WESTERN AUSTRALIA

WaterWise Perth Action Plan 2

KEP KATITJIN GABI KAADADJAN

GROWING WATERWISE COMMUNITIES IN BOORLOO (PERTH) AND BINDJAREB (PEEL) TO ADDRESS CLIMATE CHANGE

Acknowledgements

We acknowledge the Traditional Owners, the Whadjuk and Bindjareb peoples of the Noongar Nation, whose land this plan affects. We pay our respects to their Elders past and present, and we recognise the practice of intergenerational care for Country and its relevance to our work.

We seek to listen, learn and genuinely engage and build strong partnerships. We aim to provide sustainable opportunities for Aboriginal people within our workforce and through our business.

Country is a term used by Aboriginal people to describe the lands, waterways and seas to which they are intrinsically linked. Wellbeing, law, place, custom, language, spiritual belief, cultural practice, material sustenance, family and identity are all interwoven with Country. Working with the community, we move forward with a shared commitment to protect and conserve Country for future generations.

The Department of Water and Environmental Regulation would like to acknowledge and thank everyone involved in the Danjoo Koorliny Walking Together Project and particularly the Danjoo Koorliny Co-Directors for their wisdom, guidance and advice in developing this plan.

The Department of Water and Environmental Regulation would also like to acknowledge and thank the Bindjareb Elders, who have taught us so much about working together with respect and to share knowledge systems. This learning is being carried forward in this plan.

Thanks also to the Waterwise Steering Committee and Waterwise Working Group of the waterwise partner agencies for their time, commitment and collective direction and knowledge – it is through that collaboration that the waterwise program is more than the sum of its parts. Particularly important is the coordinated, shared, across-water-portfolio approach to delivering waterwise outcomes between the Department of Water and Environmental Regulation and Water Corporation.

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Cover image: By artist Darryl Bellotti

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World-leading waterwise communities for Boorloo (Perth) and Bindjareb (Peel) by 2030.

Cover image:
By artist Darryl Bellotti

What Kep Katitjin – Gabi Kaadadjan (water knowledge) means to me

The terms Kep Katitjin and Gabi Kaadadjan, to me, mean life. In simple terms, it is the essence of what caring for Country is about. Water is life. The availability of water informed our ancestors' decisions in day-to-day life: when to hunt, where to hunt, what to hunt. abundance, or lack thereof, is what determines where Noongar people would reside as they travel the landscape in a continual journey through the seasons. The Waugul, the Noongar Creator Spirit, is synonymous with the water sources; the rivers, the rains and the Great Lakes of Noongar Boodja, all share connection to the Waugul. It was the Waugul who bestowed Noongar with the responsibility of shaping and caring for the land and all that dwell upon it.

Without water we cannot survive. We, as Indigenous and non-Indigenous people alike, now have the shared responsibility of carrying out that obligation for the survival of culture, the people, and all living things. We are the caretakers of the earth, and we haven't been living up to our sacred responsibilities. Now, with *Kep Katitjin – Gabi Kaadadjan (Waterwise Perth action plan 2)*, we can begin to reclaim that position and ensure that our descendants have the knowledge they need to fulfil this obligation into the future.

Message from the Minister for Water

HON DAVE KELLY MLA
Minister for Water; Forestry; Youth

Kep Katitjin and Gabi Kaadadjan are the Whadjuk and Bindjareb Noongar terms for 'water knowledge'. The Traditional Owners of Boorloo (Perth) and Bindjareb (Peel) have been the custodians of the environment and water resources for tens of thousands of years. The management of our precious water with shared knowledge and wisdom is at the heart of this plan.

This is the second action plan in the ten-year journey towards leading waterwise communities in Boorloo and Bindjareb and builds on the excellent foundation established through the *Waterwise Perth action plan 2019*.

In the south-west of Western Australia, we are experiencing the impacts of climate change earlier and more sharply than almost anywhere else in the world. Not only have we seen a decline of 15 per cent of our annual rainfall since 1975, but we are experiencing more frequent hotter days.

There has been an approximate 80 per cent decline in rainfall runoff into Perth's dams since the 1970s, which also means less rainfall recharge to our groundwater aquifers. Due to these climate change impacts, it is essential we use our water wisely and sustainably.

The actions in this plan will help us to conserve our precious water resources, and at the same time, support urban greening, biodiversity, tree canopy and urban cooling to create climate resilient communities.

With the first Waterwise Perth Action Plan, eight State Government agencies collaborated to deliver 38 actions to support waterwise communities in Boorloo and Bindjareb.

Kep Katitjin – Gabi Kaadadjan will continue this journey of collaboration and coordination across State Government to deliver important waterwise outcomes and to build climate resilience in our communities. In addition to our foundational Waterwise Partner agencies, the Departments of Biodiversity, Conservation and Attractions, Primary Industries and Regional Development, and Education will join us in delivering an ambitious scope of work across State Government.

With the launch of the *Gnangara groundwater allocation plan* in June this year, we have taken a key step to protect our important water supplies and our environment for future generations. The Gnangara plan is integrated into *Kep Katitjin – Gabi Kaadadjan*, supported by significant State Government funding to assist groundwater users with the changes.

The McGowan Government is committed to the delivery of *Kep Katitjin – Gabi Kaadadjan*, and I am proud to support this ongoing initiative and to see Boorloo and Bindjareb becoming leading waterwise communities.

Kep Katitjin – Gabi Kaadadjan Country

Kep Katitjin – Gabi Kaadadjan focuses its actions on the Boorloo (Perth) and Bindjareb (Peel) regions of Western Australia because this is where most of the state's population lives and where the most intense urban development is occurring. The plan uses the Noongar terms for these regions to acknowledge and pay respect to the Traditional Owners, as acknowledged and recognised by the Western Australian Parliament through the *Noongar (Koorah, Nitja, Boordahwan) (Past, Present, Future) Recognition Act 2016*. There is a glossary of Noongar terms at the end of this plan.

The map at Figure 1 shows the Perth and Peel regions and local government areas. The term 'Boorloo' often refers to the city of Perth, but this plan includes the city and the broader region, including the North-West, North-East, Central, South-West and South-East subregions. Bindjareb is the name for the Peel region. This map and its boundaries are used by the Australian and Western Australian Governments, however, Bindjareb and Whadjuk Traditional Owners may have different boundaries for their Country. This plan is being delivered by State Government agencies, so some of the actions are being implemented in Boorloo and Bindjareb, as well as across WA.

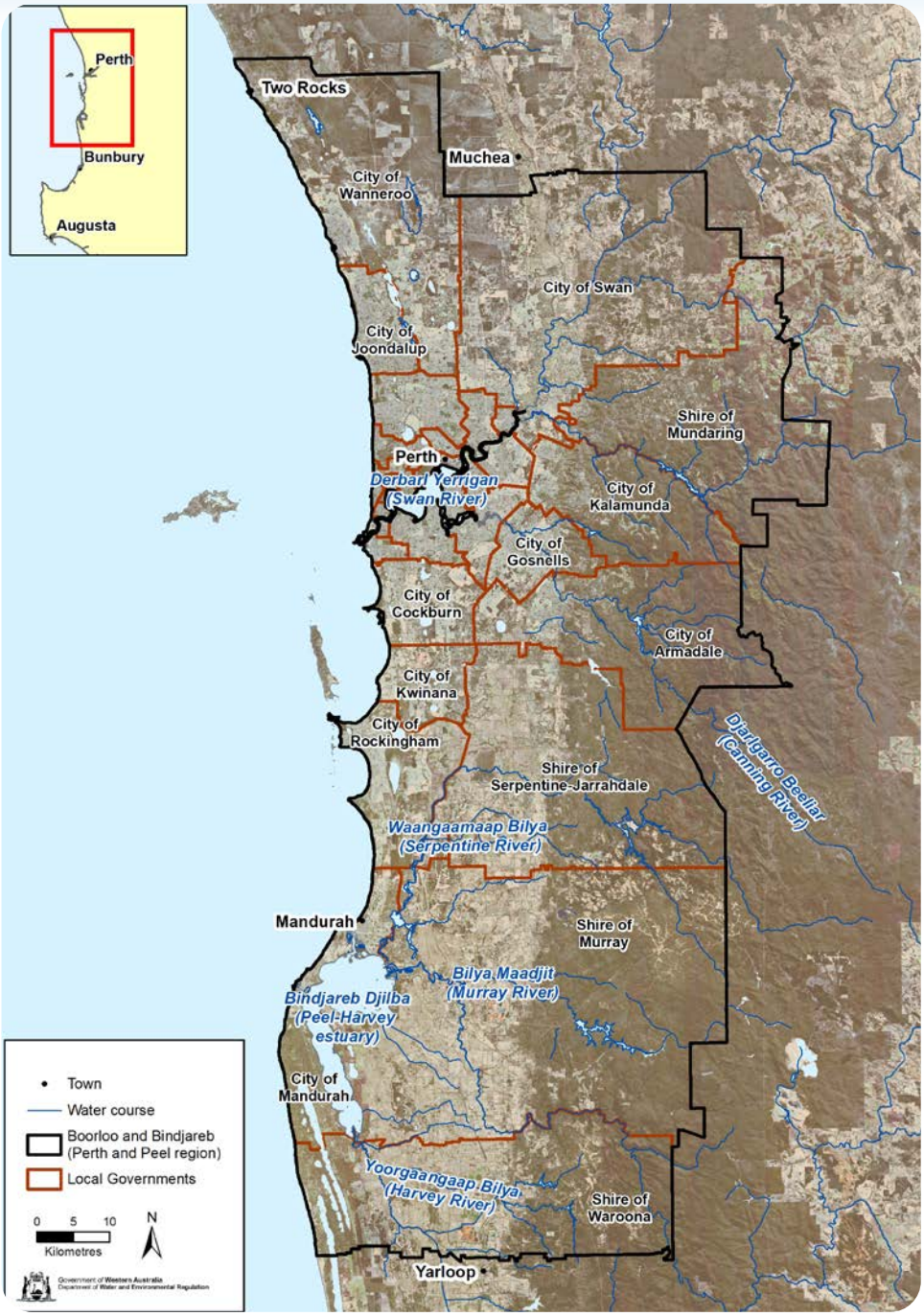


Figure 1: Map of the Perth (Boorloo) and Peel (Bindjareb) region of Western Australia's Swan Coastal Plain

Boorloo (Perth) and Bindjareb (Peel) waterwise cities are where communities care about and value water, while making best use of its various sources (groundwater, dams, stormwater, sea water and wastewater). The city serves as a catchment and provides healthy natural environments, supporting a range of cultural, social, ecological and economic benefits.

What is waterwise

In Western Australia we use the term 'waterwise' to denote a holistic approach to water in all of its meanings and functions. Being waterwise is about showing experience, Katitjin – Kaadadjan (knowledge), good judgement and wisdom in how we consider and manage our precious water resources and our connection to them. A waterwise community is sustainable over the long term, economically productive, highly liveable and resilient to extreme weather events. It is a vibrant community where our connection with water enhances our quality of life. By adopting waterwise approaches, communities and the environment can become more climate resilient and make the Boorloo (Perth) and Bindjareb (Peel) region a sustainable and liveable place for future generations.

Water is more than a resource for productive use. It is integral to all aspects of our lives – from our physical and mental health to our local environment. The human brain and heart are composed of 73 per cent water. Water is embedded in every single item that we purchase and consume. Noongar people, as the first people of the Boorloo and Bindjareb region, have been managing water for 60,000 years. The conservation and spiritual practices of the Noongar people kept the Country and its people healthy and in balance. It is a challenge to find any culture that does not have a spiritual connection with water: as a giver of life; birth and rebirth; for purity and healing; and as a connector. Boorloo and Bindjareb's groundwater feeds green spaces, sustains trees for shading, sustains wetlands, waterways and bushland; and provides the way of life that makes the region one of the most sought-after in the world to live in, and to visit. Our waterways, wetlands and ocean are central to our culture, providing places for water sports, locations for picnics, birdwatching and walks, and settings for cultural events such as festivals, fireworks and art installations, and for the generation of memories. Groundwater also supports agriculture in the Boorloo and Bindjareb region to grow almost 20 per cent by value of WA's fresh fruit and vegetables. Water is everything.

