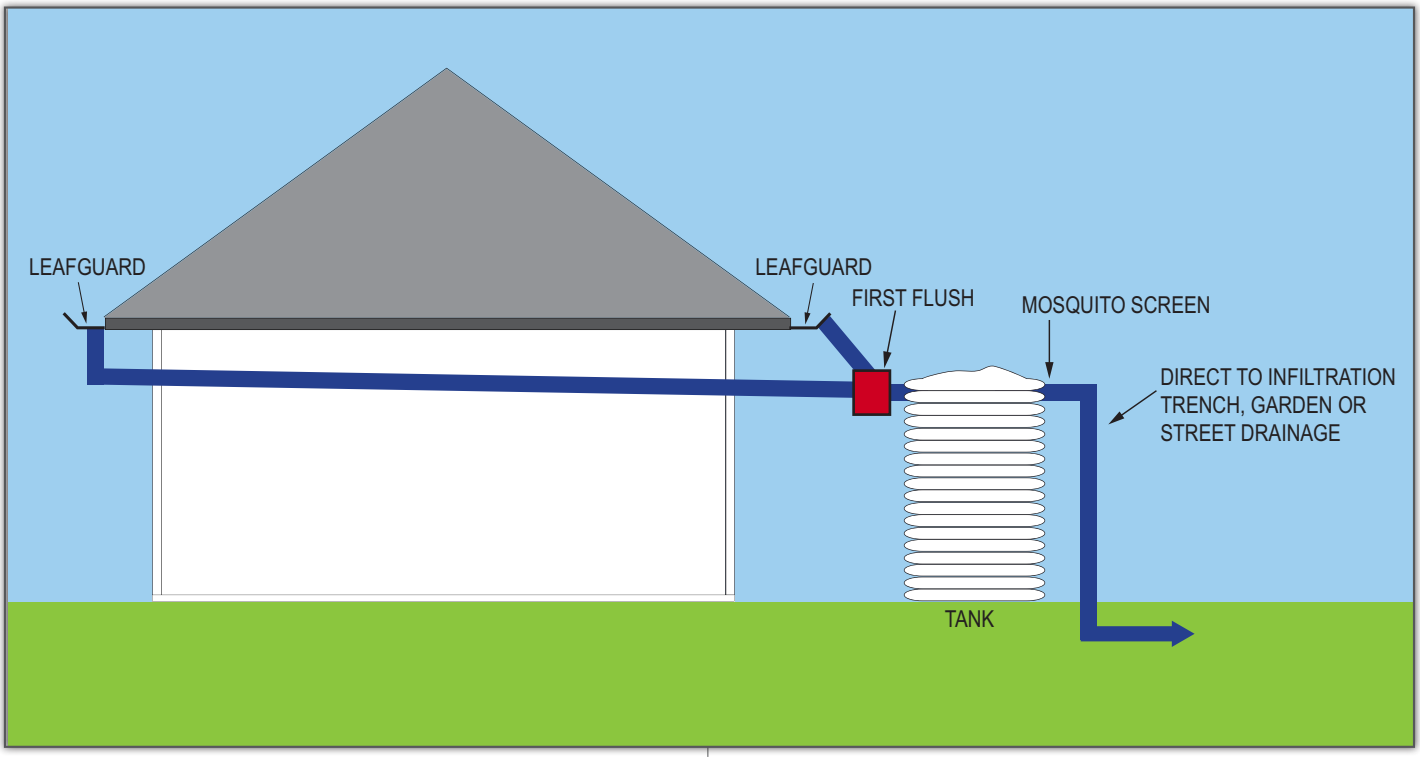


Figure 2: Dry system configuration

Wet Systems

In wet systems the pipes that feed rainwater into your tank run underground between the roof and tank (this is sometimes referred to as a pressurised system). This may be required if you have space issues or insufficient 'fall' between your roof and tank. These are less preferred as they require extra maintenance attention - as stagnant water and debris sit in the low section of the pipes. **Figure 3** shows the schematic layout for a wet system.

