Annual Water Security Update 2024

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Introduction

Water security means having an acceptable quantity and quality of water for people, industry and agriculture, and the environment now and into the future. A comprehensive understanding of our current water security status and risks is needed to enable South Australia to continue to adapt and plan for water security challenges, including with respect to a changing climate. In this context, the *Water Industry Act 2012* requires that a water security update report be prepared by 31 March each year that relates to the state water demand and supply statement, the *Water Security Statement 2022 – Water for Sustainable Growth* (DEW 2022a). This report, the *Annual Water Security Update 2024*, is intended to meet this statutory reporting requirement and includes:

- information on urban Adelaide's current water security
- a snapshot of water security by region
- detail on how current and future water security risks are being addressed.

Future climate projections and observed longer term trends in temperature and rainfall indicate an increasing likelihood of hotter and drier conditions (DEW 2022b), as well as more frequent extreme weather events of the type South Australia has been experiencing. Population growth, increased demands for greening and cooling, environmental water requirements and increases in agricultural and industrial production are also expected to place further demands on South Australia's water resources. The changing climate and increasing demand for water will require South Australia to continue adapting to ensure the majority of the state's population continues to have high levels of water security over the decades to come. This will require sustainable and adaptive water resource management, an innovative and competitive water industry, strong collaboration between the water industry and research organisations, fit-for-purpose investment in water infrastructure and technologies, and more integrated urban water management that optimises the use of all available water sources.

The *Annual Water Security Update 2024* reports on the full range of water sources used across South Australia, which include:

- River Murray water distributed via pipeline to various regions of the state (Figure 2)
- groundwater resources
- surface water resources of the Mount Lofty Ranges, Limestone Coast, and Barossa Valley
- recycled wastewater
- desalinated seawater
- captured stormwater
- rainwater tanks.

The range of water demand categories considered include:

- public water supply
- primary production
- industrial water requirements
- cultural water
- environmental water requirements
- urban greening and cooling.

Where did South Australia source its water in 2022-23?

South Australia has a wide range of water sources that are used to supply water, including surface water, groundwater, desalinated water, stormwater and recycled water. A water licensing system allows an individual or business to own water entitlements, which provide a share of the available water resource in the form of a water allocation volume. Water entitlement or allocation volumes may be traded, allowing water to move to where it can be used most productively.

Figure 1 shows the volume of water in gigalitres (GL) that was used from prescribed surface water and groundwater resources in 2022-23, as well as the water use from recycled sources and desalination. Relatively small additional volumes are also used from groundwater sources in non-prescribed areas and via direct rainfall capture using rainwater tanks.

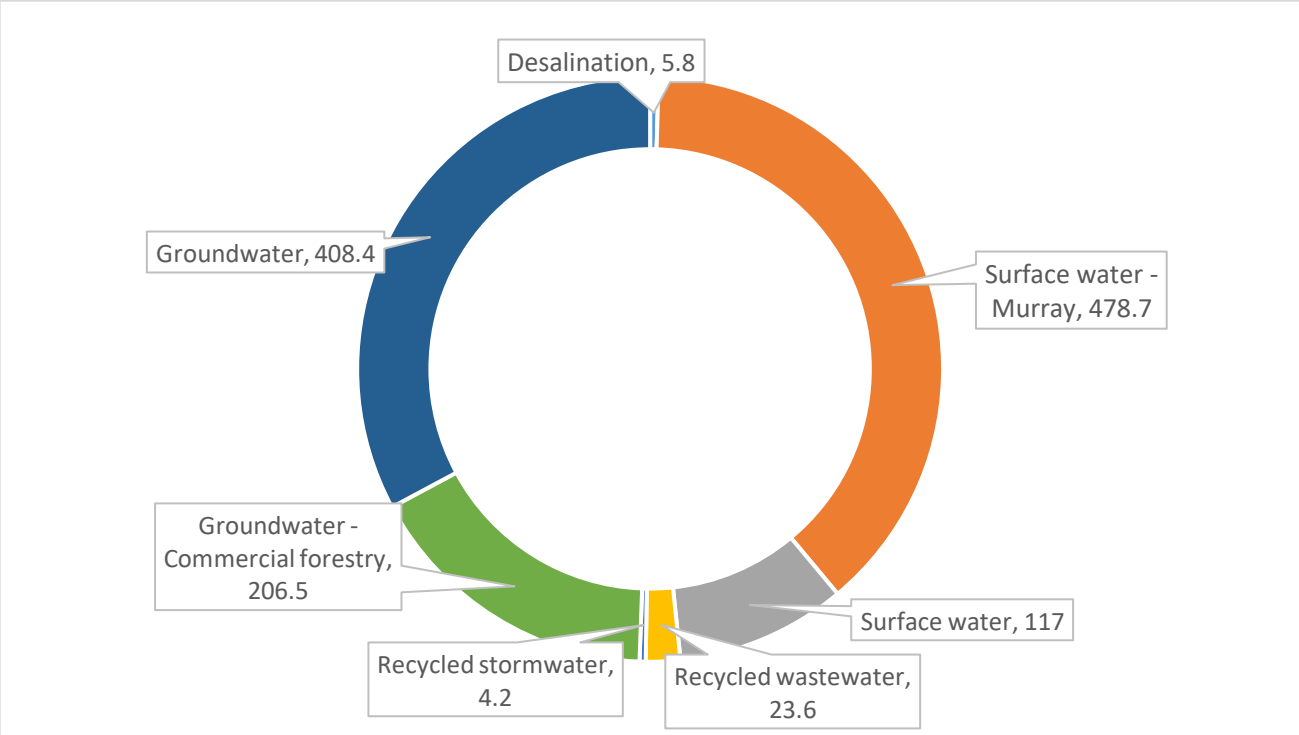


Figure 1. Average annual volume of water used (GL) in South Australia by resource type (2022-23)[1,2]

Groundwater

Groundwater is an important resource across large areas of South Australia. In 2022-23, 614.9 GL was used for irrigated agriculture, forestry, domestic supply, stock, mining, industrial applications, town drinking water supplies and irrigation of recreation and sports grounds. This volume is 15% lower than the 2016-17 to 2021-22 average annual volume (726 GL) resulting from a period of higher than average rainfall, which has reduced demand on groundwater resources.

Surface water

Surface water is, by volume, the next most significant resource. Due to our dry climate, South Australia's surface water systems are mainly ephemeral, flowing in response to rainfall events. The exception is the River Murray, which is a regulated system with water delivered from 4 major storage dams. River Murray water is transported via pipeline to many locations within South Australia. Figure *2* shows the major pipelines that distribute River Murray water. In 2022-23, 478.7 GL was used

[1] Forestry water use is measured each calendar year as opposed to each water use year. In this figure, 2022 forest water use data has been used to represent the 2022-23 water use year, as 2023 forest water use data was not available at the time this report was published.

[2] Recycled stormwater includes the volume of stormwater extracted in managed aquifer recharge (MAR) schemes.

for consumptive purposes from the River Murray (lower than the 2016-17 to 2021-22 average of 571 GL), while 117 GL was used from all other prescribed surface waters (higher than the 2016-17 to 2021-22 average of 77 GL).

Recycled water

In 2022-23, 27.8 GL of water was recycled and used in South Australia. This includes capture and re-use of stormwater and re-use of wastewater. On average over the last 5 years, 31 GL of recycled wastewater per year has been re-used in South Australia, from 105 GL of wastewater. The average use of recycled stormwater over the same 5-year period is 4 GL per year.

Desalinated water

In 2022-23, 5.8 GL of desalinated water was produced by plants operated by SA Water. The Adelaide Desalination Plant, commissioned by the Government of South Australia in December 2007 to safeguard South Australia's water security, is the state's largest desalination plant and produced 5.4 GL in 2022-23[3]. A further 0.4 GL was produced by plants servicing regional communities located at Penneshaw, Oodnadatta, Marla, Leigh Creek, Hawker, Indulkana, Kaltjiti (Fregon), Yunyarinyi (Kenmore Park), Murputja and Mimili and Yalata. Desalination plants owned and operated by local councils and private individuals also contribute to the volume of desalinated water used in South Australia.