The Government of Western Australia has used 'Waterwise' as a water-efficiency brand for decades, encouraging people to be conservative in their water use because of the impacts of climate change. It has since evolved to encompass the concepts that underpin water sensitive cities. According to the Cooperative Research Centre for Water Sensitive Cities (CRCWSC), water sensitive cities:

- serve as a potential water supply catchment, providing a range of different water sources at different scales, and for a range of different uses
- provide ecosystem services and a healthy natural environment, thereby offering a range of social, ecological and economic benefits
- consist of water sensitive communities where citizens have the knowledge and desire to make wise choices about water, are actively engaged in decision-making, and demonstrate positive behaviours such as conserving water at home and not tipping chemicals down the drain.

Hence waterwise is about more than using less water. Waterwise means appreciating how integral water is to our lives and the intrinsic value we place on this resource that is fundamental for our communities. It means we thoughtfully decide to use water in the best ways we can. We design and maintain our houses and communities to manage water onsite to provide amenity and green spaces, to benefit ecosystems and the economy, and to reduce water pollution. As we face a hotter, drier future because of climate change, wise uses of water include supporting biodiversity and the cooling of our environment. The actions in this second plan help clarify and manage this tension between water savings and investing in the more holistic benefits of waterwise. The actions also continue our journey towards world-leading waterwise communities in Boorloo and Bindjareb by 2030.

Kep Katitjin – Gabi Kaadadjan 2030 targets – Waterwise Perth action plan 2

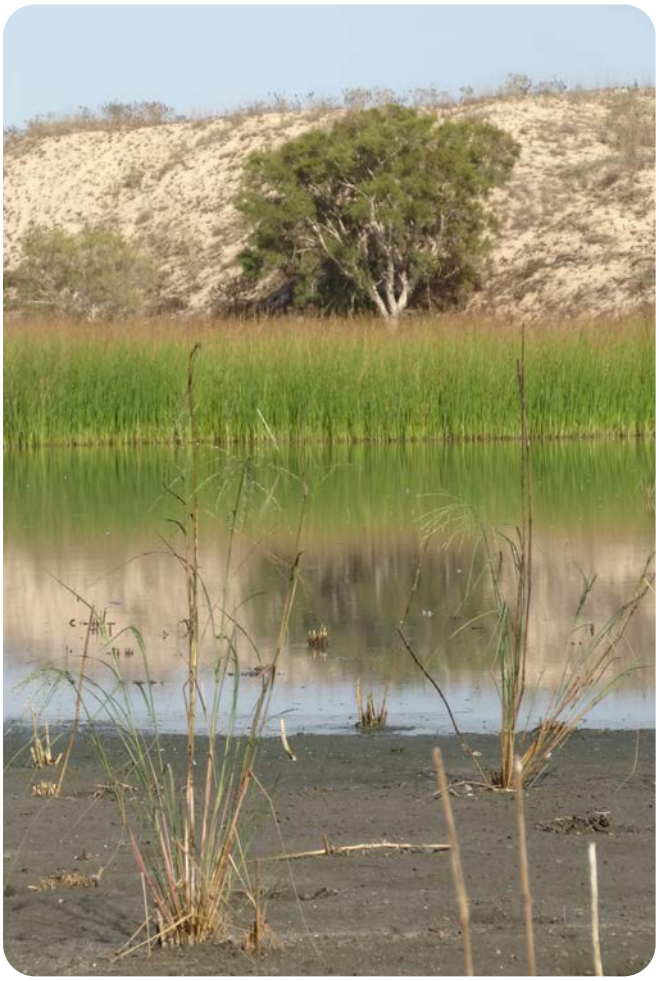
1. Retrofit 10,000 State Government owned and related social housing properties statewide with water-efficient fixtures.
2. Increase community engagement and knowledge about water by 15% - from 6.2 in 2018 to 7.1 out of 10 water knowledge questions answered correctly by 2030.
3. 100% of Boorloo and Bindjareb councils achieve Waterwise Gold status.
4. Expand the reach of the Waterwise Schools Program to engage 50,000 students per year by 2030.
5. 100% of irrigated open space audited and adopting waterwise management practices.
6. Annual water efficiency audits completed for 13 non-residential customers deemed eligible, based on their water use exceeding the 20,000kL per year threshold for participation in the Water Efficiency Management Plan (WEMP) program.
7. 50 land and water assets retrofitted to improve local community access to green spaces.
8. 100 restoration projects to contribute to improved water quality, ecological health and amenity of the Swan Canning Riverpark, tributaries and catchment.
9. Increase wastewater recycling from 21% in 2022 to 30% by 2030.
10. 10% less groundwater used across the region.
11. Adoption of water-efficiency infrastructure, soil amelioration and technology support programs in the Gnangara plan area.
12. Best practice waterwise policies integrated into all state urban water policies, guidelines and technical advice notes.
13. 100% of government-led urban development in Boorloo and Bindjareb to be waterwise.
14. At least 11 climate change management plans adopted by waterwise partner agencies, meet or exceed State Government-endorsed climate change guidelines and standards.

Note: Yellow denotes new 2030 targets to reflect the broader scope of actions.

Kep Katitjin and Gabi Kaadadjan – water knowledge

This plan has been given the Noongar name 'Kep Katitjin – Gabi Kaadadjan' meaning water knowledge in both the Whadjuk and Bindjareb dialects, to reflect the Country the plan covers; that is, the Boorloo (Perth) and Bindjareb (Peel) regions.

To help us address the impacts of climate change, with more intense rainfall events but less annual rainfall and a hotter climate, it is useful to agree on a set of principles for how we think about, design and create waterwise communities. We can use these principles as the foundation for behaviour and decision-making on what is important and valued.



Land and water are connected

Principles

Everything is connected – For Aboriginal and Torres Strait Islander peoples, connection and interdependence with the land and water is based on respect – as the land and water sustain and provide for the people, the people manage and sustain the land through culture and ceremony. Our city is built around connected ribbons of green (vegetation) and blue (water) through the landscape. People feel a sense of belonging and connection to the urban character of Boorloo and Bindjareb, reflecting its unique landscape and water environments.

Sense of place - Waterwise communities start with understanding the place you are standing on: from its cultural heritage – both ancient and modern – to its landform, plants and animals, groundwater, wetlands and waterways. Maintaining a sense of place is achieved by understanding the local conditions, including the movement and balance of water, and mimicking and enhancing natural systems when we change the landscape to develop our city. Water resources, challenges and opportunities are identified and addressed as early as possible in the planning process and at all subsequent stages.

Liveable – The urban environment is comfortable, safe and promotes health and wellbeing. Urban form and natural spaces are beautiful, resilient to climate change and support a vibrant community.

Resilient – The water elements of our urban spaces are multi-functional, designed to reduce risk to people and property and optimise benefits to the environment. Water infrastructure – both natural and built – is integrated into the urban landscape and helps us adapt to and manage the impacts of climate change and other shocks and stresses.

Sustainable – Water quantity and quality is managed to equitably meet the needs of people, production and the environment both now and in the future. Our water ecosystems are protected and thriving. By finding opportunities to reduce, reuse and recycle water across the whole water cycle, we ensure best use and recovery of water resources.

Prosperous – There is equitable access to safe and secure water supplies and essential services, across generations. Water is an economic enabler that supports a healthy natural environment for production, tourism and other benefits to the economy. Sustainable and efficient urban design and smart systems reduce and optimise the consumption of power and water.

Collaborative – Walking together to determine a shared vision and objectives. Government, businesses and the community play a role in progressing the objectives of waterwise communities. Collaboration across all stakeholders leads to innovative solutions to water and climate challenges and achieves greater overall benefit. The community values water, is well informed, and aware of the impact and risks of climate change on water resources. People have the knowledge and desire to make wise choices about water, are actively engaged in decision-making, and demonstrate positive behaviours to care for water resources and environments.

The Peel Inlet, City of Mandurah.

Walking together

The waterwise program of work has a unique opportunity to create change in our communities and cities. We can do this in the way they are designed not only to improve our connection to water and resilience to climate change, but also to achieve better outcomes for the urban environment. At the same time, we can create systems change in how we walk with First Nations people; integrating First Nations values and knowledge systems into our water planning and management and care for Country. Noongar people have given this plan a Noongar name: to honour and respect that, we are looking for the opportunities in every one of the 41 actions to walk together, understand, and integrate Noongar values and knowledge. Where appropriate, we are taking guidance on Noongar and Aboriginal naming for places, waterbodies, plants and wildlife. Naming is important, as it supports a fundamental and gradual change whereby both Noongar and Wadjela (non-Aboriginal) people begin to use common words to describe shared concepts, acknowledging that:

> Aboriginal and Torres Strait languages are not just a means of communication, they express knowledge about everything: law, geography, history, family and human relationships, philosophy, religion, anatomy, childcare, health, caring for country, astronomy, biology and food.
>
> (National NAIDOC Committee Co-Chair Anne Martin)

Building on the Waterwise Perth Action Plan 2019, there are three Noongar engagement actions in this plan that work at a systems-change scale.

Program Area	#	Action description	Target	Lead
We will walk with Noongar people to incorporate traditional environmental knowledge into waterwise action	1	Walk together with Noongar people on the journey to heal the waterways.		DWER / WC
	2	Increase understanding, value and recognition of Aboriginal and Torres Strait Islander cultures and cultural protocols, histories, knowledge and rights through cultural learning and engagement.		DWER
	3	Engage Noongar people to develop a methodology for identifying, describing and documenting Noongar ecological and cultural knowledge for a case study locality in Boorloo.		DBCA / DWER / WC / DoC / DPLH / DoE / METRONET

Shading indicates actions that continue or have evolved from the *Waterwise Perth action plan 2019.*

Action 3 will mostly be delivered by the 'Noongar water knowledge in the Djarlgarro Beeliar catchment: Implications for land-use and water planning' project, also known as the 'Djarlgarro Beeliar wetlands and waterways project'. The project was formed in late 2018 within the Clean Air and Urban Landscapes Hub of the National Environmental Science Program and formally started in mid-2020, after members of the Water Sensitive Transition Network helped secure support for the project from the network and its organisations. The interdisciplinary and cross-cultural project follows a two-way research approach and is co-led by a group of respected Noongar Elders and senior community members. It is intended that the outcomes of the work will lead to healing in the community, particularly in relation to the waterways and wetlands, which are so central to Noongar culture and wellbeing. It is also intended that the project will raise the voice and profile of Noongar knowledge about waterways and wetlands within a land use and water planning and management context, strengthening the grounds for a co-management approach going forward.

Walking together with Noongar people on the journey to heal the waterways is at the heart of all of the work to deliver this plan.

To walk together on the journey to heal the waterways, the co-designed Bring Together Walk Together Framework between Bindjareb Elders and the DWER creates a pathway to forge, build and maintain strong partnerships for better Aboriginal land and water outcomes. Through it, the Bindjareb Elders have developed their own overarching water plan, the *Bindjareb Gabi Wonga*, to preserve the unique and precious link between Spirit, the Djilba and people for future generations. The *Bindjareb Gabi Wonga* has directly informed the *Bindjareb Djilba protection plan* with Bindjareb knowledge for protecting the estuary. This partnership has taught us a great deal about the importance of sitting together, listening and reflecting, and acknowledging that we do not always get it right; thus we need to walk together with respect to learn and go forward. The principles articulated in that agreement of 'open heart, open mind, reflective thinking' are the foundation for walking together.

Bindjareb Noongar people have a continuing life commitment and cultural responsibility to preserve the Djilba (estuary) and Bilya (river). (Photo credit: Daniel Wilkins, courtesy of City of Mandurah).

The cosmology, or everything that we know is about what we have listened to and have learned from our Elders. Now it is up to us to teach those who are going to benefit and teach others. This walking together and sharing is important.

– George Walley, Bindjareb Elder.

Danjoo Koorliny Walking Together Towards 2029 and Beyond is a bold, long-term, large-scale Aboriginal-led systems change project to help all of us – in Western Australia, the rest of Australia and around the world – walk together as Aboriginal and non-Aboriginal people to co-create a better future for all. The first milestone is in 2029 (200 years of colonisation in Perth), and the project will go far beyond WA's bicentenary. As Noongar Elder Noel Nannup said, "Our focus is on 2029 at this stage. However, we have the potential to go way beyond that because this is about being a person - a human being".

The waterwise vision is for 2030 and these two paths, side by side, are converging.