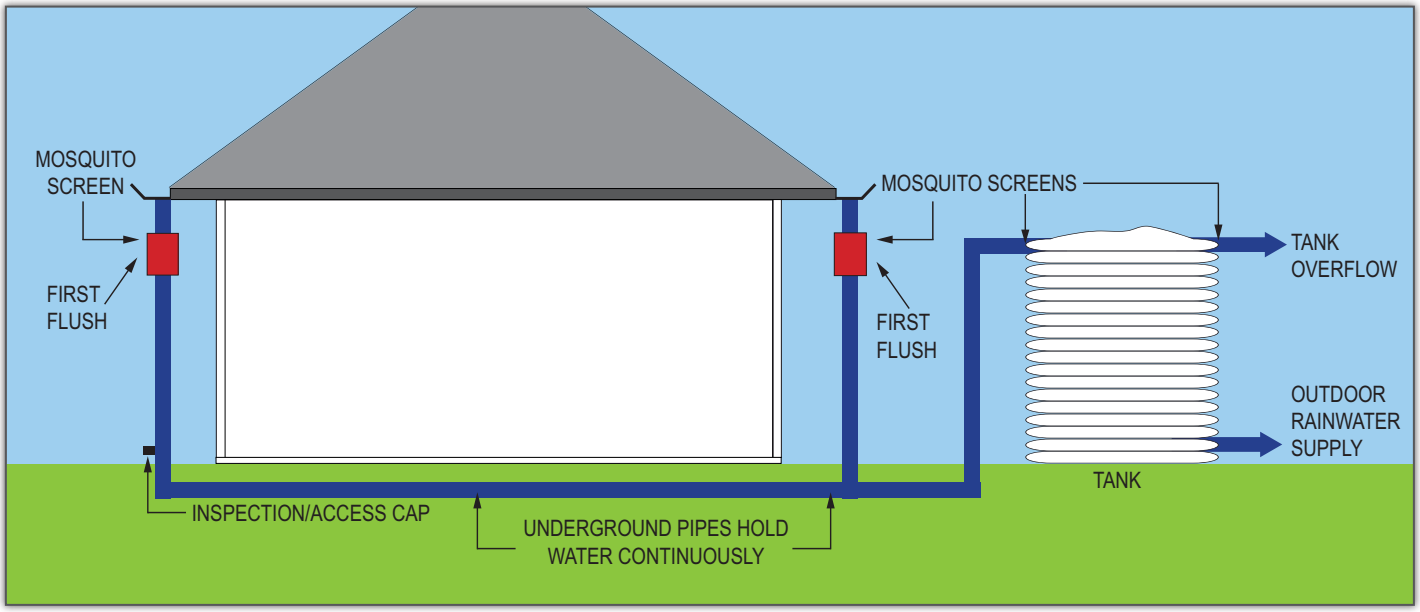


Figure 3: Wet or pressurised system

WATER DISTRIBUTION SYSTEMS

There are two methods for delivering water to the intended use, either by gravity (as shown in **Figure 4**) or a pressurised pump system (shown in **Figure 5**).

Gravity Systems

Gravity systems are widely used in rural areas. Tanks are located on a stand or in an elevated position. The water pressure at each fixture is governed by the difference in height between the tank and the fixture.

To achieve a water pressure similar to normal mains water, the tank needs to be 15-20 metres vertically above fixtures. This is generally not practical for most urban house lots. Toilets, laundry tubs and garden hoses may not require high water pressures and gravity systems may be adequate for these. Garden sprinklers are likely to require a pressure pump.

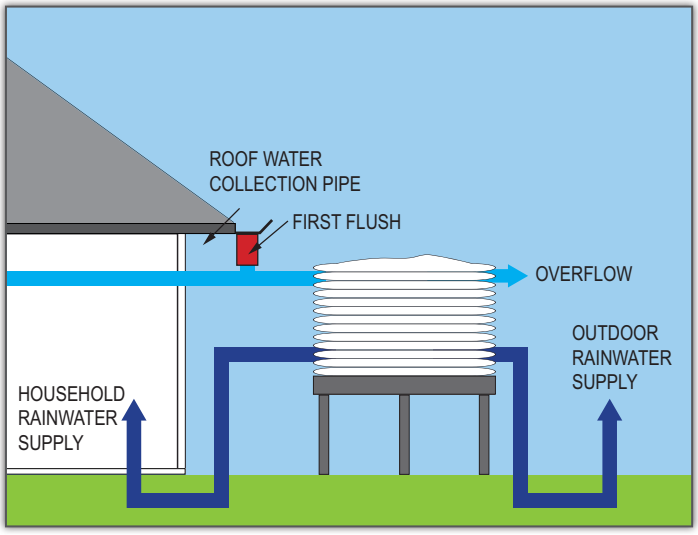


Figure 4: A gravity system (tank supplies indoor/outdoor without pump).

Pressurised Pump Systems

A pressurised pump system is common in residential areas where space is limited. A pump and pressurised system is used to extract rainwater from the tank, then deliver it to indoor or outdoor fixtures at an adequate pressure.