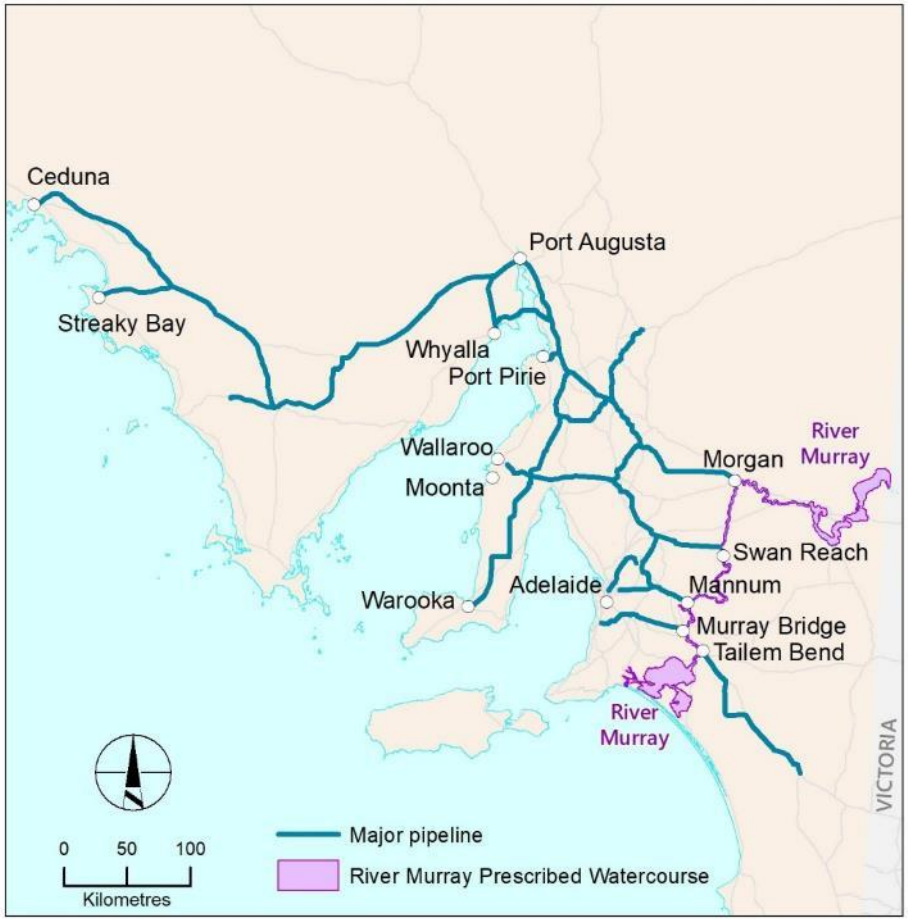


Figure 2. Major pipelines that distribute River Murray water

[3] The Adelaide Desalination Plant has produced greater than 200 GL since its introduction to the water supply system in 2012 and has a maximum production capacity of 100 GL per year. It provides a baseload capacity to the drinking water system, and the ability to scale up production quickly when dry conditions occur. This climate-independent water source is particularly crucial during periods of low inflows into the Western Mount Lofty Ranges catchment and restricted water availability in the River Murray.

Strategic water security directions and initiatives

Statewide directions and initiatives

First Nations' water interests

The Government of South Australia acknowledges that water management since colonisation has historically excluded First Nations and occurred without their proper recognition, consultation or authorisation. This history of exclusion continues to affect the wellbeing of First Nations peoples and their ability to care for Country. The volume of water held by First Nations groups remains extremely low across South Australia.

Native title holders/claimants have statutory authorisation to use prescribed water resources for cultural and spiritual purposes. At the regional level, the 9 landscape boards and DEW work closely with First Nations on statutory water allocation plans (WAPs). This has led to dedicated cultural water consumptive pools for the Far North and Adelaide Plains WAPs, as well as a stronger articulation of cultural objectives for updated WAPs and environmental watering. In Greater Adelaide, SA Water, DEW and landscape boards have also come together with Kaurna, Ngadjuri, Peramangk, and Ngarrindjeri in a series of roundtables to discuss long-term water interests and the approach to future partnership through the Resilient Water Futures project.

Cultural water for First Nations peoples needs to include economic and social models of allocation and ownership. This approach is consistent with commitments under the National Agreement on Closing the Gap and South Australia's commitment to the Uluru Statement from the Heart: Voice, Treaty, Truth.

Building on insights from previous state water planning processes and other specialist advice, the Government of South Australia will work with First Nations and peak bodies on improving water planning processes and outcomes within South Australia and co-designing an overall state policy for advancing First Nations' water interests. This will address water-related commitments under the National Agreement for Closing the Gap, as well as the Murray–Darling Basin Royal Commission findings and recommendations.

Implementing the recommendations of the South Australian 2019 Water Industry Act review

The *Water Industry Act 2012 (WIA)* regulates the water industry and provides consumer protections. A review of the WIA in 2020 recommended amendments to improve the operation of the WIA. Recommendations included:

- reducing red tape, including to encourage the use of alternative (recycled) water sources
- improving consumer protections to ensure affordable water supplies for residential tenants and persons experiencing hardship
- reviewing policy to support competition between providers of drinking water and/or sewerage services.

To reduce red tape, DEW is working with other regulators and stakeholders on a number of potential exemptions from some or all WIA requirements for low-risk activities. If approved, these exemptions would support diversification of water supplies and complement the directions in the Urban Water Directions Statement related to efficient water regulation.[4]

DEW and Essential Services Commission of South Australia are continuing to examine how affordable access to drinking water could be improved for tenants through access to hardship policies (e.g. payment plans) and dispute resolution processes. Potential legislative amendments are now being developed to deliver improved outcomes for tenants.

[4] The Urban Water Directions Statement was developed by the Department for Environment and Water (DEW) in 2022 to provide a roadmap for delivering the integrated management of water, wastewater and stormwater in South Australia's towns and cities. A more integrated approach to urban water management promises to deliver a broad suite of benefits, such as improved water security, amenity, cultural, liveability, public health and environmental outcomes.

Ensuring continuity of supply is critical to providing a secure water supply to customers. DEW is developing a process to ensure that services are maintained in the event that a water industry service provider (drinking water and/or sewerage services) exits the industry.

To ensure a level playing field across water industry service providers, DEW is also working on options for a potential new concessions scheme to promote the objectives of the WIA.

Transition to more climate-resilient water supplies

As communities continue to grow and develop, there will be increasing demands on existing water systems. Climate-resilient[5] water sources can support growth and liveability and slow storage depletion rates, thus reducing the risk of extremely low storage levels during drought. SA Water is developing new climate-resilient desalination plants and associated distribution infrastructure on Kangaroo Island, the Eyre Peninsula and in the northern town of Marree. It has also recently completed groundwater desalination projects in Oodnadatta and Marla.

To enhance water security on Kangaroo Island, an additional seawater desalination plant is being built near Penneshaw to supplement the existing Penneshaw facility and Middle River Reservoir. The construction of a major pipeline component is currently underway. A new 50 km water main will connect the new plant to the Middle River–Kingscote network for delivery of safe, clean drinking water to 4 Kangaroo Island communities by mid-2024.

On Eyre Peninsula, SA Water is working with the community as it progresses plans for a new climate-resilient seawater desalination plant to supplement existing groundwater sources to ensure water security for the region. Billy Lights Point has been identified as the preferred location for the 5.3 GL per annum desalination plant after a comprehensive site selection process considered more than 15 potential locations. This decision was informed by technical investigations; feedback from the Marine Science Review Panel; insights gained from extensive community, industry and government consultation; and assessment of the cost of construction and operation. The findings from scientific investigations and assessments will inform how the desalination plant is designed, including the position of the intake and outfall pipes. Alongside other approvals, a development application for the plant at Billy Lights Point will be lodged with the State Planning Commission, which will be assessed by multiple agencies and regulators through a comprehensive approval process. Once operational, the desalination plant will be able to produce 16 megalitres (ML) of safe, clean drinking water per day.

