Rainwater Tanks Sizing and Selection

Why should I install a rainwater tank?

The capture and storage of rainwater run-off from roof areas can provide a valuable water source for toilet flushing, car washing, laundry use and garden irrigation.

A rainwater tank for garden irrigation means you can keep your garden green for most of the year.

The benefits of harvesting rainwater are three fold. Rainwater for use in the house and/or garden:
- reduces mains (potable) water consumption (saving on water bills)
- reduces the quantity of pollutants in stormwater entering local waterways
- protects local waterways from high storm flows by reducing stormwater volume.

What are the types of rainwater tanks available?

Rainwater tank suppliers will be able to advise you on the most suitable tank type based on your home and water requirements.

Rainwater tanks are available in a variety of materials including galvanised steel, plastic, concrete and fibreglass and bladders.

Galvanised steel

Traditionally rainwater tanks were made from galvanised steel. Galvanised steel tanks now come with rust resistant coatings including Aquaplate® and Zincalume®. Plain metal tanks are typically made with Zincalume® and coloured tanks from Aquaplate®.
Care must be taken when cleaning tanks with theses coatings. Galvanised steel tanks are generally less expensive but require a concrete base or stand.

Plastic

Plastic tanks are made from UV resistant polyethylene. Plastic tanks are the now the most popular rainwater tanks for households due to their lightweight material and variety of available shapes, sizes and colours. Plastic tanks require a sand base.

Concrete

Concrete tanks are extremely strong and most suited to large and underground applications.

Fibreglass

Fibreglass tanks are strong and have the longest life span of all tanks. They are also the most expensive.

Bladders

Bladders are water storage vessels that can be stored under the house or veranda. They are made from a puncture resistant PVC material and sit in a steel frame supported by geo fabric. They are a space saving way to store rainwater.

Rainwater Tank Sizes

What size tank do I need?

The size and type of rainwater tank that should be installed depends on:

- Total water demand. This depends on the number of people living in the household, rainwater uses and household water behaviours.
- Roof catchment area
- Rainfall characteristics
- Cost
- Available space

As urban rainwater tanks typically provide a supplementary source of water, the size of the tank is primarily a balance between the intended water uses and the cost of the tank.

Indoor uses (toilet and laundry) require a reliable water supply. Rainwater tanks supplying these areas should include a mains (potable) water top up that add potable water to the rainwater tank when the water level is low (due to dry conditions or increased demand).   In addition, the plumbing should allow the tank to bypassed in the event of pump or power failure to ensure continued water supply to the house.

Rainwater tank sizing graphs

The following graphs can be used to size residential rainwater tanks and consider:
- roof area
- rainwater uses (demand)

The graphs were developed by a modeling program called MUSIC, using historical Melbourne rainfall data and have been provided for use by the City of Melbourne.

Rainwater for General Use - Graph 1: is used for sizing rainwater tanks where expected residential rainwater demand is calculated.
If your water use is not considered average or you would like to use rainwater for a combination of uses, Graph 1 is best for determining a suitable tank size.

Rainwater for Toilet Flushing - Graph 2: is used for sizing rainwater tanks where rainwater is used for toilet flushing and average demand values can be safely assumed.

Rainwater for Outdoor Use - Graph 3: is used for sizing rainwater tanks where rainwater is used for outdoor use and average demand values can be safely assumed.

Rainwater for General Use

Rainwater demand can be collected from meters or estimated using a water usage calculator.

Water usage calculators available include:
City of Melbourne Watermark Calculator:
http://www.melbourne.vic.gov.au/rsrc/PDFs/Water/CalculatorWaterMark.pdf

South East Water Ready Reckoner -
http://www.southeastwater.com.au/forms/watersewage_readyreckoner.asp?area=edu

Note: When using calculators to determine rainwater demand, be sure to only include your intended rainwater uses (e.g. toilet flushing, outdoor, laundry etc).