Pumps are needed when tanks are not at a sufficient height to provide acceptable pressure. For example, if a tank is installed underground, or on sloping sites where the tank needs to be installed low enough to allow roof downpipes to feed into it. The pump can be located inside or outside the tank (see **Figure 5).**

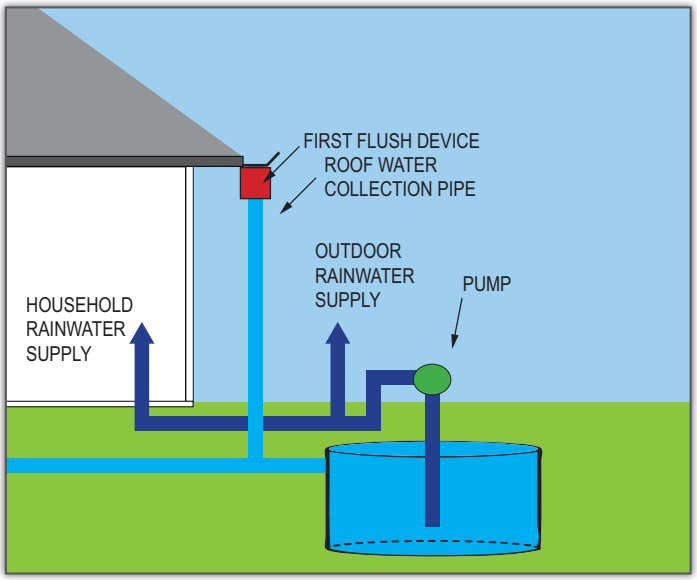


Figure 5: A pressurised pump system (pump carries water from the tank to indoor and /or outdoor fittings).

DUAL SUPPLY SYSTEMS

Dual supply systems are the most common configuration adopted in urban areas. This involves combining rainwater and mains water to provide a dual water supply to the various indoor and outdoor fixtures.

This method ensures water is available, even when the tank is low or empty. If configured as a by-pass, mains water can be available during power failures when the pump for a water tank will not operate. The two basic kinds of dual supply systems are:

1. Dual Supply with Mains Water Top Up
2. Dual Supply with Mains Bypass

Since Dual Supply Systems connect rainwater supplies to mains water, backflow prevention devices must be installed, by law, to protect the drinking water supply.

Dual Supply System with Mains Water Top Up

The rainwater tank is 'topped up' with mains water via a trickle system when tank water levels fall below a specific level. Water supply to the home continues to be provided via the tank (see **Figure 6**).

Water is drawn from above the anaerobic zone at the bottom of the tank to avoid sludge. When the water level in the tank falls below the mains water top up zone the tank is topped up with mains water automatically through the use of a float valve. This option can use more electricity as it runs the pump more frequently.

SEE THE APPROVALS AND GUIDELINES SECTION AND **"USEFUL WEBSITES"** FOR FURTHER INFORMATION ON MEETING WATER AUTHORITY REQUIREMENTS.

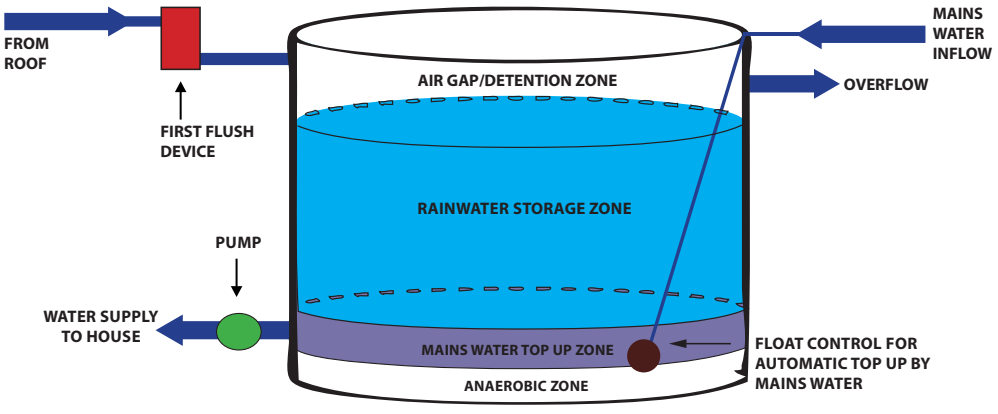


Figure 6: A mains water top up system

Dual supply system with mains Bypass Switch

When tank water levels drop, the system switches to mains water supply. The tank is bypassed altogether, rather than 'topped up'. This bypass switch can be automatic or manual (e.g. via manually operated valves or taps to switch between water supplies as required). No 'mains water top' occurs, which maximises the empty space available in the tank to store rainfall. Another benefit of this option is that there is less chance that if a leak develops in the tank it will waste water, as the tank will run dry and simply be bypassed (Leaks may go unnoticed if the tank is underground and mains water is continually fed into the tank).

Your local water supply authority can provide detailed information and advice on by-pass systems

Backflow prevention

Any tank system that physically cross-connects mains water supply with a water tank, such as the dual supply systems above, is required by law to have some form of backflow prevention measure installed to ensure no rainwater flows back into the public potable water supply. This is because rainwater (particularly in urban areas) is not guaranteed to be of drinking water quality. Backflow prevention measures must be installed by a licensed plumber who must also formally notify your water authority. They must be to Australian Standard ASNZ3500.1. The Standard outlines requirements and guidance on the kinds of backflow preventions required - which vary, depending on the level of hazard posed by different kinds of tank systems.