The Northern Water Supply Project is assessing the viability of building a desalination plant and pipelines to meet the increasing demand for water by mining and emerging green energy industries in the Upper Spencer Gulf region (Government of South Australia 2023). The desalination plant would be constructed in 2 stages – each providing a capacity of 130 ML per day – to a total capacity of 260 ML per day. This provides maximum flexibility to meet fluctuating demand over time and can be scaled up as demand increases.

The business case for the project has been completed and further development of the project is underway in the lead-up to a final decision on whether to progress with construction of the project in late 2025. Cape Hardy has been selected as the preferred location for the Northern Water Supply Project following a multi-criteria analysis of 4 shortlisted desalination plant location sites. Other recent project developments include:

- the commencement of the Design Build Operate and Maintain procurement processes
- commencement of environmental approvals
- initial land access discussions
- ongoing community and stakeholder consultation.

The Government of South Australia has also committed $593 million to building a world-leading green hydrogen power station, electrolyser and storage facility near Whyalla by 2025. Should a desalination plant be constructed in the Upper Spencer Gulf region, the Northern Water Supply desalinisation plant may, in the future, supply water to the green hydrogen power station.

Projects have been completed to upgrade the existing non-drinking water supply to the regional towns of Oodnadatta and Marla to drinking water quality. This involves the installation of new reverse osmosis desalination facilities to treat groundwater to a drinking standard. The existing water networks in these towns are among 19 non-drinking water supplies across South Australia where water is currently only provided for irrigation, livestock, laundry, bathing and flushing toilets. In mid-2023, SA Water delivered water from the new small-scale reverse osmosis desalination plant at Oodnadatta, which

[5] Climate-resilient water supplies are not affected by variations in rainfall and are therefore more resilient to a drying climate.

can produce up to 210,000 litres of clean and safe drinking water for local customers each day. In February 2024, water was also provided from the Marla desalination plant, providing up to 87,000 litres of safe, clean drinking water each day.

SA Water is also currently undertaking the construction of a desalination plant at Marree, expected to supply 126,000 litres per day. It is due for completion by mid-2024.

These new facilities will join the existing network of 9 reverse osmosis desalination plants across regional and remote South Australia that turn groundwater into a reliable supply of safe, clean drinking water.

SA Water Regulatory Business Proposal for 2024 to 2028

This year's water security update coincides with the finalisation of SA Water's Regulatory Business Proposal for the 2024 to 2028 regulatory period. Every 4 years, SA Water must submit its investment proposal to the independent regulator, the Essential Services Commission of South Australia. The proposed investment for 2024-28 focuses on maintaining services to current customers and meeting legislated responsibilities, with support for growth projects and investigations of new water sources to ensure a secure and resilient water future.

Preparing for drought

The Australian Government has a Drought Response, Resilience and Preparedness Plan. A part of this is a $5-billion Future Drought Fund that provides funding to help Australian farmers and communities become more prepared for, and resilient to, the impacts of drought.

The Department of Primary Industries and Regions, South Australia (PIRSA) is coordinating the delivery of 2 Future Drought Fund programs in South Australia, as follows:

- Regional Drought Resilience Planning program
- Farm Business Resilience program.

These 2 programs are jointly funded through the Australian Government's Future Drought Fund ($100 million per annum) and the Government of South Australia.

Regional Drought Resilience Planning Program

The Regional Drought Resilience Planning Program supports regionally based partnerships to develop regional drought resilience plans. These plans will identify and guide innovative ways to build resilience to future droughts with a focus on agriculture and allied industries. The development and implementation of regional plans will be led by the community with the support of the Government of South Australia. Partnerships are made up of regional organisations, local government, communities and industry groups, with plans to be developed through a co-design process.

Regional partnerships conducted planning processes during 2022 to develop drought resilience plans for the Murraylands and Riverland and Northern and Yorke Landscape Board regions. Regional drought resilience planning will commence soon in the Far North and outback.

Farm Business Resilience Program

The Farm Business Resilience Program aims to better prepare Australian farmers to manage risks relating to drought and improve their resilience. In partnership with the Wine Grape Council of South Australia, Livestock SA, AUSVEG SA and SA Dairyfarmers, farmers, farm managers and employees in the South Australian livestock, wine grape, grains, dairy and vegetable sectors will be able to access industry-led training in:

- strategic business skills
- risk management
- natural resource management
- personal and social resilience (for example, succession planning).

Other initiatives contributing to drought resilience in South Australia include the On-farm Emergency Water Infrastructure Rebate Scheme Round 4 and the One Basin Cooperative Research Centre (One Basin CRC).

On-farm Emergency Water Infrastructure Rebate Scheme – Round 4

This initiative supports primary producers to improve resilience to drought and recover from natural disasters with eligible costs associated with the purchase and installation of on-farm water infrastructure for livestock and permanent horticulture. The state and Australian governments are providing a co-funded rebate up to 25% to a maximum of $25,000.

One Basin CRC

On 19 May 2022, the Australian Government announced that the One Basin CRC was successful in its application for a $50-million grant through the Commonwealth Cooperative Research Centres Program. Together with funds from 85 partners, it will:

- deliver the capacity for communities, government and industries to respond to emerging climate, water and related changes in business and planning decisions
- develop engineering and digital water infrastructure solutions that contribute to a resilient Basin.

The Government of South Australia is a partner in the One Basin CRC, with the South Australian regional node located at Loxton.

Regional directions and initiatives

Greater Adelaide

Resilient Water Futures

Greater Adelaide will face growing challenges over the next 50 years as demand for water increases and the drying climate continues to deplete available water resources. Water systems and supporting governance arrangements need to be robust in the face of challenges such as a growing population, urban expansion, technological advancement and climate change.

The current combination of surface water sourced from the River Murray and Mount Lofty Ranges (rainfall-dependent supplies) and desalination may not be sufficient to meet Adelaide's need for a secure and resilient water supply over the longer-term.

In this context, the Government of South Australia made an election commitment to "create an urban water security plan that ensures governance structures are addressed to enable government, councils and other agencies and authorities to deliver true integrated water management and stop treating recycled, stormwater and mains water in isolation".

A key first step in addressing this commitment has been the creation of a draft Resilient Water Futures strategy – a 50-year urban water strategy for Greater Adelaide. Resilient Water Futures is being led by SA Water, together with DEW, the Environmental Protection Authority (EPA), Local Government Association of South Australia (LGA), Green Adelaide and Planning and Land Use Services as key members of a strategic advisory committee. This work on Resilient Water Futures also aligns with directions being pursued by DEW under the Urban Water Directions Statement.

Water for urban greening

Green Adelaide is leading the creation of the first Urban Greening Strategy for metropolitan Adelaide, which will bring together different sectors, knowledge and resources to accelerate the greening of our streets, open spaces and backyards. The strategy will focus on increasing tree canopy cover, reducing hard surfaces, meeting the urban green cover target of the 30-Year Plan for Greater Adelaide and prioritising areas that are the most vulnerable to heat.

This Urban Greening Strategy will help deliver the Government of South Australia's commitment to increase greening in our neighbourhoods, improve urban biodiversity and address the loss of mature trees. Green Adelaide will collaborate and partner with all sectors who deliver, champion or influence urban greening outcomes, including other state government agencies, local government, industry peak bodies, research institutions, non-government organisations and Kaurna Miyurna (people).

Work is continuing on the Greening Port Pirie program, with support from the Port Pirie Regional Council, DEW, SA Water and the Targeted Lead Abatement Program. The program includes several projects to deliver increased greening and water-sensitive urban design in Port Pirie to support dust suppression (for management of lead pollution) and deliver a greener, cooler environment.

