

# RAINWATER TANKS

## 1 Household requirements

The main requirements for household water, and the number of litres people use on an average per day, are shown in Table 1 below. Only a small part of the total needs to be biologically and chemically safe.

Table 1: Household Requirements

Household Use	Main Requirements	Litres/Person/Day
Drinking	Biologically & chemically safe	2
Cooking and Food preparation	Biologically & chemically safe	3
Bathing/showering/cleaning	Biologically safe	100
Toilet flushing	Not discoloured or stain causing	80
Clothes washing	Not discoloured or stain causing	65
General use	No special requirements	100
	<b>TOTAL</b>	<b>300</b>

As well as using water for domestic purposes, some households may need water for gardening and stock watering. Typical volumes and quality requirements are shown in Table 2 below.

Table 2: Other Uses

Other Uses	Main Requirements	Volume/Day
Garden watering	Boron <sup>1</sup> and salinity not excessive	5 litres / m <sup>2</sup>
Stock watering	Not biologically contaminated by other stock	Up to 50 litres/stock unit

<sup>1</sup>Only a few plants in New Zealand are sensitive to boron, usually when grown in glasshouses.

These figures can be used to calculate total daily usage. For example, the total daily requirements for an isolated farmhouse with five people, 100 square metres of garden and troughs for eight head of dry stock (40 stock units) would be:

Five people @ 300 litres	= 1500 litres
100 m <sup>2</sup> @ 5 litres per m <sup>2</sup>	= 500 litres
40 stock units @ 50 litres per unit	= 2000 litres
<b>Total required</b>	<b>= 4000 litres per day</b>

## 2 How much water would I need for a natural disaster?

This depends on:

- how many people there are in your household; and
- how long it will take to restore the water supply network after a natural disaster.

Civil Defence recommends storing a **minimum** of three litres of water per person per day for three days – but this is just drinking water for survival.

You will need to store more water for cooking and hygiene – Civil Defence recommends having 20L per person per day of stored water for as long as the water supply system isn't working.

If you have a family of four and the water supply is out for two months, you would need to have stored around 4,800L. A rainwater tank that is connected to your roof guttering system would get replenished every time it rains, which means that a smaller tank could be enough.

### 3 Can I drink the water from my rainwater tank?

Yes you can – but you'll need to take a few simple precautions.

Rainwater can contain:

- leaves, soil and other debris
- bird, possum and other animal droppings
- heavy metals such as lead from your roof
- ash and chemical residues - for example, from agricultural spraying and vehicle emissions.

To protect your health, you'll need to ensure your rainwater system is properly set up and maintained.

#### ***Preventing Contamination***

To prevent leaves, droppings and other organic matter from contaminating your rainwater:

- Use a 'first flush diverter'. This is a simple, inexpensive device that fits to your tank inlet. It prevents the initial flow of contaminant-laden water from the roof entering the tank when it rains. Contaminants drain off to a suitably planted part of the garden or soakage area.
- Ensure the tank is tightly covered - this also prevents evaporation.
- Use a screen over the tank/s inlet pipe to keep out insects, birds and animals.
- Install covered rainwater-collecting gutters to prevent debris from entering your water tank.

A leaf filter helps keep your rainwater tank free from contamination



#### ***Roof materials***

Some roofing materials aren't suitable for rainwater collection. Check with the manufacturer.

If there's lead, chromium or cadmium in the roof materials, soldering, flashings, paint or any other part of the roof, you shouldn't collect rainwater from the roof.

Rainwater can also react with uncoated metal roofs, so any metal roof should be painted (using a roof paint that is labelled 'suitable for potable water supply') before rainwater is collected.

See the diagram below for an example of a well setup rainwater tank system



### ***Pipework and Connections***

Water that is not supplied from a full-scale municipal treatment plant is often corrosive.

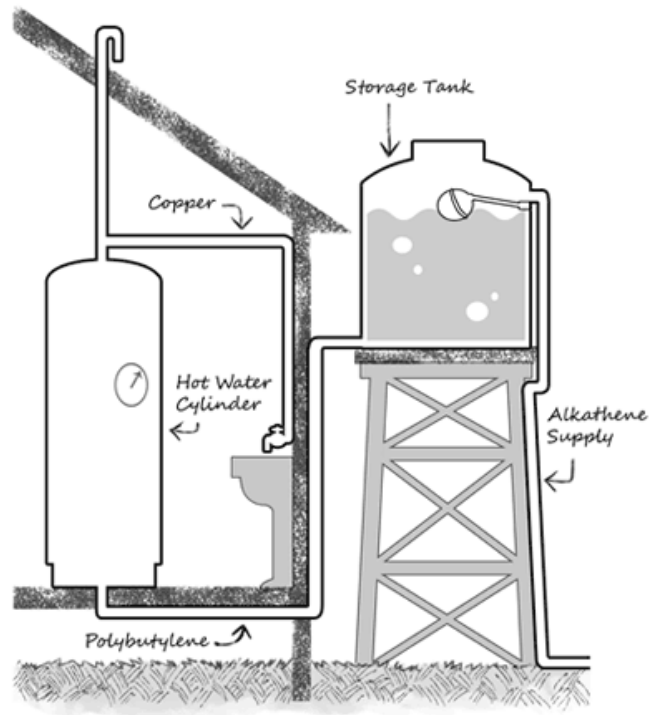
As corrosive water can leach out metals from metallic pipes and fittings, you may need to use plastic pipes and valves for cold water.