An approved backflow prevention device (such as a dual check valve) is also required to be fitted at the home's water meter - to protect the public drinking water system. Generally this is included in new water meters which are provided by Council or the local water authority. Backflow prevention measures are also required where your home's drinking water pipes actually interconnect with your rainwater system—to protect your home's drinking water system. Options include:

- An air gap - a simple physical gap between the mains water 'top up'supply and rainwater in your tank which makes it impossible for the rainwater to backflow into the water supply. A simple, reliable and maintenance-free solution that meets Australian Standards. It also has added stormwater benefits, by delaying tank overflows during downpours when the tank is full.
- A reduced pressure zone device (RPZD) is a mechanical device that separates mains and other water supplies. These are often mandatory for underground tanks. It requires regular servicing and replacement.

RAINWATER HARVESTING DESIGN CONSIDERATIONS

RAINWATER TANK MATERIALS

- *Concrete tanks* can be purchased in ready-made forms or constructed on-site for above or below ground installations. They can be subject to cracking although careful construction minimises this risk. Being impervious to heat they are a good choice in bushfire prone areas.
- *Fibreglass tanks* (constructed from similar materials as fibreglass boats) can be used for above-ground installations.
- *Metal tanks* Galvanised iron tanks are constructed from steel with zinc or proprietary coatings. Whilst strong and durable, they are restricted to above ground applications and are subject to corrosion if the copper household water pipes are connected to the tank. The first section of plumbing connected to the tank should be PVC or other non-metallic material.
- *Zincalume*™ tanks are constructed from steel with a zinc/ aluminium coating. They are similar to galvanised iron tanks. Aquaplate™ tanks are made from Colorbond™ lined with a food-grade polymer. When used in above-ground installations they are strong, durable and corrosion resistant. Care must be taken when cleaning the tank, to avoid damaging the polymer lining.
- *Plastic or poly tanks* are made from food-grade polyethylene that has been UV-stabilised. These strong, durable tanks come in a wide range of sizes: slimline profiles for narrow spaces; PVC 'bladders' can be installed under floors and decks to save space. Many of the slimline tanks are modular, offering flexibility but this comes at a cost premium. Some underground models can be placed under driveways and garages.

The images on page 2 & 3 illustrate some of the various tank types and materials.

ROOF & GUTTER GUARDS

Australian Standard AS4020 Products for use in Contact with Drinking Water provides guidance on acceptable roof materials when using tanks to supply drinking water. Galvanised iron, Colorbond™, Zincalume™, slate or ceramic tiles provide acceptable water quality - but not if the roof or gutters are corroding. Lead flashing should be painted. Rainwater should not be harvested from roofs with lead-based or tar-based paints, or from asbestos roofs.

Normal guttering is sufficient provided that it is kept clear of leaves and debris. Quality gutter guards or meshing may reduce maintenance needs if trees are present, however the efficacy of different products can vary so research your options.

A **leaf diverter** (sometimes called a 'leaf eater') can be installed below gutter outlets, to further screen tank inlet pipes and first flush devices from leaves and other debris.

FIRST FLUSH DEVICES

Over time, dust, leaves and debris collects on roofs and gutters. A first-flush device stops the first (and 'dirtiest') part of rainfall event from entering the rainwater tank. They come in different shapes and sizes, but the general principle is illustrated in **Figure 7**, where the first volume of rainwater in a chamber is stored, and then diverted away from the tank. Once this chamber is full, cleaner rainwater will flow into the rainwater tank.

First-flush devices are a great way to reduce the build up of grime and bottom sludge in your tank. It may be advisable to have more than one first flush device if a significant roof area is feeding the tank.

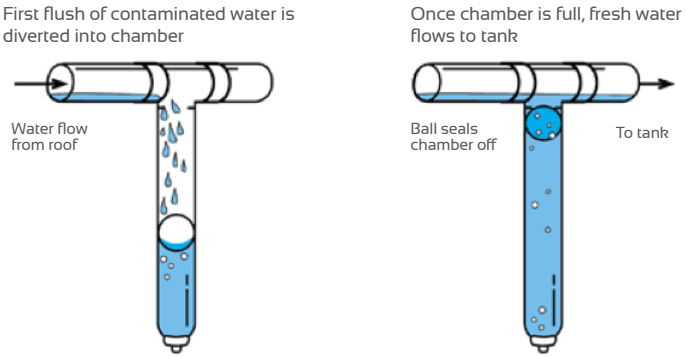


Figure 7: Example of a first flush device (Source: www.watertankspumpsandirrigation.com)

FILTERS & SCREENS

Screens and meshes keep large particles, mosquitoes and vermin out of your tank. They include inlet screens at the top of the tank and mosquito screens at the end of the overflow pipe. See **Figure 8** examples.