Climate change and adaptive management

In line with the priorities identified in the 2022 Water Security Statement, the Government of South Australia is investing in projects to better understand the water security risk in a changing climate and improved climate resilience. Knowledge of the most at-risk resources will assist the Government of South Australia to prioritise the delivery of regional water security strategies. This has led to improved climate and water availability predictions for Barossa and McLaren Vale regions.

Eleven WAPs are also currently in development, under review or being amended (Appendix A). DEW is actively engaging with landscape boards to ensure that next generation WAPs include adaptive management approaches that facilitate effective and sustainable water resource management in a changing climate.

River Murray – Basin Plan implementation

Climate projections predict that there may be significant drying in the Southern Murray-Darling Basin by mid-century. There will be reductions in stream flows with more frequent droughts, increased temperatures and evaporation and below-average rainfall. An increased vulnerability to flooding is also forecast in coming decades due to changes in the occurrence of extreme rainfall events in some parts of the Basin.

The drying climate outlook reinforces the importance of the Government of South Australia's commitment to securing the full range of water recovery and environmental objectives required under the Basin Plan 2012. In 2012 Basin states signed up to the Basin Plan – a package deal to deliver environmental outcomes equivalent to a reduction in consumptive use of 3,200 GL of water through a combination of water recovery and the Sustainable Diversion Limit Adjustment Mechanism. This included the recovery of 450 GL of water to provide for enhanced environmental outcomes in the southern end of the system.

The primary purpose of the 450 GL is to achieve enhanced in-stream outcomes and increase connectivity between the main river channel and the floodplains in New South Wales, Victoria and South Australia, boosting the amount of time flow rates for the Basin's critical environmental assets can be delivered. The recovery of this 450 GL remains vital for mitigating the impacts seen during the Millennium Drought and improving local area resilience, particularly at the lower end of the system.

In late 2023, the Australian Government enacted the *Water Amendment (Restoring our Rivers) Act 2023*, which extends timeframes to deliver the Basin Plan in full. It includes additional mechanisms to deliver the 450 GL of water for the environment and increased accountability and transparency measures for governments to be held to account in their delivery of the Basin Plan.

Remote communities

South Australia is committed to playing its part in national Closing the Gap efforts. Water security of remote communities is a critical element of Closing the Gap Target 87A:

> *Community infrastructure: The community infrastructure target will measure progress towards parity in infrastructure, essential services, and environmental health and conditions. This will include data development to measure essential service provision to Aboriginal and Torres Strait Islander communities, including water and sewerage, waste management, road reserves and electricity supply, as well composite measures to capture all aspects of the target.* (Commonwealth of Australia n.d.)

SA Water manages and supplies safe drinking water and wastewater systems to 22 South Australian First Nations communities. Of these, 18 are in remote areas and 4 are in regional areas. SA Water supplies over one million litres of water each day to a mobile population base of over 2,500 people and also works with local communities to identify wastewater reuse opportunities.

Recent and current SA Water Remote Communities initiatives include investigative bore drilling at Indulkana (Iwantja) community in the Aṉangu Pitjantjatjara Yankunytjatjara (APY) Lands, smart metering upgrades across groundwater supplied networks, and wastewater system upgrades to Amata, Pukatja and Mimili in the APY Lands and Yalata on the West Coast.

SA Water has initiated the creation of a new 2-way science curriculum for use in First Nations schools with the most recent consultation occurring in September 2023. In addition, a restart of SA Water's basic plumbing training course is scheduled for the beginning of the 2024-25 financial year. This course will be run in communities in the APY Lands and seeks to provide a suite of skills for the repair of basic plumbing issues. It is hoped that this program will foster enhanced local capacity to resolve simple domestic water supply issues and community awareness of water industry career paths available to people in these communities.

In other regional and remote communities, upgrades to existing water supply systems are planned for the railway towns of Terowie, Yunta and Manna Hill to improve and maintain the water quality throughout each town network. Works include building a new chlorination top-up system at Peterborough, upgrading and replacing elevated water storages and installing new decontamination systems in Terowie, Yunta and Manna Hill. Kaltiji (Fregon) in the APY Lands and Yalata community on the West Coast of South Australia both received upgrades to their reverse osmosis water treatment plants during the 2021-22 financial year.

In addition to the SA Water activities, DEW has completed a project to improve knowledge of remote community water supplies, needs and risks. The project focuses on a further 19 remote self-supplied communities. These include communities outside of council areas and remote Aboriginal communities both in and outside council areas. The Stocktake and Water Security Assessment for Self-Supplied Remote Communities project assessed water requirements and available water sources for relevant communities and evaluated the risk of water insecurity over a 10-year period. This project has provided a better understanding of the complex water supply arrangements and challenges faced by self-supplied remote communities and produced a number of recommendations to improve the security of water supply in each community. This work identified that 7 self-supplied remote communities (Iga Warta, Leigh Creek Station, Kakalpurannha, Yappala, Scotdesco, Kingoonya and Innamincka) are at high risk of water insecurity within the next 10 years, either in relation to potable and/or non-potable water supply for one or more of the following risk factors: source water availability, water quality, infrastructure failure or changing demand. The assessment is being used to prioritise on-ground works to improve water security in remote communities.

Several projects were funded in 2023, including a water solution for Scotdesco and further groundwater quality assessment for self-supplied remote communities. The Scotdesco project received Australian Government funding of $500,000 over 2 years to deliver improved water security. DEW has been working with the community on a scoping study to identify works to improve water security and is currently tendering for the infrastructure upgrades required. For the self-supplied remote community's groundwater quality assessment project, DEW (with Flinders University) has received funding from the National Water Grid Authority (NWGA) science program to investigate the groundwater resources that underpin the water supply in high-risk communities. The investigation will consider the age of the groundwater, its ongoing ability to meet demand and any water quality issues that may need addressing in the future.

In December 2023, DEW and the Department for Infrastructure and Transport were successful in securing funding from the NWGA First Nations program for infrastructure to improve the non-potable water supply in Iga Warta.

Following on from the stocktake assessment, and based on ongoing SA Water project planning, DEW and SA Water are developing a number of proposals to address water security risks for communities at 'high' risk of water insecurity.

Updating of the State Water Demand and Supply Statement

Section 6 of the *Water Industry Act 2012* requires the Government of South Australia to prepare and maintain a State Water Demand and Supply Statement, and to comprehensively review the statement every 5 years. In 2022, DEW published the 'Water Security Statement 2022' to meet this requirement. A range of state government initiatives currently in progress, including those outlined above, will affect the scope and content of the forthcoming statutory comprehensive review of the statement. In view of this, DEW is planning to build on the knowledge gained from these initiatives to inform a statutory stakeholder consultation later in 2024 and to develop a revised water security statement by the end of 2025.

Adelaide's water security

Adelaide's water use in 2022-23

In 2022-23, metropolitan Adelaide used 149 GL of drinking water, which is comparable to the historical range of 145 to 200 GL per year.

The relative quantities of water from the various sources contributing to Adelaide's water balance are illustrated in Figure 3.

