Educational resources

Warrnambool College Roof Water Harvesting Project

Case study

Many townships and cities around Australia are experiencing dwindling water resources and, as a result, are looking at challenging and expensive options to supplement supplies.

Harvesting water from the roofs of houses and other structures in growth areas is a viable means of boosting existing water supplies – from an economic, environmental and social perspective. This principle is very simple and adaptable to any scale of township or area that is growing. Whether the growth is in terms of hundreds of buildings or tens of thousands of buildings, there is an opportunity to install the necessary infrastructure as a subdivision develops to 'tap' the new catchment.

This case study provides an overview of an innovative approach to roof water harvesting through the construction of a large-scale roof water harvesting system. It collects roof water from a local secondary school and delivers it to a nearby water storage through a dedicated pipe network to contribute to the available water resources.

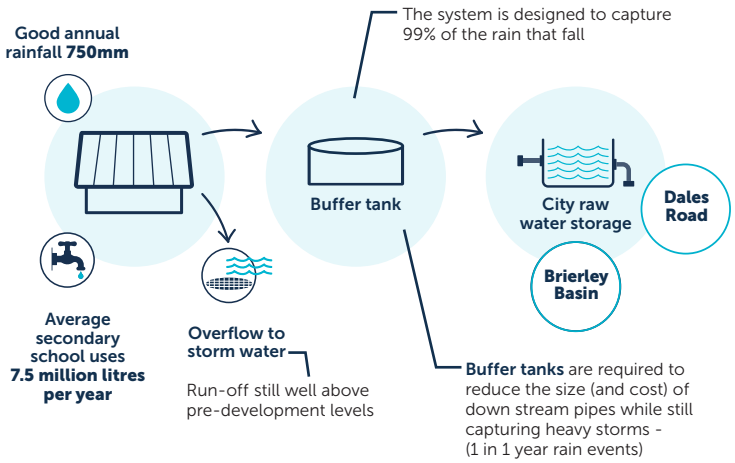
Climate change predictions also suggest that there will be increasing pressure on the availability of the current supply source. Most of the rainfall in the larger township and city areas is currently lost as stormwater.

The majority of land within these areas is sealed with concrete, bitumen or roofing. These surfaces shed water quickly, requiring large diameter pipes to divert and dispose of stormwater, removing it from the area as quickly as possible. Increasing development has, in turn, led to a dramatic rise in run-off volume and intensity during rainfall events compared to the pre-development environment.

There is very little infiltration, and very few obstacles to slow the rate of drainage. The harvesting of roof water in urban environments has the combined effect of contributing to the city's water resources and reducing the severity of rainfall events on the natural creeks and waterways in the catchment.

The school project is a working example of a hybrid model, using a new source of water from a decentralised catchment but linked to the existing centralised storage, treatment and distribution network. It ensures the water supply meets the Australian Drinking Water Guidelines 2004, and provides for coordination of the water supply/ demand cycle for regional towns and cities.

Wannon Water's centralised roof water harvesting - how it works



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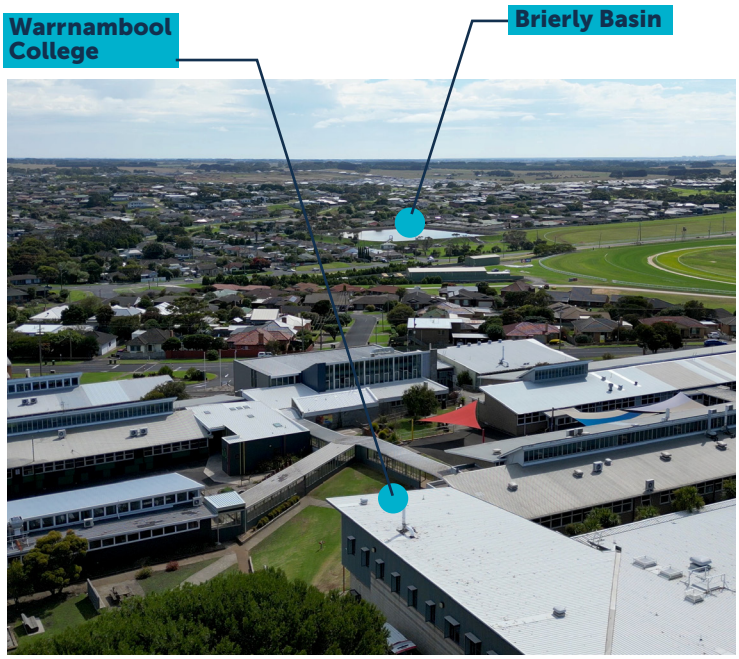
Roof harvesting benefits:

- Reduced extractions from the environment.
- Avoided carbon emissions from pumping.
- Reduced impacts of urban stormwater entering waterways.
- Improved water and sustainability literacy within the school and wider community.
- Tested and reliable technology – Wannon Water began roof water harvesting 10 years ago. There have been no issues – no leaks, flooding or need for call-outs.
- An innovative approach to sustainable use of water resources, and it promotes community consciousness of clever outcomes that can be achieved in the water cycle.



Warrnambool College roof water harvesting sets a new record

In January 2024 we set a new roof water intake record with 331 litres of water flowing a second at the peak of the downpour.