Internal filters also protect sediment and sludge from the bottom of the tank entering the pump and internal piping system.

Screen over the inlet at the top of the tank

Mesh screen over the tank overflow pipe

Figure 8: Screens required for rainwater tanks (photos courtesy of Lake Macquarie City Council)

GUIDANCE & REQUIREMENTS

DESIGN STANDARDS

Australian Standards and Plumbing Codes

Anyone installing a tank needs to comply with the National Plumbing and Drainage Code of Practice (AS 3500), the NSW Code of Practice for Plumbing & Drainage and additional requirements set by your water supply authority. A licensed plumber is required to meet the criteria set out in the Australian Standard. Water Authorities often provide 'technical guides' to assist. An example is correct signage for rainwater tanks and outlets as shown in **Figure 9**.

Figure 9: Signage for rainwater tanks and outlets

A National Plumbing Code of Australia (PCA) is successively replacing the NSW Plumbing Code. The PCA will set out performance requirements for the design, construction, installation, replacement, repair, alteration and maintenance of plumbing and drainage installations.

The National Code is anticipated to include the various provisions within the Australian Standard that relate to domestic rainwater tanks. The range of applicable standards is set out in the reference: MP&MSAA (2008).

RAINWATER TANK MANDATES

State Government water efficiency requirements (BASIX):

NSW councils cannot issue development consent for new residential developments (and major residential renovations and large swimming pools) unless the applicant has a BASIX certificate from the NSW Department of Planning. The online BASIX calculator assesses whether the proposal meets minimum water and energy efficiency requirements. Householders can choose how it meets these requirements. A typical single dwelling design will generally meet a 40% water conservation target if it includes both the following:

- Showerheads, tap fittings and toilets with at least a 3A rating
- A rainwater tank (or alternative water supply) for outdoor water, toilets and laundries

Councils may encourage or set additional requirements for larger rainwater tanks—but only if they do not compete with BASIX's water efficiency provisions. Examples of 'non competing' provisions include requirements for larger tank sizes for bushfire risk management or stormwater management (retaining and re-using additional rainwater which aids in reducing site runoff resulting in a reduced impact on the natural water cycle).

Development Approval for domestic rainwater tanks

Rainwater tanks can be installed for new or existing residential properties without development consent from a council or other authority - but only if a number of specific conditions have been met. These conditions are set by the NSW State Government under the 'Housing Code' (NSW State Environmental Planning Policy No 4). There are a number of criteria to meet for the installation to qualify as exempt development some of the criteria to be met are, the tank should:

- Not be on a lot in a foreshore area
- Be less than 10,000 litres
- Meet siting requirements (distance from property boundaries etc)
- Have a first flush device installed
- Have an overflow that connects to existing stormwater drainage and does not overflow to neighbouring properties

Please note that all the criteria for exempt developments need to be met, the criteria is available from the Housing Code website: http://housingcode.planning.nsw.gov.au. If your tank does not qualify as exempt development under the NSW Housing Code, formal approval from either Council or a registered Private Certifier will be required.

Water Authority requirements

Most water supply authorities encourage the use of water tanks on residential blocks for non-potable (i.e. non-drinking water) purposes. It is worth checking if any additional rebates or incentives are offered by local water authorities in addition to State and Federal governments. Water Authorities are legally obliged to approve any cross-connections made between rainwater systems with mains water supply systems. In this instance, Plumbing Codes require the proper installation of a backflow prevention device to prevent contamination of mains water by rainwater or stormwater.

In NSW, Water Authorities require written notice, signed by a licensed plumber, that a backflow prevention device has been installed to meet the relevant Plumbing Codes and Australian Standard requirements. They are likely to charge a fee for an inspection to confirm proper installation has occurred.

Health Advice

The NSW Health Department does not prohibit the use of rainwater for drinking or other domestic purposes. On the other hand, it does not recommend using rainwater for drinking in urban areas where reticulated drinking water is available - due to microbial and heavy metal contamination risks.

Department guidance sets out how to maintain tank systems and how to treat rainwater. It recommends that rainwater is only drunk if it undergoes approved levels of treatment. For example: sufficient filtration to remove possible contamination from soil and leaves in gutters; disinfection to reduce contamination risks from faecal material (birds, lizards, rodents, possums and animals which may have entered the tank and died).

The National Health Council document 'Guidance on use of Rainwater Tanks' (Cunliffe, 2004) gives more details how to manage the health aspects of rainwater. See useful websites' in this document.

There is scientific evidence to support that water from rainwater tanks is acceptable for most other non-potable household uses. Some research indicates that when used in hot water systems, rainwater complies with the Australian Drinking Water Guidelines - provided that temperature settings greater than 60°C are maintained. The risk is dependant on the quality of the hot water system and tank maintenance undertaken by householders over time.