Steps to calculate rainwater tank size based on calculated demand :
1. Determine the roof area (m^2) available for catching rain (this may be the total roof area or only a proportion).
2. Determine the rainwater demand (Litres/day) using a water calculator.
3. Calculate the rainwater demand per $100m^2$ of roof area **Rainwater demand / $100m^2$ roof area = Rainwater demand (L/d) x (100 / roof area)**
4. Determine level of reliability required (the percentage of the time the rainwater meets demand).
5. From the graph determine 'Tank size as % of roof'.
6. Calculate rainwater tank size **Rainwater tank size (kL) = (roof area x tank size as a % of roof area)/100**
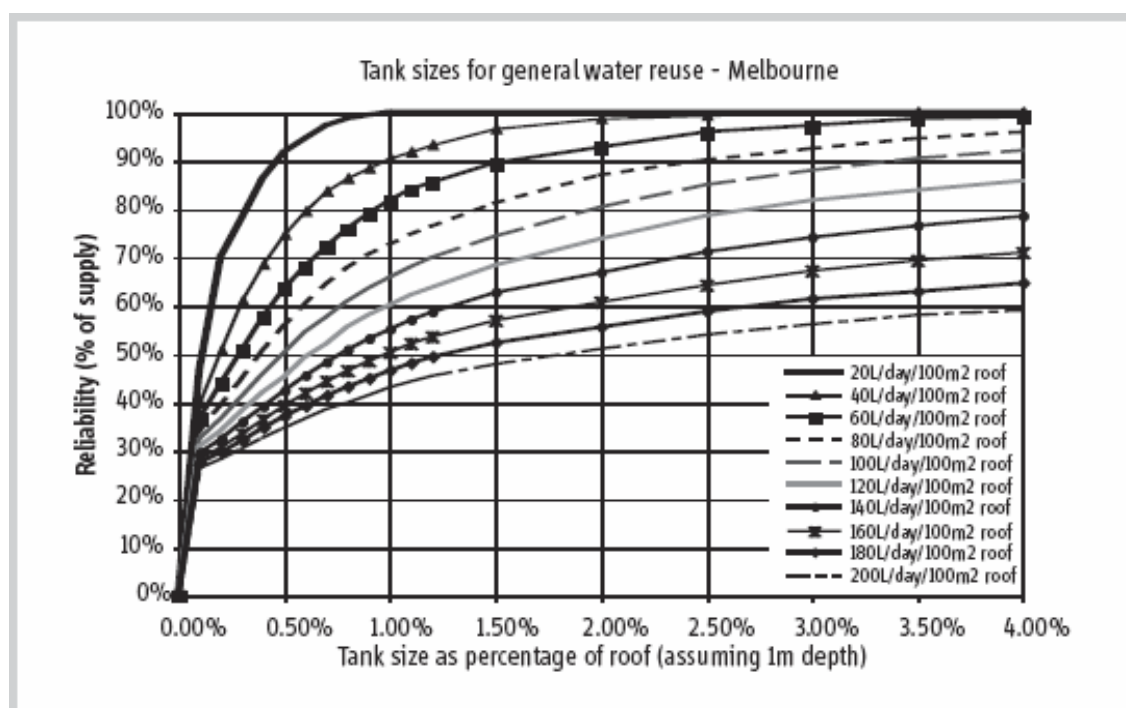
Graph 1: Tank Sizes for General Use

Rainwater for General Use

Example: Isabella would like to install a rainwater tank for toilet flushing and laundry use. She has estimated her demand as 80 litres per day (40 litres for laundry and 40 litres for toilet). Her house has a roof area of 200m^2 and would like the rainwater tank to be reliable 90% of the time.
1. Roof area available for catching rain = 200m^2 (assuming you can collect rainwater from all areas of the roof)
2. Rainwater demand = 80 Litres /day
3. Rainwater demand / 100m^2 roof area = 80 x (100/200) = 40L/day / 100m^2 roof
4. Level of reliability required 90%
5. From graph 'Tank size as % of roof area' = 1.0
6. Rainwater tank size (kL) = (200 x 1.0)/100 = 2kL (or 2,000 litres)
On average a 2,000 litre tank would supply 90 percent of toilet flushing and laundry water demand for this household.

