

Rainwater Tanks

WHAT SIZE RAINWATER TANK DO I NEED?

Many State and Local Governments mandate a minimum size of rainwater storage tank for new buildings and only certain sizing are eligible for many government rebate and incentive schemes. Check with the local plumbing/building authority for any rainwater storage tank sizing requirements.

The following factors should be considered in determining the size of the rainwater tank for the intended use:

- (a) *Rainwater performance* Percentage % expectation of water supply to be sourced from rainwater.
- (b) *Rainfall for the region* Rainfall data from Bureau of Meteorology, local rainfall stations, Council information.
- (c) *Roof catchment size* Sq/m of specific roof catchment area discharging to tank.
- (d) *Allotment size* The available land to place tank in or on, the footprint size of the tank.
- (e) *Is the network utility operators' water supply available?*
- (f) *Water demand* Intended use and daily water usage, consumption.
- (g) *Is stormwater attenuation to be incorporated into the rainwater tank?* Stormwater attenuation is the temporary storage and slow release of stormwater to reduce flow rates into the stormwater drainage system during and immediately after a storm event. Please refer to the Local Council requirements further detail.

Bushfire Rainwater Storage Requirements

Local council authorities may require rainwater storage tanks for the sole purpose of fire fighting, check with the local authorities for their recommendations.

CALCULATING EXPECTED ANNUAL RAINWATER CATCHMENT

There are a number of factors that need to be considered when calculating the expected annual rainwater catchment from a particular roof or other harvesting areas which will in turn help determine the size of the rainwater tank and the potential intended use.

- *Rainfall for the region* Rainfall data from Bureau of Meteorology, local rainfall stations, Council information.
- *Catchment size* Sq/m of specific roof catchment area discharging to tank.
- *Pre-treatment* Devices (first flush, etc.) that may divert rainwater away from storage tank.
- *Coefficient runoff percentage from catchment area* For example, an impervious surface such as a metal or tiled roof will have a higher coefficient runoff percentage than a grassed area where a large percentage of water would be absorbed.

Formula

Annual x catchment x coefficient x percentage of = maximum litres of rainfall (mm) area (sq/m) runoff (%)
diverted water (%) rainwater per year

1000 ltrs = 1000 kg

Example – Calculation 1:

There is a tiled roof on a residential house in Sydney where 70m² roof area is draining to a single downpipe where they would like to capture and store the roofwater in a rainwater tank nearby.

- Rainfall for the Sydney region (1217mm/year).
- Catchment size – Sq/m of specific roof catchment area discharging to tank (70m²).
- Coefficient runoff percentage from catchment area tiled roof, assume 90% coefficient rate for metal or tiled roofs
- Pre-treatment devices – No device.

Answer: 1217 x 70 x .90 = 76,671 L per year of rainwater

Example – Calculation 2:

There is a metal roof on a residential house in Perth where 200 m² roof area is draining to four downpipes where they would like to capture and store the roofwater in an underground rainwater tank nearby, with a first flush device diverting 40 L each time it rains.

- Rainfall for the Perth region (869 mm/year).
- Catchment size – Sq/m of specific roof catchment area discharging to tank (200m²).
- Coefficient runoff percentage from catchment area tiled roof, assume 90% coefficient rate for metal or tiled roofs.
- Pre-treatment devices 20 L per rainfall event (assume 50 rainfall events – 2000L).

Answer: 869 x 200 x .90 – 2000 L = 154,420 L per year of rainwater

WHAT CAN I USE RAINWATER FOR?

Rainwater quality is dependent on implementing an appropriate inspection, filtration and maintenance program. This handbook focuses on the following applications for rainwater within an urban environment:

- Laundry washing machine connection – Cold water use.
- Toilet Flushing.
- Outdoor use.
- Hot Water use
- Pool/pond/spa top up.
- Garden irrigation.

AVERAGE WATER CONSUMPTION VALUES FOR URBAN ACTIVITIES

Water usage volumes for certain activities around a domestic home can vary greatly depending on the number of residing within the home, the appliances and fixtures inside the home and the size and type of garden.

Outdoor Water Use

Size of land/garden area			
	Small garden	Typical garden	Very large garden
Water everything except the lawn area	Up to 50,000	Up to 55,000	Up to 60,000
Water everything including the lawn area	Up to 120,000	Up to 160,000	Up to 380,000
<i>Running tap/sprinkler</i> A running tap/sprinkler at 15 L per minute will consume 900 L per hour.			
<i>All figures are in litres per year; (local rainfall and seasonal watering may vary the above consumption volumes) The above figures do not include outdoor washing, garden ponds or swimming pools</i>			

Indoor Water Use

Household appliance	Number of people residing in household					For each extra person
	1	2	3	4	5	
Toilet flushing						
Single flush (11/flush)	20,075	40,150	60,225	80,300	100,375	20,075
Dual flush 11/5	11,315	22,630	33,945	45,260	56,575	11,315
Dual flush 9/4.5	9,855	19,710	29,565	39,420	49,275	9,855
Dual flush 6/3	6,570	13,140	19,710	26,280	32,850	6,570
Dual flush 4.5/3	6,023	12,045	18,068	24,090	30,113	6,023
Washing machine						
Small automatic	11,000	21,000	32,000	42,000	53,000	8,000
Medium	14,000	28,000	42,000	56,000	60,000	10,000
Large	17,000	35,000	52,000	70,000	87,000	12,000
Water efficient large	11,000	21,000	32,000	42,000	53,000	8,000
<i>All figures are in litres per year (local housing type and occupants age may vary the above consumption volumes) Toilet flushing figures based on AS/NZS 1172 & AS/NZS 6400</i>						

Average Householder Water Consumption Percentages

The Average Australian Urban Household consumes between 230,000 – 280,000 L of water per year.

Garden use	35 – 50%
Bathroom	10%
Hot water	16%
Toilet flushing	10 – 20%
Laundry	10 – 20%
Kitchen	5%

RAINFALL DATA

Australian Annual Rainfall Averages

Australian Average Rainfall (mm)
* Averaged Over Period of 1908 – 2004

State	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total mm/year
Melbourne	48.2	47.0	50.6	58.2	56.6	49.8	47.9	50.3	58.7	67.4	59.3	59.1	653.2
Canberra	59.8	51.2	55.6	49.3	47.5	37.9	52.4	47.6	65.2	61.9	58.7	46.0	633.1
Sydney	103.3	117.4	131.2	127.2	123.3	128.1	98.1	81.5	68.7	76.9	83.1	78.1	1217.0
Brisbane	159.6	158.3	140.7	92.5	73.7	67.8	56.5	45.9	45.7	75.4	97.0	133.3	1146.4
Adelaide	19.2	13.7	26.2	38.7	62.6	83.1	77.8	68.1	63.6	48.5	29.6	26.8	558.1
Perth	8.6	13.3	19.3	45.5	122.7	182.4	172.9	134.6	79.9	54.5	21.7	13.9	869.4
Hobart	48.0	39.8	45.7	51.8	47.0	54.6	52.8	53.0	52.4	62.6	54.5	57.2	619.5
Darwin	423.3	361.1	319.3	98.9	26.5	2.0	1.4	5.7	15.4	70.7	141.8	247.9	1713.9