Most states in Australia permit the use of rainwater to supply hot water systems. Refer to the guidance prepared by enHealth, NSW Health and the National Water Commission in 'Useful Websites'.

RAINWATER TANK MAINTENANCE

Maintenance of rainwater tank systems is necessary in order to manage and remove unwanted sediment and debris that is commonly occurring in the urban environment, and can build up in a water tank. Sediment is commonly generated from paths, roads and soils areas but it can also come from roof areas, where in some situations, approximately 2kg of sediment can be generated per 100 square metres of roof each year. This is why it is important to undertake regular maintenance.

What to do, and when, to keep your tank system in good condition

It is the householder's responsibility to keep tanks clean and in good working order. Regular maintenance is essential to ensure high water quality, efficiency, and longevity of your rainwater tank system. It will also help avoid problems such as:

- blockages in gutters, pipes and tank inlets (leading to nuisance overflows when in rains)
- low water quality, often caused by the growth of bacteria, algae and other micro-organisms harmful to human health
- build up of sediment and sludge in the tank— reducing water quality and putting a strain on any pumps
- mosquitoes entering and breeding in the tank
- poor water pressure and even pump failure

By following a regular maintenance regime, problems can be sorted quickly and the benefits of having a rainwater tank can be maximised. A rainwater tank system requires very little maintenance. Recommended maintenance tasks are set out in **Table 1**.

HOW OFTEN?	MAINTENANCE REQUIREMENTS
1 - 3 months	Clean and check the first flush device and all filters
	Clean gutters, rain heads, tank inlets and screens
	Check for torn or loose mosquito screens and replace if necessary. Put screens back carefully, ensuring they are tightly refitted.
3 - 6 months	Check roof (and gutters) and remove accumulated debris, including leaf and other plant material (more often if trees overhang)
	Prune overhanging tree branches and foliage
	Check the tank for defects and repair and replace as required
	Check the tank for evidence of animal, bird or insect access, including mosquito larvae and algal growth inside the tank.
	Check and clean the pump, filters and strainers
2 -3 years	Remove accumulated sediment (sludge). Clean out if necessary.

Table 1: Rainwater tank maintenance checklist (source: Lake Macquarie City Council, 2010)

For detailed instructions on how to undertake these maintenance activities, please refer to the HCCREMS "Water tank Maintenance Video" (see Website and resource Section).

A first flush device and adequate mesh screens on all tank inlets and outlets will ensure that the majority of sediment and debris does not enter the tank - this means you can reduce how often you get your tank de-sludged.

CLEANING DOWNPIPES & GUTTERS

By regularly cleaning out your gutters, they are less likely to clog up, and will be less prone to nuisance overflows during downpours. It also helps to keep the muck out of your tank – protecting any connected pumps and filters and reducing how often you need to call someone in to clean sludge out of your tank.

If you have a lot of trees and foliage around, you may need to clean your gutters every couple of months. You can save yourself some effort by ensuring overhanging vegetation is trimmed back. This house keeping is also an important preventative measure for houses in bushfire prone areas.

CLEANING THE FIRST FLUSH DEVICE

Cleaning the first flush device is simple and should be undertaken regularly. Figure 11 shows how sludge can build up in these devices if they are not attended to. To clean the first flush device put a bucket underneath and unscrew the small fitting first to limit the amount of water that spills out. The filter should then be removed and hosed out. Next take off the larger cap and remove further debris. (see step one and two in **Figure 10**) Don't lose the floater ball – it stops the debris captured in the chamber from getting mixed back in the clean water that runs into the tank after the first flush.

Make sure the o-ring is in good condition (no nicks, no rubber perishing etc.) and put everything back together once clean. If you need a new filter, o-ring, try your local hardware store or plumbing supplies.

Figure 10: Two step procedure for routine cleaning of first flush device. (Photos courtesy of Lake Macquarie City Council)

CLEANING INLET SCREENS

The inlet screen is often screwed into the hole below the inlet pipe at the top of the tank. It may need to be unscrewed to clean it. Hose or scoop out and brush off any debris. It's in your interest to stop this screen from clogging up by giving it a clean every couple of months so that it doesn't cause overflows or lead to rotting debris falling through into your tank. Check the screen has no tears. Take a moment to make sure you've put the screen back properly – ensuring no gaps for access by mosquitoes or other insects (see **Figure 11**).

Figure 11: Clean inlet screen in tank
(Photo courtesy of Lake Macquarie City Council)

ENSURING TANK OVERFLOW OUTLETS ARE IN GOOD ORDER

The outlet is where your overflow pipe releases excess water into your stormwater pipe/drain. To prevent mosquitoes and vermin from entering your tank a screen should be fixed to the end of the pipe. This screen re-quires regular checking to ensure the flow is not restricted. Flap screens like the one pictured below must be checked to ensure they are not jammed or bent.