Your rainwater tank sizing calculations for general use:
1. Roof area =
2. Rainwater demand =
3. Rainwater demand / 100m^2 roof area =
4. Level of reliability required =
5. From graph 'Tank size as % of roof area' =
6. Rainwater tank size (kL) =
Notes:

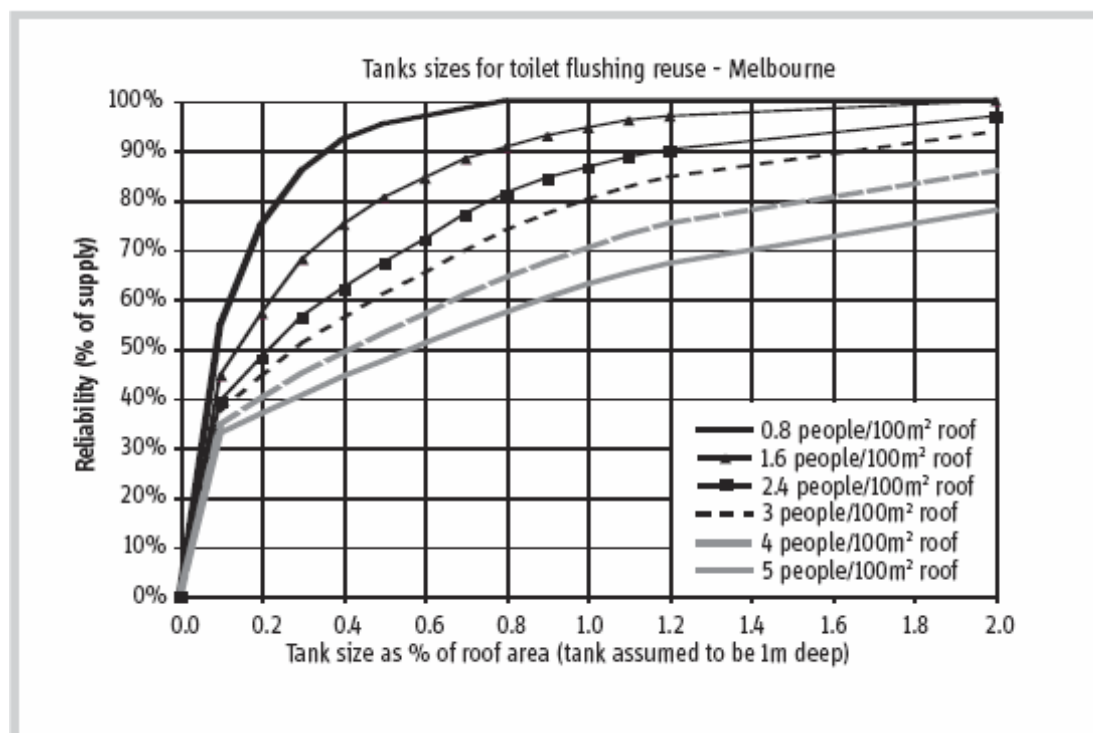## Rainwater for Toilet Flushing

Rainwater for toilet flushing provides a constant yearly demand and maximises the use of the tank.

Steps to calculate rainwater tank size for toilet flushing:
1. Determine the roof area (m^2) available for catching rain (this may be the total roof area or only a proportion).
2. Calculate the number of people per 100m^2 of roof area.   **No people / 100m^2 = (No of people x 100) / available roof area**
3. Determine level of reliability required (the percentage of the time the rainwater meets demand).
4. From the graph determine 'Tank size as % of roof area'.
5. Calculate rainwater tank size   **Rainwater tank size (kL) = (roof area x tank size as a % of roof area) / 100**

Graph 2: Tank Sizes for Toilet Flushing

Rainwater for Toilet Flushing

<table>
<tr><td colspan="2">Example: Joshua would like to install a rainwater tank for toilet flushing. He lives in a four person household with a roof area of 200m^2. He would like the rainwater tank to be reliable 90% of the time.</td></tr>
<tr><td>1.</td><td>Roof area available for catching rain = 200m^2 (assuming you can collect rainwater from all areas of the roof)</td></tr>
<tr><td>2.</td><td>Number of people per 100m^2 of roof area = (4 x 100) / 200 = 2 people per 100m^2</td></tr>
<tr><td>3.</td><td>Level of reliability required 90%</td></tr>
<tr><td>4.</td><td>From graph 'Tank size as % of roof area' = 0.95</td></tr>
<tr><td>5.</td><td>Rainwater tank size (kL) = (200 x 0.95)/100 = 1.9kL (or 1,900 Litres)</td></tr>
<tr><td colspan="2">On average a 1,900 litre tank would supply 90 percent of toilet flushing demand for this household.</td></tr>
</table>