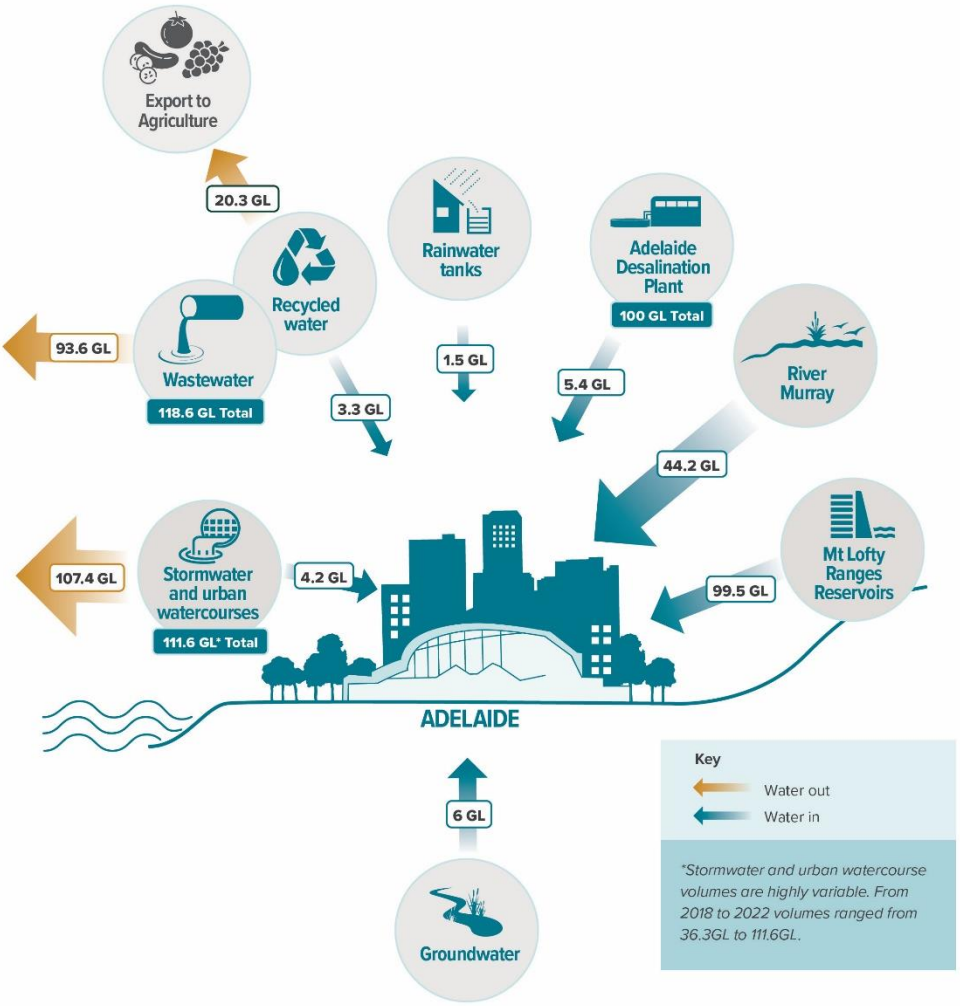


Figure 3. Urban Adelaide's water balance 2022-23

In 2022-23, 44.2 GL of water was sourced from the River Murray, 99.5 GL from Mount Lofty Ranges Reservoirs and 5.4 GL from the Adelaide Desalination Plant to meet urban Adelaide's demand for drinking water. Metropolitan Adelaide's full water balance for 2022-23 is shown in Figure 3. The volume of drinking water supplied to Adelaide by SA Water from its major water sources from 2000-01 to 2022-23 is shown in Figure 4.

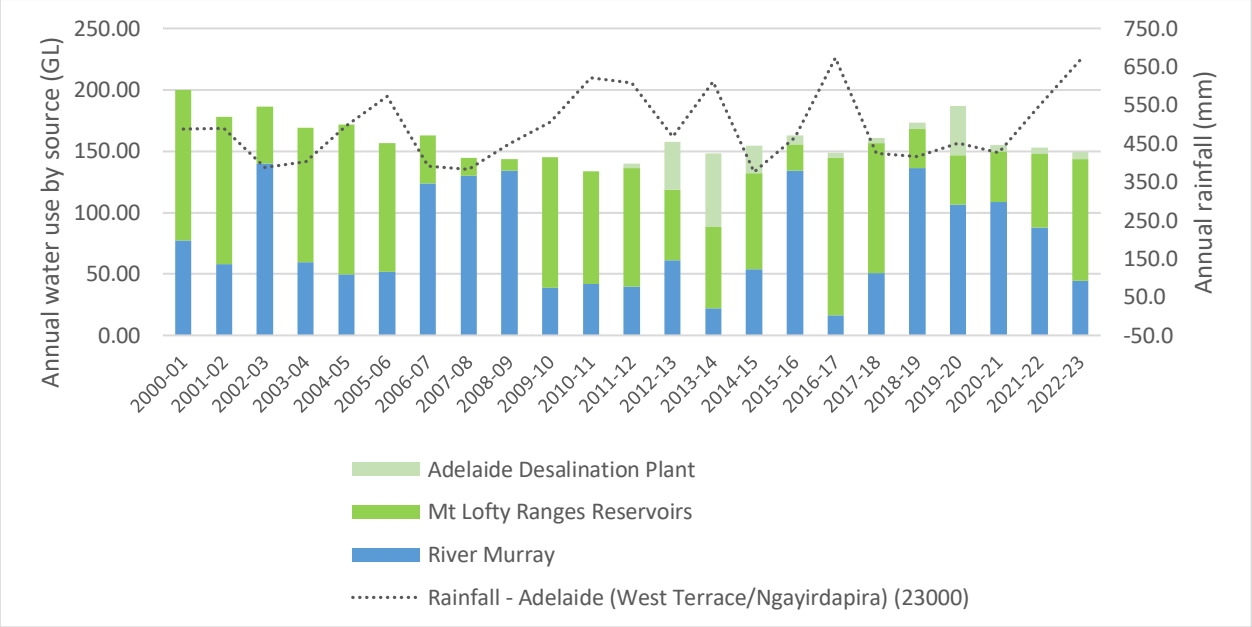


Figure 4. Adelaide's historical use of drinking water by source (SA Water 2023)

Adelaide's water resources

In metropolitan Adelaide, SA Water uses 3 main water sources to supply drinking water, including the Western Mount Lofty Ranges catchment, the River Murray and the Adelaide Desalination Plant. Water from these sources is stored in reservoirs, before being treated to drinking water standard at water treatment plants and supplied to the community via an extensive network of tanks, pipelines and pumps.

A balanced mix of all 3 water sources is required to service demand with the drinking water supply mix varying from year to year. The annual volume of water supplied to urban Adelaide depends on a range of factors including climatic conditions, population growth and patterns of use. Temperature and rainfall influence water use, particularly during summer periods when more water is used to water gardens, parks and sportsgrounds. The same factors also influence inflows to our storages.

The Adelaide Desalination Plant, commissioned by the Government of South Australia during the Millennium Drought to safeguard South Australia's water security, began operation in 2012 and is the state's largest desalination plant. This climate-resilient water source is particularly crucial during periods of low inflows into the Western Mount Lofty Ranges catchment and restricted water availability in the River Murray. Today the Adelaide Desalination Plant is an essential component of the supply system.

With the wet conditions in 2022-23, the percentage that each source contributed to Adelaide's water balance changed slightly compared to the previous 4 years, with a greater contribution from the Mt Lofty Ranges reservoirs and less from the River Murray.

A number of other water suppliers provide non-drinking water across Adelaide for a range of irrigation and industrial uses. A small amount of recycled wastewater was used in urban Adelaide (3.3 GL in 2022-23) with a far greater amount being exported for use in agriculture (20.3 GL in 2022-23). The volume of stormwater that runs off to the sea is highly variable; over the last 5 years the volume has ranged from 33 GL (in 2019) to 107 GL (in 2022).

Summary of Adelaide's water security

In the near term, Adelaide will continue to rely on the River Murray and Mount Lofty Ranges as key sources of water supply. These sources, along with the Adelaide Desalination Plant, ensure Adelaide's water security in the near term.

Moving forward, as a result of a changing climate, it is expected that there will be less water available from climate-dependent water sources such as the Mount Lofty Ranges catchments, the River Murray and some groundwater sources.

Extreme flood events along the River Murray in the 2022-23 summer had significant impact. An increased vulnerability to flooding is also forecast in coming decades as climate change increases storm severity and urban development increases impervious surfaces. Other key risks to consider in long-term planning include higher temperatures and increased frequency of droughts, bushfires and rising sea levels.

