

# USING RAIN WATER

## Too little water? Too much water?

In Waitakere City rainwater is collected in dams, owned by *Watercare Services Ltd.* It is then treated, and pumped to individual households via EcoWater Solutions the Council-managed supply network. We collect rainwater from a relatively small area and distribute it over the entire urban area of the city.

The main reason for introducing a water supply network was to provide a growing city with safe clean drinking water to protect public health. Currently we are in a situation where demand threatens to exceed supply. As well as evaluating expensive alternatives (like a pipeline from the Waikato) we need to question our wasteful use of drinking quality water.

At the same time there is another extensive pipe network (the stormwater system) taking unwanted water away from our urban areas and disposing of it into our streams and harbours. This water is often contaminated, because it picks up vehicle pollutants from roads and sediment from soil erosion.

Both water supply and stormwater systems cost a lot of money to maintain and will need costly upgrades over the next years. It is a good time look at our current practices and identify more sustainable ways of supplying our city with water.

Collecting water on-site for use in the home and garden is one way to reduce the pressure on the city supply. Some people will have access to stream or spring water, or be able to drill into an aquifer, but for most of us the practical option is rainwater collection off our roof. Many Waitakere City residents installed roofwater tanks during the supply crisis of 1996.

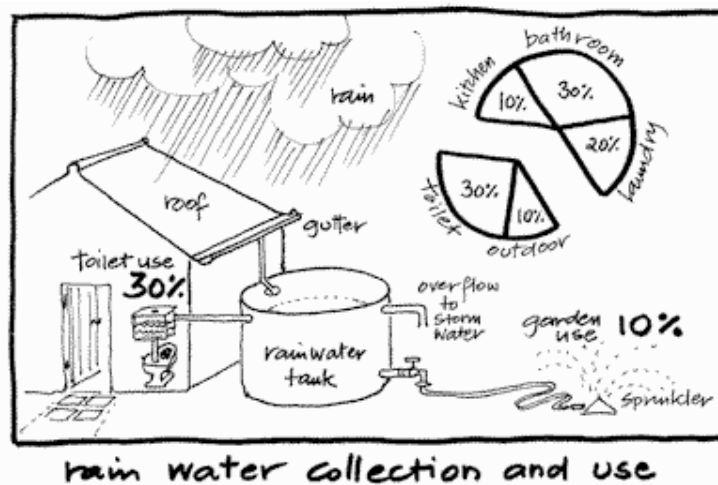
### Did you know?

- Waitakere City buys 13 billion litres of drinking quality water from Watercare Services Ltd to distribute to the community each year. At the same time the average total rainfall in the city is about 150 billion litres. It's not so much the availability of water that's a problem – it's the cost of providing the capacity to collect, treat and distribute it.
- Collecting and using your own rainwater will not only reduce the pressure on the water supply, but also reduce the amount of stormwater that needs to be disposed of from your property. This can reduce flooding downstream and save money on pipes and erosion control.
- You only need about 5 litres of drinking quality water for each person a day, for cooking, drinking and food preparation. The rest - about 170 litres per person in an average household - is used for toilets, showering, washing, the garden and other uses

## To drink or not to drink?

Many New Zealanders, especially in rural areas rely on tank-water for all their uses. They take responsibility for ensuring their supply is safe by cleaning and maintaining their system, using filters or water treatment systems to control water quality. In urban areas the city supply was established to provide guaranteed clean and safe water to city dwellers.

Council recommends that you use the city supply, where available, for drinking water. You may, however, be outside the supply area, or you may not want City Supply for your own reasons. If so, there are ways of ensuring that your roof-water supply is safe. Good set-up and maintenance of the collection and distribution system are generally more important than treatment methods. Remember that the responsibility of ensuring that your tank-water is safe lies with you.

