



# Collecting drinking water from roofs



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Collecting rainwater for drinking can be practical, money saving and sometimes necessary. For safety's sake, though, it's important to have the correct set-up that is regularly maintained.

**AN ESTIMATED 10%** of New Zealanders obtain their drinking water from rainwater collected from the roof.

If roof-collected water is clear and has little taste or smell, it is generally safe to drink. To ensure it is safe and does not become contaminated, precautions are needed and the system and storage tank regularly checked, cleaned and maintained.

### Be aware of contamination sources

The two types of contamination hazard are microbial or chemical. Microbial contamination is caused by faeces from birds, animals and insects, from dead birds and animals and decaying organic matter and when underground storage tanks are not sealed or protected from ground run-off.

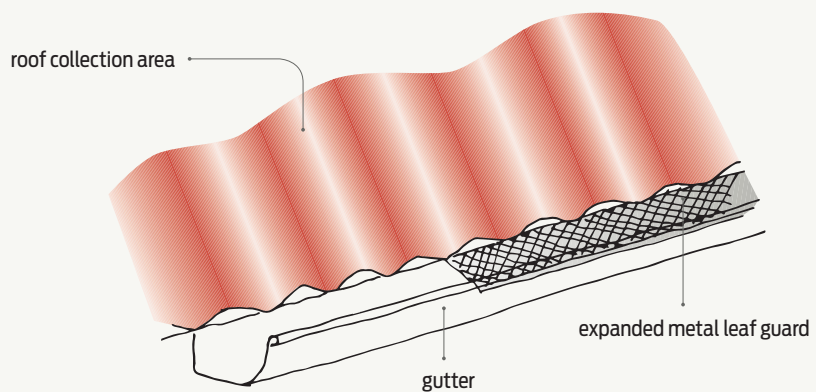
Chemical contamination comes from pesticides and spray drift, flue or chimney emissions, paint or other roof coatings, roofing materials such as lead flashings and traffic and industrial emissions.

Sediment will accumulate at the bottom of the tank and may contain high concentrations of chemicals.

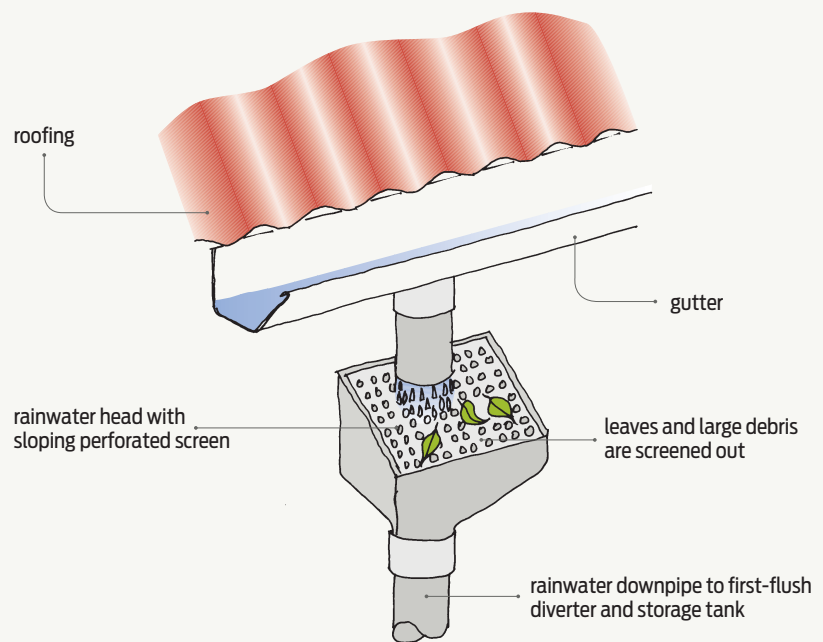
### Take precautions to avoid contamination

To minimise the risk of rainwater contamination:

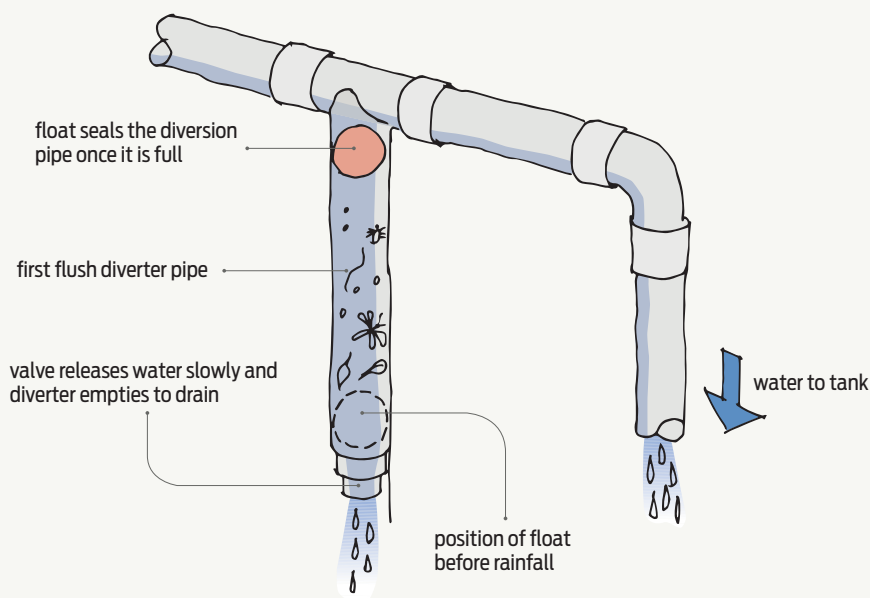
- ensure the roof surface is suitable for collecting potable water
- keep the roof clean and free of debris
- keep the roof catchment area clear of overhanging branches and therefore away from birds, rodents, possums and cats
- avoid installing a television aerial or other fixtures that may provide roosting for birds on the roof



