



CRC for Water Sensitive Cities

Warrnambool Roof Water Harvesting

Location: Warrnambool, VIC



Case Study — Prepared by Cooperative Research Centre for Water Sensitive Cities, September 2018



Business Cooperative Research Centres Programme

Insight

Regional roof water harvesting can be used to supplement potable water supply

Project description

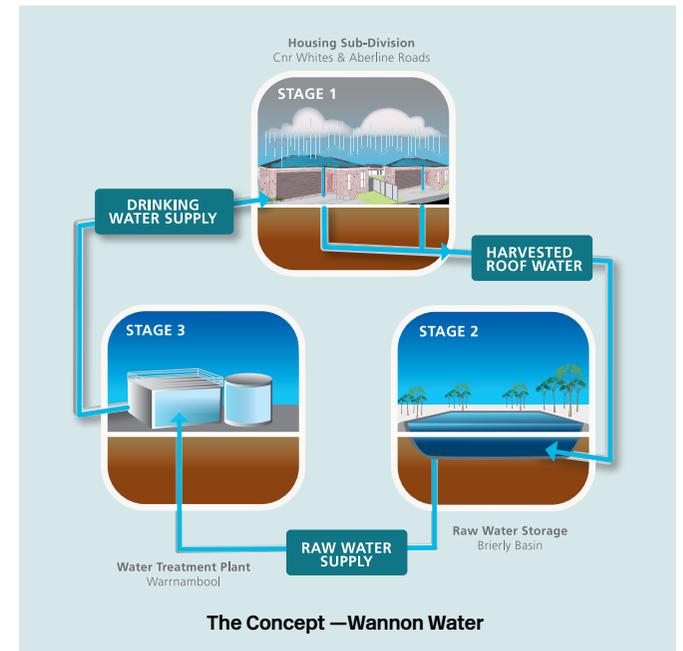
This roof water harvesting scheme collects and diverts roof water from all new houses and industrial buildings within new estates located in a growth corridor. Water is then transferred via gravity into an existing untreated water storage where it is treated through the existing treatment plant to provide drinking water for the city of Warrnambool.

The drivers

Working demonstration of innovative water management approach to meet the increased water supply demands in urban growth areas

- Wannon Water's Water Supply Demand Strategy 2007–2055 identified the need for new water resources within the 50-year planning period to meet the projected increase in demand.

- The growth areas in Warrnambool provided an opportunity to test innovative ways to save water and secure water supplies by constructing, monitoring and evaluating the roof water harvesting scheme as a pilot to identify risks and barriers and build confidence for other water authorities and councils to establish similar projects in applicable developments.
- The cost per megalitre (ML) was similar to the next preferred augmentation option (groundwater) and had additional environmental and social benefits.



Conceptual diagram showing transfer of roof water to local raw water storage before treatment and distribution of potable supply

What does this case study demonstrate?

Each case study has been selected to demonstrate specific solutions, benefits or enabling structures that support the creation of water sensitive cities. This case study focuses on:

Rainwater and stormwater harvesting

Alternative water supplies

The innovations

A leading example of integrated water management, collecting and diverting roof runoff for potable uses

- **Regional harvesting of roof runoff** – A separate collector pipe system has been installed for houses in new developments in the Warrnambool growth area. This pipe network (which includes trunk water mains and smaller collector pipes through the development) flows under gravity into the Brierly Basin where it is mixed with other untreated water.
- **Treatment of rainwater** – Harvested roofwater is treated with other untreated water in the Brierly Basin at the existing Warrnambool water treatment plant to produce drinking water for the City of Warrnambool. Since roof water is generally cleaner than other surface runoff, additional treatment was not necessary.
- **Hybrid model** – Typically there are discussions around the benefits of centralised versus decentralised water solutions. This project provides a hybrid model that collects water using a decentralised system but treats the water in an existing centralised system, which eliminates many of the public health and safety risks associated with decentralised systems.
- **Progressive expansion** – The project commenced in 2011 in Warrnambool's northern growth areas with the initial pilot applied to 250 lots across two subdivisions. This will expand to over 3,000 homes and a new industrial estate as development in the growth corridor continues.
- **Toolkit** – Wannon Water created a toolkit that estimates capital and operating costs of rainwater harvesting schemes. The toolkit can calculate a net present cost (NPC) per ML which can be used to directly compare the financial viability of rainwater harvesting schemes with other potential water supply solutions across Australia.



Peter Wilson, Asset Planning Manager for Wannon Water, looking over the water storage with the roofs of new homes in the background



The outcomes

 Cities providing ecosystem services	 Cities as water supply catchments	 Cities comprising water sensitive communities
<ul style="list-style-type: none"> • Less urban excess stormwater entering waterways – Reducing stormwater volumes entering local waterways reduces erosion risk and improves waterway health. • Improved environmental flows – Harnessing local water supplies reduces pressure on the water supply catchment of the Gellibrand River. 	<ul style="list-style-type: none"> • Augmentation of water supply system – Each new dwelling is expected to generate 145KL/year. • Harvested roof water can meet urban demands – In an average rainfall year, the project is estimated to meet approximately 100% of the annual demand of the connected properties. In fact, early monitoring of the system identified more water was generated than used, which would result in excess water being used by other Warrnambool customers. 	<ul style="list-style-type: none"> • Informed residents – Flyers are sent out regularly to remind landowners that water is being harvested from their roof and treated to form part of Warrnambool’s drinking water supply. This builds their community consciousness and reduces risk of contamination. • Toolkit to assist other growth areas – The toolkit has been developed to assist stakeholders in other growth areas to use similar roof water harvesting schemes.

