RAINWATER TANKS

With increasing pressure on local authority water supply infrastructure, it makes sense to look at ways to collect and reuse this precious resource.

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Water passes by (or through) us naturally, so how can we use it more effectively? Collecting rainwater and using greywater to water the garden or flush the toilet are examples. Although greywater use is increasingly common, storage isn't practical because it is hard to keep the water fresh. Here, we look at rainwater storage only.

Bigger may be better for tank sizes

Whether harvesting rainwater for domestic use or taking groundwater from a well, water usually needs to be stored before it is used.

The need for water is regular while the supply of rainwater is only intermittent so tank size is important. Tanks that are too small may run out during high summer demand and spill water through the overflow when rainfall is plentiful. An oft-repeated rural refrain is 'I wish I'd put in a bigger tank', followed by the addition of another tank.

The size of tank installed often comes down to space and cost, and demand is overlooked. A better starting point is to calculate water usage/demand. Consider what the water will be used for and when, for example, watering gardens in summer or full household supply.

If the roof is the collection agent, use the formula below to calculate how much water you can theoretically catch.

Roof area × annual rainfall = average year possible water

For example, 180 m² × 1,000 mm/year = 180,000 litres

Look at local rainfall statistics, in particular, the gaps between plentiful rainfall and shortages.

Tanks come in many different sizes, shapes and types. Some can be buried, others can't. There are rigid, semi-rigid and even flexible bladder tanks. Some are designed to be installed under floors and others to fit down the narrow side of the house under the eaves. A local plumbers' merchant will help choose the right type for particular circumstances.

Gravity can do the work

Gravity normally takes rain from the roof to the tank via the downpipes and connecting pipework.

The simplest piping scenario takes full advantage of gravity and has the tank installed so the water can flow down into the tank, then down again to the garden via a simple hose connection from a point near the bottom of the tank. This may mean erecting the tank on a platform – a building consent is required for a tank greater than 500 litres on a platform.

Keeping contaminants out

Debris should be deflected before it gets to the tank. Contaminants and bird droppings build up, and the first rainfall washes these into the collection network. It is important that this 'first water' is separated out and discarded. Proprietary items called 'first flush diverters' are available, and some councils insist on their use. →

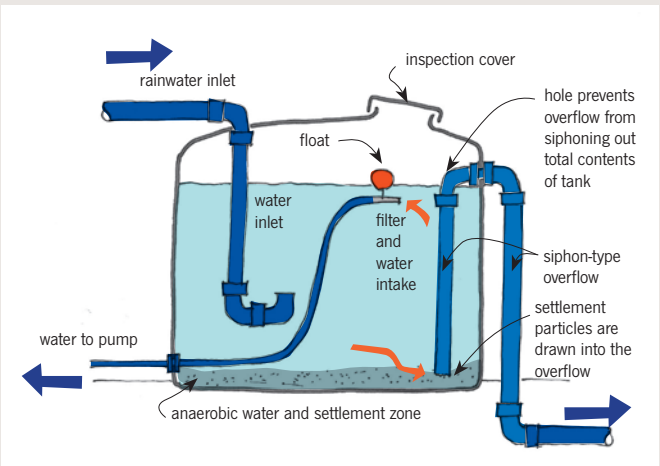

Figure 1: Rainwater storage system.

Don't overlook water demand when deciding on the size of tank.

It's good practice to further screen the water as it goes into the tank – the cleaner the water, the less filtering it will need. 'Wet' or siphonic systems, where the pipework doesn't dry out when the rain stops, need to have insect-proof screens at both ends.

Overflows and vents

The overflow pipework can be arranged to incorporate a siphoning leg to the bottom of the tank. Then, the water spilled when the tank is full is taken from the bottom of the tank.

The tank needs to be vented to keep the water fresh. Ideally, the water should enter via a calmed inlet pipe, so there is less disturbance of the stored water, and drawn off from the aerobic (higher) zone (by having a floating outlet). If your tank will be topped up by a mains supply, there must be a backflow prevention device or an air gap above the overflow to the position of the incoming supply. The Building Code compliance document G12/AS1 gives these requirements.

Water is heavy so structure important

Each m^3 of water (1,000 litres) weighs a tonne. Therefore, tank installation must be done strictly in accordance with the manufacturer's instructions.

Structural integrity is particularly important for slimline tanks, which can fit against the house and are taller than they are wide. These tanks should be correctly restrained by tying to the building to withstand earthquake movement.

Water for household use

Water collected for household (potable) use is more complex. First, the tank will possibly be 25,000 litres or even larger – if it is above 20,000 litres (or over 500 litres on a platform), it will need a building consent.

It will be remote from the house and the water will usually need to be pumped to provide pressure. This will necessitate a power supply to the protected pump and access for maintenance.

In the past, water was often pumped to a higher level holding tank, which then provided the water pressure and flow to the taps. This is mostly now done by pumps and controllers, which enable the water to be supplied on demand directly from the tank. Mains pressure water supply is replicated, and the rest of the plumbing installation can be done as if it was connected to a reticulated supply.

In areas where the water contains minerals that are aggressive towards copper, it is advantageous to use a stainless steel, high-pressure hot water cylinder and a pump matched accordingly. The system needs to be controlled by pressure-reducing, tempering and relief valves rather than the cheaper, simpler, low-pressure system.

Safe drinking water

The *Drinking water standard for New Zealand 2005* (updated in 2008) requires drinking water to be filtered to remove particulates and treated to remove contaminants. This can be done by passing the water through two screening filters (usually a 20 micron filter, followed by a 1 micron one) then passing the water through a UV light process filter.

This is a health requirement, not a building requirement. The local authority must ensure safe water is being delivered.

Remember the maintenance

The tank will need draining and cleaning out every few years or the water may require chemical treatment to remove organic build-up. The frequency will depend on how complete the pretank filtering is and whether there is a siphoning overflow installed to spill the debris from the bottom of the tank.

Filters also need replacing. The cleaner the water is before it gets to the filters, the longer the filters will last.

Rainwater tanks come in many different sizes, shapes and styles.