**Figure 1** Leaf guard for gutters.



**Figure 2** Leaf screen fitted to downpipe.



**Figure 3** First-flush diverter.

- install mesh leaf guards over gutters to keep debris out (see Figure 1)
- install leaf screens to downpipes to keep debris out of the storage tank (see Figure 2)
- install a first-flush diverter to divert the first water from the gutter away from the storage tank (see Figure 3)
- install a system of finer filtration to remove smaller particles that are not removed by the leaf guard and screening systems
- if spray drift is anticipated, disconnect the pipes and do not reconnect them until the roof has been well washed by rain.

#### Storage tanks

To reduce contamination in the storage tank:

- install a calmed water inlet system to reduce sediment disturbance during heavy rainfall
- install the water intake near the water surface (where the water is likely to be the cleanest quality) using a floating intake (see Figure 4)
- attach insectproof screens or flap valves to the end of all pipes to keep insects out and ensure the tank is vented properly
- install an air gap to the overflow outlet to prevent stormwater backflow into the tank
- keep access covers closed to prevent access into the tank by insects, pests or debris

- if the storage tank is below ground, ensure that surface run-off from areas other than the roof catchment cannot get into the tank. Leave a new roof for at least one good rainfall before connecting downpipe to the storage tank.

#### A few do nots

Do not use collected water for drinking if it has been in contact with:

- uncoated lead flashings – lead flashings on existing roofs should be coated with suitable paint – coated lead is available for new roofs
- treated timber – chemicals leaching out might contaminate the water
- asbestos – although asbestos is no longer used in new building work, existing asbestos roofs should not be used for collecting rainwater
- bitumen, lead-based and other paints that do not meet required water quality standards.

#### Water catchment system

The water catchment system comprises the roof, gutters, downpipes, water storage tank and the pipework connecting the two.

Downpipes may be open, i.e. they can easily be disconnected if required (such as for roof cleaning or if contamination of water occurs), or sealed if the pipework remains full of water and cannot be easily disconnected.

#### Roofing materials

Roofs suitable for water collection for human consumption must meet the requirements of AS/NZS 4020:2005 *Testing of products for use in contact with drinking water* and may include:

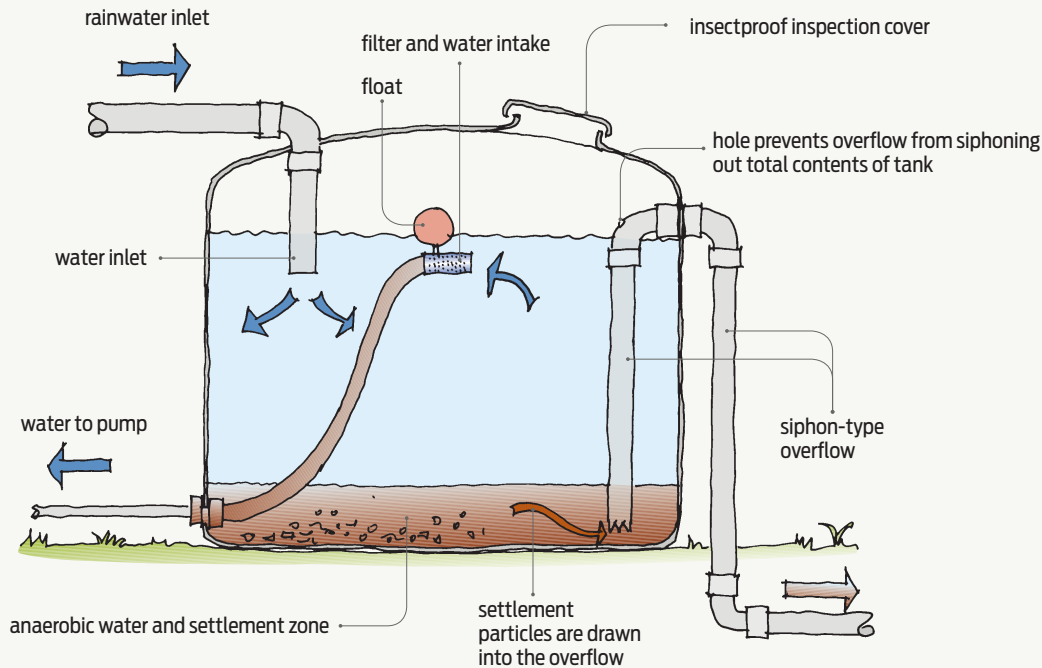
- unpainted zinc/aluminium alloy-coated or galvanised (zinc) steel
- factory-coated or painted zinc/aluminium alloy-coated or galvanised steel
- zinc
- stainless steel
- aluminium
- concrete or clay tiles
- untreated timber shingles – usually imported western red cedar
- butyl rubber
- asphalt shingles
- bitumen membranes.