In practice, this plan builds on the work established in the *Waterwise Perth action plan 2019* to include Aboriginal knowledge. Under that plan, the Waterwise Schools program expanded to include new educational resources with six *Water in Aboriginal culture* videos, the *Walk with the Waugal 360 experience*, and supporting comprehension lesson plans. The new resources take students on a sensory journey through Noongar Boodja (Noongar Country) to broaden their understanding and respect for Aboriginal culture by learning about Aboriginal people's connection to land and water, as well as about their languages and spirituality.

Connecting with Country.

Community education about water in Aboriginal culture is also delivered through the Water Corporation's Splash of Colour program. The program engages local artists, including Aboriginal artists, to transform electrical and wastewater pump stations and other small water structures into works of art – with vibrant paintings depicting the local community, natural environment and the importance of water. One of the major benefits of the across-government waterwise approach is sharing successes; now other projects are looking at ways to use Aboriginal artwork and naming.

An action for the Department of Local Government, Sport and Cultural Industries to *Embed waterwise design and efficiencies in State Government infrastructure projects and projects supported by State Government funding* includes major projects being conducted under the Arts and Culture portfolio, including the Aboriginal Cultural Centre. When the site was announced, the Whadjuk Cultural Authority representative said:

> **The site is part of our spiritual identity. It is where the Bilya (river) meets the Boodja (land) and where ancient waterways were created by the Wagyl as part of our Dreaming.**

When we consider waterwise principles in design and delivery, so many of them are guided by Noongar environmental knowledge and wisdom. State Government agencies are committed to walking together and working with respect to integrate – or 'thread' – Noongar knowledge, values and caring for Country into all of our waterwise activities and learning as we go.

Healthy groundwater sustains healthy wetlands.

Water and climate action

The *Waterwise Perth action plan 2019* discussed the importance of transitioning to waterwise cities and communities to adapt to the impacts of climate change. Climate projections for Western Australia from Climate Change in Australia are summarised in Western Australian climate projections: summary and supported by the Bureau of Meteorology's State of the Climate 2020 report. Boorloo's future climate is projected to be hotter and drier. There is high confidence we will experience more hot days and fewer cold days. Less rainfall is projected in winter and spring, with medium confidence that a larger proportion of rainfall will be from more intense, short-duration events. This means the role of water sensitive urban design and waterwise approaches to mitigate urban heat, optimise infiltration to groundwater and manage stormwater will become more important.

The Bureau of Meteorology has recently published climate projections based on the CMIP5 global climate model datasets. These are associated with the fifth assessment report of the Intergovernmental Panel on Climate Change (IPCC) and are used in the Climate Change in Australia projections. The bureau's new website, Australian Water Outlook, provides future climate data at the temporal and physical scale required for climate adaptation decision-making to achieve on-ground waterwise outcomes.

In August 2021, the world's leading climate scientists delivered their starkest warning on climate change. The IPCC has released three of four reports as part of its sixth assessment report, with the final synthesis report due in late 2022. These reports underscore the threat of climate change to Western Australia's community, environment, infrastructure and businesses, and predict the state's south-west will become hotter and drier. The report also outlines that Australia is experiencing temperature and sea-level rises faster than many other places on the planet. Cool-season average rainfall is decreasing across many regions of southern and eastern Australia (increasing the risk of droughts), and yet short-duration heavy rainfall events are increasing.

As part of the sixth assessment, new CMIP6 models have been used to assess the science of climate change. Under both the CMIP5 and CMIP6 models, there is high confidence that the future climate for south-west Western Australia will be hotter and drier. The State Government launched the four-year Climate Science Initiative in November 2020 to downscale the CMIP6 models from a global to a local (Western Australian) scale so that we can use the latest climate science and knowledge to respond to the impacts of climate change.

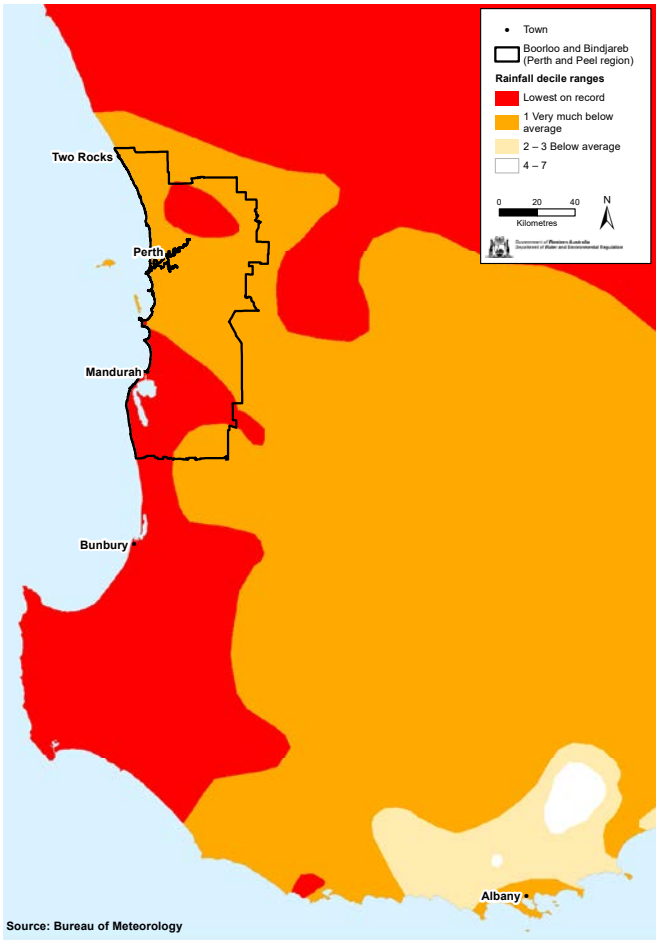


Figure 2: April to October rainfall deciles for the past 20 years (2000–19). A decile map shows where rainfall is above average, average or below average for the recent period, compared with the entire rainfall record from 1900. ©Bureau of Meteorology

Less rainfall is projected in winter and spring, with a larger proportion of rainfall coming from short-duration heavy rainfall events.

Western Australia's most populated urban centres are not designed to adapt to climate change, urban development and population growth on the urban water cycle and on human health and comfort. We need to continue the systematic and coordinated response established through the waterwise program of work to mitigate the risk to our most populous areas from urban heat impacts, less rainfall, degraded environments, flooding, drought, low urban amenity, fewer irrigated open spaces, less affordable energy and water, and reduced agricultural and industry production.

Kep Katitjin complements the Western Australian Climate Change Policy and sets out the vital role that water can play in climate change adaptation and mitigation. An outcome of the Covid-19 pandemic has been a better appreciation in the community of the importance of local access to quality natural spaces for our health and wellbeing. With more frequent hotter days, we need spaces that can provide this even in the heat of summer. Approximately half of the actions in this plan improve biodiversity, urban greening, tree canopy cover and help to mitigate urban heat impacts.

These activities demonstrate some of the breadth and depth of work occurring across state and local governments to build climate resilience and support the measures in the Gnangara groundwater allocation plan to achieve the sustainable allocation of Gnangara groundwater. Declining rainfall (15 per cent since 1975) and groundwater abstraction have contributed to more than 1,000 gigalitres (a gigalitre is one billion litres) of groundwater storage being lost from the Superficial aquifer of the Gnangara groundwater system since the 1980s (Figure 3). As a result, the health of our groundwater-dependent wetlands and vegetation is suffering, groundwater quality is reducing in some areas, and even with the impressive efficiencies gained to date, the long-term sustainability of the resource is still under threat. The goal is to rebalance the Gnangara groundwater system by 2032, to secure our lowest-cost and most-accessible water source for Boorloo and to support a healthy environment. This can only be achieved through a suite of measures focused on reductions in groundwater use.

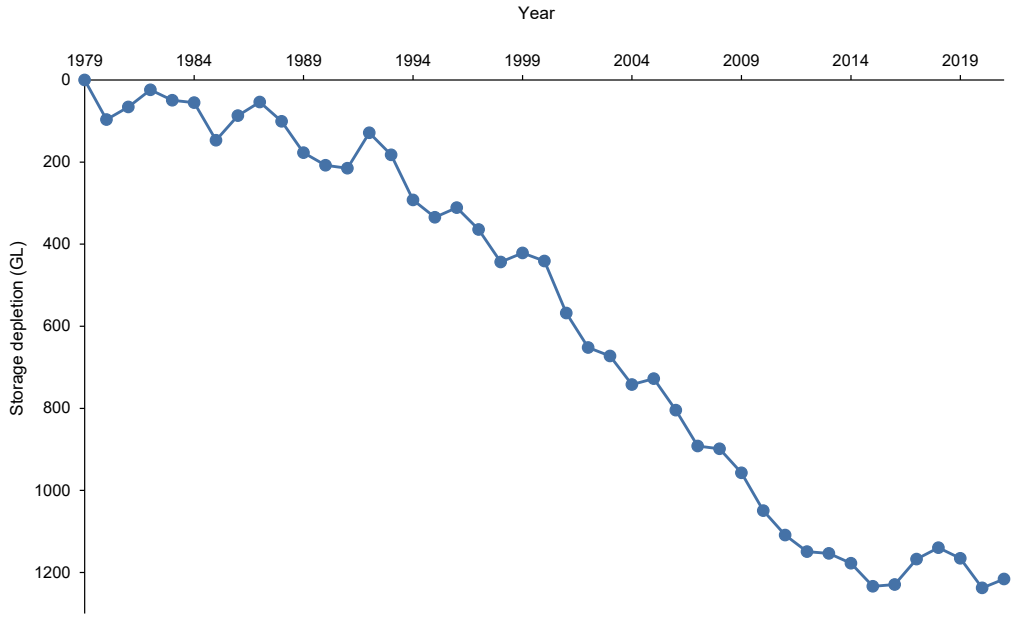


Figure 3: More than 1,000 billion litres of groundwater storage has been lost from the Gnangara Superficial aquifer since the 1980s.

Changes have been introduced to help conserve groundwater across the entire Boorloo–Bindjareb region, in addition to the measures to manage impacts on the Gnangara groundwater system, which extends north from Derbarl Yerrigan (the Swan River) to Moore River and Gingin Brook, east to the Darling Scarp and west to the Indian Ocean. One important initiative is the change to the garden bore sprinkler roster from three to two watering days per week, bringing it into line with the roster for scheme users. Current estimates indicate garden bore users in Boorloo and Bindjareb pump approximately 22 per cent of all the groundwater taken from aquifers in those areas each year. The change to the garden bore roster will save up to 30 gigalitres per year of precious groundwater, or enough water to fill Optus Stadium 30 times every year.

This step-change in the way we manage groundwater is also an opportunity to reset the way we approach scientific planning for our environment and our future and to embrace Noongar – and First Nations – environmental knowledge alongside contemporary scientific approaches.

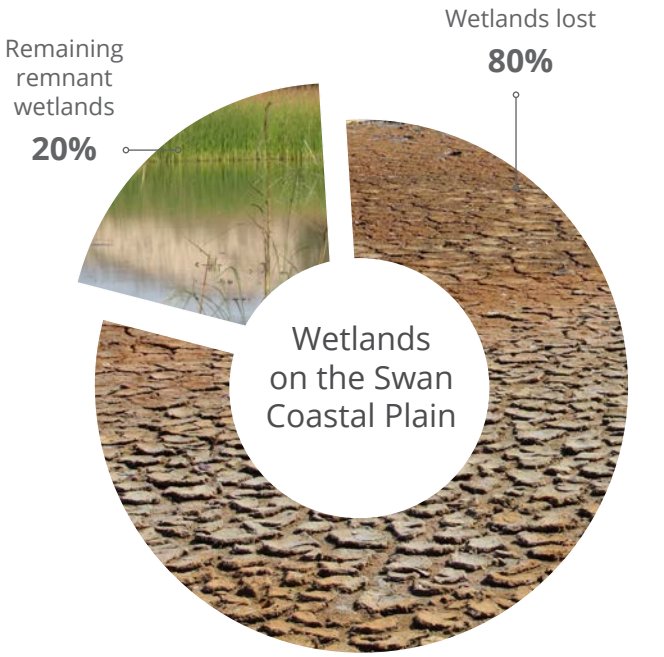


Figure 4: Wetlands on the Swan Coastal Plain. At least 80 per cent of the wetlands on the Swan Coastal Plain have been lost (Jennings Murdoch University). Protection of wetlands supports urban greening, biodiversity and the retention of valued community assets.

