Rainwater Harvesting Policy

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RAINWATER HARVESTING ASSOCIATION

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INTRODUCTION

Acknowledgements

The Rainwater Harvesting Association is indebted to Prof. PJ Coombes for the strategic insight and technical analysis that underpin this policy.

The Rainwater Harvesting Association acknowledges the Traditional Owners of Country throughout Australia and their continuing connection to land, sea and community. We pay our respects to them and their cultures, and to their Elders both past and present.

Systems Thinking and a Sustainable Built Environment

Managing our cities requires understanding them as urban systems. Our urban water problems are not caused by too little rain or too much. Our problems are functions of the system we live in, and our problems will continue until we change the structure of the system. (Meadows, 2008)

Rainwater Harvesting using rainwater tanks changes the structure of the urban water system. It is an efficient solution that uses local water and is low-cost to implement as a first response, reducing the challenge for subsequent large and expensive infrastructure solutions.

Changing the building design to harvest rainwater using rainwater tanks reduces utility water use, stormwater damage, and resource and energy use, making our built environment more efficient, resilient, and sustainable.

Rainwater harvesting supports safer cities, healthy catchments, and water bodies by reducing the volume of stormwater our cities produce. Stormwater volume is the primary determinant of flooding and its damaging impact on our natural environment.

Rainwater Harvesting improves urban water systems' diversity, efficiency and resilience. Rain delivers high-quality water directly to our buildings, reducing the need for utility water (see definitions) to be stored, treated, and transported long distances. This reduces the overall costs of water services to the community.

Rainwater Harvesting is defined as rainwater captured from a roof and detained or stored for later use. It does not include rainwater captured from roads, car parks, commercial hardstand areas or small-scale catchment management such as swales. This is an essential distinction because stormwater, which is rainfall runoff from urban areas, has high levels of contamination and has much higher treatment costs than rainwater harvesting.

The Significance of Volume

Volume is a measure of water that provides valuable information about the water behaviour of our buildings and cities. We can define water policy objectives by the volumes of water saved, retained, or used. Volumes of water can also be used to understand water efficiency, demand for water infrastructure, community water charges, and water security. (Urban Water Cycle Solutions, 2024)

Reducing volume lowers all stormwater risks. Volume is a primary determinant for all aspects of stormwater management. The volume of stormwater created is a function of rainfall and impervious areas. Flow is a function of volume over time. The quantity of contaminants transported by stormwater is a secondary indicator closely related to volume, as is damage to the waterway ecosystem caused by peak flows in a sensitive receiving environment. If we can lower the volume of stormwater, we can also reduce flooding risk, quantities of pollutants, and damage to waterways. These secondary indicators are assisted by modifying urban areas to slow stormwater down.

Australian Urban Water Balances

Figure 1 Average Annual Water Balances from Households in Adelaide, Ballarat, Brisbane, Canberra, Melbourne, Perth and Sydney (Coombes & Russo, 2019)

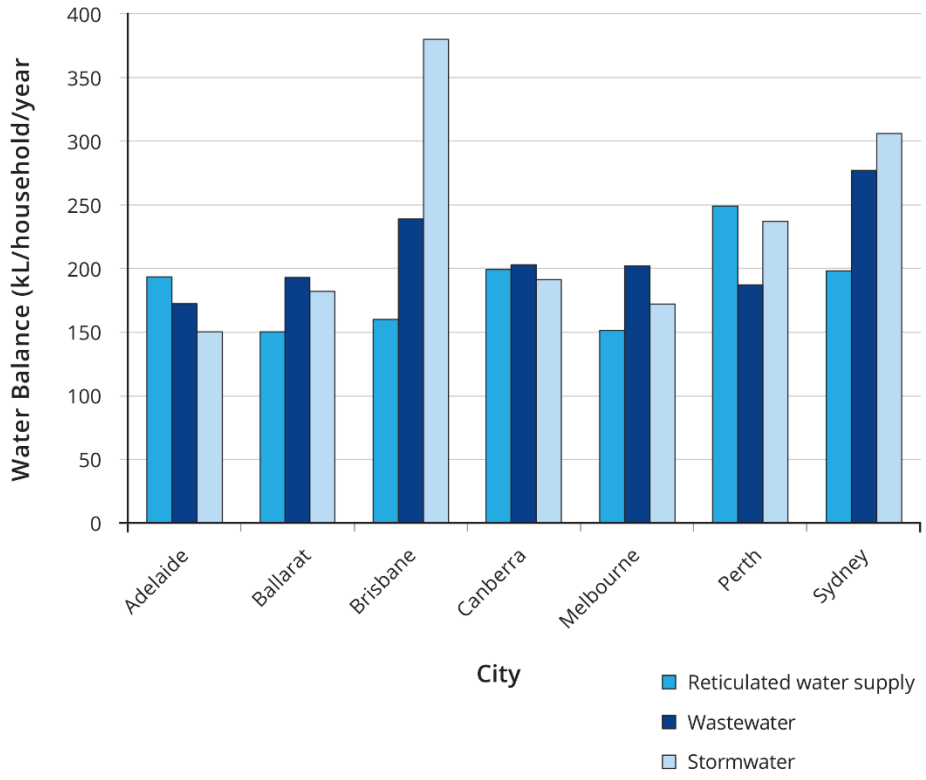

Figure 1 illustrates the water balance for households in urban centres. Stormwater represents the rainfall that falls on urban areas and is discarded. The insights from the graph are:

1. Stormwater volumes are greater than water supply, this means more rain falls on households than the reticulated water they use.
2. This rain is discarded as high volumes of stormwater due to the nature of the urban system.
3. Stormwater volumes damage the environment and put urban areas at risk.
4. Our current strategy is to invest in new water supplies without using the rain resource.
5. Harvesting rainwater as a first response is crucial, reducing the challenge for subsequent large and expensive water and stormwater infrastructure solutions.