Check for any tears that may need repairing or replacing and get in touch with your local plumbing supplies or hardware store for new screen material or screens. (see **Figure 12**).

Figure 12: Clean inlet screen in tank.
(Photo courtesy of Lake Macquarie City Council)

ENSURING PUMPS ARE WORKING

It's important to ensure your pump is always on and working properly. For an outside pump this is as easy as checking the lights or switch, or being aware of hearing the pump start up whenever you use water – like flushing the toilet. For a submersible pump it is harder to be sure that the pump is working properly – because the noise is muffled by the water. One way is to use a water level gauge (see **Figure 13**) – if it hasn't been raining and you have been using water the gauge should show a drop in water. As long as there is no evidence of a leak, this means your pump must be working.

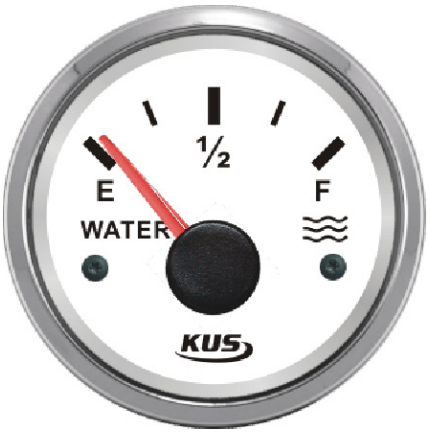


Figure 13: Water level gauge in tank for measuring change in water level for submersible pumps. (Source: ASAP Marine).

USEFUL WEBSITES & GUIDES

Rebates:
Refer to this NSW Government webpage for advice on any current rebates for domestic rainwater tanks: www.environment.nsw.gov.au/rebates - also links to rebates from the Federal Government.

Approvals and mandates for tanks:
Housing Code Website http://housingcode.planning.nsw.gov.au (NSW State Environmental Planning Policy No 4 – Development Without Consent and Miscellaneous Exempt and Complying Development)

NSW Building Sustainability Index; BASIX: www.basix.nsw.gov.au

Design and Selection:
Online Water Usage Calculator: http://www.hunterwater.com.au/Save-Water/Water-Usage-Calculator.aspx or http://stratco.com.au/products/rainwater_tanks/Calculator/rainwatertanks.asp

Rainwater Harvesting Association of Australia (Fact Sheets and Consumer Guide): http://www.arid.asn.au

Your Home, Technical Manual: Environment Australia: http://www.yourhome.gov.au/index.html

Save Water website: http://www.savewater.com.au/how-to-save-water/in-the-home/rainwater Includes some general 'rules of thumb' for sizing your tank.

Water Not Down the Drain: A guide to using rainwater and greywater at home www.notdownthedrain.org.au

Rainwater Tank Design and Installation Handbook, 2008 Master Plumber and Mechanical Services Association of Australia and National Water Commission http://www.nwc.gov.au/resources/documents/RAINWATER_handbooknwc_logo.pdf

Requirements for installation of rainwater and greywater systems in Australia Master Plumber and Mechanical Services Association of Australia Waterlines Report Series No 10, November 2008 http://www.nwc.gov.au/resources/documents/Final_Waterlines_full_version.pdf

Water meters and backflow prevention see Circulars 2/2007: NSW Code of Practice for Plumbing and Drainage http://www.water.nsw.gov.au/Urban-Water/Plumbing/Circulars/Circulars/default.aspx

Information on Plumbing Requirements—the Plumbing Code and Australian Standards:
National Water Commission: WaterLines Report: Requirements for installation of rainwater and greywater systems in Australia (2008) http://www.nwc.gov.au/resources/documents/Final_Waterlines_full_version.pdf (includes information on rainwater supply to hot water systems)

Sydney Water Corporation: http://www.sydneywater.com.au/Water4Life/InYourGarden/RainwaterTanks/ Follow the links for detailed information on backflow prevention and technical 'plumbers guide' to domestic rainwater tanks (in production).