The most commonly used plastics are unplasticised polyvinylchloride (UPVC), low density polyethylene (LDPE e.g., alkathene), medium density polyethylene (MDPE), high density polyethylene (HDPE) and polybutylene.

Select your pipe according to cost; availability; resistance to handling, trenching and superimposed loads; flexibility and ease of laying; ease of connection and resistance to frost. Roofing, guttering, downpipes and pipework used in conjunction with drinking water should comply with AS/NZS 4020: *Testing of Products for Use in Contact with Drinking Water*.

While an experienced master plumber or plumbing goods supplier should be able to give you useful advice, a low-cost quality system might consist of low density polyethylene pipe, approximately 20 mm internal diameter for main runs and 15 mm internal diameter for spurs. For long runs or high flow, a 25 mm pipe connecting the source and the house may be desirable.

The pipe should be buried (at least 400 mm) from the source to the storage tank, followed by reticulation, to and throughout the house, of polybutylene for cold water and copper or copper and polybutylene for hot water.



#### 4 Treating and purifying water for drinking

If you want to drink your rainwater or use it for any household use other than flushing the toilet and washing clothes, you'll need to treat it or purify it. Options include:

- adding chlorine
- using a filter or purifier
- boiling the water for one minute
- ultraviolet light treatment.

This will involve added costs. The following can provide guidance and requirements on water treatment:

- Public Health Service in the White Pages
- Ministry of Health' website
- Your rainwater tank supplier
- Civil Defence website

#### 5 Testing

You can have water tested by a specialist water-testing laboratory. In the Ruapehu District water samples can be referred through Veolia Water.

Veolia Water  
 59 Marsack Road  
 Taumarunui  
 Phone: 07 8958026

Further information on fees and collection technique can be sought through Veolia.

## 6 Maintenance

Regular maintenance is vital especially if you use rainwater for household use. Maintenance should include:

- (a) desludging your tank yearly, using the sediment removal tap at the base of the tank, if there is one - this takes about 20 minutes
- (b) checking the roof and guttering for debris
- (c) keeping the roof clear of overhanging vegetation
- (d) making sure your roof remains clean, especially from bird droppings
- (e) regularly checking and maintaining screens and filters
- (f) washing out the first flush diverter every six months or so, depending on your rainfall (this only takes 10 minutes)
- (g) checking the condition of the tank's pipes, fittings and structural supports and inspecting the tank for cracks and leaks, particularly before it gets dry over summer.
- (h) servicing any sterilisation equipment (as recommended by the supplier).

It's also a good idea to drain and clean your tank every so often. How often depends on what gets into your tank, and on how often you remove sludge and sediment. Every five years is recommended.

## 7 Storage tanks

The storage tank, an important part of your system, is usually situated 2 to 4 metres above the level of the highest outlet, either on a tank stand, the house roof or on adjoining level ground. Alternatively, the storage tank may be at or below ground level with a pumped feed to the house.

When selecting and locating a storage tank, you should consider:

- location, elevation and size
- materials used in building the tank - use materials suitable or approved for drinking water
- how to inspect buried tanks for cracks or holes
- safety during earthquakes
- how the tank will be cleaned out
- inaccessibility by vermin, mosquitoes, midges and other insects, etc.
- keeping light out of the tank so algae can't grow.

A large tank will provide plenty of storage should your supply fail for a short period. A long retention time in the tank also allows some water contaminants to settle to the bottom.

As water weighs 1 tonne for every 1000 litres it is recommended that storage tanks should be adequately secured to prevent them causing damage to either your house or to your neighbours' properties during earthquakes or high winds, and should be adequately supported at all times.

Talk to your rainwater tank supplier for the best way to secure your tank.

### ***What can a rainwater tank be made of?***

The most common tank materials include plastic (polyethylene), concrete, fibreglass, timber and steel. The type of material you select depends on your budget, the size of tank, water use and whether the tank will be sited above or below ground.

Modern steel tanks have a long life polymer coating on the inside and a wide range of shapes and sizes are available. There are a range of slim-line designs suitable for urban sections available. Timber tanks have a plastic bladder liner, and generally come in larger sizes.

Concrete and fibreglass tanks are strong and long-lasting. Plastic is tough, durable and relatively lightweight, and – like steel – there are a wide range of sizes and shapes suitable for urban environments.