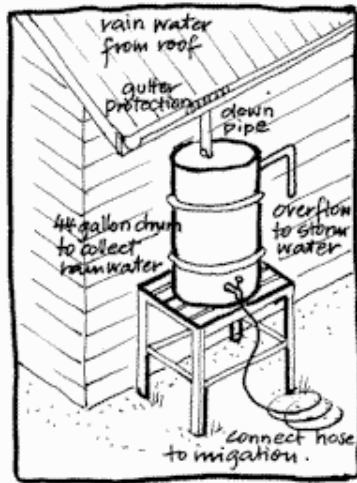


Roof-water collected in a water tank can more easily be used for non-drinking purposes. About 30% of a home's water use is for toilet flushing and another 10% is used on the garden. By setting up a relatively cheap and simple collection system for these two uses alone, you can reduce your water consumption by 40%. At current water prices this is about \$100 worth a year for a typical three-person household.

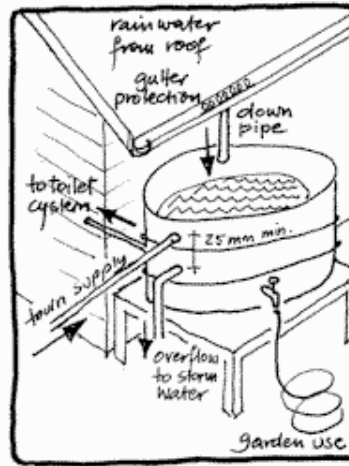
## Collecting roof-water for non-drinking uses

### Toilet and outdoor use:

An easy water-saving option is to collect water for outdoor use and toilet flushing. The options vary from simple 44 gallon drums under your downpipes for garden use, to complex systems involving pumps and filters. By raising the drums off the ground by about one meter (you can buy special stands or build one) the pressure head will be sufficient to operate a low pressure gravity fed irrigation system. This is also an excellent method of using the roof water of garages, garden sheds and other small buildings. Keep your system as simple as possible. The payback period may be up to six years, but would be much less if you use drums or water a large garden.



Using 44 gallon drums to collect rainwater for garden use



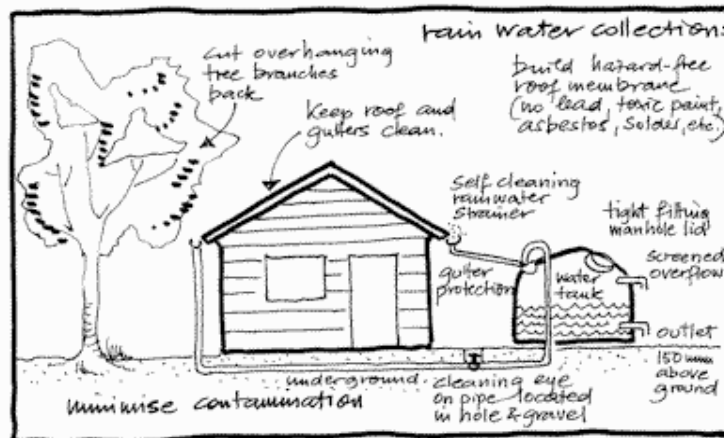
Using roofwater for toilet and garden, with town supply backup and an air gap for backflow prevention

### Washing machines:

You can also easily use rainwater for washing machines. Rainwater can be gravity fed from a tank to the machine, and from there it could be re-used for toilet flushing before it is discharged into the sewer. See *Wastewater* for a detailed description.

### All non-drinking uses:

If you want to use the city supply for drinking water only, but roofwater for all other uses, you can connect the cold water kitchen tap to the town supply, while using tank-water for all other uses. In this case you should still ensure that your tank water is reasonably clean, because it will be difficult to ensure that nobody drinks from other taps in the house.



Minimising contamination of drinking water (adapted from *Caring for Your Rain Water Supply* - Southland District Council)

## Ensuring that your tank-water is safe to drink

A common-sense approach should be taken to water quality for drinking purposes. There are many possible contaminants (natural and artificial) that can enter your tank water, but many thousands of New Zealanders drink untreated tank water with

few problems. However some people are more sensitive to contamination than others, especially infants, the elderly and sick.

There are many steps you can take to reduce the risk of contamination of roof-water. The following paragraphs outline different options It is the responsibility of the individual to choose appropriate methods.