Understanding and testing the resilience of water supplies and systems is an essential activity undertaken as part of developing Resilient Water Futures, a 50-year water strategy for Greater Adelaide.

The water demand and supply projections undertaken for the Resilient Water Futures strategy show that under a high population growth, high-end climate impacts scenario, even with full use of the current Adelaide Desalination Plant, there is the possibility of localised water shortfalls by 2032 and overall system shortfall by 2038.

Climate risks and extreme events mean South Australians cannot rely on meeting our water needs by using only traditional water supplies. In this context, our water security and resilience will depend on smarter water use and securing supplies that are climate resilient and of a reliable 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.

Successfully managing these issues over the coming decades will require additional investment in water networks as the population, jobs and housing developments continue to grow.

Regional water security

Overview

Local groundwater and surface water sources provide water for irrigated agriculture, forestry, domestic supply, stock, mining, industrial applications, town drinking water supplies and irrigation of recreational and sports grounds across many parts of the state. Where there is a high demand for local ground and surface water and there is a need to sustainably manage the resource, the resource is prescribed by Regulation under the *Landscape South Australia Act 2019*. Once a resource has been prescribed, the taking and use of water is managed via principles detailed in Water Allocation Plans (see Appendix B for location of prescribed water resources).

Areas where there is a high demand for local ground and/or surface water and there is a need to sustainably manage the resource include:

- Limestone Coast
- Murraylands and Riverland
- Mount Lofty Ranges
- McLaren Vale
- Barossa
- Clare Valley
- Adelaide Plains
- Eyre Peninsula
- Far North

The remainder of this report focuses on the prescribed water resources in these regions with a final section covering non-prescribed areas in other parts of the state.

Groundwater and surface water resources in the Baroota Region are prescribed and a WAP is currently under development in this region. As such, a licensing regime is not currently in place and this region is not reported on in the subsequent sections.

Across the state, the average annual volume of water used from prescribed resources in each region between 2015-16 and 2022-23, including the minimum and maximum volumes used across those years, is provided in Figure 5. The largest amount of water used each year comes from the groundwater of the Limestone Coast (596 GL), followed by the surface water of the River Murray (563 GL) and the ground and surface waters of the Mount Lofty Ranges (95 GL).

In some regions, other water sources (water sources other than the local ground and surface waters) are used. In the sections below, other water is discussed where it represents a significant portion of the total water supply.

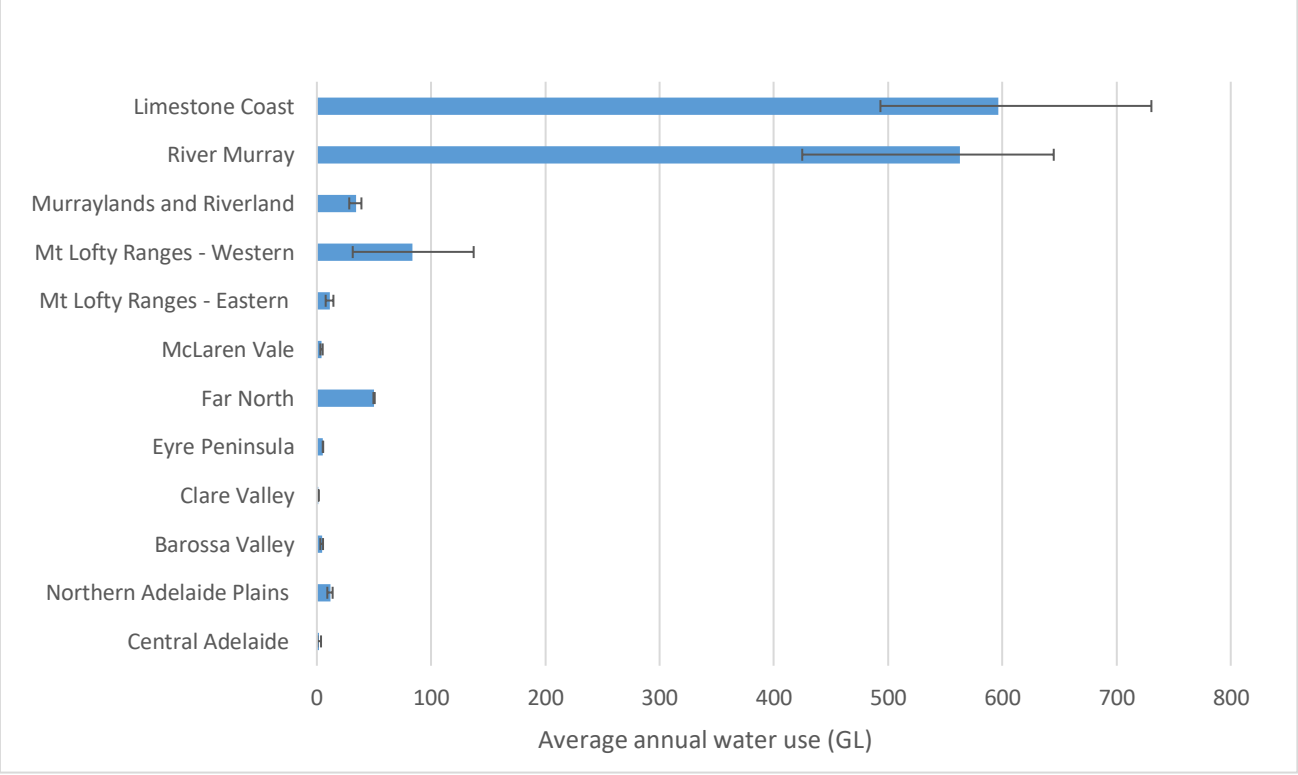


Figure 5. Average annual water use from a prescribed water resource, by region (2015-16 to 2022-23)

For each of the prescribed resources, the annual water use[6], water resource condition indicators, and long-term rainfall trends are presented for each region. The water resource condition indicators presented include 1) 2023 groundwater level compared to historical average levels, 2) long-term groundwater salinity trends, 3) long-term annual streamflow trends, and 4) long-term trends in the number of flow days[7]. In the tables below, stable trends are shown in blue, trends that indicate increased water availability or decreased salinity are shown in green, and trends that indicate declining water availability or increasing salinity are shown in red. The direction of the arrow on the coloured box displays the direction of the trend.

Further information on regional water resources is available in annual water resource assessment reports and supporting documents[8].

The groundwater level status ratings in the tables that follow are based on an analysis of the 2023 groundwater levels relative to the full history of groundwater level monitoring data. The full monitoring records for all wells in an area (or within a particular aquifer) with at least 10 years of data are included in the analysis. Each monitoring well had its highest 2023 water level ranked against its respective history of monitoring, based on the decile descriptions provided in Table 1 (e.g. 'Average' or 'Very much below average). The groundwater level decile of the median ranked well in an area is then used as an indicator of the groundwater level status rating for that area.

Table 1. Percentile/decile descriptions for resource condition

Decile	Percentile	Description*	Colour
N/A	100	Highest on record	
10	90 to 100	Very much above average	
8 and 9	70 to 90	Above average	
4, 5, 6, and 7	30 to 70	Average	
2 and 3	10 to 30	Below average	
1	0 to 10	Very much below average	
N/A	0	Lowest on record	

* Deciles descriptions as defined by the Bureau of Meteorology (BOM 2023)

[6] Unless otherwise stated, the volume of water used is based on metering data reported to DEW. Data was sourced from the State Water Register 21/11/2022.

[7] Trend date ranges are detailed below each water resource trend table.