Business case

Costs	Benefits
<ul style="list-style-type: none"> The total cost of the pilot project was \$3.8 million with \$2 million contributed by federal and state government funding. Wannon Water's assessments identified that the roof water harvesting approach has a significantly lower cost per ML than individual rainwater tanks for each property or the development of a new groundwater resource. 	<ul style="list-style-type: none"> Stormwater management costs to the council and the development industry were minimised, because less extensive flood management and stormwater treatment systems are required to mitigate increased stormwater runoff from the new development areas. The program deferred the need to augment the existing water supply system for five years. The new developments are close to 'water neutral' because they generate enough water to meet the new demand. The roof water harvesting scheme can also be implemented progressively as it is needed. The local harvest and gravity transfer of roof water reduces the energy costs and greenhouse gas emissions associated with transporting water.

The lessons

- Collaborative management** – Collaborative working relationships between project stakeholders were required to overcome management challenges, particularly the transfer of water from a local government authority to a water retailer.
- Compliance** – The regulatory and cultural behaviours of the plumbing industry have been challenging. In particular, several domestic plumbers installed house connections with a 'business as usual approach' and connected the roof downpipes into the regular stormwater system.
- Reducing risk** – While no significant risks were identified with the project, Wannon Water will be monitoring the water quality, inspecting connections to ensure there are no cross-connections, and will be responsible for the roof water harvesting network including screening of leaves and other materials.

Transferability

There are opportunities to use this concept in most urban areas across Australia with an annual rainfall of over 700mm (lower annual rainfall may still be cost effective). This approach will be most cost effective where development is located near an existing raw water storage or transfer. The toolkit was used to determine the potential yield from a similar regional roof water harvesting scheme across each Australian capital city.

Awards

- Winner of Australian Achiever at the 2011 Savewater Awards
- High Commendation at the 2012 AWA Victorian Water Award
- Finalist at the 2012 Environ Innovation in Sustainability Award
- Winner at the 2013 Tidy Towns Sustainable Communities Awards
- Winner at the 2013 Stormwater Victoria Awards For Excellence
- Winner at the 2017 AWA Victorian Water Awards

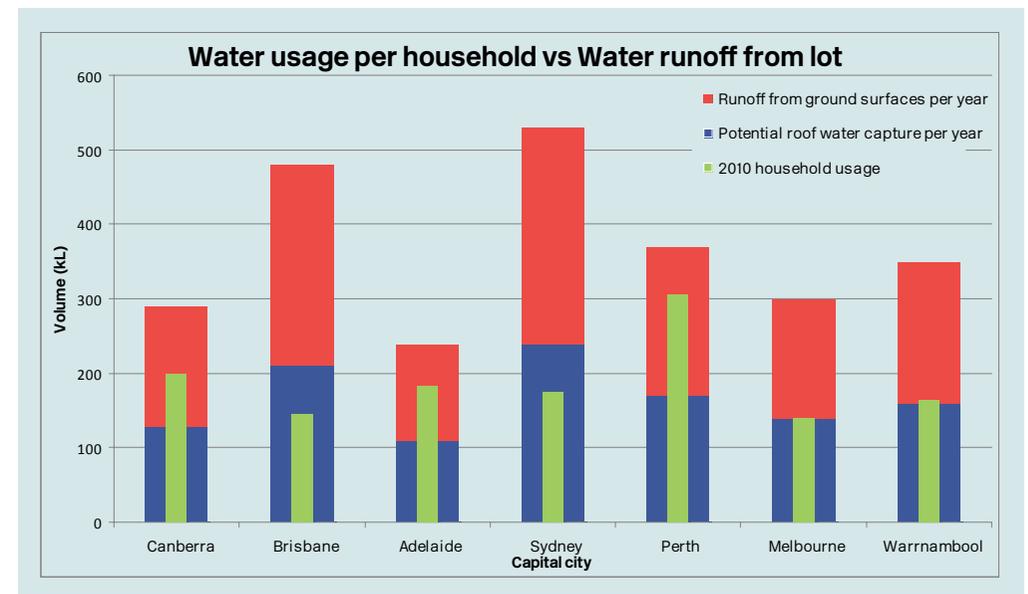
Project collaborators

- Wannon Water
- Australian Government – Water for the Future
- Victorian Government – Stormwater and Urban Recycling Fund
- Cove Land Developments Pty Ltd
- Kriway Investments
- Warrnambool City Council

Additional information

More information on the Warrnambool Roof Water Harvesting project can be found at:

- [Wannon Water media release](#)
- [Clearwater: Warrnambool’s Regional Roof Water Harvesting \(P Wilson\)](#)
- [Clearwater: Warrnambool Case Study](#)



Comparison of available roof water to residential demand
 Assumptions: Allotment size 750 m² – 1/3rd roof area, 1/3rd paved, 1/3rd garden/lawn. Runoff coefficients: roof 0.85, paved 0.8 and garden/lawn 0.2. Water restrictions applied for some cities in 2010. Warrnambool water consumption from 2009–10. Using historical average rainfall and typical temporal patterns