NSW Code of Practice for Plumbing and Drainage – Issued Circulars for rainwater tanks and rainwater use http://www.water.nsw.gov.au/Urban-Water/Plumbing/Circulars/Circulars/default.aspx

Water Authorities:
Hunter Water Corporation: www.hunterwater.com.au/

MidCoast Water: www.midcoastwater.com.au/

Gosford Wyong Councils' Water Authority: http://www.gwcwater.nsw.gov.au

Health guidance:
The National Health Council document, Guidance on use of Rainwater Tanks' (Cunliffe, 2004) provides detailed information on how to man-age water quality issues pertaining to rainwater tanks, including use of rainwater in hot water systems http://enhealth.nphp.gov.au/council/pubs/documents/rainwater_tanks.pdf

NSW Health, Rainwater tank brochure: http://www.health.nsw.gov.au/publichealth/environment/water/rainwater.asp

Product Suppliers and Service Providers:
Search via the following: www.yellowpages.com.au; www.arid.asn.au; www.savewater.com.au (go to the Products section). And www.greenplumbers.com.au; www.enviroplumber.com.au;

Tank Maintenance—How to:
Lake Macquarie City Council, 2010: Give your tank a check-up: Rainwater Tank Maintenance Fact Sheet http://www.lakemac.com.au/downloads/

NSW Code of Practice for Plumbing and Drainage – Issued Circulars for rainwater tank & roof gutter maintenance: http://www.water.nsw.gov.au/Urban-Water/Plumbing/Circulars/Circulars/default.aspx

HCCREMS "Water tank maintenance" video - http://www.hccrems.com.au/Programs/Water/Rainwater-tank-maintenance-videos.aspx

REFERENCES

Coombes, P.J., Argue, J.R. & Kuczera, G. (2000). Figtree Place: A Case Study in Water Sensitive Urban Development', Urban Water 1(4), 335-343.

Coombes, P.J., Frost A., & Kuczera G. (2001). Impact of Rainwater Tank and On-site Detention Options on Stormwater Management in the Upper Parramatta River Catchment. Research Report prepared for Department of Civil, Surveying and Environmental Engineering, University of Newcastle.

Coombes, P.J., & Kuczera G. (2001). Rainwater Tank Design for Water Supply and Stormwater Management. Stormwater Industry Association Re-gional Conference, Port Stephens NSW.

Coombes, P.J., Kuczera, G. & Kalma, J.D. (2000a). Economic Benefits Arising from Use of Water Sensitive Urban Development Source Control Measures', pp 152-160 in 3rd Int. Hydrology and Water Resources Symp., Institution of Engineers Australia, Perth.

Coombes, P.J., Kuczera, G. & Kalma, J.D. (2000b). Rainwater Quality from Roofs, Tanks and Hot Water Systems at Figtree Place', pp 1042-1047 in 3rd Int. Hydrology and Water Resources Symp., Institution of Engineers Australia, Perth.

Cunliffe, D. A. (2004). Guidance on use of rainwater tanks. enHealth Council. Department of Health and Ageing. Australian Government.

Institution of Engineers Australia (1987). Australian Rainfall and Runoff: A Guide to Flood Estimation. 2 Volumes. IEA, Canberra.

Lake Macquarie City Council (2010) Give your tank a check-up: Rainwater Tank Maintenance Fact Sheet McQuire, S (2007), Water Not Down the Drain: A guide to using rainwater and greywater at home www.notdownthedrain.org.au

National Health and Medical Research Council and Natural Resource Management Ministerial Council (2004). National Water Quality Management Strategy; Australian Drinking Water Guidelines. NHMRC & NRMMC, Australian Government.

NSW Health (2007) Rainwater Tanks brochure

NSW Health (2007) Guideline for Rainwater tanks where a public water supply is available – Use of. Document GL2007_009. See http://www.health.nsw.gov.au/policies/gl/2007/pdf/GL2007_009.pdf

NSW State Environmental Planning Policy No 4 (SEPP4) – Development Without Consent and Miscellaneous Exempt and Complying Devel-opment – Reg 16] http://housingcode.planning.nsw.gov.au

MP&MSAA (2008): Master Plumber and Mechanical Services Association of Australia, Requirements for installation of rainwater and greywater systems in Australia, Waterlines report, National Water Commission, Canberra Standards Australia

AS/NZ 3500.1.2-2003: National Plumbing and Drainage - Water Supply - Acceptable Solutions provides guidance on the design of stormwater and rainwater reuse systems. See MP&MSAA (2008) which sets out relevant Australian Standards that apply to domestic rainwater tank sys-tems.

Standards Australia (1997) AS/NZ 3500.4.2-1997: National Plumbing and Drainage - Hot Water Supply Systems - Acceptable Solutions. Standards Australia, Homebush.

Australian/New Zealand Standards 3500 (AS/NZS 3500:1) A guideline for installing and maintaining a backflow prevention device

DEVELOPED BY

A project delivered by the Hunter and Central Coast Regional Environmental Management Strategy (HCCREMS): a program of the Environment Division of Hunter Councils Inc.

This project has been assisted by the NSW Government through its Environmental Trust.

HCCREMS MEMBER COUNCILS

Address for Correspondence:
Environment Division
Hunter Councils Inc.
PO Box 3137
THORNTON NSW 2322
Phone: (02) 4978 4020
Fax: (02) 4966 0588
Email: execassist@huntercouncils.com.au

© HCCREMS, 2013
Rainwater Tanks
Hunter Councils