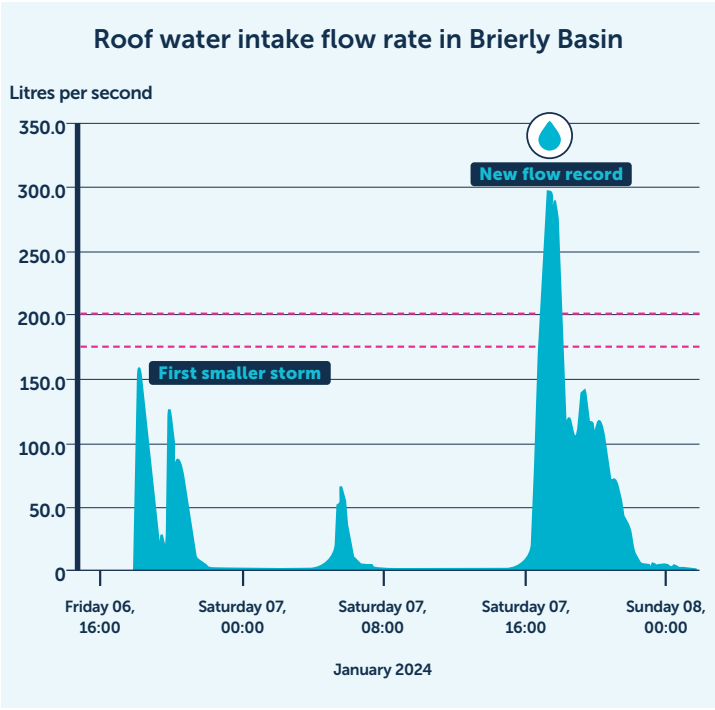
During the eight hours from 4pm to midnight, we harvested 2.5 million litres of water, enough to supply 17 houses for an entire year.

This rainwater would normally be lost in run-off to stormwater. We collect it from the rooftops of some north-east Warrnambool housing estates, sheds at the Gateway Business Park in Horne Road, the sporting precinct at Albert Park, and buildings at Warrnambool College.

The raw water goes via Brierly Basin, then to the Warrnambool Water Treatment Plant where it's disinfected and becomes part of Warrnambool's drinking water supply.

On average, each home connected to the rainwater harvesting system collects 150,000 litres of water each year which is equivalent to the amount of drinking water they use.

The Victorian Government has co-invested $685,000 in the project through the Department of Energy, Environment and Climate Action's Integrated Water Management division.



Warrnambool College roof water harvesting - system overview

Rainwater system

Tank:
Roof water harvested volume 1 kl per 100m^2 of roof area.
Eg. 20m x 40m Roof = 800m^2 = 8 kl tank.

Filter:
Filter boxes (Maelstrom On-Tank Filter *duralirrigation.com.au*) are installed on the top of tanks to remove debris, further treatment is undertaken at the Water Treatment Plant as part of the process for making the water potable.

Pump: The system is gravity based, therefore no pumping required to move the water.

Average annual rainfall: 729.2mm with an estimated capture of 80% (Run-off Coefficient – 0.8mm).

Design data - Building 9 (Technology Hub)

Roof area:
1096.39m^2

Annual volume of water saved:
0.639 ml – (Area * (rainfall/1000) * Runoff Coefficient) /1000 = (1096*(729.2/1000)*0.8*)/1000

Project cost:
Breakdown of details on the follow page.
(Not including full connection mains).

Completion:
May 2024

Building 9 - system details

Description	Width	Length	Area (m^2)	Total (m^2)	Downpipes	Tank size
West	13.9	12.8	177.92	348.99	West to alcove tank with building 7	3.49
East	20	26.9	538			
Triangles	20	14.7	294			
Veranda west	2.075	11.6	24.07			
Veranda east	2.4	26	62.4	747.4	East total to garden tank	7.47
Total from roof approximations			1096.39	1096.39		

Warrnambool College - Building 9 costings

Drainage Network

Assumptions:
- Pipe to be installed below ground; any concrete paths and driveways to be reinstated.
- Required pipe - 100 or 150 mm PVC.

Cost:

Item	Qty	Unit	Rate	Amount
100mm PVC to tank south side	23	m	$250.00	$5,750
Downpipe Connections	2	Item	$300.00	$600
Supply & install 150mm PVC drainage pipe to tank under	0	m	$250.00	-
Overflow connection	1	Item	$2,000	$2,000
			Total	$8,350

Detention Tank

Assumptions:
- Tank will be above ground, located adjacent to buildings

Cost:

Item	Qty	Unit	Rate	Amount
Excavation & earthworks	1	Item	$2,000	$2,000
Supply & installation of 7.5 kl of tanks	1	Item	$10,000	$10,000
Pipe work 1	Item	$1,000	$1,000	
			Total	$13,000

Transfer Pipe

Assumptions:
- Pipe is to be a gravity system, utilising head available in tank
- Flow controlled by limiting discharge from each buffer tank

Cost:

Item	Qty	Unit	Rate	Amount
Supply & installation of 63mm HDPE pipe, including trenching & reinstatement	22	m	$250.00	$5,500
			Total	$5,500
		TOTAL		**$26,850**

Cost:

Item	Rate	Amount
Design & Planning	10%	$2,685
Engineering & Administration	6%	$1,611
Contingency on construction	30%	$8,055
		$39,201

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