[8] For further information about the location of the water resource units described in this section or trends reported, please refer to the relevant Water Resource Assessment Report on WaterConnect https://www.waterconnect.sa.gov.au/Systems/GSR/Pages/default.aspx or *Technical information supporting the 2023 surface water (quantity and quality) Environmental Trend and Condition Report Card*, Draft DEW Technical report. Department for Environment and Water, Adelaide (DEW 2023)

Limestone Coast

Water in the Limestone Coast region is almost exclusively extracted from prescribed groundwater resources. Water resources in the Limestone Coast are managed under 5 WAPs:

- Lower Limestone Coast
- Tatiara
- Tintinara–Coonalpyn
- Padthaway
- Morambro Creek.

The location of the prescribed areas, which align with WAPs, can be seen in Figure 6.

Water use

Groundwater use is shown in Figure 7. Total licensed extraction in the Lower Limestone Coast, Tintinara–Coonalpyn, Tatiara and Padthaway prescribed areas was 493 GL in 2022-23. This was a wetter-than average year and the relatively low total groundwater use for the year is commensurate with this. Total use has varied between 493 GL and 731 GL for the period 2015-16 to 2022–23. In general, groundwater use patterns reflect rainfall trends: less groundwater is used in higher rainfall years compared to lower rainfall years. Mt Gambier rainfall data is displayed in Figure 7 to provide an indication of the historical relationship between rainfall and groundwater use.

In comparison to groundwater, a negligible amount of surface water is sourced from Morambro Creek. The Morambro Creek Water Allocation Plan only allows for the taking of water when flows are over a specified threshold. The volume of 0.64 GL was taken in the period from 2015-16 to 2022-23. Water was taken in 5 of the 8 years, with the greatest volume of water taken in the 'wet' year of 2016-17.

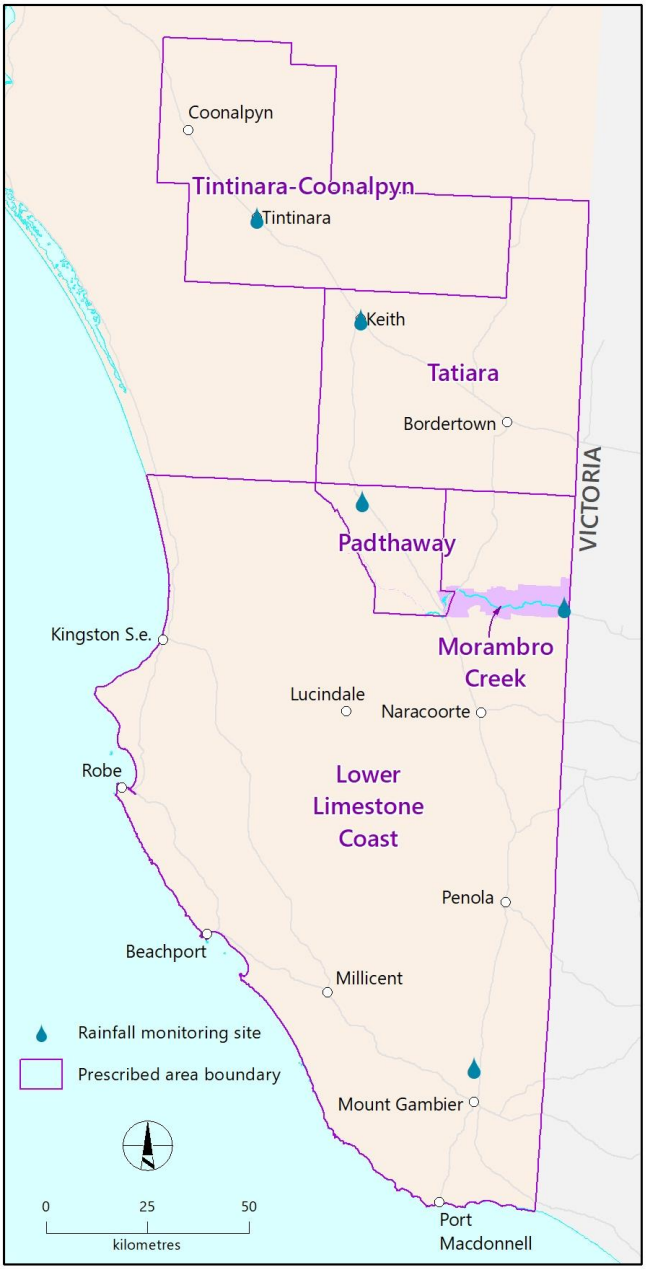


Figure 6. Map of Limestone Coast

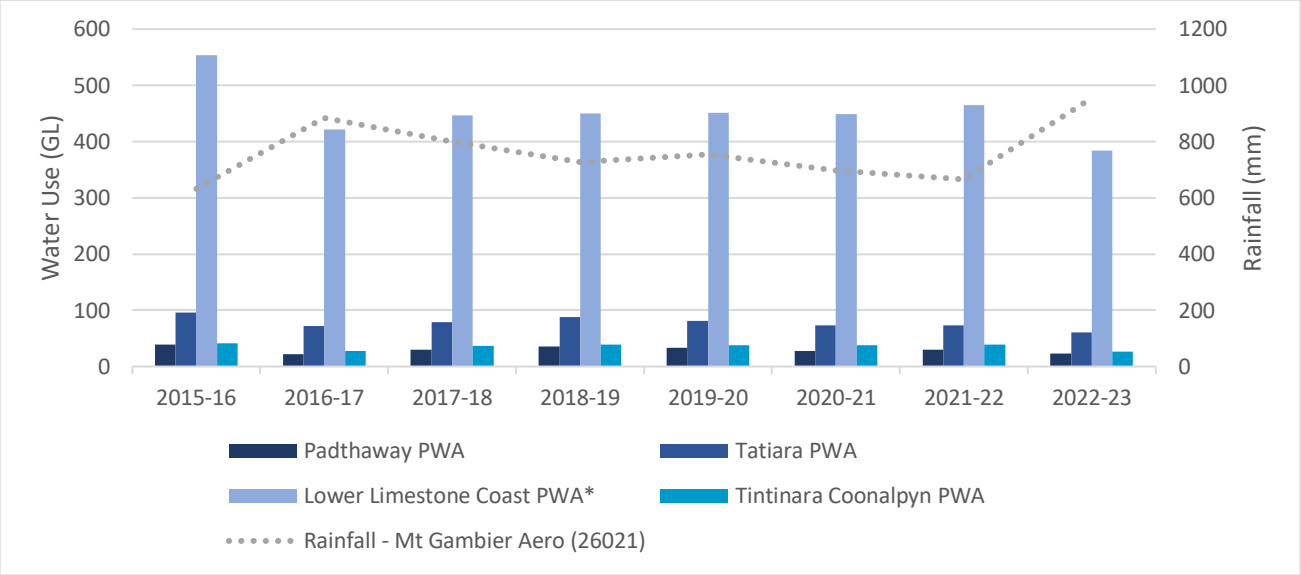


Figure 7. Annual rainfall and groundwater use in the Limestone Coast region, by prescribed water resource[9]

Water resources

Groundwater level status and trends for Limestone Coast prescribed water resource areas are shown in Tables 2 and 3. Water use in the last 5 years has been relatively consistent across the Limestone Coast region. With above-average rainfall occurring in 3 of the last 4 years, rainfall trends in the Lower Limestone Coast prescribed area are now rising. Rainfall trends remain downward in the other 3 prescribed areas. Groundwater levels are now average for the Lower Limestone Coast and Padthaway but below average in Tatiara and Tintinara–Coonalpyn. Groundwater salinity trends are stable, apart from in the Padthaway Flats unconfined aquifer.

Table 2. Condition of Limestone Coast prescribed groundwater resources

Lower Limestone Coast	Groundwater level status	Salinity	Rainfall
Confined Aquifer			
Unconfined Aquifer Lowlands[#]			
Unconfined Aquifer Highlands[#]			
Padthaway	Groundwater level status	Salinity	Rainfall
Unconfined Aquifer Flats			
Unconfined Aquifer Range			
Tatiara	Groundwater level status	Salinity	Rainfall
Confined Aquifer			

[9] Lower Limestone Coast water use totals include groundwater used by commercial forests. Forestry water use is measured each calendar year as opposed to each water use year. In this figure, 2022 forest groundwater use data has been used to represent the 2022 and 2023 water use years, as 2023 forest groundwater use data was not available at the time this report was published.