Check with the manufacturer.

#### Tank materials

Tanks and pipework used for storing drinking water, even if only in an emergency, must be made from materials complying with AS/NZS 4020:2005.

Water tanks can be made of galvanised steel, zincalume (only if not in ground contact), fibreglass, plastic and concrete. When new, they may sometimes affect the taste of water. ➤



**Figure 4** Storage tanks.

A galvanised tank, for example, may initially cause a metallic taste, or a new concrete tank may release lime that increases the pH of the water and cause a slightly bitter taste.

The taste generally diminishes over time, and if the tank and pipework materials meet the requirements of AS/NZS 4020:2005, they do not present a health hazard.

#### Filtration systems

Filtration systems can be either a:

- point-of-use system, where the filter is attached to the inlet supply, a tap or plumbed in with a dedicated faucet
- point-of-entry system which is a centrally installed system to treat all water.

There are a range of filters including:

- mesh filters, including polyester, of various sizes to remove different types of particles
- carbon filters
- reverse osmosis filters
- UV sterilisers to kill bacteria.

Ideally, a filtration system should include several different types of filters.

#### First-flush diverter

First-flush diverters prevent the first rainfall, containing dirt, debris and contaminants from the

roof, from entering the storage tank by diverting it into a separate chamber (see Figure 3).

Once this chamber is full, the water feeds into the storage tank. There are different size chambers – the larger the roof area, the more rainwater initially has to be flushed away from the storage tank so the larger the chamber must be.

First-flush diverters are designed to empty themselves, but they should be checked regularly and emptied if necessary.

#### Inspect regularly and maintain

It is very important that inspections and maintenance are carried out regularly.

Every 3–6 months:

- inspect and clean gutters (if there are large amounts of leaf material or other debris, increase the frequency of inspections)
- before cleaning, disconnect the pipes that feed the storage tank if possible.

Every 12 months or more frequently:

- check the roof, remove debris as required and prune any overhanging tree branches
- check tank inlets, mesh covers and leaf filters, and clean and repair as necessary

- check the exterior of the tank and pipes for structural integrity, leaks and seepage – any damage should be repaired or the tank or components replaced
- check for evidence of access by animals, birds or insects, the presence of algal growth and accumulated sediment.

#### Tank cleaning

If the tank needs cleaning, it should be emptied, sediment removed, scrubbed and rinsed with clean water. Cleaning should generally be done by professional tank cleaners.

Sediment should be removed when required. This can be done without emptying the tank by siphoning, pumping, through a scour valve (if the tank has one) or by using a swimming pool vacuum cleaner.

#### Disinfecting storage tanks and pipelines

Tanks and pipework should be disinfected approximately every 18–24 months to reduce the algal growth. Use hydrogen peroxide or a household bleach containing sodium hypochlorite or calcium hypochlorite.

Calculate the amount of disinfectant required based on the volume of water in the tank and

according to the manufacturer's instructions. Dose the tank and leave for 30 minutes before running the dosed water through all household lines until clean water has come through all taps.


Another method of treating water is with UV light. A tube containing a UV bulb is inserted in the water. The light disrupts the DNA of micro-organisms so they are unable to reproduce. In order to be effective, UV light must pass through water that is relatively clear and free of particles, so a filtration system must be installed upstream of the UV light.

### **Roof maintenance and painting**

Roofs used as water catchments must not be painted with lead or chromium-based

paints. The use of paint containing white lead was banned in New Zealand in 1979, but some special-purpose, lead-based paints containing red lead are still available. These should be clearly labelled. Anti-rust primers sometimes contain chromium salts.

Most modern roof paints are labelled for their suitability if the roof is to be used as a water catchment, but if unsure, always ask the manufacturer.

The roof should be cleaned annually. Before beginning, disconnect pipes to the water storage tank so the water can be flushed away. Scrub the roof with a brush or broom and clean water. Clean and rinse through the spouting to remove dirt, debris and contaminants. 

## **Useful publications**

The Ministry of Health in association with the Health Promotion Agency has published resources on the safe collection and storage of drinking water from roofs, including:

- *Water collection tanks and safe household water*, available from [www.health.govt.nz/home](http://www.health.govt.nz/home)
- drinking water guidelines, available at [www.health.govt.nz](http://www.health.govt.nz).

The BRANZ Level website ([www.level.org.nz/water/water-supply](http://www.level.org.nz/water/water-supply)) also has information on:

- harvesting rainwater
- storing rainwater
- filtration and treatment.