The Australian Rainfall and Runoff Guidelines by Engineers Australia identify rainwater harvesting as an effective policy response for managing stormwater.

The Systems Framework

A key strength of the policy is Peter Coombes's systems-based modelling, the Systems Framework. The Systems Framework is based on behaviour at the individual building and lot level to determine local and regional impacts. The modelling allows costs and benefits to be accurately considered at the local government and city levels for policymakers to consider. The award-winning Systems Framework is internationally recognised, and the models have proved accurate. (Coombes, Smit, & Macdonald, 2016)

Balancing Business Interests

The Australian water industry uses the Building Block Method to determine water corporation revenue. Rainwater harvesting can reduce the demand for supply infrastructure, such as new water treatment plants, which is a primary driver of increased revenue. This seems to be a conflict for the Water Corporations; there is a business interest in increasing revenue by building more assets and a community interest in reducing water and stormwater charges by building fewer assets. We rely on the government to acknowledge and balance these interests.

Rainwater Harvesting Association

Rainwater Harvesting Association is a membership association representing the Australian rainwater harvesting industry. The sector's value is estimated to be greater than $29.7 billion. (Urban Water Cycle Solutions, 2021)

CONTEXT

Value

Rainwater harvesting uses low-cost, low-impact technology that can be quickly implemented and modified to meet local needs compared to other water management technologies, such as desalination plants or retention ponds.

The yield from rainwater harvesting mostly depends on how it is used—the more connected appliances, the higher the yield. The tank size and the roof area harvested are relevant but less important.

Most houses use about 88,000 to 390,0000 litres of water each year. (Bureau of Meteorology, 2024) Combined with water efficiency measures, rainwater has met about 40% of household water demand in Greater Sydney. (Nera economic consulting, 2010)

Professor PJ Coombes's modelling reveals yields of 50-100kl/annum in Greater Sydney suburbs and shows that rainwater harvesting and water efficiency could meet 45%-60% of household water demand with subsequent stormwater benefits. (Urban Water Cycle Solutions, 2024) This is important because it reduces the demand for water and infrastructure across the urban system, providing long-term savings by deferring and reducing new infrastructure costs.

Measuring these values has proved challenging for the water industry. Policy analysts must consider the views of multiple disciplines to assess costs and benefits across the system.

A systems approach is recommended to gain accurate insight into complex infrastructure in an urban environment. Traditional infrastructure modelling is likely to misrepresent values and be inaccurate.

Snapshot

More than one in four households in Australia has a rainwater tank. (ABS, 2017) Outside urban areas, rainwater is the primary source of drinking water, and almost three million people use it for household use. Thorough government health studies have found that the risks of using rainwater are low, and there is no evidence of widespread health impacts. (Enhealth, 2011) (Heyworth, Glonek, Maynard, Baghurt, & Finlay-Jones, 2006)

Water is an essential and often scarce resource in Australia, and it has yet to receive the focus applied to energy-efficient buildings and appliances this century. During the millennium drought, when the community was asked to take direct action to save municipal water, thousands of Australians turned to rainwater harvesting.

The high demand for rainwater tanks led to an expanded local manufacturing industry. In 2021, an industry assessment estimated the following about the rainwater industry in Australia (Rainwater Harvesting Australia, South Australia Rainwater Harvesting Industry Group, Associate Professor PJ Coombes, 2020):

- Direct employment: 1,360 people
- Employment in associated industries: 5,440 people

- Annual national sales value: approximately $1.6 billion
- Current business value of the rainwater market segment: around $6.5 billion

Additionally, the contribution of rainwater harvesting to the Australian water industry was assessed by estimating the net present cost to local government and water utilities for replacing rainwater supply and its benefits within a 50-year planning horizon, using a discount rate of 4%. Considering the cost of replacing rainwater and associated environmental outcomes, the estimated value to the water industry was greater than $29.7 billion. (Urban Water Cycle Solutions, 2021)

The quality of the product and product offerings has changed over the last decade, overcoming quality issues from some suppliers during the boom. The industry includes warranties and care services for rainwater harvesting systems.

Rainwater harvesting is a decentralised source of water that is not well suited to the centralised management model favoured by the water industry, administrators, and regulators. Decentralised systems have advantages and disadvantages compared to centralised systems.

Rainwater tanks come in various shapes and sizes for residential, commercial and industrial uses. Residential tanks are generally 2000 – 5000 litres. A pump should be expected to last ten years, and a rainwater tank more than 20 years. The purchase price varies from the many small businesses in the industry based on demand and local conditions. Operating costs are usually low, and the householder can do most of the maintenance.

For new development, the cost of purchasing and building rainwater harvesting systems is borne by the builders and passed onto homeowners. According to economists, this creates a market failure because the builders who bear the costs do not receive the benefits of the investment and, therefore, will only invest if required by legislation. This was the rationale for NSW's BASIX water efficiency and rainwater market intervention and regulation. (Nera economic consulting, 2010)

Plumbing, landscaping, and stormwater plumbing are lower cost if the tank is installed during the house's construction, but they will cost more if retrofitted.

Pumping rainwater costs energy, about 1kwh/1000 litres. (Water Conservation Group, 2010) This compares favourably with pumping municipal water long distances or energy-intensive uses such as desalination plants. Rainwater harvesting pump efficiency is closely linked to good design and operating practices.

Increasing Urban Resilience

A disruption to human systems, such as a natural disaster, becomes a crisis when it overwhelms the community's capacity to respond. Therefore, resilience measures increase that capacity.

When local communities manage some aspects of the water they use, they have greater control over their resources and opportunities to adjust the system to local conditions.

Centralised water municipal systems have high-cost thresholds; a new treatment plant, a dam, or a major pipeline requires hundreds of millions of dollars and many years to construct. A natural disaster, such as a drought, might only occur once in a lifetime. These low probabilities make it difficult for local water utilities to justify building more infrastructure, leaving their communities vulnerable.

We could explore different options. Decentralised assets like rainwater tanks can be modified and adapted to suit local needs in earthquakes, bushfires, droughts or threats to the urban water supply. They are a low-cost asset that can be easily implemented through the land use planning development process or a targeted scheme. Rainwater harvesting systems can be implemented for water efficiency and stormwater management benefits and then realise a resilience benefit. Rainwater harvesting is already plumbed into buildings and can be an essential local storage solution. A 5000-litre rainwater tank is equivalent to 10,000 plastic water bottles. When it rains, rainwater tanks become a self-renewing storage.

Options that reduce water demand have a double benefit: they defer a crisis as the existing reserves will last longer and reduce the volume of emergency water required.

Climate Change

Reducing stormwater volumes is crucial because climate change is a significant risk factor. Rain events are more intense, delivering more water in a shorter time. This intensifies the challenge of high runoff from hard urban surfaces and is a crucial reason existing infrastructure will not meet the challenge of future stormwater volumes.

Indigenous Benefits of Rainwater Harvesting

Rainwater Harvesting Association recognises the Indigenous concept of respecting Country, and information shared by kate harriden on western and indigenous approaches to water management and rainwater harvesting. (Bawaka Country, Wright, S. Suchet-Pearson, S., Lloyd, K., Burarrwanga, L., Ganambarr, R., Ganambarr-Stubbs, M., Ganambarr, B. & Maymurua. D., 2015)

Bawaka country defines itself as “the land, the water, the animals, the plants, the rocks, the thoughts, the songs, the people and the ways they relate to each other”. That is, country is a web of relationships. This approach is entirely consistent with modern systems thinking.

Kate talked about “centring Country”, which is research and practice that considers actions, options and decisions from beyond human perspectives, cognisant that the more-than-human have their rights, responsibilities and desires.

As elements of country, people, plants, animals, and ecosystems are indivisible and water is ‘more than a human’ entity that can be greeted as an old friend. This indicates a personal and respectful relationship with water, even in rainwater tanks.

In this context, water and waterways are to be respected in their own right as having more-than-human value. Human success could be seen as indivisible from a healthy environment, and we must tread lightly because we are treading on our own indivisible systems and our own indivisible heritage.

Rainwater harvesting, as a form of water storage that potentially restores flow patterns, doesn't require/rely on permanent structures on riverbanks and beds, and floodplains and may be regarded as a "tread lightly" water management solution that respects Country.

Urban Rainwater Systems

Our cities and towns require high levels of investment to provide water and stormwater services. These services are under strain and cause significant environmental detriment (Australian Senate, 2015). Figure 1 demonstrates more than half of the water in our cities is being thrown away while we invest in other water supply solutions. This policy focuses on urban rainwater systems because these systems have the most significant benefits for the community.

Rural Rainwater Services

Rainwater is the primary source of drinking water outside urban areas, and almost three million people use rainwater for household uses, including drinking. (Urban Water Cycle Solutions, 2021) Without rainwater harvesting, our communities could not survive in most of rural Australia. Rural practitioners are experienced in managing rainwater harvesting and meeting their own needs.

Rainwater Harvesting Association does not have evidence of significant risks to the community from rural rainwater harvesting, and our consultation with rural rainwater users does not support increased regulation for rainwater harvesting.

RAINWATER HARVESTING POLICY

A model Rainwater Harvesting Policy is provided in Appendix 1.

Implementing Rainwater Harvesting through the Land Use Development Process

Building design is a practical and effective way to manage water, addressing most of our water problems at their source.

Implementing water efficiency and stormwater management strategies through the land use planning process has proved to be successful, improving over half a million buildings in NSW since 2004. (NSW Government, 2025)

Local government land use planning schemes can set performance objectives for development, and developers can choose to harvest rainwater to achieve these objectives or an alternative performance solution that meets the objectives.

A land use planning scheme process allows rainwater harvesting as a deemed-to-satisfy solution, providing certainty to the development application process. Rainwater harvesting then becomes a condition of development approval. Implementation of the rainwater harvesting requirements must be linked to the building permit approval to provide reliable outcomes for policy modelling.

Internet of Things monitoring is recommended for all rainwater storage as they are low cost, provide an important communication channel for building owners, and verify policy benefits for the community and government. The monitoring is designed to provide data on yield and stormwater diverted to building occupants, as well as network information on functionality, rainwater harvesting yield, and temporal information for stormwater management available to the local government.

Objective One: Resilient Cities and Catchments: To reduce the volume of stormwater runoff at both the lot and city scale

Rainwater harvesting supports safer cities, healthy catchments, and water bodies by reducing the volume of stormwater our cities produce. Stormwater volume is the primary determinant of flooding and its damaging impact on our natural environment.

The urban designer now aims to manage the impacts of urban stormwater run-off 'at source' (Argue 2004) and at multiple scales by retaining stormwater in landscapes and soil profiles, rainwater harvesting and disconnecting impervious surfaces from drainage networks (Poelsma, Fletcher, and Burns 2013). Consistent with the philosophy of source control and systems analysis, stormwater run-off is now seen as an opportunity and is valued as a resource (Clarke 1990; Mitchell, McMahon, and Mein 2003; McAlister, Coombes, and Barry 2004; Australian Senate 2015). (Coombes P. J., 2018)

Impact of Urbanisation on the Natural Water Cycle

Figure 2 Impact of urbanisation on the Natural Water Cycle

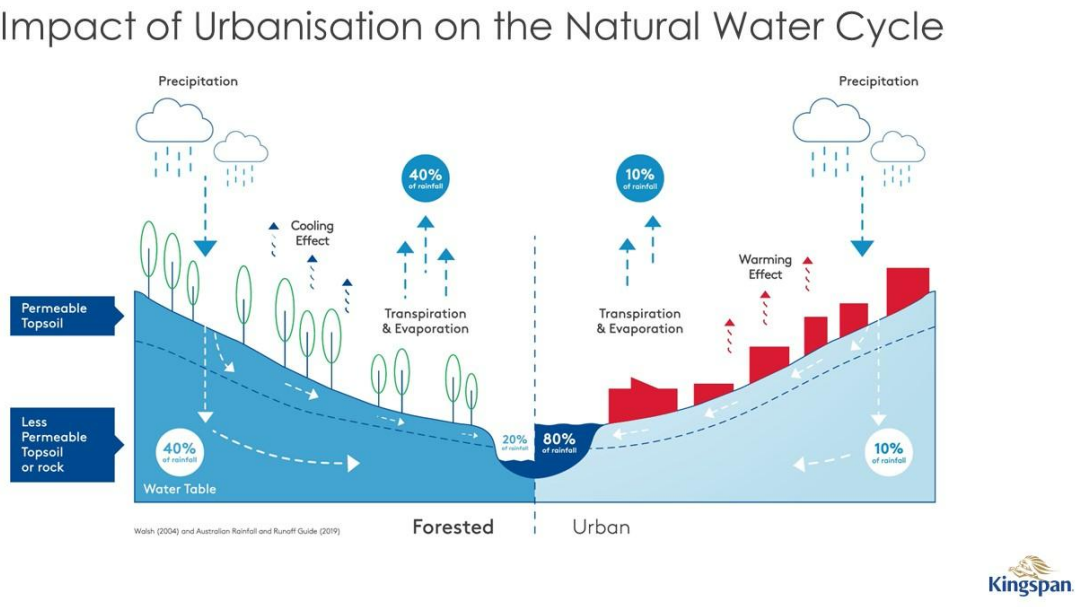

Figure 2 shows that urbanisation reverses the natural water cycle. In a natural water cycle, we might see 80% of rainfall retained in the catchment and transferred to evaporation, evapotranspiration and groundwater replenishment. Only a small amount of runoff becomes waterway flows fed by groundwater, providing consistent, good-quality water for stream ecologies. In contrast, urbanisation reduces water transfer to evaporation and groundwater, and 80% of the rainfall becomes runoff. High runoff volumes collect large quantities of pollutants, and fast-moving water scours streambanks and damages waterway ecologies. Waterways are damaged by high flows when it rains. When it is not raining, waterways are stressed by low-level flows due to depleted groundwater. (Ball J, 2016) (Walsh, CJ, Fletcher TD, Burns MJ, 2012)

Changing the system's structure through rainwater harvesting on every lot has cumulative cascading benefits.

Runoff is retained in rainwater tanks, reducing stormwater volume.

Reduced stormwater volume reduces flooding, peak flow, pollutants, and damage to waterways.

Local waterways, in turn, improve their ecological functions and further reduce damage and pollutants

Rainwater harvesting creates opportunities for green infrastructure, urban cooling, groundwater replenishment, and, therefore, base-level stream flows.

Australian Rainfall and Runoff Guidelines 2019

Australian Rainfall and Runoff Guidelines 2019 identifies a series of benefits in viewing urban stormwater as an opportunity rather than a problem to be disposed of:

- *Urban stormwater is an opportunity to supplement urban water supplies and enhance the amenity of urban areas (Mitchell et al., 2003; Barry and Coombes, 2006; Wong, 2006).*
- *This includes development of green infrastructure and microclimates that reduce urban heat island effects.*
- *Urban catchments with impervious surfaces are substantially more efficient than conventional water supply catchments in translating rainfall into surface runoff. Rainwater and stormwater harvesting can extend supplies from regional reservoirs and the restoration of environmental flows in rivers subject to extractions for water supply (Coombes, 2007).*
- *These insights are consistent with earlier applied research by Goyen (1981) that both volumes and peak flows of stormwater runoff are required to design stormwater infrastructure**, and the local property scale is the building block of cumulative rainfall runoff processes** (Goyen, 2000). (RHA emphasis)*
- *Reducing urban stormwater runoff volumes via harvesting and retention in upstream catchments can also decrease stormwater driven peak discharges and surcharges in wastewater infrastructure (Coombes and Barry, 2014).*

The Australian Rainfall and Runoff Guidelines by Engineers Australia identify rainwater harvesting as an effective policy response for managing stormwater. The policy approach is based on Chapter 3 of the Australian Rainfall and Runoff Guidelines 2019, published by Engineers Australia, documented in Case Study 2. The policy focuses on “at source” management strategies at the local scale, forming part of an integrated urban water strategy at neighbourhood and regional scales. Responsible Authorities will designate urbanising catchments as future growth areas, highly urbanised catchments, and overdeveloped catchments. Responsible Authorities can determine catchment-wide volume management strategies based on Argue (Argue, J.R, 2017) as Yield Maximum, Regime in Balance and Yield Minimum strategies and, using the appropriate approach, specify performance solutions and volume reduction targets for development approval.

Flooding

Urban flooding is likely to be an increasingly significant issue due to climate change. The Australian projections from the Insurance Australia Group indicate tropical cyclones are likely to extend south into northern NSW. Warmer air holds more water and generates more intense storms, indicating more intense rain and storm events across most of Australia. These impacts will coincide with rising sea levels. (Bruyère, C., Buckley, B., Prein, A., Holland, G., Leplastrier, M.,, 2020)

South Australian research indicates that future volumes of stormwater are likely to be 2.5 times greater than the volume of existing stormwater infrastructure that was designed to manage. (State Planning Commission, 2019)

Pollutants

Nitrogen in stormwater is a critical pollutant of our waterways, and it is expensive to remove at about $4000/kg. (Aither, 2015) Harvesting and storing rainwater in a tank reduces nitrogen and other stormwater pollutants.

Coombes calculated that this Rainwater Harvesting Policy would reduce nitrogen levels by 90 tonnes at an equivalent benefit of $360 million in Greater Sydney. This is a significant saving for a side effect of harvesting rainwater. Traditionally, these benefits have not been associated with the cost-benefit analysis of rainwater harvesting.

Degradation of urban waterways

Victorian EPA Urban Stormwater Management Guidelines 2021 (Environment Protection Authority Victoria, July 2021) provide a useful summary of the environmental impact of urban stormwater and conventional drainage engineering. While written for Victoria, the principles can be applied across Australia.

Urban stormwater impacts contribute significantly to the degradation of waterway ecologies.[4] Even at low levels of urbanisation, significant adverse impacts can occur when impervious surfaces are connected to urban streams through drainage pipes[5]. These impacts can cause significant harm to aquatic ecosystems, particularly sensitive species of invertebrates, fish, and also platypus.

Modelling suggests that to maintain the ecological values of many relatively healthy streams in Melbourne's growth areas, very high volumes of stormwater have to be retained or reused. In particular, streams in the northern and western growth corridors are in drier parts of the city, and therefore would need higher stormwater flow reductions, as a proportion of total flow volumes, to avoid impacts.

Conventional drainage practices transport stormwater to urban waterways as quickly as possible. The continued use of these practices is expected to cause the degradation of an additional 900 km or more of stream length when Melbourne is developed to its urban growth boundary.[6]

Many of Victoria's regional cities and towns are also growing substantially. There is similar potential for degradation of waterways associated with these centres unless stormwater management practices improve….

Uncontrolled stormwater run-off can also harm downstream bays, lakes and coastal waters, and pose a risk of harm to human health. This is because it carries sediments, nutrients, toxicants, pathogens and litter. Examples of common human health risks are increased risk of gastroenteritis and skin irritations.

The Port Phillip Bay Environmental Management Plan (https://www.marineandcoasts.vic.gov.au/-coastal-programs/port-phillip-bay) emphasises the need to control the levels of pollutants that stormwater carries to the bay to avoid increases in pollutant loads as Victoria's population and urbanisation continue to expand.

Onsite Detention

Onsite Detention (OSD) in the Australian Rainfall and Runoff (ARR) guidelines 2019 refers to the practice of temporarily storing stormwater on-site during and immediately after a rainfall event, before it is gradually released into the stormwater system. This approach helps manage peak flows and reduce the risk of downstream flooding by controlling the rate of stormwater discharge from developed areas.

Although retention rainwater tanks are effective at storing rainwater volumes this relies on the rainwater tank having some capacity when the rainfall event occurs. Research suggests that rainwater tanks have available storage prior to most significant rain events (Coombes, P.J and Barry, M.E, 2008); however, some authorities require OSD. This is usually managed through an orifice plate that releases the water over several hours and ensures available storage within 24 hours. A common arrangement is for the upper volume of the rainwater tank to be dedicated to detention and the lower volumes for rainwater retention and household and garden uses.

Objective Two: Efficient Water Use: Reduce the demand for municipal water at both the lot and city scales

Rainwater harvesting's value lies in reducing the investment and operating costs of municipal water infrastructure to provide a net benefit to the community.

Municipal water infrastructure is a capital, resource, and energy-intensive asset. Alternative solutions like rainwater harvesting are less expensive but do not meet all our water needs. Rainwater harvesting is a first response reducing the need for more significant investment in more expensive water infrastructure.

Municipal water infrastructure is a capital, resource, and energy-intensive asset.

Municipal water requires intensive energy, resources and infrastructure to treat water to drinking water standards. Municipal water is transported long distances from the storage and treatment plant to service large capital cities using an extensive network of pipes, pumps, and more energy, resources, and infrastructure. Additional water supply infrastructure in the form of desalination plants and recycled sewage plants are more energy-intensive than water storage solutions and require further energy, resources and infrastructure. A city the size of Greater Sydney uses 600 million tonnes of water annually to be stored, treated and transported across the region. The costs of such a system are high, but they deliver vital services.

Rainwater harvesting, in contrast, collects water from the roof of the building where it will be used. Transport costs are low. A roof is a non-trafficable area, so there are few opportunities for contamination. Rainwater does not usually need to be treated to drinking water quality. Therefore, water treatment costs are low.

Infrastructure savings

Traditionally, the benefits of rainwater harvesting have been measured based on the value of water saved at the household level. Professor PJ Coombes modelled whole urban systems, including water and sewage distribution costs. The studies showed that the more significant benefit of demand management and alternative water sources is deferring investment in major water and stormwater infrastructure projects and savings in operating costs. The benefits to the whole community are measured in billions rather than millions of dollars. (Coombes & Smit, 2020)

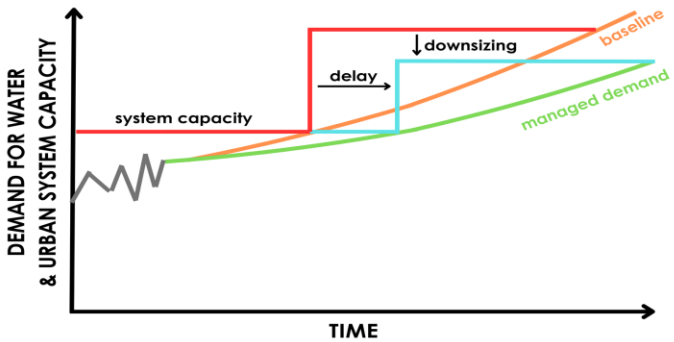

Figure 3 Economic benefits of demand management for infrastructure investment (Various industry references including PJ Coombes, Queensland Water Directorate and NSW Department of Planning, Industry and Environment)

Figure 3 describes a key relationship between managing demand in a growth environment and savings achieved through deferring and reducing subsequent infrastructure investment.

Cascading and Cumulative Benefits

The benefits of this approach affect the whole urban water system and have compounding, cascading impacts throughout the urban water system.

- Using water efficiency to reduce water demand reduces the volume of both rainwater and municipal water needed to meet that demand.
- Rainwater can meet a proportion of the building's water needs, reducing the volume of municipal water to meet the buildings needs
- Less demand for municipal water has system-wide benefits, the municipal needs less water storage, less water treatment and less water transport. This reduces the infrastructure and operating costs of the utility and, therefore reduces water charges borne by the community.
- Reduced water charges increase household welfare, reduce cost of living and increase the productivity of urban systems.
- In the event of a drought or other disaster, households and other buildings have multiple urban water systems to call on and less demand that needs to be met by alternative solutions.
- These benefits are reflected in best-practice urban systems modelling, indicating that the BASIX water efficiency program and rainwater harvesting program will reduce the community's annual water and sewerage costs by $236 million by 2050. (Coombes & Smit, 2020)

Objective Three: Understanding and Supporting Rainwater Harvesting Systems.

Rainwater harvesting assets require support similar to other infrastructure assets, even though we rely on individuals in the community for management. Rainwater harvesting systems are relatively simple to manage, more so if well-designed.

Rainwater harvesting systems are more than just rainwater tanks; they include the roof, gutters, downpipes, pumps, and plumbing. (Urban Water Cycle Solutions & Rainwater Harvesting Association of Australia, 2017) CSIRO surveys found that 93% of respondents were satisfied with their rainwater harvesting system, and the level of satisfaction was higher for mandated installations. (Moglia M, Tjandraatmadja G, Delbridge N, Gulizia E, 2014) Similarly, the ABS found that 60% of rainwater tank owners in Queensland had carried out maintenance in the last 12 months, and 49% of these checked pipework and connections. (ABS, 2017) This does not suggest a community reluctance to support rainwater harvesting systems.

Support for rainwater harvesting can be encouraged by explaining the environmental and community benefits and the straightforward and generally low-cost maintenance required. The environmental benefits of rainwater harvesting through reducing stormwater volumes, including reduced flooding risk, reduced costs of stormwater infrastructure, reduced pollutant loads, and reduced damage to waterway ecologies from scouring and fast-moving water, need to be explained. Explaining these benefits further incentivises the community to continue supporting Rainwater Harvesting.

Policy

- IOT monitoring for all rainwater storage
- Provide access to design guidelines and maintenance schedules for rainwater harvesting systems.
- Promote the benefits of rainwater harvesting through brochures, reports, and media.
- Provide practical support for rainwater harvesting, including services and community incentives.

Internet of Things monitoring is recommended for all rainwater storage as monitoring is low cost, provides an important communication channel for building owners, and confirms policy benefits for the community and government. The monitoring is designed to provide data on yield and stormwater diverted to building occupants, as well as network information on functionality, rainwater harvesting yield, and temporal information for stormwater management available to the local government.

Government and local government annual budgets could be based on 2% of the rainwater asset value for promoting and developing content, education and, where required, direct support. Because rainwater harvesting systems are low-cost, this is still a fraction of the operating expenses of centralised water infrastructure.

Rainwater harvesting support functions should include the following.

- Community education on the benefits of rainwater harvesting, including school curriculum material.

- Formal elements of training for Plumbers
- Community maintenance advice and schedules
- Direct service support and subsidised pump replacement in critical areas
- Publication of BOM National Performance Reporting on water efficiency and rainwater harvesting

Best Practice Regulation

National best practice principles state that regulation must be based on a clear rationale and that the benefits of regulation justify the cost. (Council of Australian Governments COAG, 2007) A transparent and accountable process for developing rules protects the community's interests. National and State plumbing regulations that reduce the effectiveness of rainwater harvesting in achieving policy objectives require a high level of independent evidence to justify the cost to the community.

Voluntary measures to satisfy performance objectives are available through industry associations and government advice (including the RHA Design Guide, HB230, and BASIX Guidelines). These documents are generally free of charge and easily accessible. Where rainwater harvesting is required through the land use development process, compliance for builders can be achieved through a permit condition requiring compliance with approved guidelines.

When significant problems with caring for rainwater tanks are evidenced, this should be publicly documented, and a state and local government maintenance strategy based on a mix of education, regulation, and incentives should be developed.

Given that the best available modelling indicates that this alternative water strategy modelled out to the year 2050 will benefit Greater Sydney by more than $10 billion, a program to support rainwater harvesting is firmly in the community's interest. (Coombes & Smit, 2020)

CONCLUSION

Rainwater Harvesting changes the structure of the urban water systems and is an effective first response to urban water problems. Rainwater Harvesting is an efficient solution that uses local water and is simple and quick to implement, reducing the challenge for subsequent large and expensive infrastructure solutions.

Rainwater harvesting supports healthy catchments and water bodies by reducing the volume of stormwater our cities produce. Stormwater volume is the primary determinant of flooding and the damaging impact of stormwater on our natural environment.

Rainwater Harvesting supports sustainable water resources efficiently by improving urban water systems' diversity, efficiency and resilience. Rain delivers high-quality water directly to our buildings, reducing the need for municipal water to be stored, treated, and transported long distances.

Members of Rainwater Harvesting Association have a commercial interest in rainwater harvesting policy. Rainwater Harvesting Association has written this policy to improve water outcomes for the whole community. It has sought to provide evidence and develop arguments based on community interests, not industry benefits. Rainwater Harvesting Association asks policymakers and the community to consider the evidence and arguments in developing water policies.

The most straightforward argument for rainwater harvesting is the volume of rain that falls on our cities and the insights from Figure 1.

1. Stormwater volumes are greater than water supply, this means more rain falls on households than the reticulated water we use.
2. This rain is discarded as high volumes of stormwater due to the nature of the urban system.
3. Stormwater volumes damage the environment and put urban areas at risk.
4. Our current strategy is to invest in new water supplies without using the rain resource.
5. Harvesting rainwater as a first response is crucial, reducing the challenge for subsequent large and expensive water and stormwater infrastructure solutions.

Sustainable Building Rainwater Harvesting Land Use Policy v1.1

Policy by Rainwater Harvesting Association.

Introduction

Purpose:

The policy promotes and regulates the integration of rainwater harvesting to achieve more sustainable and resilient buildings through reduced stormwater volumes and water efficiency. The policy considers cities as urban systems, using building design to address urban water challenges and increase the sustainability and resilience of the built environment.

Scope:

This policy applies to all new residential, commercial, and industrial development, and significant renovations and retrofitting projects. The policy will be applied to all new developments and alterations to greater than 30% of the existing floor area.

Legal Framework:

The policy is applied through land use planning schemes to achieve water efficiency, stormwater management, economic efficiency and environmental protection planning objectives. The policy aligns with the Engineers Australia Australian Rainfall and Runoff: A Guide to Flood Estimation (ARR) guidelines.

Vision and Objectives

Vision Statement:

To foster a sustainable and resilient built environment across Australia, where buildings actively contribute to reducing stormwater impacts and water efficiency through the widespread adoption of rainwater harvesting systems.

Objectives:

Support Resilient Cities and Catchments: To reduce the volume of stormwater runoff at both the lot and city scale, enhancing the resilience and health of urban areas and natural catchments.

Support Efficient Water Use: Reduce the demand for municipal water at both the lot and city scales, including during droughts or water restrictions.

Understand and Support Rainwater Harvesting Systems: Empower communities to design and maintain high-functioning rainwater harvesting systems through IOT monitoring, education, practical support, and funding based on the value of the assets.

Performance Goals

Effectively designed and operated rainwater harvesting systems reduce stormwater volumes from the lot by 30%, varying with local conditions and behaviour.

Effectively designed and operated rainwater harvesting systems reduce residential water demand from the lot by 30%, varying with local conditions and behaviour.

Combined with effective water efficiency measures, rainwater harvesting reduces residential water demand by 45% -60%

Rainwater Harvesting Deemed to Comply Provisions

A summary of relevant content is provided with further information in Reference Materials.

Housing type	Roof catchment area	Minimum Tank Size	Usage
Detached housing	150sqm roof catchment	5000-litre storage	connected to toilets, laundry and outdoor taps
Semi-detached housing	100sqm roof catchment	3000-litre storage	connected to toilets, laundry and outdoor taps
Unit housing	18sqm roof catchment/unit	2500 litre storage	connected to toilets, laundry and outdoor taps
Non-residential buildings based on eight classes of land use	100sqm roof catchment	Generally 2000 litre storage/100sqm roof area	connected to toilets and other indoor and outdoor water applications

Rainwater Service

- Is connected to the building's toilet cisterns and washing machine cold water tap and outdoor taps for non-potable uses
- Allows for a continuous water supply through an automatic switching device, trickle top-up system or other suitable system

Water Quality Protection

- Screen mesh to leaf diverters on downpipes, minimum 1mm mesh
- Screen mesh to tank inlets minimum 1mm screen mesh
- Screen mesh to charged systems minimum 1mm screen mesh
- First flush protection
- Backflow protection

System Materials (see RWH Design Specification in references)

- Rainwater tank standards
- Tank openings
- Tank overflow

Alternative Performance Solutions:

Alternative solutions to rainwater harvesting are supported, and they can be shown to meet performance goals.

- Reduce stormwater volumes from the lot by 30%, and
- Reduce utility water demand from the lot by 30% and

Land Use Categories

Residential:

New residential developments include rainwater harvesting systems with a minimum capacity proportional to the roof area. Harvested rainwater is used for garden irrigation, toilet flushing, and laundry.

Apartment or unit development is well suited for rainwater harvesting with storage in the grounds or the basement and a high demand for toilet flushing. Rainwater harvesting is recommended for all unit development.

Commercial and Industrial:

Commercial and industrial buildings incorporate rainwater harvesting systems that can supply non-potable water for landscaping and sanitation facilities. Industrial developments consider using harvested rainwater in manufacturing processes where appropriate. Maintenance plans for rainwater harvesting systems are in place to ensure long-term functionality and water quality.

Agricultural:

Greenhouse buildings incorporate rainwater harvesting systems because their roof areas are suitable for capturing rainwater, providing an efficient and local natural water source as the first option for irrigation.

Agricultural land use in peri-urban areas and urban community gardens integrate rainwater harvesting systems from nearby buildings to support irrigation needs, especially in regions prone to water scarcity.

Environmental and Open Space:

Public parks and recreational areas harvest rainwater from nearby buildings for irrigation, reducing dependence on treated water.

Cultural and Heritage Sites:

Rainwater harvesting systems in heritage sites are designed to preserve the site's historical integrity while contributing to sustainability.

Guidelines are provided for the unobtrusive integration of rainwater harvesting in such sites.

Planning Principles

Sustainability:

Rainwater harvesting is integral to a sustainable built environment. It supports municipal water conservation and reduces environmental impact by reducing stormwater runoff.

Resilience

Rainwater harvesting significantly benefits stormwater management and flooding as it is an 'at source' control at the top of the catchment. Reductions in stormwater volumes and pollutants benefit the entire catchment and improve the ability of waterways to respond to other challenges. Municipal water sources rarely have stormwater benefits.

Rainwater harvesting provides an alternative water source to municipal water, reducing our reliance on a single, centralised system. Rainwater harvesting is a decentralised water system that individuals can manage and rapidly respond to local needs. Reducing the reliance on municipal water, increasing the diversity of water sources and providing local control over water sources increases the community's resilience.

Economic Efficiency

Rainwater harvesting assists in optimising the mix of municipal water, alternate water sources, water supply solutions and demand management to meet the community's best interests.

Community Engagement:

Actively involve local communities in the planning and implementing rainwater harvesting systems through education, consultation, and collaboration. Encourage community ownership and responsibility for maintaining these systems.

Equity and Inclusion:

Ensure that all socioeconomic groups have access to the resources and information necessary to implement and benefit from rainwater harvesting systems. Consider providing financial assistance or incentives to low-income households.

Innovation and Adaptation:

Encourage the adoption of innovative rainwater harvesting technologies and designs that can be adapted to various climatic conditions and urban settings. Support research and pilot projects to explore new applications for harvested rainwater.

Integration with Existing Infrastructure:

Rainwater harvesting systems seamlessly integrate with existing water supply and stormwater management infrastructure, ensuring compatibility and maximising efficiency.

Implementation and Monitoring

Implementation Plan:

IOT monitoring on all rainwater storages provides data on yield and stormwater diverted to building occupants, as well as network information on functionality, rainwater harvesting yield, and temporal information for stormwater management available to local government.

Implement clear guidelines and standards for installing, operating, and maintaining rainwater harvesting systems in new developments, retrofitting projects, and public infrastructure. Establish a

certification process for compliance with rainwater harvesting requirements, ensuring that all systems meet the specified standards.

Provide incentives, such as grants, rebates, or reduced water rates, to encourage the adoption of rainwater harvesting systems across different building types. Facilitate training programs for builders, architects, and engineers to ensure they have the knowledge and skills to design and install effective rainwater harvesting systems.

Monitoring and Review:

Regularly monitor the performance of rainwater harvesting systems to ensure they effectively reduce municipal water demand and manage stormwater runoff. Collect data on system adoption rates, water savings, and maintenance issues to inform policy adjustments and improvements. Review and update the policy every five years or as needed to reflect technological advances, changing environmental conditions, and evolving community needs.

Declaration Of Interest

Members of Rainwater Harvesting Association have a commercial interest in rainwater harvesting policy. Rainwater Harvesting Association has written this policy to improve water outcomes for the whole community. Rainwater Harvesting Association has sought to provide evidence and develop arguments based on community interests, not industry benefits. Rainwater Harvesting Association asks policymakers and the community to consider the evidence and arguments in developing water policies.

Definitions:

Charged Line: Also known as a wet system. For a tank is a system that

a) Relies on hydraulic head pressure to force water through pipework and then up a vertical riser pipe and into the inlet of the tank and
b) Consistently holds water.

(Queensland Development Code definition).

Utility Water: Water supplied by a public or private utility for residential, commercial, and industrial use, typically treated to meet potable water standards and distributed through a centralised system, including recycled water. (ChatGPT, 2025)

Rainwater Harvesting: The collection and storage of rainwater, specifically from roofs, for applications such as irrigation, toilet flushing, and laundry.

Sustainable Building: Building practices that minimise environmental impact and promote the efficient use of resources.

Water Efficiency

1. the optimal use of water resources to achieve the desired outcomes while minimising wastage and maximising the utility of each unit of water used. Water efficiency involves using water-saving technologies, practices, and behavior changes that reduce water consumption and ensure sustainable water management in both residential and commercial settings. (AWA Guidelines)

2. Optimising the mix of municipal water, alternate water sources, water supply solutions and demand management to meet the best interests of the community

Maps and Diagrams:

A zoning map indicates areas where rainwater harvesting is mandatory or recommended. Diagram illustrating a typical rainwater harvesting system setup for residential and commercial buildings.

Relevant Legislation:

List of applicable national and state legislation.

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