Case study
Government leading to secure climate-resilient water supplies

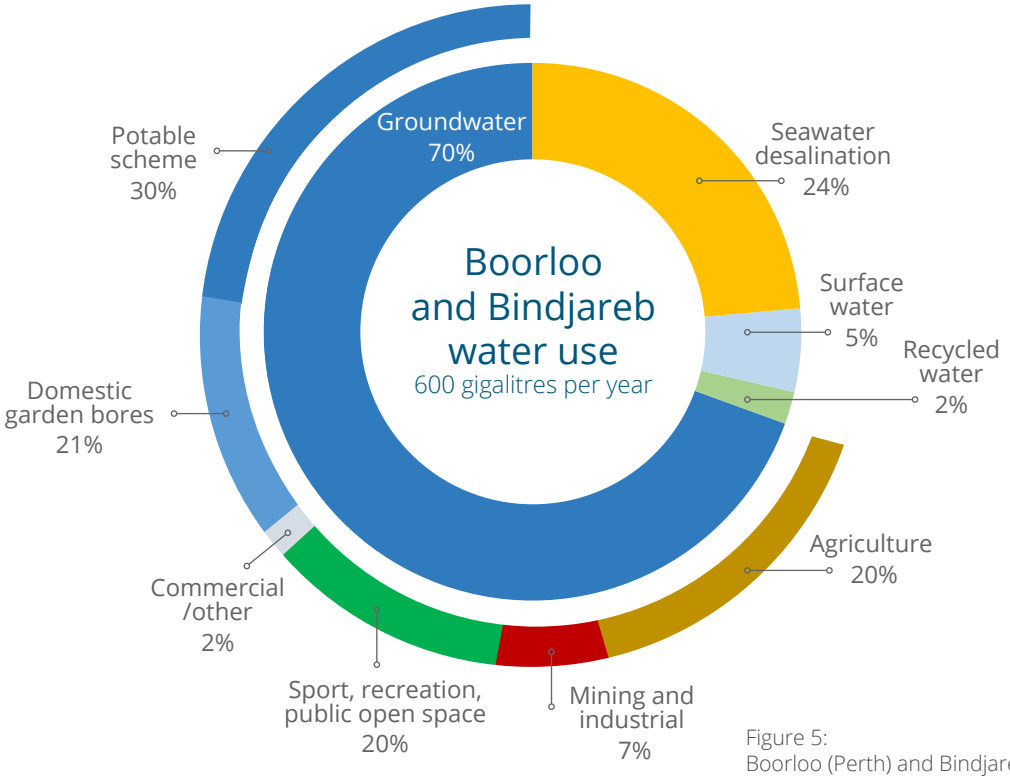


Figure 5:
Boorloo (Perth) and Bindjareb (Peel) total water use (potable and non-potable) by source and by sector

What are climate-resilient water supplies?

Climate change has dramatically affected the sources of water for our largest drinking water scheme – the Integrated Water Supply Scheme (IWSS). We can no longer rely on rainfall to maintain supply to the IWSS as we did until the 1970s. The Darling Scarp dams now include desalinated seawater to supplement stored rainfall, and groundwater replenishment occurs on the Swan Coastal Plain. These sources are independent from rainfall; however, they are still connected with the environment and their quality depends on catchment management practices. Ongoing protection and integration of these sources means these water supplies will support Boorloo's water needs for future generations no matter how dry our climate gets.

Groundwater replenishment scheme Stage 2 expansion – Water Corporation advanced water recycling plant.

Alkimos Seawater Desalination Plant

In June 2022, the State Government announced the state's next major new water source – a seawater desalination plant powered by renewable energy that will provide safe, secure drinking water to millions of Western Australians. Proposed for Water Corporation land north-east of Alkimos Beach and subject to environmental approval, the plant will be designed to deliver 100 billion litres of drinking water annually to support the IWSS.

The Alkimos plant and Boorloo's two existing desalination plants will be renewably powered, supporting the State Government greenhouse gas emissions target of 80 per cent below 2020 levels by 2030. The Water Corporation is also committing to a new, more ambitious net-zero greenhouse gas target across all operations by 2035. Desalination is energy intensive, so it is important that all three desalination plants are powered with renewable energy to help achieve this target.

The new Alkimos plant's design has been carefully considered to protect the surrounding environment and cultural heritage, and to meet community expectations. It will be set behind large, vegetated sand dunes to shield it from view and to buffer noise, while a special tunnel-boring technique will limit seabed and beach disturbance during construction.

The State Government has already set aside $1.4 billion as a down-payment for the new desalination plant.

The Alkimos seawater desalination plant will be delivered in two stages, with the first 50-billion-litre stage expected to be operational by 2028. Construction of this new climate-independent water source will also support achieving the 30-billion-litre per year reduction to groundwater use for public water supply in the *Gnangara groundwater allocation plan* from 2028, which will help protect our wetlands, bushland and parks.

Conceptual illustration of the proposed Alkimos seawater desalination plant infrastructure.

Dave Kelly MLA Minister for Water and Caitlin Collins MLA Member for Hillarys touring the Water Corporation advanced water recycling plant

Groundwater Replenishment Scheme

Water Corporation's groundwater replenishment scheme is an innovative process whereby highly treated used water is further treated to above drinking water standards and recharged into our groundwater supplies. The water is pumped into deep underground aquifers, which store and filter the water until it is required. It does not rely on rainfall and has the potential to recycle large volumes of water.

Australia's first full-scale groundwater replenishment scheme is located at Craigie, in Boorloo's northern suburbs, at the Beenyup advanced water recycling plant. The scheme began recharging treated wastewater to Boorloo's deep aquifers in 2017. After the second stage of the scheme was commissioned in 2022, it was able to recycle up to 28 billion litres a year – recharging both the Leederville and Yarragadee aquifers onsite, as well as offsite bores in Wanneroo and Neerabup – thus further supplementing a rainfall-independent drinking water source for Boorloo.

Do we still need to save water?

Although new climate-resilient water supplies are an essential part of Boorloo's water future, they are just one element in a much larger and more complex water supply planning process. It is vital we continue to use water efficiently to help protect our state's most precious resource, reduce impacts on the environment, minimise energy use, and reduce the cost to the community of producing more water.

Waterwise Perth action plan 2019

The Waterwise Perth action plan 2019 was the first of successive plans to transition Boorloo (Perth) to a leading waterwise city by 2030. As the south-west of WA is one of the world's regions most affected by climate change, and thus the State Government has committed to respond. Water does not recognise jurisdictional boundaries and the initial eight participating agencies adopted this thinking to work together to deliver waterwise outcomes for Boorloo and Bindjareb (Peel). The success of this whole of-government approach has led to three more agencies joining the collaborative effort to deliver this next significant step in the waterwise journey.

Figure 6 shows some of the impressive water efficiencies we have achieved through waterwise programs and how they have contributed to urban greening, the tree canopy and heat mitigation, as well as to community engagement and education. In addition to these, the State Government has showcased how to achieve waterwise outcomes in urban development, with:

- 68 new lots constructed in waterwise DevelopmentWA precincts
- five estates recognised as Gold Waterwise Developments for their outstanding achievement in water sensitive urban design at the 2021 Waterwise Recognition Awards
- four of the state's leading waterwise housing developments newly endorsed under the Water Corporation's Waterwise Development program in 2020–21.

Other leading achievements are described in the featured case studies.

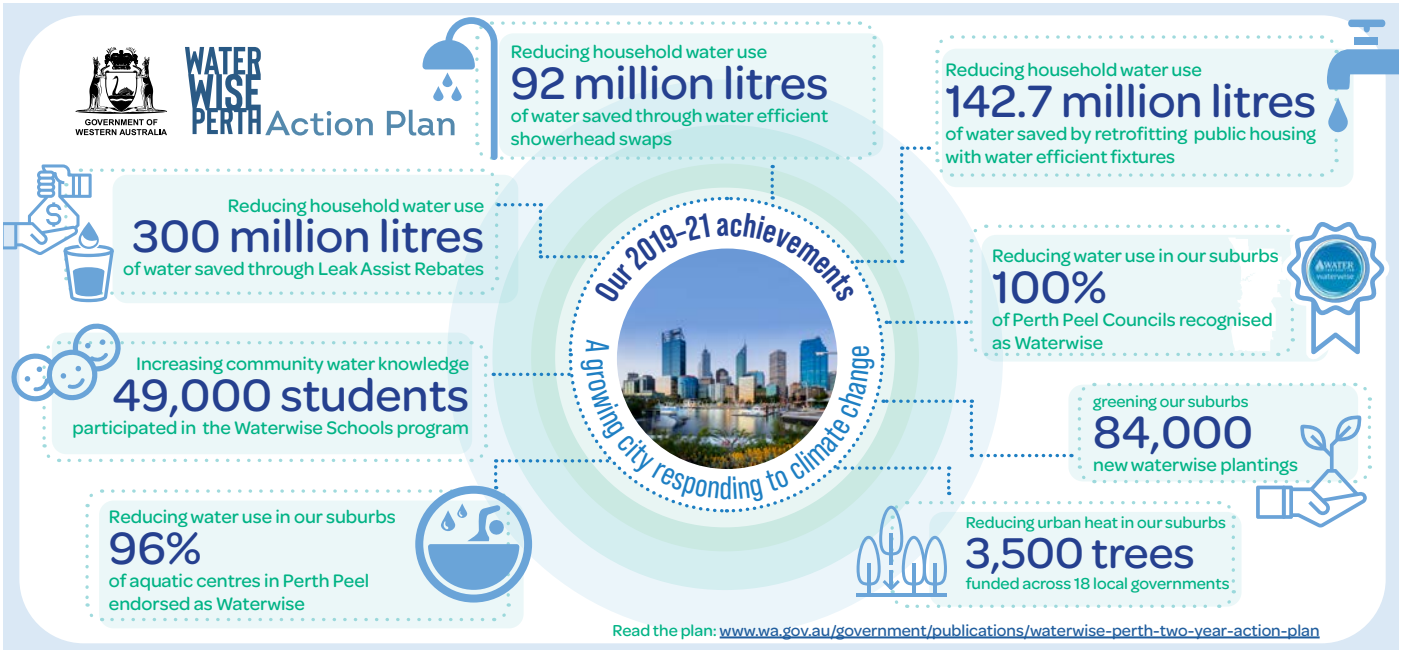


Figure 6: *Waterwise Perth action plan 2019* scorecard of achievements to December 2021.

Bindjareb Elders, Franklyn Nannup and George Walley at the Waangaamaap Bilya (Serpentine River). (Photo credit: Roz D'Raine)

Kep Katitjin – Gabi Kaadadjan 2022–24 Waterwise Perth action plan 2

Integral to *Kep Katitjin* and flowing through the plan is the commitment to walk together with Noongar people to care for Country and to heal the waterways and wetlands. We have an opportunity to make a step change with this plan, incorporating Noongar values and knowledge to put waterwise actions in place. Australia-wide, momentum is gaining for genuine recognition of First Nations sovereignty alongside acknowledgement and respect for the wisdom the world's oldest continuous living cultures bring to caring for our land and waters.

The State of the Environment report 2021 combines science and Indigenous and local knowledge to understand the outlook for Australia's environment. Its key findings are consistent with the focus and direction of the broader scope of *Kep Katitjin* and the 2030 waterwise program of work:

- In a rapidly changing climate, with unsustainable development and use of resources, the general outlook for our environment is deteriorating.
- Immediate action with innovative management and collaboration can turn things around.
- Indigenous knowledge and connections to Country are vital for sustainability and healing Australia.
- Environmental decline affects the wellbeing of Australians.

There are three priority areas for *Kep Katitjin* delivery – integrating Noongar knowledge and values; action on water and climate change; and collaboration. The State of the Environment report underscores that this is how we should be working, stating: ...we must expand collaboration across governments and nongovernment sectors, including through listening and co-developing solutions with Indigenous and local communities, building on and learning from Indigenous and western scientific knowledge.

This next plan on the ten-year journey to world-leading waterwise communities for Boorloo and Bindjareb builds on the *Waterwise Perth action plan 2019* and delivers a broader scope encompassing water quality, ecological health and peri-urban horticulture. The Water Sensitive Cities Index, featured in the case study on page 32, has been an important diagnostic tool. We have used the index to compare Greater Perth's (Boorloo and Bindjareb) progress over five years and to identify the goals that need more attention.

Across-government collaboration 'more than the sum of its parts'

In seeking to deliver a broader scope, the existing 8 partners' welcome the new waterwise partner agencies: the departments of Biodiversity, Conservation and Attractions; Education; and Primary Industries and Regional Development. The Department of Water and Environmental Regulation (DWER) as the lead agency would like to thank and acknowledge the Water Corporation and the departments of Communities; Finance; Local Government, Sport and Cultural Industries; Planning, Lands and Heritage; DevelopmentWA; and METRONET as the initial seven waterwise partner agencies for their immense commitment to and passion for shaping and delivering the *Waterwise Perth action plan 2019* and furthermore to creating *Kep Katitjin*.

This plan has an intentional shift to even more integrated delivery and collaboration, with 21 actions having at least two agencies listed as 'leading', compared with five in the previous plan. For the sake of brevity, the 41 actions are articulated as succinctly as possible, however each action has a program of work with multiple deliverables. In some instances, agencies are leading discrete parts that collectively inform the whole. In others, the work is integrated and co-delivered among agencies. Plus, other actions incorporate multiple projects that form a collective program. This programmatic approach is already creating synergies across agencies, including sharing and aligning data, ensuring our communications and messages about waterwise are clear and consistent with one another and stakeholders. Urban planners and governments are recognising the need for change and a more collaborative, whole-of-system approach, with place-based outcomes that can build greater resilience and regenerate our urban areas, which is precisely what the waterwise program is seeking to achieve and to-date is achieving significant progress.

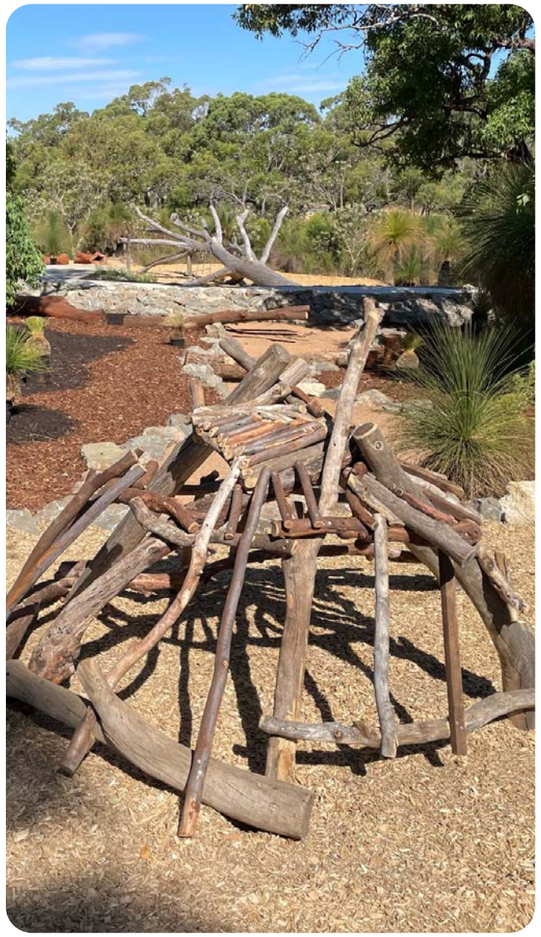
Like the previous plan, *Kep Katitjin* has four delivery scales. Many agencies have actions across all scales, reflecting the work being done to address waterwise challenges at multiple levels. The number of actions at the government-leading scale has doubled in *Kep Katitjin*. This demonstrates the willingness of waterwise agencies to deliver on-ground works that bring together the water efficiencies and community connection work under the household and building scale. Meantime, water sensitive urban design and liveability outcomes will be achieved in precincts and suburbs and be guided by city and urban-scale planning, policies and Noongar engagement. There is an intention to learn from and to build capacity in our partners both within the State Government and in diverse disciplines that contribute to waterwise outcomes for Boorloo and Bindjareb. Collaboration and walking together to determine a shared vision and objectives across all stakeholders is at the heart of this plan. This way of working will enable innovative solutions to water and climate challenges and achieve greater overall benefit for Boorloo and Bindjareb communities.

Waterwise collaboration

Plan at a glance

Kep Katitjin is underpinned by a commitment to threading Noongar values and knowledge into the 41 waterwise actions. The plan at a glance below shows the 41 actions grouped into program areas that are colour coded to reflect the four delivery scales: Household and building; Precinct and suburb; City and urban; and Government leading.

Each bullet point is an action: actions in italics denote new or amended actions, building on the *Waterwise Perth action plan 2019*. Further details are provided in the tables below.



Nature Play photo credit: Josh Byrne & Associates

Kep Katitjin – Gabi Kaadadjan (Waterwise Perth action plan 2)

Kep Katitjin – Gabi Kaadadjan actions 2022–24

Household and building

During the past 20 years, per capita scheme water demand within the Boorloo (Perth) and Bindjareb (Peel) region has reduced by 32 per cent, through using waterwise fixtures and fittings inside our homes and buildings along with changes to irrigation practices. For example, the scheme water sprinkler roster introduced in 2001 created a step change in residential water savings. The most effective demand-management approaches have been widely adopted; hence targeted approaches are now required to achieve further reductions in demand. More than 500 million litres of scheme water were additionally saved by households under the *Waterwise Perth action plan 2019*. The measure used for water efficiency at that time was total water use per capita. The target for the measure was 110 kilolitres per person per year. This however included residential, non-residential and non-revenue water use, making this target unsuitable, as it is not an accurate representation of household water use efficiency. In this plan we have instead focused on current residential water supplied per person per year, which currently sits at 91 kilolitres. A new action for this plan is to develop a residential water supplied per capita target for Boorloo and Bindjareb.

Through the collaborative work done in the *Waterwise Perth action plan 2019*, we found that around 60 per cent of household water use (both scheme and groundwater) occurs in the garden. We therefore have an opportunity to develop waterwise gardens that create biodiversity and amenity for the outdoor lifestyles we value, while adjusting to the aligned sprinkler roster for two days' watering per week. The following actions are applied at the household and building scale to continue to ensure that we use water wisely, prevent water pollution, increase awareness of our precious groundwater resources, and make positive changes to how we value water and our natural environments – all of this creating resilience in the face of an increasingly hot and dry future.

Installing water efficient fixtures and fittings

Program Area	#	Action description	Target	Lead
Household and building				
We will ensure water efficiencies and waterwise design in and around our buildings	4	Retrofit of Department of Communities public housing to water-efficient fixtures and fittings and empower tenants to be waterwise.		DoC / WC
	5	Improve water-efficiency standards in waterwise built form by incorporating WELS guidance materials into vocational training and exploring changes to the National Construction Code.		WC / DWER
We will raise awareness of the impacts of climate change and we will change our behaviours to reduce impacts on our precious water resources	6	Deliver programs to help households adapt to climate change.		WC / DWER
	7	Encourage garden bore users to be waterwise and support Boorloo-Bindjareb households through Be Groundwater Wise initiatives.		DWER / WC
	8	Raise awareness of water's importance and strengthen community connection to local water stories and environment through community partnerships and programs.		WC / DWER / DBCA

Shading indicates actions that continue or have evolved from the *Waterwise Perth action plan 2019*.

Case study
Household and Building

Water Corporation customer information

Waterwise Public Housing – Empowering tenants to save water and reduce bills

The *Waterwise Perth action plan 2019* featured Action 2: *Reduce water consumption in Department of Communities' public housing properties through water audits and education to reduce water consumption, lower living costs and increase water knowledge* and *Action 32: Upgrade to waterwise products and fixtures in Department of Communities' public housing properties when maintenance occurs.* This has been a hugely successful program of work that has continued in *Kep Katitjin*.

Communities partnered with Water Corporation on a waterwise program to audit 973 public housing properties with high water consumption to identify how to make them more water efficient and sustainable. Since the program began, more than 600 repairs have been completed in homes with leaks or damaged water fixtures.

Using the audit's insights, phase one of the water fixture replacement program began in December 2019 to retrofit homes with efficient showerheads, toilets and taps. Housing Services officers were equipped with specialist water-efficiency knowledge through face-to-face training sessions and in-house tools to help identify internal plumbing leaks and provide waterwise education to tenants. As part of the project, the Communities' water usage account statement was updated to include customer-friendly comparative water use information, an explanation of water use charges and waterwise tips. A water consumption dashboard was created to give Housing Services officers greater insight into water use at individual tenancies, allowing them to spot and fix leaks early.

Communities' water-efficiency guidelines have been upgraded to ensure future property fixtures and landscaping are waterwise. The insights gained from the metropolitan program can help improve the approach for tenants across the state and stimulate broader behaviour change, ultimately helping to transition Boorloo and Bindjareb into leading waterwise communities.

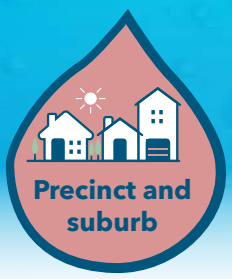
Tenants have recorded an average reduction of 27 per cent in their annual household water consumption, equating to total water savings of 227 million litres of drinking water between September 2019 and the end of June 2022.

> Saving money was not the only motivation for engagement. Genuine interest was generated by tenants being provided specific tools to help the environment. It was clear that the time we spent with them would have a long-term positive effect in changing people's water use.
>
> – Housing Services officer, Perth office

Overall, phases 1 and 2 of this initiative have seen inefficient water fittings being replaced or retrofitted in 683 properties, including 401 showerheads, 777 toilets and 170 tapware aerators. Phase 3 will be progressed in *Kep Katitjin* with new targets.

Building on the success of the pilot program, the State Government announced up to $26 million for a five-year expansion of the Waterwise Public Housing Program, which will see about 10,000 State Government-owned properties retrofitted with water-efficient fixtures across the state.

With the upgraded water-efficiency guidelines now standard for Communities' developments, *Kep Katitjin* will showcase 'the state's first two facilities. Common Ground is a model of permanent, supportive housing in a purpose-built facility for adults who have experienced chronic homelessness or are low-income earners. Common Ground will showcase waterwise initiatives throughout, including waterwise fittings and fixtures and waterwise verges and rooftop gardens.



Precinct and suburb

Local governments are essential to delivering waterwise communities through their key role in planning, decision-making, engaging residents and encouraging community action to create highly liveable, sustainable places to live. Local governments understand their community's needs and aspirations, as well as the conditions of their local area. A waterwise city does not look the same everywhere. It needs to be considered and planned in context of the local waterwise vision and landscape. The Noongar people have built knowledge over generations, which we can acknowledge and include in our understanding of sense of place, and in creating waterwise communities.

The Waterwise Councils program was established in 2009 in recognition of the important role that local governments play in delivering community outcomes. This next plan continues to build on our successful partnership with local governments to deliver on-ground action at the precinct scale and create waterwise neighbourhoods. The actions at this scale also include partnerships with schools and industry groups, and initiatives to increase native vegetation, secure water for urban green space and improve river health. These partnerships are essential to drive advocacy, harness broader networks, pool resources, bring together greater knowledge and expertise, seed ideas and innovation, support common goals, and foster solutions. No organisation on its own can deliver on the complexity and scale required to tackle the challenge of a growing city facing the impacts of climate change.

An example of a successful partnership is the Waterwise Schools program, which has reached over 330,000 students across the state. Under the *Waterwise Perth action plan 2019*, new interactive resources were developed to expand the program's reach, educate students about the water cycle and Noongar water knowledge, and empower future generations to become sustainability ambassadors and provide valuable input for future community decisions.

Program Area	#	Action description	Target	Lead
Precinct and suburb				
We will work with stakeholders to deliver waterwise programs	9	Implement the Waterwise Councils Program to recognise 100% of councils as Gold by 2030.		WC / DWER
	10	Expand the Waterwise Schools Program to reach 50,000 students per year by 2030 to deepen understanding of water in their community and environment.		WC/DoE
	11	Improve the design, use and water efficiency in school grounds and buildings through the Waterwise School Grounds program and Water Efficient Public Schools Program.		DoE / WC / DWER
	12	Continue to support the golf course industry to achieve waterwise outcomes through the Waterwise Golf Program.		DWER
	13	Deliver the Waterwise Business 2.0 project to improve the on-boarding experience and increase knowledge for new businesses entering the Water Efficiency Management Plan (WEMP) program. This includes the provision of comprehensive business audits to identify water efficiency opportunities for 13 non-residential customers deemed eligible, based on their water use exceeding the 20,000 kilolitres per year threshold for participation in the WEMP program.		WC

Shading indicates actions that continue or have evolved from the *Waterwise Perth action plan 2019*.

Program Area	#	Action description	Target	Lead
Precinct and suburb				
We will create healthy, liveable communities and healthy water ecosystems	14	Partner with local government to improve urban liveability by transforming eight Water Corporation assets and surrounding land into neighbourhood green spaces, such as living streams, wetlands, community gardens, nature corridors or parkland.		WC / DWER
	15	Support local governments to create cooler, greener and more sustainable neighbourhoods by co-funding waterwise verges, street trees, plant sales, gardening workshops, demonstration gardens and garden competitions for the community through the Waterwise Greening Scheme.		WC
	16	Plan and implement a Swan Canning Riverpark Urban Forest Program.		DBCA
	17	Implement, review and update the Swan Canning River Protection Strategy to ensure waterwise outcomes, improve water quality, manage river flows, enhance biodiversity and amenity and adapt and build resilience to climate change.		DBCA
We will work towards water for the future	18	Identify appropriate water supplies for urban green space in areas with limited or no groundwater availability.		DWER / WC
	19	Deliver the Swan Valley North-East Corridor groundwater investigation project to clearly define the groundwater characteristics of the area, specifically the location and characteristics of the Wanneroo and Serpentine faults and the connectivity between aquifers.		DWER

Shading indicates actions that continue or have evolved from the *Waterwise Perth action plan 2019.*

Wharf Street Basin, Cannington

An unnattractive basin

A shared, multi functional space

Case study
Precinct and Suburb

Wharf Street Basin Next Generation Community Park

One of the standout projects from the *Waterwise Perth action plan 2019* is the transformation of the Wharf Street Basin, in Cannington. This site was a fenced-off, inaccessible area used only for the purposes of stormwater management. This project was delivered under Action 11: *Transform eight drains or basins and surrounding parklands into living streams and parkland in partnership with local governments* and is an incredible example of what can be achieved through collaboration and adopting a waterwise cities approach. A multi-disciplinary, cross-organisational team with a shared vision was key to the successful transformation of an unattractive basin into a multi-purpose space that serves as a shared public amenity, outdoor classroom, and water-cleansing function on its way to the Canning River, while also encouraging biodiversity and community engagement.

Wharf Street Next Generation Community Park incorporates landscape design enhances the natural features of the environment, and includes:

- a boardwalk
- interactive education stations
- real-time information on environmental conditions
- installation of bat boxes and a bee hotel
- wetland vegetation of local native species.

A large mural was also created in the park on an existing 40-metre wall, designed and painted by two Boorloo (Perth) artists, Brenton See and Aboriginal artist Jade Dolman. The painting is a celebration of water, native plants and wildlife, and the Whadjuk Noongar people's connection to water and land.

The Water Corporation-owned stormwater basin has retained its existing drainage-water hydraulic function and, through a variety of smart design and technology solutions, has improved the overall water quality within the basin.

The collection of water quality and microclimate data from different areas of the park provides data for educational purposes and will help to improve our understanding of water quality and conditions at the park. The community has direct access to this data through Open Datasets, a web page visualisation tool, and through augmented reality stations around the park.

In addition, public amenity is enhanced by free public wi-fi and smart bins that report fullness levels to the City of Canning, allowing for proactive waste management. The technology also provides useful data relating to park usage.

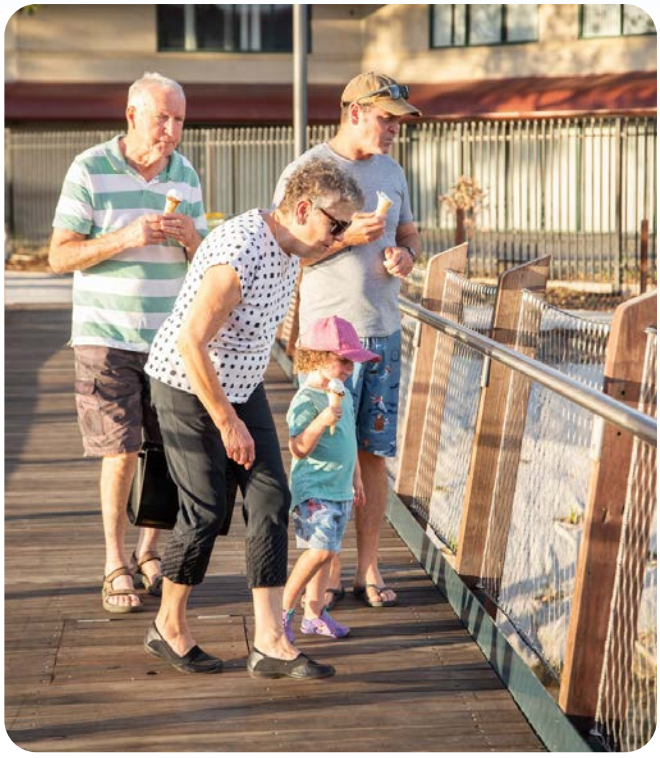
The project was led by the City of Canning, in partnership with the Australian Government's Smart Cities and Suburbs Program, Water Corporation, The Department of Water and Environmental Regulation, the Department of Biodiversity, Conservation and Attractions, Curtin University, Innovation Central Perth, Josh Byrne and Associates, Environmental Industries and Urbaqua. This partnership project demonstrates an innovative approach to liveability and sustainability that delivers significant value to the community.

It has won multiple awards and is an example of how stormwater management assets can be transformed into a multi-purpose space benefitting the environment and community.

The project was delivered under the Drainage for Liveability Program. This program, delivered in partnership with local and State governments and other natural resource management groups, enhances the value of stormwater drains and basins across Western Australia. It began in 2016 and by the end of June 2022, 25 drainage areas had been transformed into beautiful natural spaces for residents and local wildlife to enjoy.

City and urban

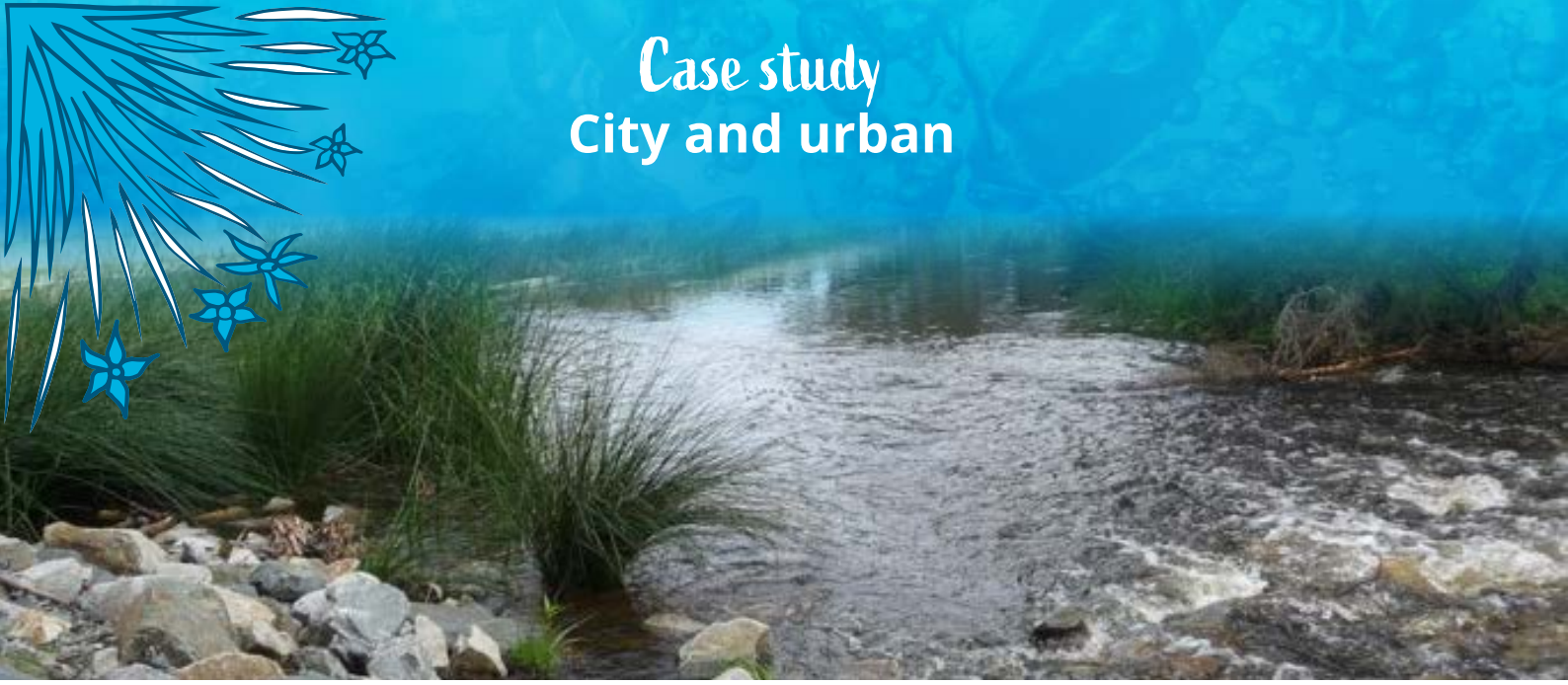
Planning at the city scale helps manage pressures on our water resources and enables the sustainable development of our urban communities. Identifying potential water issues, such as drainage and flood patterns, as early as possible in the planning process (and at all subsequent stages) is a key principle of water sensitive urban design. It enables the social and economic benefits of water in our landscape to be maximised, while enhancing the long-term sustainability and health of ecosystems. We have embedded waterwise outcomes and water sensitive urban design in policy and planning to help transition Boorloo and Bindjareb to leading waterwise communities by 2030. The release of draft State Planning Policy 2.9: Planning for water for public comment was a key achievement under the Waterwise Perth action plan 2019, consolidating six state planning policies and the Government Sewerage Policy into one. This will deliver greater clarity and guidance for integrating the management of water resources into planning and development decision-making.



A family enjoying the Wharf Street Basin

Program Area	#	Action description	Target	Lead
City and urban				
We manage our precious groundwater for all users	20	Review allocation limits across the Boorloo and Bindjareb region to manage groundwater levels for its sustainable use in line with the impacts of climate change.		DWER
	21	Support horticultural water users in the Gnangara plan area to adjust to the effects of climate change and reductions in water licence allocations through best-management-practice water efficiency infrastructure, soil amelioration and technology programs.		DPIRD / DWER
	22	Support local governments, particularly those in the Gnangara plan area that are most impacted by the urban heat island effect, to develop a pathway to achieve reductions in their groundwater use.		DWER / WC
	23	Work with the commercial nursery and tree farming sector to agree on and adopt new waterwise standards.		DWER
We will improve the water and land use planning systems	24	Consolidate, streamline and improve water-related state planning policy, guidelines and associated processes to strengthen waterwise outcomes at all levels of land use planning.		DPLH
	25	Commence implementation of the water policies, guidance and technical advice review findings, to strengthen waterwise outcomes.		DWER

Shading indicates actions that continue or have evolved from the *Waterwise Perth action plan 2019.*



Case study
City and urban

Water Sensitive Cities Index – how the indexing tool is driving change towards more waterwise communities in Boorloo and Bindjareb

Benchmarking has been an essential step in creating a shared understanding of water management performance among Boorloo and Bindjareb metropolitan area stakeholders. Using the results, we are identifying actions we can take collectively to transition towards a water sensitive city (or 'waterwise city' as we say in Western Australia).

Greater Perth (the Boorloo and Bindjareb region as shown in Figure 1) was the first city to trial the Water Sensitive Cities Index benchmarking tool in 2016 and the first to re-benchmark in 2021. The index enables a city or local government area to measure performance against 34 indicators organised under seven goal areas that characterise a water sensitive city (Figure 7). These indicators cover both biophysical and social institutional elements, which are scored through a collaborative workshop process with a broad cross-section of stakeholders.

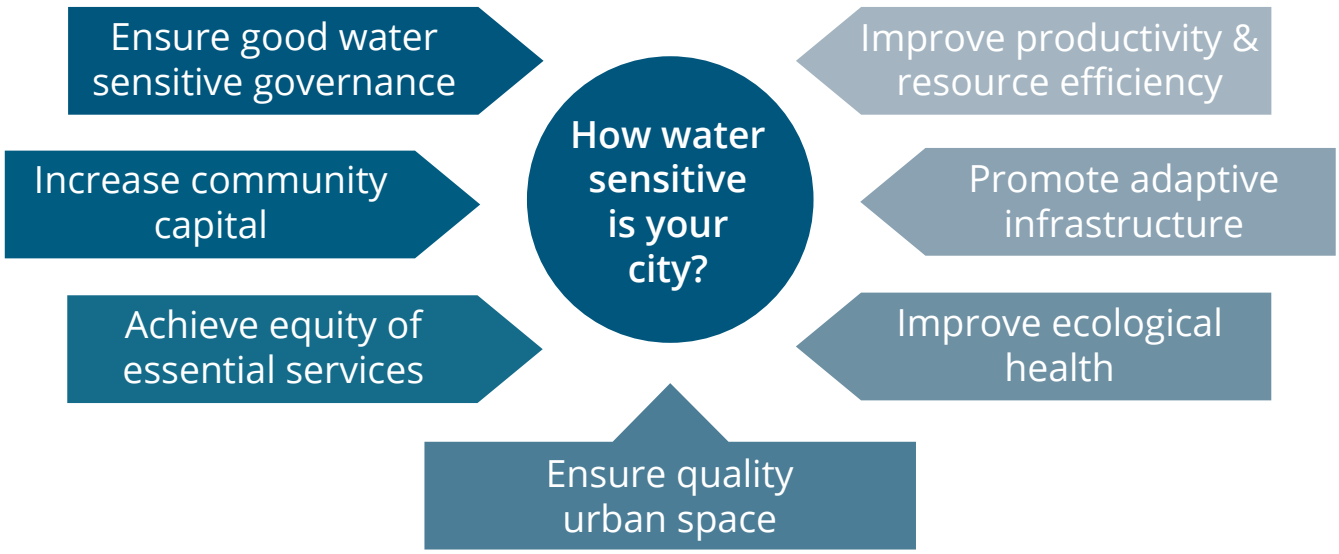


Figure 7: Water Sensitive Cities Benchmarking Index's seven goal areas

The Cooperative Research Centre for Water Sensitive Cities (CRCWSC) released the tool in 2016 and it has since been used by more than 70 cities and municipalities across Australia and overseas. The tool allows organisations to set targets, model the impact of potential management responses and track progress over time. It can also facilitate more effective collaboration across sectors to manage water in ways that join up to enable liveable, productive, resilient and sustainable urban communities.

The results show that Boorloo (Perth) has shifted from being slightly behind other capital cities' water sensitive performance and is now a leading water sensitive city. Our overall urban water management performance improved by 26 per cent over five years (total score across all seven goal areas in 2021, compared with 2016). This is a fantastic achievement that reflects the significant effort by all stakeholders to tackle the challenge of a growing city being impacted by climate change.

Boorloo achieved notable progress in *Goal 1: Ensure good water sensitive governance*, which assesses the political, social, economic and administrative systems to support water sensitive practice. Improvements in this goal area were driven by the strong cross-sector collaboration achieved through the Water Sensitive Transition Network – a group of champions from government, industry, community and research organisations who have been working together since 2016 with a clear ambition for Boorloo to be a water sensitive city. The high score also reflects the commitment demonstrated across government through the Waterwise Steering Committee and Working Group to deliver the *Waterwise Perth action plan 2019* and its long-term vision.

There was a significant improvement in performance under Goal 2: *Increase community capital*, which assesses whether citizens have good water knowledge, connection to water and are empowered to contribute to decision-making. Improvement was driven by an increase in connection to water assets and stories achieved through community engagement, for instance through the Drainage for Liveability Program, which transforms drains and basins to provide greater community amenity. The increased score also reflects the success of waterwise messaging and incentives, including the high uptake of water saving measures by customers (e.g. Shower Head Swap Program). Covid-19 restrictions may have also changed people's behaviour and resulted in an increased appreciation of river systems, green space and gardening.

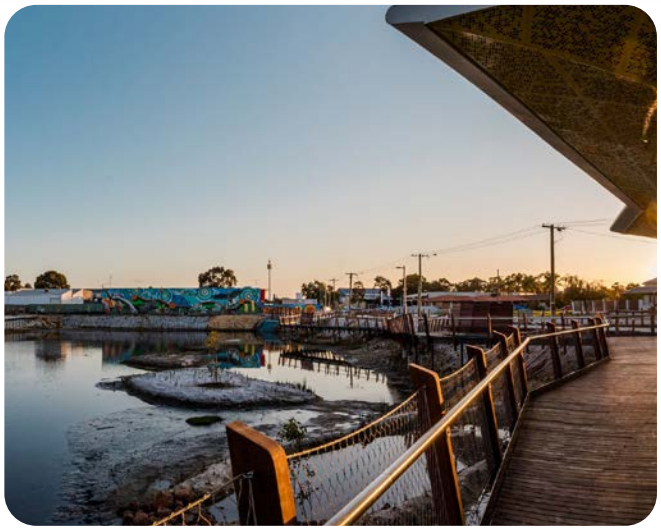
Performance under Goal 4: *Improve productivity and resource efficiency* improved during the past five years, driven by a strengthened commitment to managing water-sector greenhouse gas emissions and greater investment in recovering water and other resources from waste streams. The success of waterwise programs and targeted initiatives reduced potable water demand; for example, more than nine billion litres of scheme water was saved through the Waterwise Business program in 2019–20, and 100 per cent of Boorloo local governments achieved endorsement as Waterwise Councils through their commitment to improving water efficiency and creating waterwise communities. Since 2016, 22 of the 32 metropolitan local governments have completed Water Sensitive Cities benchmarking workshops, which have guided their water management action plans.

The reassessment of Boorloo's water sensitive performance identified the priority goal areas for improvement are *Increase community capital, Improve ecological health, Ensure quality urban space and Improve productivity and resource efficiency.* These priorities informed development of this plan, including expanding the partnerships to three new agencies who will deliver actions under these goal areas. Actions to address climate change have been included, which will support the *Improve productivity and resource efficiency* goal. This goal area is also boosted by the Department of Primary Industries and Regional Development's new action to support horticultural water users in the Gnangara plan area to adjust to the effects of climate change. Meantime the ecological health goal has been boosted by the river protection and urban forest actions of the Department of Biodiversity, Conservation and Attractions. This plan includes greater investment in building community capital, with increased offerings to households and garden bore users to help them adapt to climate change, and a new action across agencies to increase community connection to local

Drainage for Liveability at Peters Place, City of Bayswater.

water stories and environment through community partnerships and programs. Showcasing how waterwise outcomes can be delivered in government work will help contribute to the quality urban spaces goal.

Boorloo's journey towards a water sensitive city has been accelerated by the tools, knowledge and partnerships created through our participation in the CRCWSC (2012–21). The purpose of the CRCWSC was to help change the way we design, build and manage our cities and towns by valuing the contribution water makes to the economic development and growth, our quality of life, and the ecosystems of which cities are a part. In recognition of the value of this partnership and benefit of being part of a national water sensitive city network, Western Australia formed a local hub of Water Sensitive Cities Australia, a multidisciplinary research-to-practice partnership within the Monash Sustainable Development Institute, which has been established to continue the mission of the CRCWSC and mainstream waterwise practice.



Wharf Street Basin redevelopment 2020

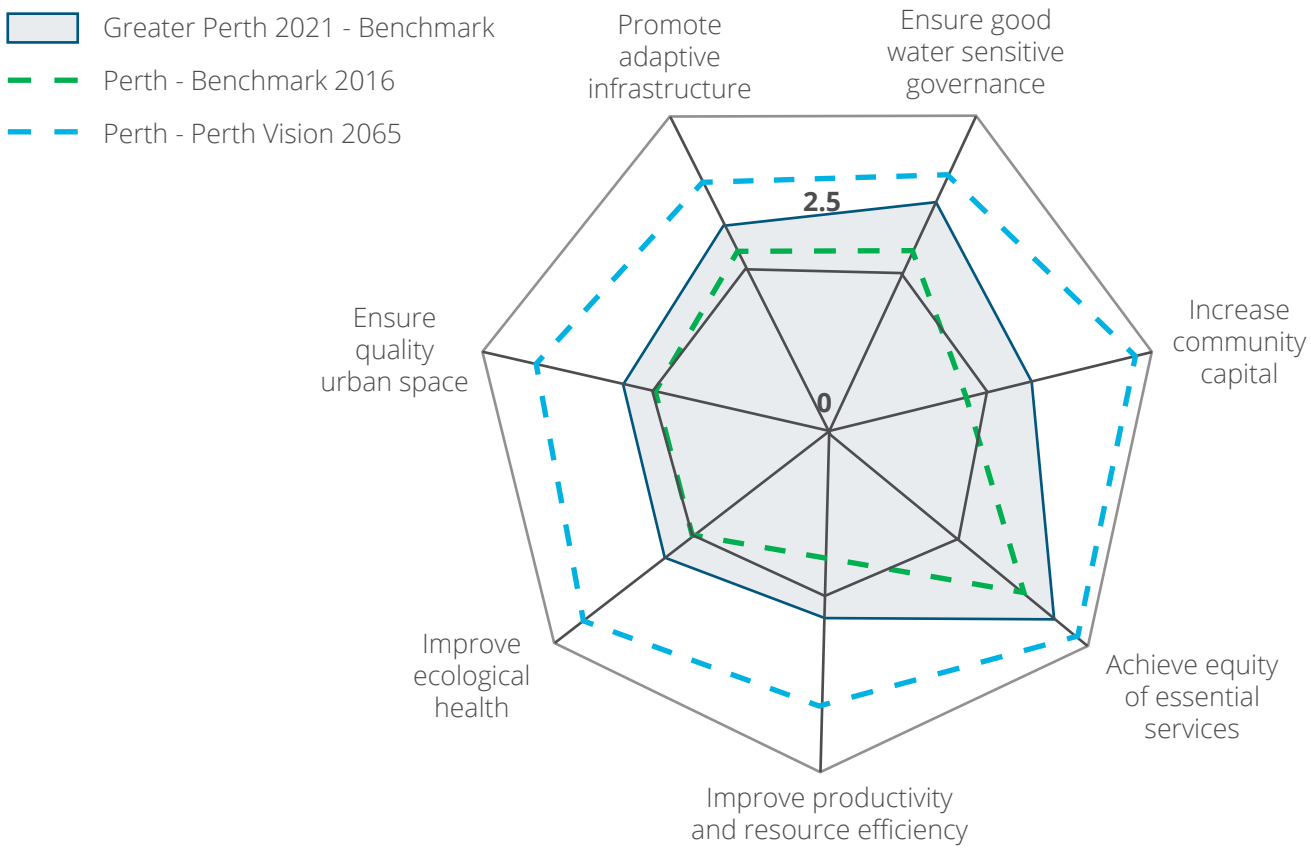


Figure 8: Results of Boorloo's reassessment using the WSC Index in 2021, compared with the 2016 benchmark and 2065 vision mapped to the seven goals of the Water Sensitive Cities Index. A score of 5.0 represents the aspirational water sensitive performance for each goal.

Government leading

During development of the *Waterwise Perth action plan 2019*, we heard from stakeholders in industry, academia, local governments and non-government organisations that they wanted to see government leading on waterwise cities – demonstrating how it could work in practice and trialling innovative approaches. The previous three 'scales' build a picture towards achieving a holistic waterwise city and waterwise communities. The foundations of water efficiency and conservation mean we are valuing our precious resource and using it as best we can in our households and buildings; then actions at the precinct and suburb scale are considering our sense of place, water sensitive urban design, and forming a vision for the local area. These then need to be underpinned by data, planning, policy, guidance, Noongar and heritage values, and action at the city scale. All three scales come together at the 'government leading' scale where truly innovative and waterwise developments can show the private sector that this is business as usual, to contribute to a climate resilient and water-secure Boorloo (Perth) and Bindjareb (Peel).

Program Area	#	Action description	Target	Lead
Government leading				
We will use research, data and information to achieve on-ground waterwise outcomes	26	Deliver Boorloo and Bindjareb's transition to a waterwise community, by undertaking science research and adoption priorities through a dedicated Western Australian hub of Water Sensitive Cities Australia.	All targets	DWER / WC / DBCA / DoC
	27	Collaborate with universities, local government, industry and the Water Corporation on sustainable design and management solutions for lawns in public green spaces in a changing climate.		DWER / WC
	28	Deliver the Urban Recharge Estimation project to support better groundwater modelling and deliver greater understanding of the effects of urbanisation on aquifer recharge.		DWER / WC
	29	Monitor and evaluate two drainage retrofit projects to improve understanding of their design, maintenance and operational requirements and ecological and water quality benefits.		DBCA
	30	Introduce new technologies in Boorloo and Bindjareb with the aim of greatly improving the quantity, timeliness and resolution of groundwater information for Boorloo and Bindjareb available for the use of industry and for government regulatory decision-making.		DWER
We will show how waterwise outcomes can be delivered in Government work	31	Embed waterwise outcomes in the METRONET program of projects.		METRONET / DPLH
	32	Commence planning to deliver exemplar Department of Education waterwise projects by 2025.		DoE
	33	Include waterwise principles in the primary school design brief and secondary school planning guide.		DoE
	34	Embed waterwise outcomes in government-led urban development in Boorloo and Bindjareb.		Development WA / DoC / WC / DoF

Shading indicates actions that continue or have evolved from the *Waterwise Perth action plan 2019.*

Program Area	#	Action description	Target	Lead
Government leading				
We will show how waterwise outcomes can be delivered in Government work	35	Showcase waterwise developments to evaluate, share and inspire adoption in the private sector.		Development WA / WC / DoC
	36	Embed waterwise design and efficiencies in State Government infrastructure projects and projects supported by State Government funding.		DLGSC
We will ensure action on climate and water	37	Develop guidance for the water sector on how to use climate change projections for risk-based decision-making.		DWER
	38	Apply the Climate change risk management guide, or bespoke framework, to complete a first-pass climate risk assessment to enhance resilience to water-related climate risks (e.g. water quality, water efficiency, addressing urban heat island effect) within government organisations.		DWER / DBCA / DoE / DLGSC / METRONET / WC
	39	Identify emissions associated with water management as a foundation for emissions reduction measures to support the public sector emissions targets of 80 per cent below 2020 levels by 2030 and net-zero emissions by 2050, consistent with the Western Australian Climate Policy.		DWER / DBCA / DoE / DLGSC
	40	Promote climate resilient water supplies.		DWER
	41	Water Corporation to reach net-zero greenhouse gas target across all operations by 2035.		WC

Shading indicates actions that continue or have evolved from the *Waterwise Perth action plan 2019*.

Case study
Government leading

OneOneFive Hamilton Hill

Waterwise developments have been scaling up, starting with Josh's House, and the WGV residential estate in White Gum Valley, Fremantle, and then moving to the large infill development scale with OneOneFive Hamilton Hill by DevelopmentWA. These projects demonstrate how innovative urban water management strategies can be 'mainstreamed' in response to the reduced rainfall and hotter conditions now prevalent in south-west Western Australia. Diversifying our water supply and reducing demand is important, and we need a balanced approach to water use that supports our green spaces, ecosystems, and overall community wellbeing.

A part of Action 35 in the *Waterwise Perth action plan 2019 – Showcase innovative waterwise outcomes in key government developments to evaluate, share and inspire adoption in the private sector* – OneOneFive will test innovations in water sensitive design and water use efficiency. The project has been awarded all six leaves of the Urban Development Institute of Australia (UDIA) EnviroDevelopment sustainability certification program and is recognised as a Platinum Waterwise Development, winning the Waterwise Development of the Year in 2022 under the Water Corporation's Waterwise Development Program, a joint initiative with UDIA.

The project has included significant education and community and stakeholder engagement, including publishing of A guide to a waterwise development and waterwise streetscapes – An implementation guide for local government to share learnings and support mainstreaming of waterwise practices.

Artist impression OneOneFive Hamilton Hill – DevelopmentWA.

Water sensitive urban design

Water sensitive urban design features allow for the passive treatment and natural infiltration of stormwater via vegetated swales, rain gardens, pervious paving, and underground detention galleries. These features increase soil moisture, helping the growth of mature trees and new plantings, improve water quality, and reduce pressure on the local government's stormwater infrastructure.

Urban greening

Urban greening is a key part of the overall site philosophy to improve liveability, amenity and biodiversity outcomes. The site is part of a broader ecosystem, so water management will consider neighbouring areas and bushland. Appropriate vegetation will be maintained and enhanced to maximise shading and cooling effects.

Landscaping and smart irrigation

Landscapes will be 'hydrozoned' to ensure plants with similar water needs are grouped together in the same area or zone and water is allocated based on the irrigation requirements of the various zones in the public open spaces, streetscapes and private gardens. Efficient smart metering systems will be installed to help detect leaks, measure soil moisture and consider weather forecasts to reduce unnecessary watering.

Water supply

Water capture and storage systems, as well as a variety of water sources, will be included to support the long-term water needs of the community. These fit-for-purpose options will have lower impacts on the environment and include:

- rainwater for toilets and washing machines
- greywater-ready plumbing for larger lots
- groundwater for watering public and private spaces, with sustainable recharge of the aquifer
- onsite stormwater management and infiltration to provide additional water for trees and plants to cool the urban environment.

Household scale

Water savings will be established at the household level through good planning and design guidelines, including:

- medium-density development with smaller lots to reduce garden water use and a range of high-quality, attractive and useful shared green spaces to provide connection with nature
- design guidelines that target water-efficient fixtures and fittings, such as taps, showerheads, toilets and appliances
- incentives to support the uptake of efficiency measures and alternative water systems
- community programs to support and encourage waterwise behaviour.

Nature Play photo credit: Josh Byrne and Associates

Artist impression – DevelopmentWA

Delivering

The waterwise principles set out in this plan apply to what we do and the way in which we do it. For waterwise, everything is connected. Hence this program of work is delivered across the State Government to identify synergies, areas where activities connect and where existing successes can be shared and replicated. Waterwise connects people through shared visions of better water and land management. Walking together with Noongar people means a commitment through the waterwise program of work to converge water planning values and management with Whadjuk and Bindjareb Noongar peoples' knowledge of caring for Country. The commitment to working collaboratively is based on a shared vision and objectives and an acknowledgement that to tackle such long-term and complex problems, input is needed from multiple points-of-view and experiences. Government, industry and the community all play a role in progressing the objectives of waterwise communities.

This program of work has been championed by the State Government and endorsed by Cabinet. Its implementation includes oversight from the most senior leaders of each of the agencies involved and is underpinned by a monitoring and evaluation framework that works to the 2030 targets outlined on page 8.

Further to waterwise partner agency activities, the participation and leadership of local governments and the development industry in creating our waterwise communities has and will continue to be critical as we mainstream waterwise approaches and outcomes. As illustrated in the case study on page 28, the foundational role of the Water Sensitive Transition Network in positioning Boorloo (Perth) as a leading waterwise city, and of transitioning Boorloo and Bindjareb (Peel) to leading waterwise communities, has been essential in achieving the gains. Progress to date would not have occurred without this collective effort. One of the main success factors has been the capacity building and knowledge sharing to develop the skills and capabilities necessary to deliver waterwise outcomes. As reflected in the Water Sensitive Cities Index benchmarking scores for Greater Perth, through increased collaboration and collective effort across the many stakeholders who shape our city, Boorloo is well on its way to becoming a leading waterwise city and *Kep Katitjin* is the next step change in getting us there.

Working on the whole picture

Other policies and activities that are relevant to *Kep Katitjin* include:

Aboriginal Empowerment Strategy – Western Australia 2021-2029

Bindjareb Djilba (Peel-Harvey estuary) Protection Plan

State Planning Policy 7.0 - Design of the built environment

Strategic policy – Protecting public drinking water source areas in WA

Vision and Transition Strategy for a Water Sensitive Greater Perth

Vision and Transition Strategy for a Water Sensitive Greater Perth – Implementation Plan 2022 - 24

METRONET Sustainability Strategy 2021

Western Australian Climate Change Policy

Waste Avoidance and Resource Recovery Strategy 2030

Western Australia's Plan for Plastics

Healthy Estuaries WA

Swan Canning River Protection Strategy

State Infrastructure Strategy

Caring for Country together - Our sustainability framework

Better urban forest planning - Perth and Peel

Wharf Street Basin in 2022.

Glossary of Noongar terms

There are various terms to describe Australia's First Nations people and they have been used in their specific context throughout this plan. The term 'Indigenous' is frequently used in a national context, for instance in the *State of the Environment report 2021*. The Department of Water and Environmental Regulation uses the term 'First Nations' to describe Aboriginal and Torres Strait Islander people across the country. When referring to Western Australia, the term 'Aboriginal' is most common, and when we are describing work with Aboriginal people in south-west Western Australia, we use the term 'Noongar'. The Noongar Nation includes a number of peoples and regions and this plan covers Whadjuk and Bindjareb Country.

Bindjareb	The Country, people and dialect of the Peel region
Bindjareb Djilba	Peel-Harvey estuary
Bindjareb Gabi Wonga	Bindjareb water story
Bilya/ beeliar	River
Bilya Maadjit	Murray River
Boodja	Country or land
Boorloo	Often refers to the city of Perth and includes the city and the Greater Perth region in this plan
Danjoo Koorliny	One translation could be 'going together to the future' or 'moving together', or it could be simply translated as 'walking together'.
Djarlgarro Beeliar	Canning River
Djilba	Estuary; fish bream; and a Noongar Six Season
Derbarl Yerrigan	Swan River
Gabi	Water – Bindjareb dialect
Gabi Kaadadjan	Water knowledge – Bindjareb dialect
Katitjin	Knowledge – Whadjuk dialect
Kep	Water – Whadjuk dialect
Kep Katitjin	Water knowledge – Whadjuk dialect
Mandjoogoordap	Mandurah
Noongar	Traditional owners of the South West of Western Australia
Wadjela	Non-Aboriginal person
Waugal/ Wagyl	Noongar rainbow serpent and Dreamtime creation spirit. A snake or rainbow serpent recognised by Noongar as the giver of life, maintaining all fresh water sources.
Waangaamaap Bilya	Serpentine River
Whadjuk	The Country, people and dialect of the Greater Perth region
Yoorgaangaap Bilya	Harvey River

Abbreviations and acronyms

BOM	Bureau of Meteorology
Communities	Department of Communities
CMIP5	Coupled Modelled Intercomparison Project 5
CMIP6	Coupled Modelled Intercomparison Project 6 (expanded number of modelling groups participating)
CRCWSC	Cooperative Research Centre for Water Sensitive Cities
DBCA	Department of Biodiversity, Conservation and Attractions
DLGSC	Department of Local Government, Sport and Cultural Industries
DoC	Department of Communities
DoE	Department of Education
DoF	Department of Finance
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
IPCC	Intergovernmental Panel on Climate Change
MAR	Managed Aquifer Recharge
UDIA	Urban Development Institute of Australia
UWA	University of Western Australia
WA Hub of Water Sensitive Cities Australia	Water Sensitive Transition Network
WC	Water Corporation
WELS	Water Efficiency Labelling and Standards
WEMP	Water Efficiency Management Plan
WSC	Water Sensitive Cities
WSTN	Water Sensitive Transition Network
WSUD	Water Sensitive Urban Design

Message from the artist Darryl Bellotti

I chose to stay with the blues and teals. These colours are what comes to mind when I think of clean, fresh water. Of a refreshing drink. Of a cool swim on a hot day. Keeping to the blue colour scheme allows the mind to go to a place of tranquillity. That's what I think of when I experience those colours.

The symbology in the logo symbolises the pooling of ideas. With reference to the two Noongar language groups of the Boorloo (Perth) and Bindjareb (Peel) regions, the two separate, but similar viewpoints come together and those ideas reverberate through the pool of water in the centre. Ripples swirl towards the centre and become as one. This is the way we need to be for the sake of our water sources. The dual symbology also represents Indigenous and non-Indigenous ideas, ideals, and ideology in regard to water and water planning.

The vegetation and animals are all significant to the story of water. As the seasons change, the importance of plants and animals shifts in terms of their usefulness to Aboriginal people and how abundant they may be during a particular season. The seasons determined where the water and food resources were readily accessible from the blooming of flowers, to the rains and rivers, to the changes in diet, to the breeding of animals – all of this is dependent on the season and the availability of water. It was important for me to include various animals and plants in the artwork to tell this side of the water story.

Department of Water and Environmental Regulation

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