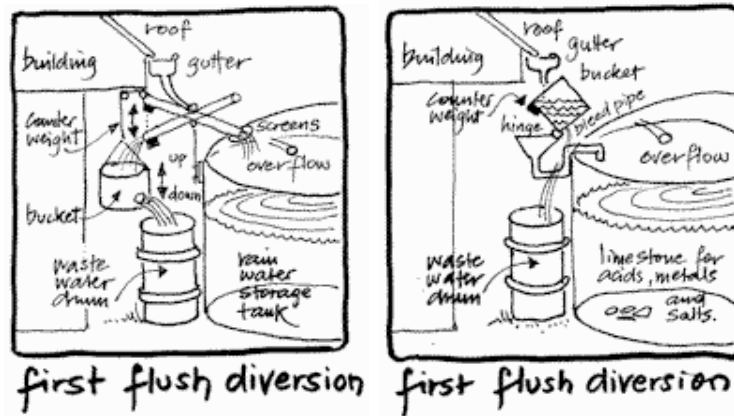
#### **Roof, pipe-work and storage materials:**

- collect drinking water only from non-toxic roof surfaces. The roof should not have lead, chromium or cadmium in its paint, nails, flashings or soldering. Paints used for roofs should be labelled "suitable for potable water supply," as should pre-finished roofing materials. Also avoid bituminous or porous surfaces. The same applies to pipe and storage materials.
- rainwater is slightly acidic because CO<sub>2</sub> from the air is dissolved in it. This means that it can react with and leach uncoated metallic roofs. Such roofs need to be pre-coated or painted.
- concern has also been raised about the suitability of PVC pipes for water collection, because of the possibility of chemicals leaching from PVC. Good alternatives are polybutylene and polyethylene. Use the latter in areas of high exposure to UV light.
- keep the distance the water has to travel to a minimum to reduce the risk of degradation.
- underground lines to the water tank are more difficult to clean and maintain and should be avoided if possible. Maintenance is made easier by running the water pipe in a duct (for example a 4-inch pipe inside a 6-inch pipe). Pipes should have a constant gradient if possible to avoid stagnant water forming.

#### **Organic matter and other contaminants:**

Plant matter, animal droppings and any dust or dirt contained in the air can contaminate roof water. The following steps will reduce this risk:

- you can fit self-cleaning rainwater strainers to all downpipes connected to the tank or at the inlet of the tank. These need to be maintained from time to time.
- first flush diversion devices will reduce contamination drastically, because the first rinse of the roof when it starts raining is discarded.



Two methods of first flush diversion (adapted from *Permaculture - a Designers Manual*)

- the inlet from the downpipe to the water tank should be easily detachable. This ensures that you can discard the water when you clean or paint the roof and pipes.
- animal access to the roof can be reduced by maintaining a gap of at least two metres between tree branches and the roof, and by avoiding aerials that overhang the roof.
- if you live next to heavy industry, a busy road (or a metalled road treated with dust suppression chemicals), or an area where agricultural sprays are used, it is better not to collect your rainwater for drinking.

## How much water will I get off my roof?

In the drier areas of Waitakere City the roof of a 120-square-metre house will give you a little over 110,000 litres of water in a dry year. For a four-person household this is 75 litres per person per day (the recommended minimum is 90 litres, the average use about 200 litres). In the Waitakere Ranges you can expect to collect nearly twice as much, but conserving water is still important especially over the drier summer months. Households dependent on roof-water for all their needs generally use much less, because relatively easy changes to the way you use water can achieve significant savings (see *Saving Water*).

To work out how much water your own roof will collect in a year, find the average annual rainfall from the map on the next page. To allow for drier than usual years we calculate for only two thirds of these values, and then assume another 10% is lost to evaporation, spillage and first flush diversion:

$$\text{Total Water (litres)} = \text{Roof Area (m}^2\text{)} \times 0.66 \times 0.9 \times \text{Mean Annual Rainfall (mm)}$$

This is a cautious estimate - most of the time you will have a lot more water. The size of your tank will determine how well you will last over a dry period. A smaller household should get by on a 25,000 litre (5500 gallon) tank. A larger household will need two. You should probably allow for enough storage to last for 30 days.