<table>
<tr><td colspan="2">Your rainwater tank sizing calculations for toilet flushing:</td></tr>
<tr><td>7.</td><td>Roof area =</td></tr>
<tr><td>8.</td><td>Number of people per 100m^2 of roof area =</td></tr>
<tr><td>9.</td><td>Garden area / 100m^2 roof area =</td></tr>
<tr><td>10.</td><td>Level of reliability required =</td></tr>
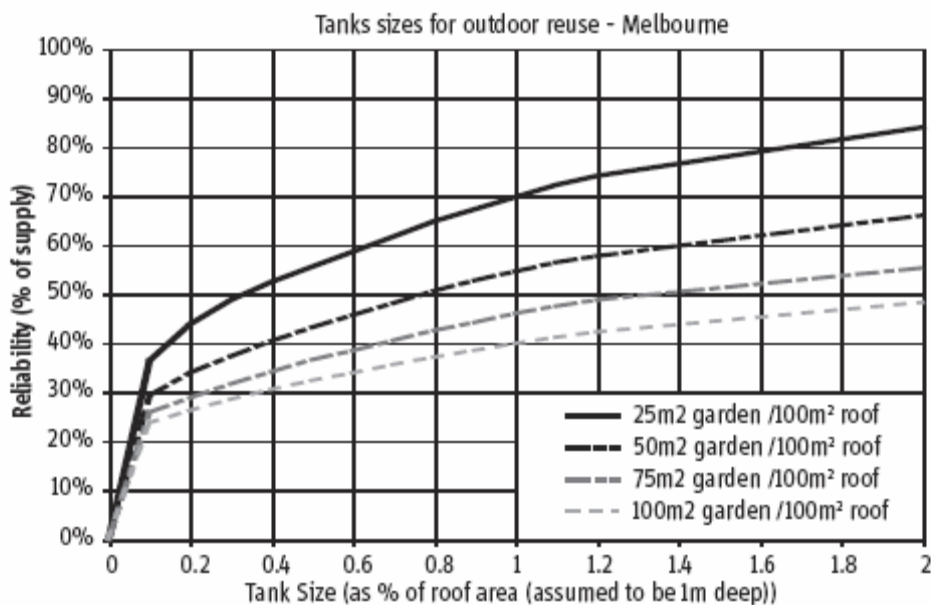<tr><td>11.</td><td>From graph 'Tank size as % of roof area' =</td></tr>
<tr><td>12.</td><td>Rainwater tank size (kL) =</td></tr>
<tr><td colspan="2">Notes:</td></tr>
</table>

Rainwater for Outdoor Use

Rainwater for outdoor use is seasonal as more water is used during summer.

Steps to calculate rainwater tank size for outdoor use :
1. Determine the roof area (m^2) available for catching rain (this may be the total roof area or only a proportion).
2. Determine the garden area that you would like to water.
3. Calculate the garden area per $100m^2$ of roof area **Garden area / $100m^2$ roof area = Garden area x (100 / roof area)**
4. Determine level of reliability required (the percentage of the time the rainwater meets demand).
5. From the graph determine 'Tank size as % of roof area'.
6. Calculate rainwater tank size **Rainwater tank size (kL) = (roof area x tank size as a % of roof area)/100**

Graph 3: Tank Sizes for Outdoor Use

Example: Lucas would like to install a rainwater tank for garden irrigation. His house has a roof area of 200m^2. He has a garden area of 200m^2 but only needs to water 150m^2. He would like the rainwater tank to be reliable 50% of the time.

1. Roof area available for catching rain = 200m^2 (assuming you can collect rainwater from all areas of the roof)

2. Area of garden to be watered = 100m^2

3. Garden area / 100m^2 roof area = 150 x (100/200) = 75m^2 garden / 100m^2 roof

4. Level of reliability required 50%

5. From graph 'Tank size as % of roof area' = 1.3

6. Rainwater tank size (kL) = (200 x 1.3)/100 = 2.6kL (or 2,600 litres)

On average a 2,600 litre tank would supply 50 percent of outdoor watering demand for this household.

Note: To size a tank for both toilet flushing and outdoor use, add the two tank sizes together (1,900 litres + 2,600 litres) = 4,500 litres

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Your rainwater tank sizing calculations for outdoor use:

13. Roof area =

14. Area of garden to be watered =

15. Garden area / 100m^2 roof area =

16. Level of reliability required =

17. From graph 'Tank size as % of roof area' =

18. Rainwater tank size (kL) =

Notes: