

Water Strategy



CITY OF
TEA TREE GULLY
Naturally Better

Mayor's Message

Ensuring that our residents and businesses have access to water is vital to the City of Tea Tree Gully. While the state government delivers most water services, councils play a significant role in irrigating public open spaces, managing stormwater to minimise flooding, and caring for waterways and coasts.

Residents and visitors to our city enjoy natural creek lines, flourishing parks and reserves, attractive streetscapes and high-quality sports fields.

Maintaining these year-round, especially through our hot, dry summers, is only possible with a reliable water supply. Our drinking water systems are coming under increasing pressure as communities grow. We are reminded that there is no guarantee that we will be able to continue using drinking water to irrigate public open spaces in the future.

To avoid future water restrictions or a decline in the quality of our open spaces we must have secure, reliable and affordable access to water for irrigation. We will achieve this through a combination of water conservation measures, water efficiency measures, and diversifying our water sources, making us more resilient to shocks and droughts.

We also recognise the impacts that urban growth and development have on stormwater. Urban growth is necessary to cater for a growing population and meet demand for affordable housing, but it must be managed sensibly and sensitively to avoid unnecessary stormwater impacts. These impacts are twofold. Increased stormwater runoff results in greater flood risk, and more stormwater entering waterways increases pollution in our creeks, rivers—and ultimately—oceans.

Council has been at the forefront of stormwater harvesting schemes in South Australia; however, more needs to be done to reduce reliance on drinking water, control flood hazards, and protect our waterways. Collaboration across all levels of government, with access to funding, will be critical to meet the shared water security challenge.



A handwritten signature in black ink, appearing to read 'Marijka Ryan', with a stylized flourish at the end.

Mayor Marijka Ryan

Contents

Mayor's Message	2
In Brief...	4
Introduction	6
Strategic Context	7
Our Water Story	8
Our Water Systems and Sources	10
How We Use Water	12
Why the City of Tea Tree Gully Needs a Water Strategy	13
The city is changing	14
The community is changing	15
Community expectations are changing	16
The climate is changing	17
The regulatory environment is changing	18
Our Water Focus	19
A Balanced Water Supply Mix	21
How we will get a balanced water supply mix	23
Living Creeks and Rivers	24
How we will maintain living creeks and rivers	25
Multi-objective Stormwater Management	26
How we will deliver multi-objective stormwater management	27

In Brief...



The **water services** provided by Council include:

- stormwater management
- irrigation of public open space
- stewardship of the creeks and rivers flowing through the city.



Council uses 570 million litres (megalitres, ML) of water every year. Most of this water is used to irrigate public open space. Our irrigation systems use a combination of drinking water (supplied by SA Water) and non-drinking water supplied by Council, which includes stormwater, recycled water (treated wastewater) and groundwater.



Secure and affordable water is vital for the wellbeing of our community and for the environment we want to create in our city.



We need to prepare **now** for the future because...



More houses and development mean more hard surfaces and more stormwater runoff.

Water infrastructure in the older parts of the city may need attention sooner than infrastructure in the newer parts of the city.



A growing population means more demand for community facilities and public open space.



Our community wants quality public open space, and cares about our creeks, rivers, parks and reserves that make us 'naturally better'.

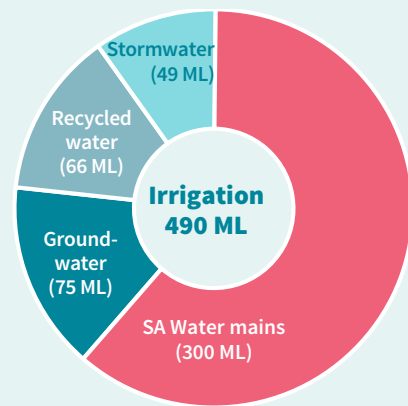
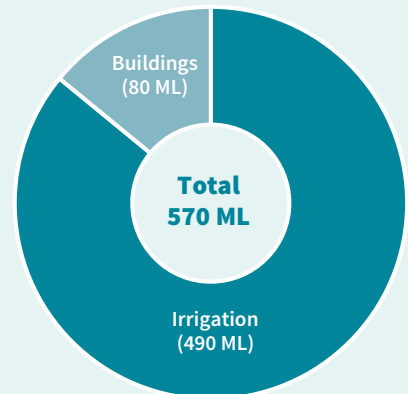


There could be less water available in a hotter, drier climate, and more frequent extreme weather events.

'Greening and cooling' our city will make us more climate resilient but will need more water.



Opportunities are emerging to work towards better water management policy, regulation and funding arrangements between levels of government.



We will focus on...

1 A balanced water supply mix



- 1.1 Underpinning water services with robust data and information on water quantity, water quality and water consumption.
- 1.2 Optimising water supply from existing water sources through appropriate asset management, operation and maintenance.
- 1.3 Developing new water sources to make Council's water supply systems more flexible and resilient under changing conditions.
- 1.4 Understanding future water demand and supply trends and when interventions will be required, so that Council can proactively prepare.
- 1.5 Advocating for state government and Australian Government policy, regulation, governance and investment that supports integrated urban water management.
- 1.6 Sharing knowledge and expertise between local government water system operators.

So that...

Our mix of water sources provides secure and affordable water for public social, economic and environmental benefit.

2 Living creeks and rivers



- 2.1 Recognising, protecting and restoring the biodiversity, amenity and water supply value of healthy riparian corridors.
- 2.2 Managing and mitigating the impacts of vegetation clearance, pest plants and animals, stormwater runoff and soil erosion on watercourses, waterbodies and riparian corridors.
- 2.3 Applying nature-based stormwater management solutions in preference to hard infrastructure where possible.
- 2.4 Developing and maintaining staff capacity and capability in best practice urban watercourse management.
- 2.5 Helping volunteers, community groups and private citizens all contribute to living creeks and rivers through their actions in the community and on private property.

Healthy biodiversity in our creek and river corridors provides clean water, amenity and recreational opportunities.

3 Multi-objective stormwater management



- 3.1 Managing stormwater holistically by considering flood hazard, stormwater quality and opportunities to use stormwater as a beneficial resource.
- 3.2 Sharing contemporary flood hazard information with relevant authorities so that it can underpin planning and development decisions.
- 3.3 Adopting water sensitive urban design (WSUD) and biodiversity sensitive urban design (BSUD) principles in city development.
- 3.4 Encouraging and supporting Innovative and emerging approaches to flood risk reduction supported.
- 3.5 Collaborating with stakeholders (including other local governments and state government agencies) on whole-of-catchment initiatives and regional initiatives.

Our community is safe in flood events, our natural environment thrives, and stormwater is a valuable resource.

Introduction

Water underpins our lives and livelihoods. It is often said that South Australia is “the driest state in the driest inhabited continent”, and most South Australians understand the value of water.

The water services provided by Council include stormwater management, non-drinking water supply (for irrigation), and stewardship of the many watercourses that flow through the City of Tea Tree Gully. These water services culminate in many things that are easy to take for granted, such as flourishing parks and reserves, quality sports fields, tranquil natural areas, and a community relatively safe from flood hazard.

In the future, we expect to face a range of water management challenges due to a growing population and economy and a drier climate. Preparing for these challenges now will ensure that our communities, businesses and environment continue to thrive. This Water Strategy sets the foundation for:

- a city that is greener and cooler
- a city that can rely on resilient and affordable water supplies to irrigate parks, reserves and sports fields
- a community that enjoys clean and healthy watercourses and natural areas
- a community that is protected from flood events.



Wynn Vale Dam, in the heart of the city, provides water for irrigation and is highly valued for its recreational opportunities.

Strategic Context

Council recognises the natural environment as one of the five themes in its Strategic Plan 2030.

The City of Tea Tree Gully Environmental Management Framework guides the Council in planning and delivering actions to achieve its environmental aspirations. Prudent management of our water systems and water sources is a part of being a ‘water smart’ city (Figure 1) and supports the strategic plan objectives shown in Table 1.

Water doesn’t stop flowing at local government boundaries. That is why we will align our efforts with relevant state government strategies and collaborate with other levels of government to contribute to a secure water future for all South Australians, as well as the City of Tea Tree Gully community.

This strategy and its related action plan will be reviewed regularly to ensure ongoing alignment with strategic plan objectives and other Council priorities.

Table 1: Related Strategic Plan objectives.

Strategic Objective	Wellbeing Pillars					
	Healthy	Safe	Prosperous	Connected	Vibrant	Liveable
3. We are leaders in how we manage and care for our environment and resources.						
3.1 Biodiversity, green spaces and tree canopy are valued, enhanced and protected.	●				●	●
3.2 We practice the responsible and sustainable use of resources.	●		●			●
3.3 We are resilient to extreme weather events, bushfires and environmental risks.	●	●				●
4. Our city is a desirable place to live, stay and play.						
4.1 Our public places are attractive, adaptable and fit for purpose.			●	●	●	●



Figure 1: Water security and stormwater management are part of being a ‘water smart’ city.

Our Water Story

Tea Tree Gully's water resources legacy

Hope Valley Reservoir was completed in 1873 to service Adelaide's growing water needs. Hope Valley Reservoir was supplied from the same weir on the River Torrens (Gorge Weir) constructed in 1860 to supply the nearby Thorndon Park Reservoir. Today, Hope Valley Reservoir is still supplied (in part) from the River Torrens via a modern pipeline and remains an integral part of Adelaide's water supply system.



Hope Valley Reservoir circa 1875. (Credit: State Library of South Australia, B 7350.)

In 1955, the Mannum-Adelaide pipeline was completed, bringing water from the River Murray to Hope Valley Reservoir, and in 1980 the Anstey Hill Water Treatment Plant was commissioned to serve the north-eastern suburbs of Adelaide.

Little Para Reservoir on the city's northern boundary was commissioned in 1979 and is Adelaide's youngest reservoir. It is used as a balancing storage for River Murray water taken from an offtake on the Mannum-Adelaide Pipeline.



Little Para Reservoir. (Credit: SA Water.)

The City of Tea Tree Gully spans the Adelaide foothills from Gould Creek and the Little Para River in the north, to Adelaide's iconic River Torrens in the south (Figure 2).

The Kurna people—the first inhabitants of Tea Tree Gully—would camp by the many springs and waterholes along the Little Para River and River Torrens. It was also water that brought European settlers to Tea Tree Gully as a place for 'squatters' to water and feed their cattle.

The Tea Tree Gully area has featured prominently in the historical development of Adelaide's water resources (◀ see box left). Today, both the Little Para River and River Torrens remain essential parts of Adelaide's water supply system.

While providing drinking water is primarily a state government responsibility, Council has a network of water infrastructure to irrigate parks, reserves and sports fields. At the heart of this system is Wynn Vale Dam. The dam was constructed by S. Wynn & Company in 1962 to irrigate a portion of their Modbury Estate vineyard, but by the end of the 1980s, horticulture in the city had given way to residential development. Today, in addition to being an important source of water for irrigation, the dam is valued by the community for its recreational opportunities.

Council was an early adopter of aquifer storage and recovery (ASR) as a means of better stormwater management (see box below ▼). Today, the city benefits from a water supply network comprising:

- nine dedicated ASR bores and five groundwater bores
- a wastewater treatment plant (WWTP) at Greenwith and a water treatment plant (WTP) at Wynn Vale Dam
- 6.5 hectares of constructed wetlands
- 52 kilometres of non-drinking water pipelines.

What is aquifer storage and recovery?

Aquifer storage and recovery (ASR) is a technology for storing water in underground aquifers for later use. ASR mimics the natural groundwater recharge process of rainwater permeating through the soil. Stormwater passes through wetlands and treatment plants where it is cleansed and pumped into bores drilled into the aquifer. The same bores are used to extract the stored water from the aquifer when it is required.

--- Non-drinking water pipeline

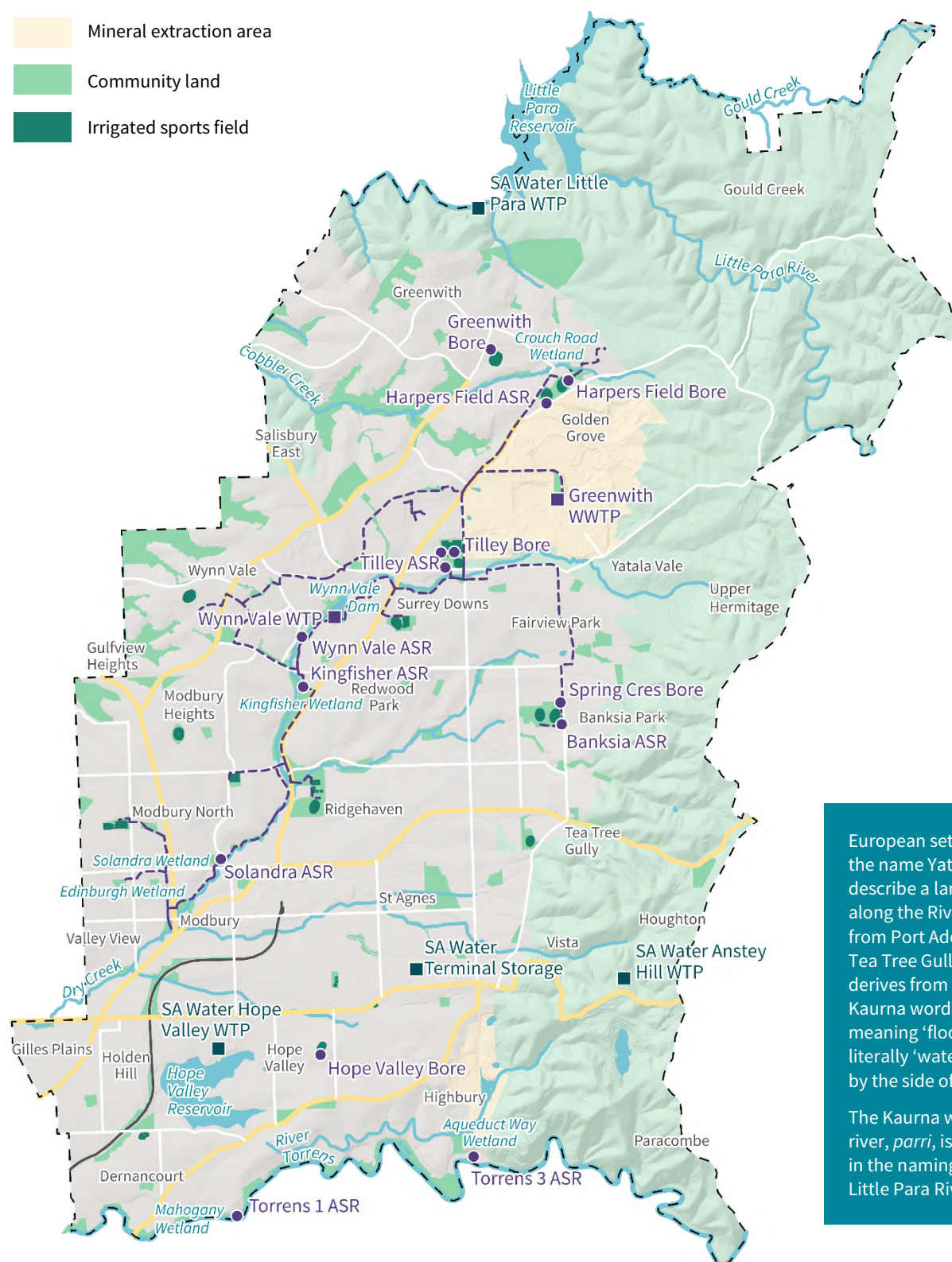
Urban area

Semi-rural or conservation area

Mineral extraction area

Community land

Irrigated sports field



European settlers used the name Yatala to describe a large area along the River Torrens from Port Adelaide to Tea Tree Gully. Yatala derives from the Kaurna word *yertala*, meaning 'flooding', or literally 'water running by the side of a river'.

The Kaurna word for river, *parri*, is reflected in the naming of the Little Para River.

Figure 2: Water resources and water infrastructure in the City of Tea Tree Gully.

Our Water Systems and Sources

In most urban areas, water is managed in five different systems (see box right ►). Historically, these systems have been managed separately, but the benefits of an integrated approach to water management are increasingly being recognised.

We rely on several sources of water (see box far right ►►). Most homes, businesses and institutions in the City of Tea Tree Gully are supplied with drinking water by SA Water. This water is imported from the River Murray via the Mannum-Adelaide Pipeline or transferred from the Millbrook Reservoir in the Mount Lofty Ranges and treated at the Anstey Hill Water Treatment Plant. River Murray water is also diverted into Little Para Reservoir and Hope Valley Reservoir. These reservoirs are located within our city but supply lower-lying suburbs outside in Adelaide's north and west.

Stormwater originates from rainfall over the city, as well as from watercourses flowing into the city. The major watercourses in the city are the Little Para River and the River Torrens, and the ephemeral Gould Creek, Cobbler Creek and Dry Creek (see Figure 2). Dry Creek drains a significant portion of the city and is an important part of our identity. Dry Creek has many branches rising as small tributaries along the foothills.

When captured and treated, stormwater can provide both a drinking and non-drinking water source. Stormwater contributes about 13% of Council's total water demand, principally through ASR schemes. In addition to Council's stormwater harvesting activities, numerous homes and businesses have rainwater tanks, and there are a small number of private farm dams that support primary production in the rural part of the city.

The five urban water systems



The **natural water system** comprises the naturally occurring elements of the hydrological cycle, including rainfall, rivers, lakes, oceans, and aquifers.



The **drinking water system** (or **potable water system**) is the network of water storages, treatment facilities, and pipes used to distribute water that is safe for drinking, cooking and bathing.



The **non-drinking water system** (or **non-potable water system**) is a separate network of water storages, treatment facilities, and pipes built in many towns and cities to distribute water that is not intended for drinking, but is suitable for uses such as irrigation, manufacturing and cleaning.



The **wastewater system** (or **sewerage system**) is the network of pipes and treatment facilities that collects and cleans wastewater for disposal, and sometimes recycling.



The **stormwater system** (or **drainage system**) is the network of pipes and channels (including natural and modified watercourses) that removes stormwater from properties, protecting communities from flooding, and sometimes collecting it for use.



The water treatment plant at Wyn Vale Dam treats stormwater, which supplies Council's ASR schemes.

Key water sources



Stormwater is water that runs off land (or structures on land) as a result of rainfall and includes water in watercourses.



Imported water is water transferred from a remote source by pumps, pipelines, canals and other non-natural mechanisms.



Groundwater is water from underground aquifers—in the spaces between soil particles and rocks, which is extracted by wells or bores.



Recycled water is wastewater that has been treated to a drinking or non-drinking standard for reuse.



Desalinated water is brackish or saline water (usually seawater) that has been treated to remove dissolved salt. Desalinated water is an important part of Adelaide's water supply mix but is not supplied to SA Water customers in the City of Tea Tree Gully.

The City of Tea Tree Gully also benefits from the groundwater resources of the Adelaide Plains. The city is almost wholly within the Central Adelaide Prescribed Wells Area. This means that taking groundwater in most parts of the city is subject to the rules of the Adelaide Plains Water Allocation Plan (WAP). The WAP provides for the equitable sharing of groundwater resources between consumptive users and protects water-dependent ecosystems from unacceptable degradation.

Groundwater contributes to around 15% of Council's overall water demand. There are also private bores throughout the city used for irrigation, and for stock and domestic purposes. These bores draw water from a complex system of aquifers dominated by the Northern Fractured Rock aquifer and Golden Grove Embayment fractured rock aquifer (▼ see box below left).

Most properties in the city have a wastewater connection to the SA Water sewer system. This excludes a small number of properties using private septic tanks, and approximately 4,700 properties connected to a Community Wastewater Management System (CWMS). Over the period 2022-2029, SA Water are transitioning all CWMS customers to seweraged wastewater connections (see box below right ▼).

Council currently harvests wastewater from the SA Water sewer by 'sewer mining' and produces a volume of recycled water treated to non-drinking water standard for irrigation use. Recycled water is among Council's most expensive sources of water, and the viability of this practice is under evaluation.

Sedimentary and fractured rock aquifers



Water in a sedimentary aquifer is stored in the spaces between particles of soil and rock (left) and can generally move equally freely in all directions.



In a fractured rock aquifer, water is stored in cracks (fractures) and cavities in rock formations and can only move along these fractures (left). Fractures form in complex patterns, and the

movement of groundwater through a fractured rock aquifer is hard to predict.

This unpredictability, together with the limited volume of the fractures mean that wells in fractured rock aquifers are often less productive than wells in sedimentary aquifers.

Tea Tree Gully Sustainable Sewers

SA Water took ownership of the City of Tea Tree Gully Community Wastewater Management System (CWMS) on 1 July 2022. The Sustainable Sewers program will transition properties connected to the CWMS to a modern sewer system delivering a national standard quality of service.

SA Water is delivering works in multiple stages, with completion of the final stage expected in 2029.



Construction of a sewer main in Banksia Park. (Credit: SA Water.)

How We Use Water

Data from SA Water, the Department for Environment and Water (DEW) and Council's records have been used to estimate where water is used in the city. The City of Tea Tree Gully community collectively uses just over ten gigalitres (GL) of water every year (Figure 3a).

Homes account for most water use. Homes in the city use 8.5 GL of water per year. Institutions (schools, hospitals, utilities and government services, including the Council) make up the next biggest group. Together, these use a little more than 1 GL of water each year. Businesses use a little less than 1 GL of water each year.

In the 2024-25 financial year, the average household water use in the city was 209 kL. This is higher than the state-wide average of 180 kL per year. Golden Grove had the highest average household consumption at 253 kL, while Valley View had the lowest at 169 kL. Household water consumption is influenced by many factors including the number of occupants and water use in private gardens.

Council's total water use in an average year is about 570 megalitres (ML). Most of the water used by Council is used to water the 98 hectares of irrigated parks, reserves and sports fields across the city, with the rest used in Council and community buildings (Figure 3(b)).

How much is that?

1 kilolitre (kL) = 1 thousand litres

1 megalitre (ML) = 1 million litres

1 gigalitre (GL) = 1,000 million litres



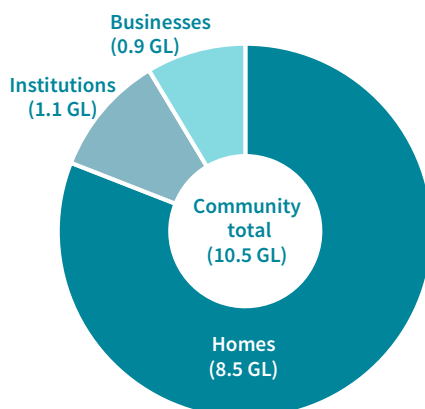
An Olympic swimming pool holds 2.5 ML.



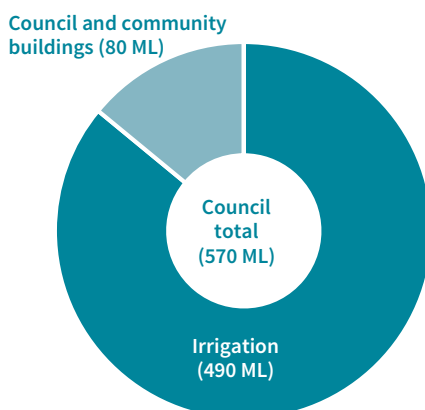
1 GL would fill Adelaide Oval to the top of the stadium.



Greater Adelaide uses 135 GL of drinking water in an average year.



(a)



(b)

Figure 3: Estimated annual water use for (a) the City of Tea Tree Gully community, and (b) Tea Tree Gully Council.



Homes account for most of the water used in the city.

Why the City of Tea Tree Gully Needs a Water Strategy

Greater Adelaide has a high degree of water security due to its diverse water supply options (including climate-independent sources like the Adelaide Desalination Plant), a highly networked distribution system, a capable water sector and heightened public awareness of the challenges of drought. Despite this, the 2025 Annual Water Security Statement Update for South Australia cautioned that:

...South Australians cannot rely on meeting our water needs by using only traditional water supplies ...our water security and resilience will depend on smarter water use and securing supplies that are climate resilient and of a reliable quantity and quality.

These issues cannot be addressed in isolation and will require an integrated and coordinated approach that encompasses how water resources are planned and managed alongside land use, urban development and infrastructure planning.¹

Local governments have always played a role in managing stormwater and urban watercourses, and increasingly they are participating in capturing, storing, treating and distributing non-drinking water supplies to support the irrigation of public open spaces, tree-planting, and greening initiatives.

Together with other levels of government, Council shares the challenge of securing adequate and reliable water supplies. Setting a clear direction today will ensure that our community, businesses and environment can thrive into the future.



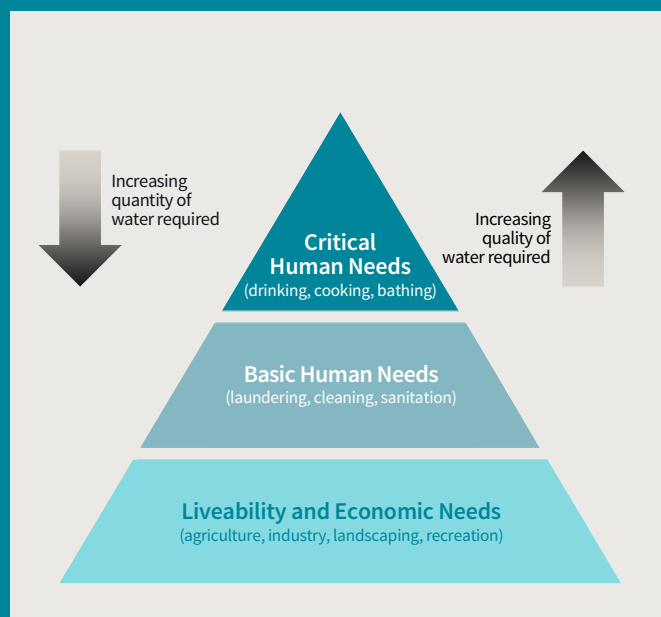
Local governments play a crucial role in maintaining public open spaces.

What is water security?

Water security refers to having an acceptable quantity and quality of affordable and accessible water for people, industry, agriculture and the environment, now and into the future.

Traditionally, water security has focused on ensuring adequate water supplies to meet current and predicted demands. While this remains important, the benefits of integrated water management are now recognised, and water security planning today requires a more holistic approach that considers:

- Matching fit for purpose water supplies to water demands, so that precious drinking water is not used in applications that do not need the highest quality water (see right).
- Minimising the environmental impacts of water supply operations and reversing the damage caused to aquatic and riparian ecosystems by past practices.
- Maximising the recreational opportunities provided by 'blue spaces' like dams and reservoirs.
- Building community resilience to water-related natural hazards like storms, floods and droughts.



We have a broad range of water needs, but not all of them require drinking-quality water.

¹ Department for Environment and Water (2025), *Annual Water Security Update*, <https://cdn.environment.sa.gov.au/environment/docs/DEW2500515-Attachment-1.pdf>.

The city is changing

The City of Tea Tree Gully has grown into a large metropolitan area with a population of more than 100,000. The city is predominantly urbanised, but the eastern fringe remains semi-rural in nature and comprises land dedicated to conservation, primary production, resource extraction and rural living (see Figure 2).

Road age data provides an insight into residential development and the historical growth of the city. Development mainly occurred in a south-to-north direction as Adelaide expanded. This is important because the last-developed suburbs, such as Greenwith, Golden Grove and Wynn Vale (see Figure 4), were primarily developed after the 1980s when standardised approaches to drainage design began to be adopted. The stormwater infrastructure in those newer suburbs is more likely to have been designed and built to a contemporary flood mitigation standard. It is also relatively young. In contrast, suburbs like Valley View, Gilles Plains and Holden Hill have older stormwater infrastructure that will be closer to reaching its useful life or capacity. Stormwater infrastructure in these older suburbs may require significant renewals in the coming decades.

Due to physical and planning policy constraints, future urban development in the city will almost certainly be in the form of small-scale infill development (where older housing stock is demolished and single allotments are subdivided to support two or more new dwellings). This type of development typically results in higher-density housing with less private open space (see Figure 5). The loss of private open space increases the importance of public open spaces and the significance of water for irrigating and maintaining those spaces. Higher density living and an associated increase in hard (impervious) surfaces also increases the amount of runoff from rainfall and puts pressure on drainage systems beyond their ‘designed for’ capacity.

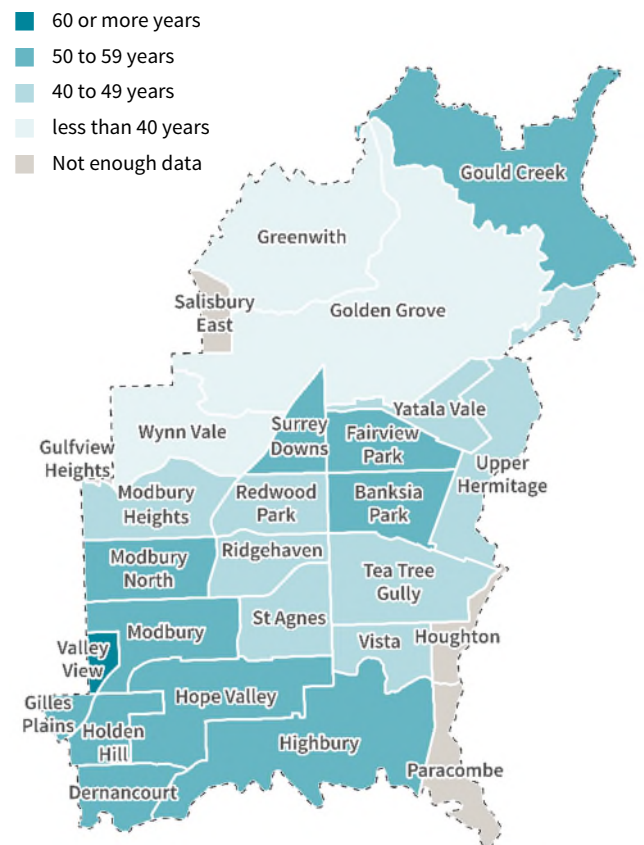


Figure 4: Estimated median age of residential development in the City of Tea Tree Gully, by suburb.



(a) 2004



(b) 2014



(c) 2024

Figure 5: An example of small-scale infill development occurring on two adjacent allotments in Dernancourt over a period spanning 2004 to 2024. Note the increase in the prevalence of hard surfaces (such as roofs and driveways) and the reduction in private open space. Note also the loss of street trees and private trees.

The community is changing

The population of the City of Tea Tree Gully is growing at around 0.5% per year and is forecast to reach 110,000 by 2026 (see Figure 6). Population growth is a direct driver of water consumption, but it also increases water demand in other, indirect ways. A growing population drives demand for council facilities, such as parks, reserves and sports fields, which in turn require adequate and reliable sources of water to sustain them.

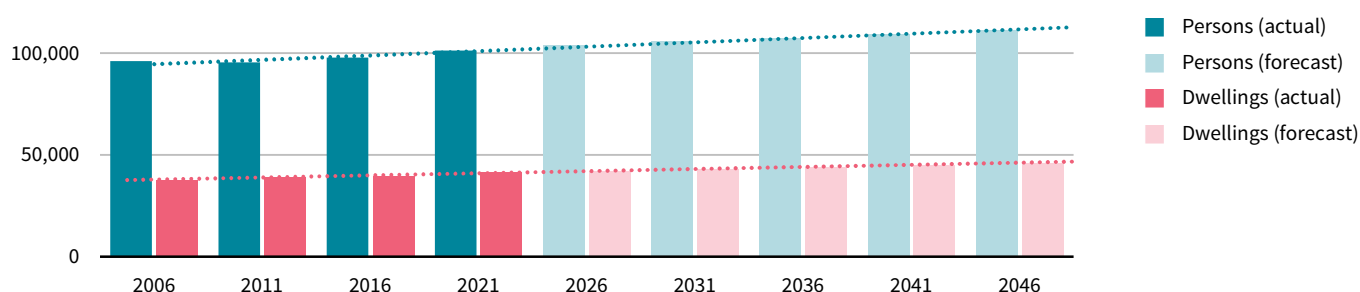


Figure 6: Historical and forecast growth in population and number of dwellings in the City of Tea Tree Gully.

Recent research indicates that participation in organised sports in Australia has remained relatively steady over the past decade, but there has been an increase in participation in 'non-organised' physical activities, such as walking, running and cycling. Much of the increase in physical activity has been via groups and individuals accessing outdoor recreational infrastructure and green spaces within their communities.²

Like much of South Australia, the city has an ageing population see (Figure 7a). Despite the predicted increase in the retiree and elderly cohort (age 65+), numbers of children and youth (0-24) and working aged people (25-64) are predicted to remain steady into the future, and in some parts of the city, they will increase (see Figure 7b). These latter cohorts are more likely to engage in organised sport and drive demand for quality irrigated sports fields. Anecdotal evidence suggests that utilisation of some irrigated sports fields in the city has already increased in response to growth in local sporting clubs, with a corresponding increase in irrigation required to maintain turf quality.

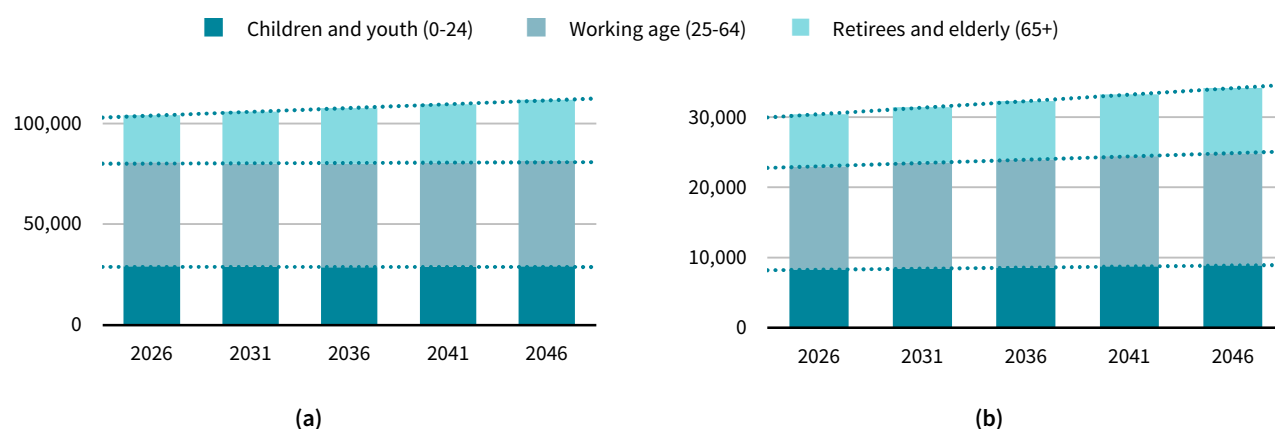


Figure 7: Forecast growth in population cohorts for (a) the whole of the City of Tea Tree Gully and (b) the south of the city, including the suburbs of Dernancourt, Gilles Plains, Highbury, Holden Hill, Hope Valley, Modbury and Valley View.

² Cameron A, Bratanova A, May C, Reynolds G, Burgin N, Menaspà P, and Burns S (2022). *The Future of Australian Sport. The second report: Megatrends shaping the sport sector over coming decades*, https://www.clearinghouseforsport.gov.au/_data/assets/pdf_file/0020/1082333/The-Future-of-Australian-Sport-Second-Megatrends-Full-Report.pdf.

Community expectations are changing

Liveability is recognised in South Australia's Economic Statement as a key factor in attracting population and investment to the state. Liveability is equally critical for attracting and retaining people in the City of Tea Tree Gully.³

In a 2021 national survey, a higher proportion of South Australians identified living in proximity to public open spaces as being important compared with respondents from other states and territories.⁴ Communities desire high-quality open spaces with high amenity value, and in a dry climate, this means using irrigation to sustain plant life year-round (see box below ▼).

Council is responding to community demand through its program of open space upgrades and enhancements, as well as a commitment to retaining and increasing the tree canopy across the city. Tree canopy cover across the city was estimated in 2022 to be approximately 23%. Increasing tree canopy is an objective of our Strategic Plan 2030 that will need to be underpinned by reliable and affordable water for irrigation.

Communities are also becoming more aware of the environmental impacts of their actions and Council decisions. Communities have become more aware of the effects of stormwater pollution on creeks, rivers and coastlines. The Adelaide Coastal Waters Study,⁵ and work by the Goyder Institute,⁶ identified stormwater discharges as one of the major contributors to fine sediments that are detrimental to seagrasses off the coast of Adelaide. These sediments and other pollutants accumulate as urban watercourses travel from the hills and across the Adelaide plains. Despite the City of Tea Tree Gully's distance from the coast, Council shares a responsibility to manage the impacts of stormwater runoff from urbanised areas.

Reducing the environmental impacts of stormwater runoff requires a different approach. Stormwater management in Australia and many other countries has evolved from having a purely drainage focus to a 'multi-objective' approach that aims to:

- protect life and property from flooding and build community resilience
- mitigate the impacts of stormwater pollution on receiving waterways and ecosystems
- harvest stormwater runoff for beneficial uses.

There are many good examples of multi-objective stormwater management in Adelaide, including within the city. Council has been a leader in using stormwater for open space irrigation, but many opportunities remain to offset drinking water use for irrigation and passive watering of urban trees.

'Green space' and 'blue space'

Green and blue spaces in urban areas are valued for providing places to gather, recreate and relax. These spaces take many forms, including:

- **Green space**—parks, gardens, sports fields, conservation areas, school grounds, rooftop gardens, green walls and vegetated streetscapes
- **Blue space**—creeks and rivers, dams and reservoirs, wetlands, ponds, fountains, public pools and splash pads.



Waterworld is a favourite community blue space.

Green and blue spaces increase community resilience against urban heat and provide respite from the built environment. As a network, they make walking and cycling more amenable and encourage outdoor activity and social interaction.

In our hot and dry climate, effective water management is crucial for sustaining green and blue spaces. Supplying enough water to maintain green and blue space is part of the water security challenge.



Council is planting more trees to enhance green spaces.

³ Government of South Australia (no date), *South Australian Economic Statement*, https://www.premier.sa.gov.au/_data/assets/pdf_file/0004/895054/SA-Economic-Statement.pdf.

⁴ Heart Foundation (2021), *What Australia wants. Living locally in walkable neighbourhoods*. https://irp.cdn-website.com/541aa469/files/uploaded/What_Australia_Wants_Report_.pdf.

⁵ Fox et al. (2007), *The Adelaide Coastal Water Study. Final report, volume 1. Summary of findings*, https://epa.sa.gov.au/files/477350_acws_report.pdf.

⁶ Rouse et al. (2016), *New modelling capability to target stormwater interventions that support seagrass health along Adelaide's coast*, https://goyderinstitute.org/wp-content/uploads/2023/04/goyder_trs_16-9_modelling_seagrass_health_adelaide_coast.pdf.

The climate is changing

We must recognise the prospect that a warming, drying climate will bring additional water security challenges. The Greater Adelaide Regional Plan recognises the impacts of a changing climate in:

- contributing to hotter urban areas and 'heat island' effects (see box below ▼)
- exacerbating natural hazards, particularly bushfires and floods
- reducing the capacity and reliability of surface water and groundwater supplies.⁷

Our water systems play a crucial role in mitigating these impacts by enabling urban greening and cooling initiatives, enhancing the capability to manage and recover from flood events, and providing alternative water sources that can alleviate pressure on limited drinking water supplies.

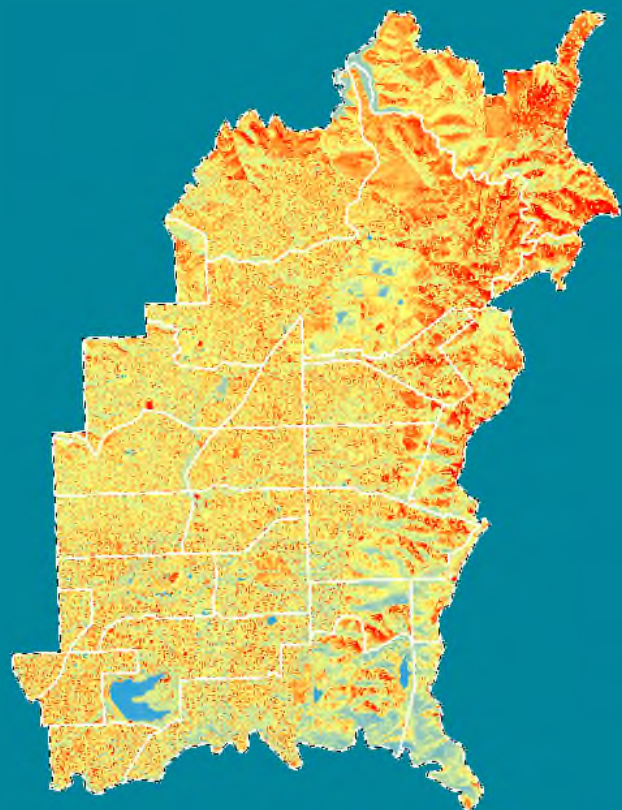
SA Water is preparing for possible reductions in surface water inflows to reservoirs.⁸ While SA Water is proactively planning measures to maintain access to water for homes, businesses and public spaces, drought conditions inevitably increase pressure on water supplies. In a future drought, drinking water restrictions like those witnessed during the millennium drought (1997 to 2010) could be imposed again. These restrictions had severe consequences for infrastructure and open space assets across metropolitan Adelaide. Council must be ready to respond to increased water demand and potential water scarcity in a drier climate.

Urban Heat Mapping

A 'heat island' is an area that is notably warmer than its surrounding environment.

The urban environment is composed of buildings, roads, footpaths and structures that have replaced natural surfaces such as forests, grasslands and marshlands. Artificial surfaces tend to absorb and hold more heat than natural surfaces. Unlike surfaces like grass, artificial surfaces also don't hold and release moisture through evapotranspiration, which has a cooling effect. The prevalence of artificial surfaces in urban areas means that they are usually hotter than the natural environment.

Together with Resilient East (a partnership of eight eastern suburbs councils) and Green Adelaide, Council has undertaken heat mapping to identify where heat accumulates across our city during hot weather.⁹ By mapping areas of excessive heat, we can better adapt urban design, vegetation, and tree planting as well as irrigation management and the use of different materials to manage high temperatures within the city.



Daytime heat mapping, summer 2023.

⁷ Department for Housing and Urban Development (2025), *Greater Adelaide Regional Plan*, <https://regional.plan.sa.gov.au/regional-plans/greater-adelaide>.

⁸ Ibid.

⁹ Department for Environment and Water (2024), *Urban Heat and Tree Mapping Viewer*, <http://spatialwebapps.environment.sa.gov.au/urbanheat/?viewer=urbanheat>

The regulatory environment is changing

South Australia's water legislation is complex and, in some cases, outdated. Responsibility for various aspects of water management (e.g., water industry operations, flood mitigation, water quality and environmental protection) is spread across a multitude of legislative instruments.

There are many situations where responsibilities lack clarity. One example is responsibility for managing urban watercourses, particularly where privately owned watercourses form part of the public stormwater system.

There are growing calls for legislative and governance reform to facilitate better urban water management in South Australia. Some examples of potential reforms are highlighted in the state government's Urban Water Directions Statement.¹⁰

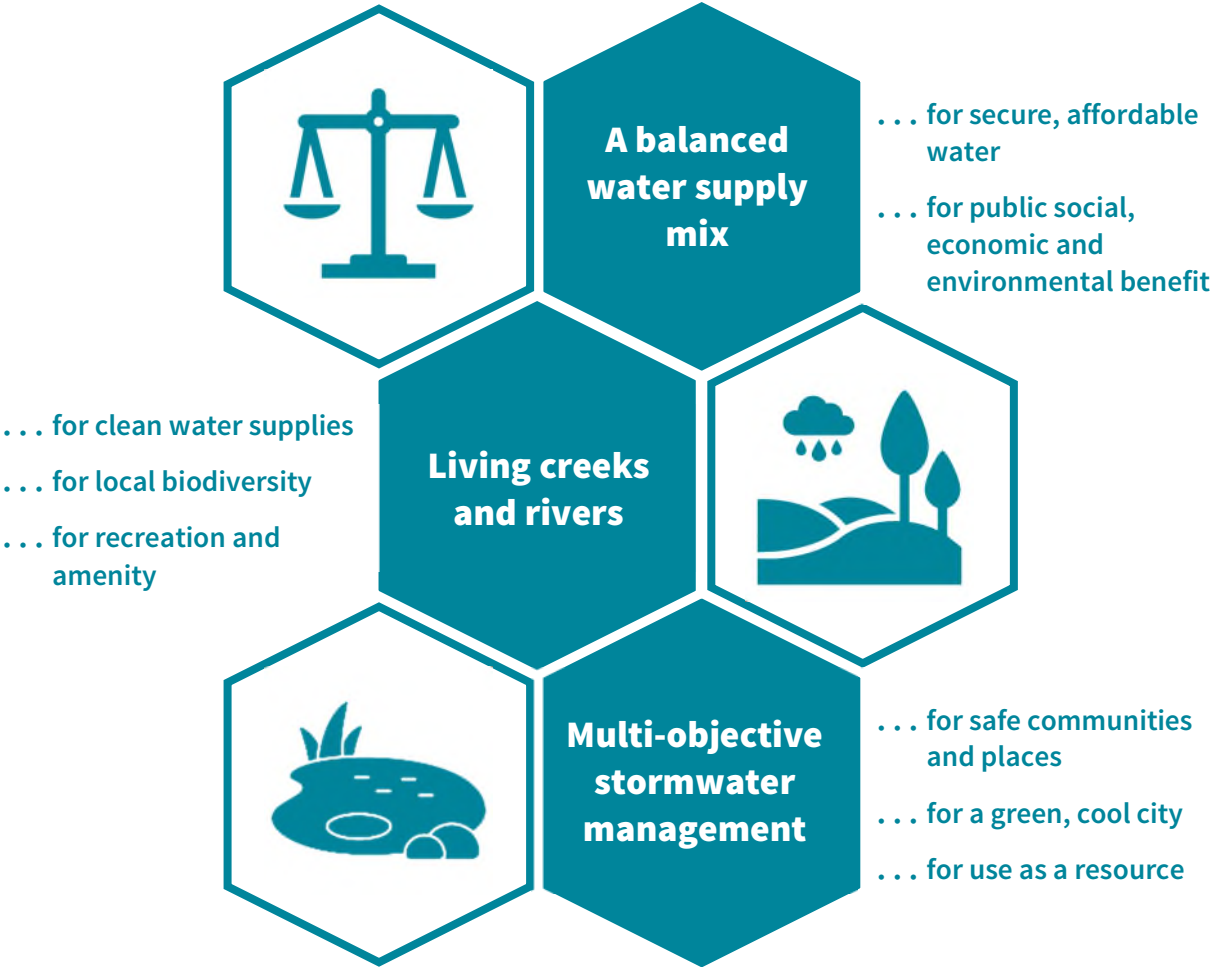
While the pace of reform is unpredictable, Council must be prepared to take advantage of the opportunities presented by improved regulation as they arise.

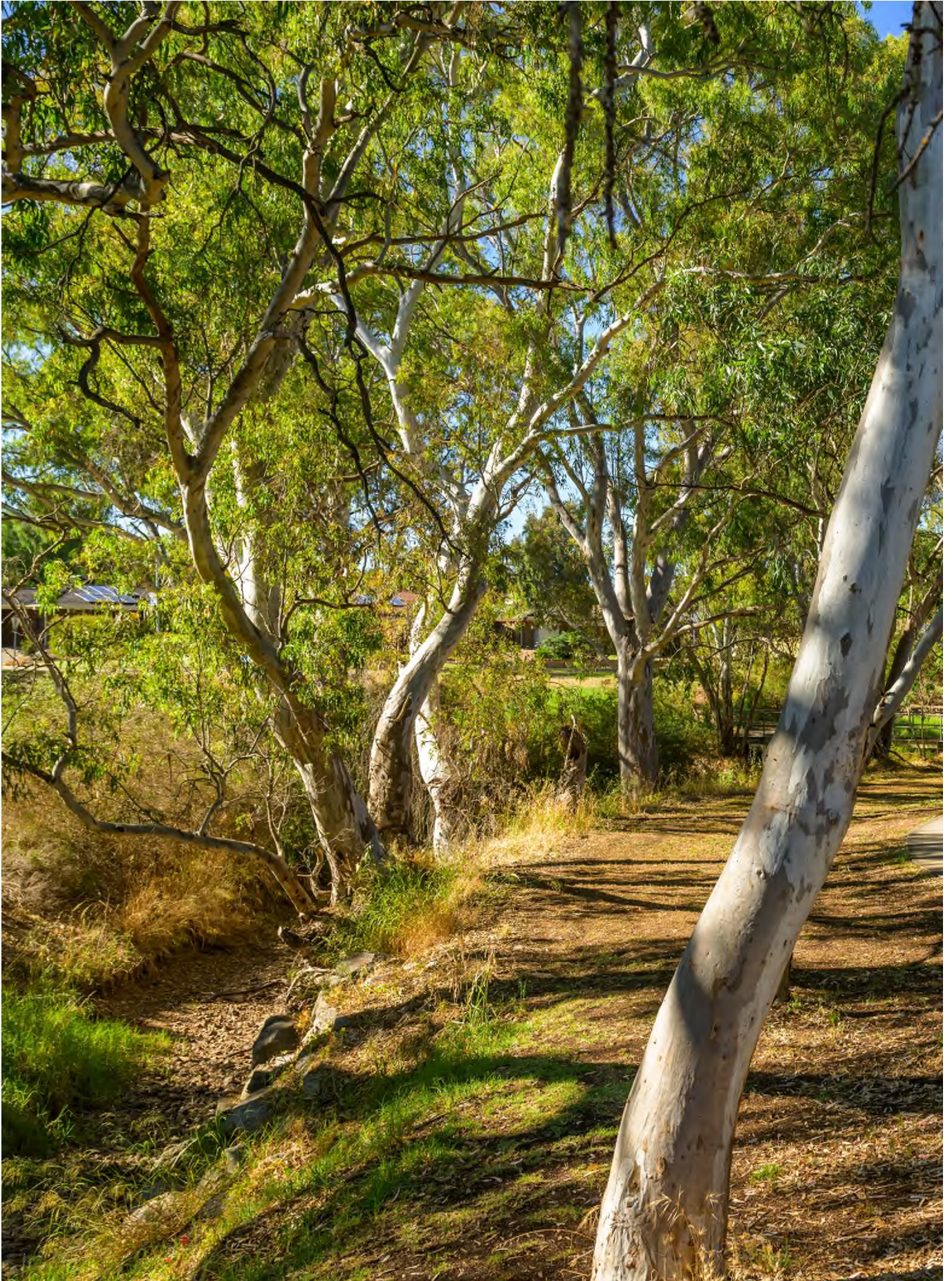


The stone well near Carter's Homestead ruins (which is now part of Cobbler Creek West Reserve) was a source of water for Jane and Thomas Carter and their family, who were early farmers along Cobbler Creek.

¹⁰ Department for Environment and Water (2022), *Urban Water Directions Statement*, <https://cdn.environment.sa.gov.au/environment/docs/853934-DEW-Urban-Water-Directions-Statement-FIN3.pdf>.

Our Water Focus





Dry Creek, Modbury North.

A Balanced Water Supply Mix

Council uses almost 500 ML of water every year for irrigation. More than half of this is drinking quality water that is supplied by SA Water (Figure 8).

About 205 ML of non-drinking water is supplied from Council’s own water systems, with production split roughly evenly between groundwater, recycled water and stormwater (Figure 9). A small volume of non-drinking water (15 ML) is sold to schools in the city for their irrigation needs.

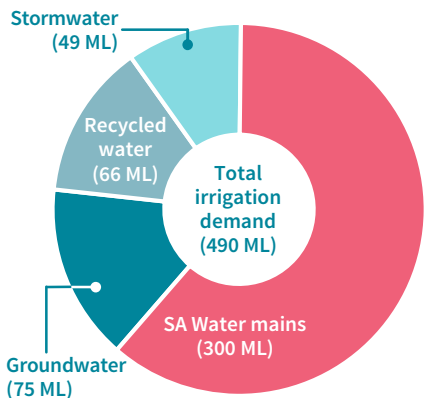


Figure 8: Council annual irrigation demand by water source.

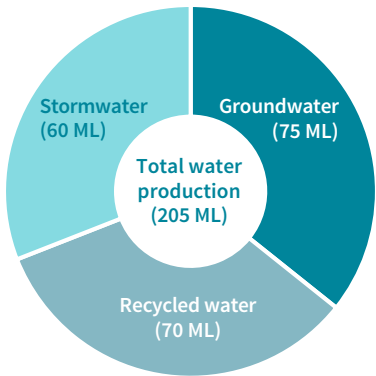


Figure 9: Council annual non-drinking water production.

Water is a significant cost for the Council. An estimated \$1.8 million is spent annually on SA Water rates and operating expenses for the non-drinking water system.

Figure 10 shows water pricing for SA Water and selected local government water utilities. While the Council is not currently considering expanding into water retail markets, these prices demonstrate that it is possible to produce and purchase non-drinking water (suitable for irrigation) at a discount to the SA Water price.

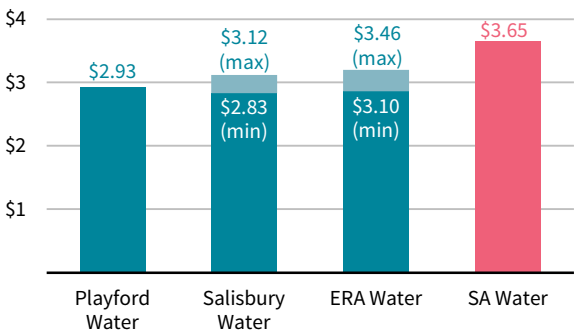


Figure 10: Water pricing (\$/kL) for SA Water and selected local government-owned water utilities (2025/26 financial year).

Using non-drinking water for irrigation can make financial sense. Using stormwater and recycled water:

- reduces the amount of water extracted from natural resources that are under pressure (like the River Murray)
- reduces the volume of untreated stormwater and excess wastewater discharged to watercourses and/or the sea
- avoids the energy costs of pumping water over long distances
- avoids the energy costs of treating water to a drinking water standard when it is unnecessary.

Complementing drinking water with non-drinking water also introduces flexibility and resilience into our overall water supply systems. The report *All Options on the Table: Urban water supply options for Australia* by the Water Services Association of Australia (WSAA) notes the importance of optimising a mix of water sources for Australia’s future water security (see box overleaf ►►).¹¹

Getting the right water supply mix is a regional-scale challenge with many components and stakeholders. The most substantial interventions required call for investment by state and territory and the federal governments, but there are logical contributions that local governments can make. These include:

- maximising stormwater harvesting opportunities
- substituting drinking water for non-drinking water where practicable and where drinking quality water is not required
- pursuing water efficiency in irrigation systems and community buildings
- using groundwater prudently.

¹¹ Water Services Association of Australia 2020, *All Options on the Table: Urban water supply options for Australia*, <https://www.wsaa.asn.au/sites/default/files/publication/download/FINAL%20Urban%20water%20supply%20options%20for%20Australia.pdf>.

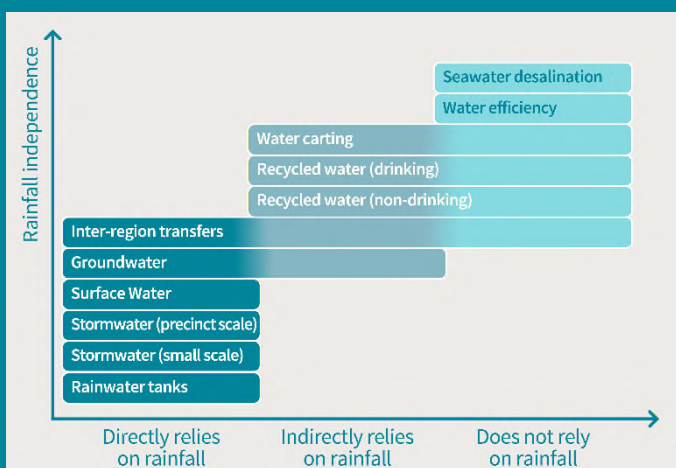
‘All Options on the Table’

In 2022, the Water Services Association of Australia (WSAA) published the report *All Options on the Table: Urban water supply options for Australia*. Against a backdrop of record drought, record bushfires and record floods, the report took a fresh look at water supply options amidst an increasingly uncertain climatic outlook.

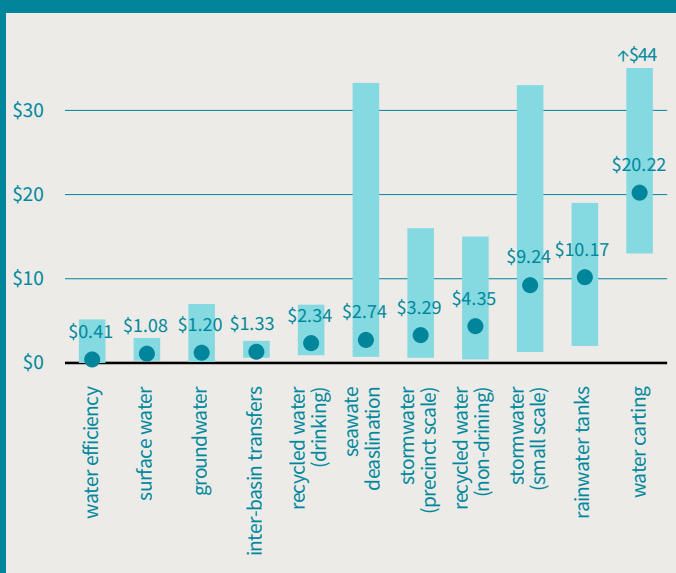
The report aimed to enhance contemporary understanding of the attributes and costs associated with various water supply options. It noted that balancing supply and demand efficiently required considering a diverse range of water sources (“all options”) and argued that a mix of rainfall-dependent and rainfall-independent sources (see right) is needed as part of the future water supply mix.

The report also collated and updated the latest available data on the costs of different water supply options. Shown to the right are the average costs of production (\$/kL) over the lifetime of water supply assets for a range of water sources, derived from a dataset of over 300 water projects across Australia. These costs vary considerably, depending on scale, location and other local factors, with some of the largest variations observed in projects applying relatively newer technologies, such as desalination. Interestingly, the cost of recycling water to a non-drinking standard were often observed to be greater than the cost of recycling water to a drinking standard. While this seems counterintuitive, it can be attributed to the avoided cost of replicating a ‘third pipe’ system to distribute non-drinking water to customers.

In reality, no single water supply option is likely to meet all the needs of a city or town. Combinations of options need to be considered. Optimising the use of multiple rainfall-dependent and independent sources increases the ability to balance resilience, security, cost and other network constraints while also meeting the expectations of customers and communities.



The WSAA rainfall independence spectrum (adapted from WSAA).



Average costs of production (\$/kL) for selected water sources as reported by WSAA. Each bar represents the range of costs observed for the water source, and each dot and label represent the median cost observed.

Council was among the early adopters of constructed wetlands in South Australia, aiming to improve stormwater runoff quality and provide a water resource for irrigation. While these have served the community well, some are approaching an age where significant mid-life maintenance works are required to ensure their efficacy. As the operation and maintenance of constructed wetlands in the city has evolved, it has become evident that some wetland sites are less reliable than others as a water supply. However, many of the constructed wetlands now provide biodiversity benefits that were never fully imagined at their inception. The management of these wetlands therefore needs to be sensitive to the biodiversity benefits that they provide in addition to water harvesting.

Opportunities remain in the City of Tea Tree Gully to increase the volume of stormwater harvested and to extend non-drinking water supplies to parts of the city that are currently not serviced. The unpredictable nature of the fractured rock aquifers that dominate the city's geology means that the expansion of ASR schemes will need to be considered carefully to ensure that the intended benefits can be realised. However, the city has a natural advantage in its numerous watercourses, which remain in public ownership within generous reserves. These watercourses, combined with Wynn Vale Dam and other Council-owned land, present a potential opportunity to increase the harvesting and storage of stormwater using surface wetlands and basins.

How we will get a balanced water supply mix

Outcome	Key Directions
1 Our mix of water sources provides secure and affordable water for public social, economic and environmental benefit.	1.1 Underpin water services with robust data and information on water quantity, water quality and water consumption. 1.2 Optimise water supply from existing water sources through appropriate asset management, operation and maintenance. 1.3 Develop new water sources to make Council's water supply systems more flexible and resilient under changing conditions. 1.4 Understand future water demand and supply trends and when interventions will be required, so that Council can proactively prepare. 1.5 Advocate for state government and Australian Government policy, regulation, governance and investment that supports integrated urban water management. 1.6 Share knowledge and expertise between local government water system operators.



The ability to obtain water from sources independent of the drinking water network is an insurance policy against future droughts and water restrictions.

Living Creeks and Rivers

Almost half of all areas in the City of Tea Tree Gully lie within 100 metres of a creek, river or water body, and nearly every part of the city has one within 500 metres. Most of our public open space follows creek and river corridors (Figure 11). Most residents can identify with a local creek or river which they live or recreate near—it is part of being “naturally better”.

Creeks and rivers provide immense benefits, including:

- providing water for critical human needs and economic activity
- providing water and habitat for native flora and fauna
- recharging aquifers and soil moisture
- conveying and attenuating flood flows.

As Adelaide grew and developed, many creeks and rivers were ‘channelised’—straightened, concrete lined or even covered over completely. Most creeks and rivers in the city avoided this fate, but there have still been human impacts. Ongoing threats to creeks and rivers today include:

- vegetation clearance and urban encroachment on riparian zones
- pest plants and animals
- in-stream structures like bridges and culverts
- stormwater-borne pollutants
- erosion
- higher and more frequent flows resulting from urban runoff
- excessive water extraction.

While all natural areas are important, riparian zones (see box below ▼) often feature a rich concentration of biodiversity that is disproportionate to their overall size. The city is fortunate that most of its creeks and rivers, as well as their riparian zones, are in public ownership. This greatly facilitates their ongoing management and opportunities to restore and enhance their natural character. Many councils, even in neighbouring local government areas, do not enjoy

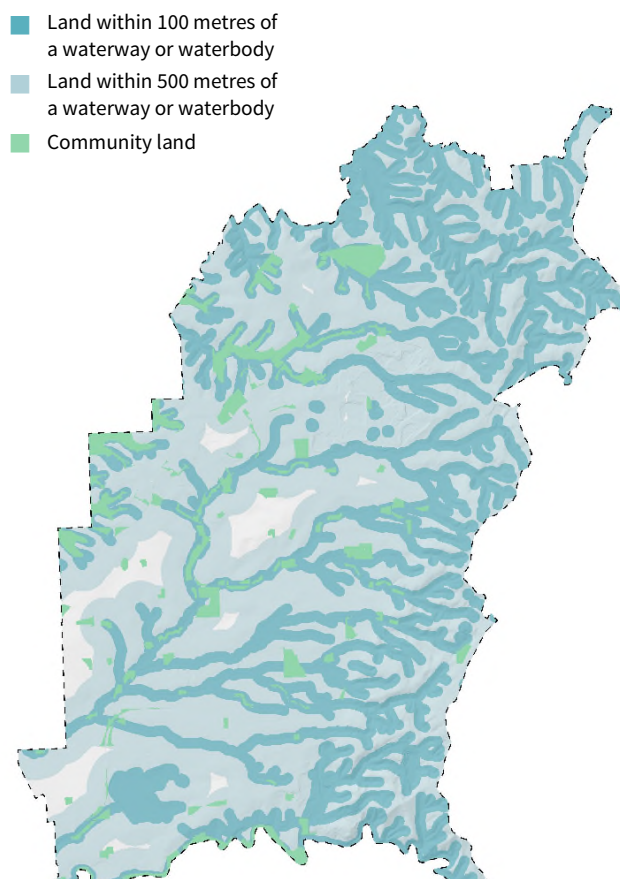


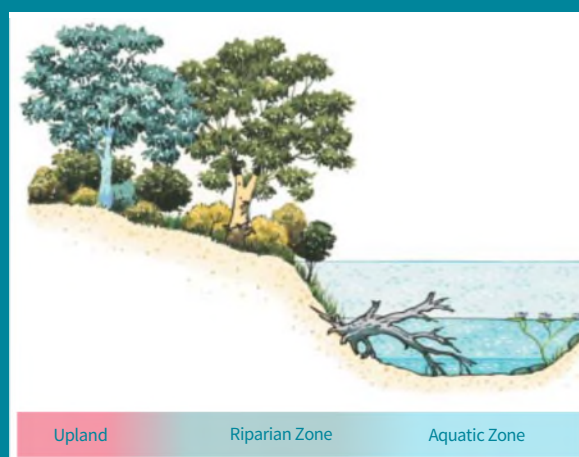
Figure 11: Creeks and rivers are a prominent part of the geography of the City of Tea Tree Gully, with most residents living close to a local waterway or waterbody.

The riparian zone

The ‘riparian zone’ is an area of transition between the wet, aquatic zone of a waterway or waterbody and the dry upland area. In this transition area, vegetation changes from species adapted to wetter sites near the channel to species adapted to drier sites in the upland, with a mixture of both species occurring. This makes riparian zones exceptionally biodiverse.

A healthy riparian zone plays a crucial role in enhancing water quality. Riparian zone vegetation is adapted to absorbing nutrients in surface runoff, preventing them from polluting streams and groundwater.

Stream riparian zones are also implicated in reduced flood hazard. Healthy riparian vegetation intercepts and retards water as it moves from adjacent land into creeks and rivers following heavy rainfall, slowing otherwise fast and rapid ‘flash flood’ flows.



Adapted from Lovett S & Price P (eds) 2007, Principles for riparian lands management. Original illustration by Paul Lennon.

this advantage as creeks are in private ownership or have been built over. Our efforts will protect and capitalise on this legacy by maintaining healthy creeks and rivers for the many benefits that they provide.

How we will maintain living creeks and rivers

Outcome	Key Directions
2 Healthy biodiversity in our creek and river corridors provides clean water, amenity and recreational opportunities.	2.1 Recognise, protect and restore the biodiversity, amenity and water supply value of healthy riparian corridors. 2.2 Manage and mitigate the impacts of vegetation clearance, pest plants and animals, stormwater runoff and soil erosion on watercourses, waterbodies and riparian corridors. 2.3 Apply nature-based stormwater management solutions in preference to hard infrastructure where possible. 2.4 Develop and maintain staff capacity and capability in best practice urban watercourse management. 2.5 Help volunteers, community groups and private citizens to contribute to living creeks and rivers through their actions in the community and on private property.



Our creek and river corridors provide the foundation for a network of parks, reserves and recreational trails and support much of the remnant native vegetation in the city.

Multi-objective Stormwater Management

There are many challenges managing stormwater in a complex urban environment and compromises are required. Multi-objective stormwater management is about finding solutions to stormwater problems that optimise a range of outcomes, such as those listed in Table 2. This often means making choices and trade-offs between sometimes-competing objectives.

In a dry state like South Australia, it is hard to imagine that rainfall could be viewed as anything but a resource. Nevertheless, the view of stormwater until recent times was that of a nuisance that needed to be disposed of.

The view of stormwater runoff as a burden began to change around the 1990s. The passage of the *Environment Protection Act 1993* marked a shift in community attitudes towards the environment (that had been building for some time) with an expectation that environmental harm be avoided or minimised. Today, stormwater is recognised as a valuable water resource, but our infrastructure and some of our practices still hold us back from realising the full benefits that multi-objective stormwater management can provide.

Despite the shift in community attitudes, stormwater remains one of the few growing sources of water pollution in developed countries. This can be attributed to:

- continued urban growth and densification
- increasing motor vehicle use
- foregone opportunities to adopt ‘greener’ infrastructure when expansions and renewals are taking place
- ‘new’ and emerging contaminants, such as microplastics and PFAS (see box right ►).

Tackling stormwater pollution is challenging because it originates from numerous sources. Indeed, experiences from Australia and around the world demonstrate that there has been great success in addressing ‘point’ water pollution sources, such as discharges to the sea from wastewater treatment plants, but there has been much slower progress in addressing diffuse (spread out) stormwater pollution. In this context, efforts to reduce stormwater pollution must be increased.

Achieving the stormwater management outcomes listed in Table 2 requires taking a whole-of-catchment management approach. This approach is not particularly well-supported by current institutional arrangements and jurisdictional demarcation, particularly where creeks and rivers cross multiple local government boundaries. Nevertheless, it would be simplistic to blame institutional arrangements entirely for a lack of coordination. Stormwater management plans (SMPs) are one way local governments can collaborate to achieve catchment-wide stormwater management outcomes. Stormwater management plans being developed for Dry Creek and the River Torrens catchment north-east of the main channel will be an essential step in identifying where Council can best direct its efforts.

Table 2: Desirable stormwater management outcomes.

Environmental	• More natural flow regimes in creeks and rivers. • Less water pollution.
Emergency management	• Fewer flood threats and impacts.
Socio-economic	• Stormwater is used to create and enhance ‘green spaces’ and ‘blue spaces’. • Costs are proportionate to community benefits.
Water security	• Stormwater is accessible as a water resource. • Stormwater displaces higher value water sources (drinking water) where it is fit-for-purpose.

What’s in stormwater?

Stormwater begins life relatively free from pollutants. Rainfall contains small amounts of dissolved atmospheric gases (like oxygen and carbon dioxide) and airborne particles. As stormwater flows across the ground and through drains, it collects pollutants that become dissolved or suspended. Common stormwater pollutants include:

- sediment from the erosion of soil
- oil, grease and rubber from vehicles
- nitrogen, phosphorus and other ‘nutrients’ from organic matter, fertilisers and detergents
- metals such as lead, zinc, copper and chromium from industrial processes, vehicle parts and building surfaces
- litter, including a prevalence of plastic items.

Stormwater pollutants have a significant impact on the health of our creeks, rivers, beaches, and coasts. Plastics break down into progressively smaller particles (‘microplastics’) and leech chemicals like bisphenols and per- and poly-fluoroalkyl substances (PFAS). Toxins poison fish, animals, insects and plants that live in and rely on waterways and water bodies. Nutrients can become present in such quantities that they cause excessive growth of unwanted plants or algae, which outcompete other species and reduce oxygen levels in water, sparking a chain reaction of die-offs.

How we will deliver multi-objective stormwater management

Outcome	Key Directions
3 Our community is safe in flood events, our natural environment thrives, and stormwater is a valuable resource.	3.1 Manage stormwater holistically by considering flood hazard, stormwater quality and opportunities to use stormwater as a beneficial resource. 3.2 Share contemporary flood hazard information with relevant authorities so that it can underpin planning and development decisions. 3.3 Adopt water sensitive urban design (WSUD) and biodiversity sensitive urban design (BSUD) principles in city development. 3.4 Encourage and support innovative and emerging approaches to flood risk reduction. 3.5 Collaborate with stakeholders (including other local governments and state government agencies) on whole-of-catchment initiatives and regional initiatives.



The Kingfisher Wetlands on Dry Creek are an example of multi-objective stormwater management, providing stormwater detention, water quality improvement, biodiversity enhancement, public space amenity and a water source for irrigation.

March 2026

For more information contact
the City of Tea Tree Gully at
customerservice@cttg.sa.gov.au
or 8397 7444



CITY OF
TEA TREE GULLY
Naturally Better