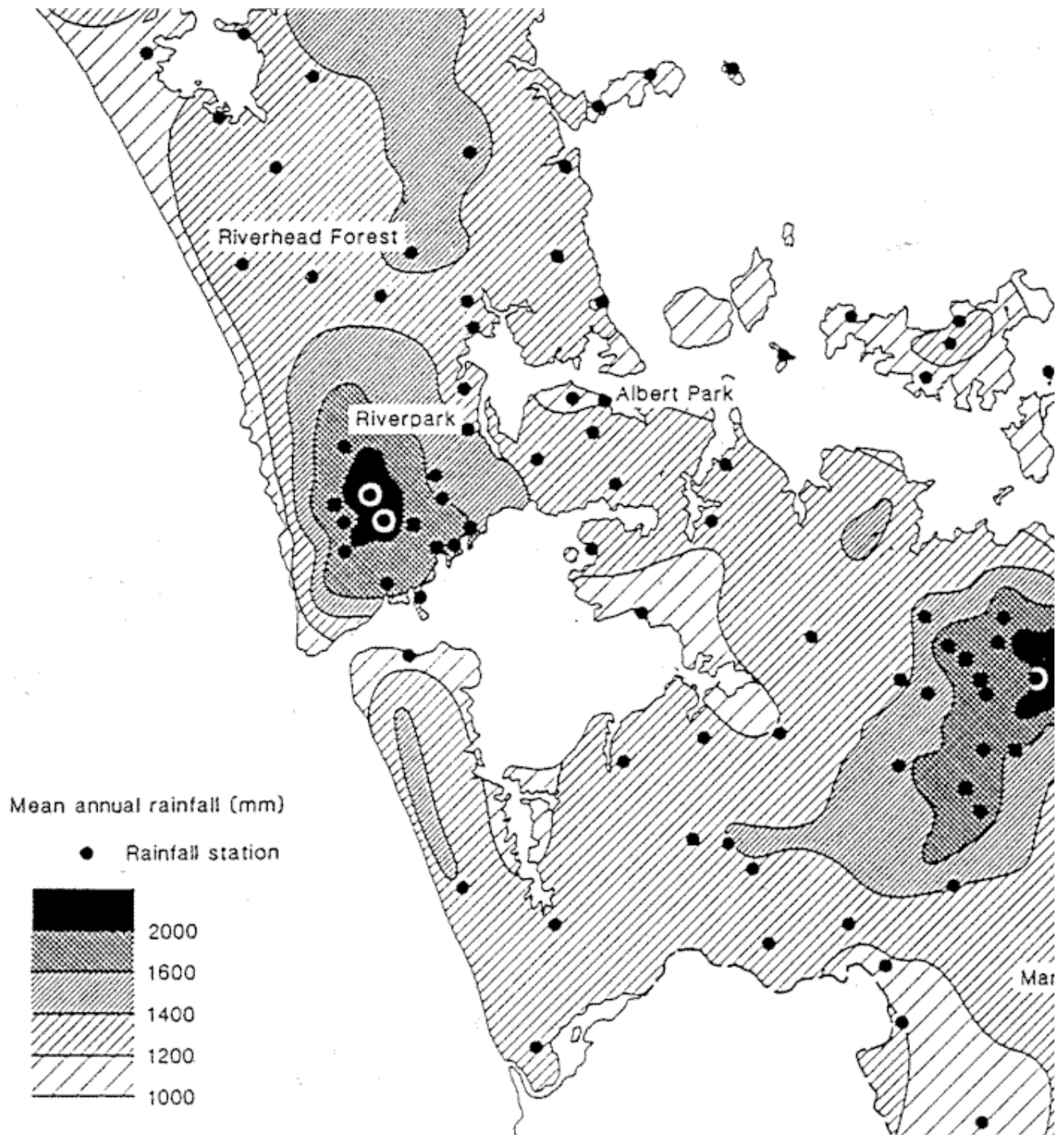
You might also weigh up the cost of installing an extra tank with that of buying extra water by tanker in case you do run out. One option is to start with one tank and to retrofit a second one if it proves necessary.

Of course, if you are also connected to the town supply, you can top up your tank whenever necessary. If you are planning to use tank water for only some uses the following table will give you an idea of average daily water usage. For outdoor and toilet use only, a tank of 4550 litres (1000 gallons) would be reasonable.

Outdoor Use	11 litres
Toilet	42 litres
Shower and Bath	53 litres
Laundry	34 litres
Dish-washing	10 litres
Other Taps	23 litres
<b>Total</b>	<b>173 litres</b>

Typical water use per person per day (Domestic Water Survey, Waitakere City Council, 1997)

The following graphic is a rainfall map of the Auckland area, it is a large file and will take a while to load.



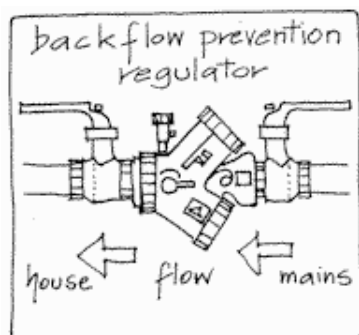
## Ensuring that your water supply is safe and legal

Bad plumbing can threaten the health of your family - and even that of the whole community. All plumbing should therefore, be done by a qualified plumber. It is a good idea to find a plumber who understands exactly what you want and who will be available to maintain and repair the system if needed.

Generally a pump is used to deliver the water from the tank to the house. Better still you might be able to raise the tank enough to gravity feed the water, especially if you are only using it for toilet flushing and garden irrigation.

You will need a 'minor works consent' from the Council for all plumbing. Special care needs to be taken if you use an alternative supply in combination with the town supply to prevent the water from your own supply or system entering the town supply when there is a pressure drop in the town supply.

This is called "backflow prevention." Some common situations that require backflow prevention are a tank that is topped up by the town supply or a toilet cistern that is connected to both roof-water and the town supply. There are several options for this and Council and your plumber can give you further advice. You could for example instal a double check valve at your boundary. This would need to be serviced once a year.



#### THE RULES

- All sanitary plumbing (this is most plumbing) requires a 'minor works consent' from the Council.
- A full water tank is very heavy, so it needs to be sited on stable ground and special care should be taken in a stability-sensitive area.
- You will need a building consent if your water tank:
  - exceeds 25,000 litres;
  - exceeds 2,000 litres and is supported more than 2 metres above the ground;
  - exceeds 500 litres and is supported more than 4 metres above the ground.
- For tanks exceeding 5000 litres or 2.5 metres in height, a resource consent might be needed. Council should be contacted for details.

## Other rainwater opportunities

Your roof is your best water collection device - it is reasonably clean and controllable and the water can be fed to tanks and taps by gravity. However, you can also harvest the rain that falls onto your garden, driveway and other outdoor surfaces.

Even though water from your driveway will contain contaminants from your car, it is quite safe to use on your garden. Contamination can be reduced by ensuring your car does not drip oil and by avoiding other spills, such as, paint or petrol. You can create water features, such as small streams and ponds to divert the water to where

it can be used to irrigate the garden. These features can be simple or quite elaborate (See the [Gardening with Water](#) section).

## Further information:

### Books and publications:

*Household Water Supplies* - N.Z., Ministry of Health, 1997

*Water Cycle Strategy*, Waitakere City, 1997. Available from Waitakere City Council, Private Bag 93109, Henderson, Waitakere City, phone: 09 839 0400

*BBE NO. 10 - Water* (available from the Building Biology and Ecology Institute of New Zealand: PO Box 35921, Browns Bay, Auckland; phone: 09-4793161)

*The Self-sufficient House*, Brenda and Robert Vale, Macmillan, 1980

Also check your local library for further resources.

### Advice at Waitakere City Council:

Eco-friendly Building 836 8000 Ext. 8365

Building Consents 839 0400

Planning and Resource Consents 836 8013

Leaks and General Water Enquiries 839 0400

Water Quality and Laboratory 836 8000 Ext.8670

Further information can be obtained from the contributing writers for this chapter of Waitakere City's Sustainable Building Sourcebook.

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