If the tank is going to be used for drinking water (even just in an emergency situation), the material that it is made from must comply with potable water requirements under AS/NZS 4020 'Products for use in contact with drinking water' and with AS/NZS 2070 'Plastics materials for food contact use'.

### ***In-ground tanks***

Consult a structural engineer if you are considering placing the tank in the ground.

### ***Types of tanks***

- **Polyethylene tanks:** Commonly known as 'poly' tanks, these tanks come in many sizes and colours and are suitable for both above and below ground use. They last a long time, are UV-resistant, cost less than metal tanks and, because of their lightweight construction, are easy to transport
- **Metal tanks:** Metal tanks are light and easy to transport, are suitable for above or below ground use, can be custom made and are usually corrugated or straight rolled. They can be made from a variety of metals including:
  - Galvanised steel - zinc-coated Z600 steel (prone to rusting)
  - Aquaplate or Colorbond - coloured polymer-coated steel (lasts longest)
  - Zinalume - silver-coloured zinc/aluminium-coated steel (prone to rusting)
  - Copper and stainless steel - used for specialised applications
- **Concrete tanks:** Concrete tanks can be built above or below ground. They're usually made on site and are durable and long lasting. However, they can sometimes crack – especially when they are below ground in clay soil. They're good for preventing algal growth (light can't penetrate) and they keep water cool. Concrete tanks are generally only available in large sizes – over 9,000 litres
- **Fibreglass tanks:** Fibreglass rainwater tanks are resistant to chemical corrosion and are suitable for both ground and stand installations. They are tolerant of extreme temperatures, come in a large range of colours and sizes and, because of their lightweight construction, are easy to transport. Fibreglass tanks can be more expensive than other varieties
- **Bladder tanks (or pillow tanks):** Bladder tanks are made of flexible and durable PVC and are designed to fit under floors and decks. They utilise previously wasted space rather than garden space. The ground that the bladder tank sits on must be flat
- **Timber tanks:** Timber tanks have timber exteriors (including a roof) with a plastic lining. Smaller tanks can be erected by the homeowner. They are available in a wide range of sizes

## **8 How much do tanks cost?**

Rainwater tanks come in a variety of sizes and prices. A tank of less than 1,000 litres in size may be available from your local hardware store with most tanks available to order online. See your local Plumber for further information.

A 200L rain barrel typically costs around \$100–\$200. A 25,000L rainwater tank can cost over \$2,000. Installation costs (for example leaf guards, first flush diverters, earthworks, pumps for indoor use) and transportation costs are extra. See your local Plumber for an estimate of installation costs.

## 9 Do I need planning or building consent?

A building consent is required if you are planning to connect your rainwater tank to your toilet or laundry. All plumbing must be carried out by a registered plumber and must comply with the New Zealand Building code. This is to ensure that the pipe entry to your house is properly sealed and that rainwater from your system can't enter the mains water supply.

Otherwise, you probably won't need a building consent, although this depends on a few criteria such as height and boundary limits if you are planning to put your rainwater tank on an elevated platform. Check with your local council first.

## 10 Does it need to be installed by a professional?

Not necessarily. If you are connecting a rainwater tank to your toilet or laundry, the tank will need to be installed by a qualified tradesman and a building consent is required. Otherwise, most installations can be done by the homeowner – check with the supplier of your rainwater tank.

## 11 Other considerations

### *Pumps*

Gravity-fed systems (without need for a pump) will need the barrel or tank on a stand. Because a litre of water weighs a kilo, a rainwater tank stand needs to be fairly robust, and should be concreted into the ground. It will need to be over 30cm and less than one metre high – tanks on stands over one metre high generally require a building consent.

A rainwater system supplying the house will need a pump to operate. Pumps are used to bring water up to points higher than the point it is being taken from, or to boost pressure so water can flow over flat gradients.

The most common type of pump used for small water systems is the centrifugal pump.

A pump supplier can advise you on the type and size of pump required. Make sure you give the supplier all the information needed to make the calculations. This includes:

- height difference between the pump and the water surface from where the water is taken
- height difference between the pump and where the water is to go, or the highest point along the way
- for online pumps: the maximum flow rate required through all possible outlets and the minimum pressure required at the outlet points
- for storage tank pumps: the daily flow out of the tank; refer to **Section 1 Household requirements**
- internal diameter and type of pipes intended for use
- total length of pipes for both the suction and discharge sides of the pump.

It may be necessary for you to pump to another tank that will gravity feed through the system. Alternatively, you could operate a pressurised line with a pressure switch to control the pump.

### *Overflow*

There is a risk of overflow from rainwater tanks that are poorly installed or aren't big enough to cope with runoff from the roof. Overflow needs to be contained on your property or diverted to the stormwater system. Otherwise, overflow from your tank could damage your property and neighbouring properties, especially in built-up areas. If damage occurs, you could be liable.