Unconfined Aquifer Highlands			
Unconfined Aquifer Plains			
Tintinara–Coonalpyn	Groundwater level status	Salinity	Rainfall
Confined Aquifer			
Unconfined Aquifer Mallee Highlands			
Unconfined Aquifer Plains			

The 'Highlands Unconfined Aquifer' is representative of the Comaum, Joanna, Zone 5A, Hynam East, Frances, Beeamma, Bangham and Western Flat groundwater management areas. All other groundwater management areas are represented by 'Unconfined Aquifer Lowlands.'

Water level status = Groundwater level compared to the historical range of water levels in wells in the regional monitoring network.

Salinity = Trend in groundwater salinity over period 2014 to 2023.

Rainfall = Trend in average annual rainfall over period 1971 to 2023 at Marcollat weather station (for Padthaway prescribed area), Keith weather station (for Tatiara), Tintinara weather station (for Tintinara–Coonalpyn) and Mount Gambier Airport weather station (for southern parts of Lower Limestone Coast). Trend in average annual rainfall over period 1986 to 2023 at Frances weather station (for northern parts of Lower Limestone Coast).

Table 3. Condition of Limestone Coast prescribed surface water resources

Morambro Creek	Streamflow	Flow days	Rainfall
Morambro Creek			

Streamflow = Trend in annual streamflow (July to June) over period 1986-87 to 2022-23 at Morambro Creek (A2390531) streamflow monitoring site.

Flow days = Trend in number of flowing days 1986-87 to 2022-23 at Morambro Creek (A2390531).

Rainfall = Trend in average annual rainfall over period 1986 to 2023 at Frances weather station.

Water security summary

A number of initiatives are underway to help manage water security risks in the Limestone Coast region and are described below. The LC Landscape Board is also working with First Nations people to investigate how water resource management can incorporate the objectives of First Nations people.

Review and amendment of the Lower Limestone Coast WAP

A review of the Lower Limestone Coast WAP commenced in late 2022 and was completed in December 2023. Based on the outcomes of the review, the Limestone Coast Landscape Board (LC Landscape Board) will commence amendment of the plan in 2024.

Review and amendment of the Padthaway WAP

The amendment of the Padthaway WAP commenced in 2019 with the establishment of a Stakeholder Advisory Group (the Group). Working with this group, a draft plan for the Padthaway Prescribed Wells Area (PWA) was developed introducing some key changes to the way water is managed and administered in the Padthaway PWA. The draft plan includes adaptive management principles that will allow groundwater extraction to be managed in response to changes in resource conditions, including as a result of climate change. Statutory public consultation has been completed and approval to adopt the plan will be sought in early 2024.

Review and amendment of the Tatiara WAP

The Tatiara WAP is currently being amended. The draft plan includes principles for adaptive management of groundwater, similar to the Padthaway plan.

Understanding climate impacts to support adaptive decision-making

Three subregional groundwater models have recently been completed for the Lower Limestone Coast region and a regional model incorporating both the confined and unconfined aquifer is being updated. These models will allow for future scenarios of groundwater use and climate change to be evaluated. This updated scientific understanding will provide an information base for the development of future adaptive management frameworks.

Monitoring and managing emerging risks

In the Limestone Coast region, the monitoring network for the groundwater-dependent ecosystem has expanded. In conjunction with the expansion of the groundwater monitoring network, investigations to understand water availability for groundwater-dependent ecosystems are underway.

Freshwater in coastal aquifers is vulnerable to salinisation by seawater intrusion due to increasing groundwater extraction and reduced recharge. A project is underway to map the extent and shape of the seawater interface in vulnerable coastal aquifers. Additional monitoring wells have been installed to help develop a more detailed understanding of the freshwater–seawater interface.

Murraylands and Riverland

In the Murraylands and Riverland, the River Murray is the main source of surface water for water users and communities along the river itself. The River Murray is also a significant source of water for Adelaide and country towns across South Australia, including the regional townships of Ceduna, Port Lincoln, Whyalla, Port Augusta, Port Pirie, Woomera, Kadina, Murray Bridge and Keith (see Figure 2) for location of major pipelines that transport River Murray water.

Groundwater is also an important source of water in the Murraylands and Riverland region, particularly in the Mallee.

Prescribed water resources in the Murraylands and Riverland region are managed under 4 separate WAPs:

- River Murray
- Mallee
- Peake Roby and Sherlock
- Marne Saunders.

The location of the prescribed areas (which align with WAP boundaries) are shown in Figure 8.

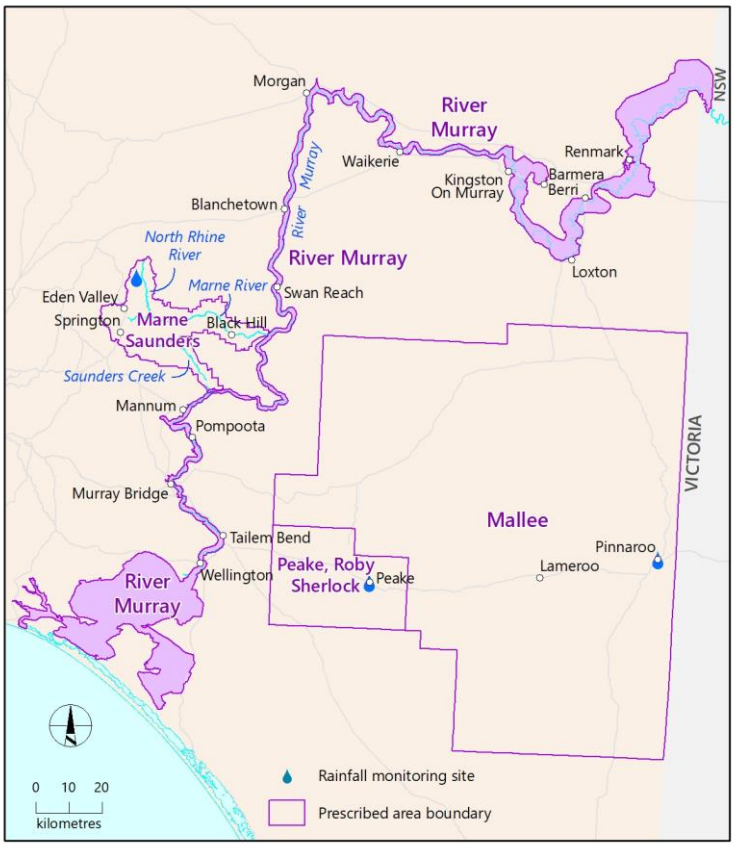


Figure 8. Map of Murraylands and Riverland region

Water use River Murray

Metropolitan Adelaide, country town and irrigation use

The majority of consumptive water sourced from the River Murray is used for irrigation, which in 2022-23 was 367 GL. In addition to water used in the Murraylands and Riverland region, this figure includes water pumped for use in the Barossa, Clare, and Mount Lofty Ranges areas. Country town use was 41 GL and metropolitan Adelaide[10] water use was 64 GL (Figure 9).

South Australia continues to comply with its sustainable diversion limit requirements under the Basin Plan. The total volume of River Murray water used for irrigation, country town use and metropolitan Adelaide use has ranged from 425 GL to 645 GL over the last 9 years (Figure 9). The current long-term average sustainable diversion limit in South Australia is 541.9 GL per year. Interstate trade and the ability to carry over unused water are important features of the River Murray management framework that ensure water available for consumptive purposes supports high-value production and economic growth.

[10] The volume indicated for Metropolitan Adelaide is the total of SA Water's Class 6 license volume under the Water Allocation Plan for the River Murray Prescribed Watercourse.

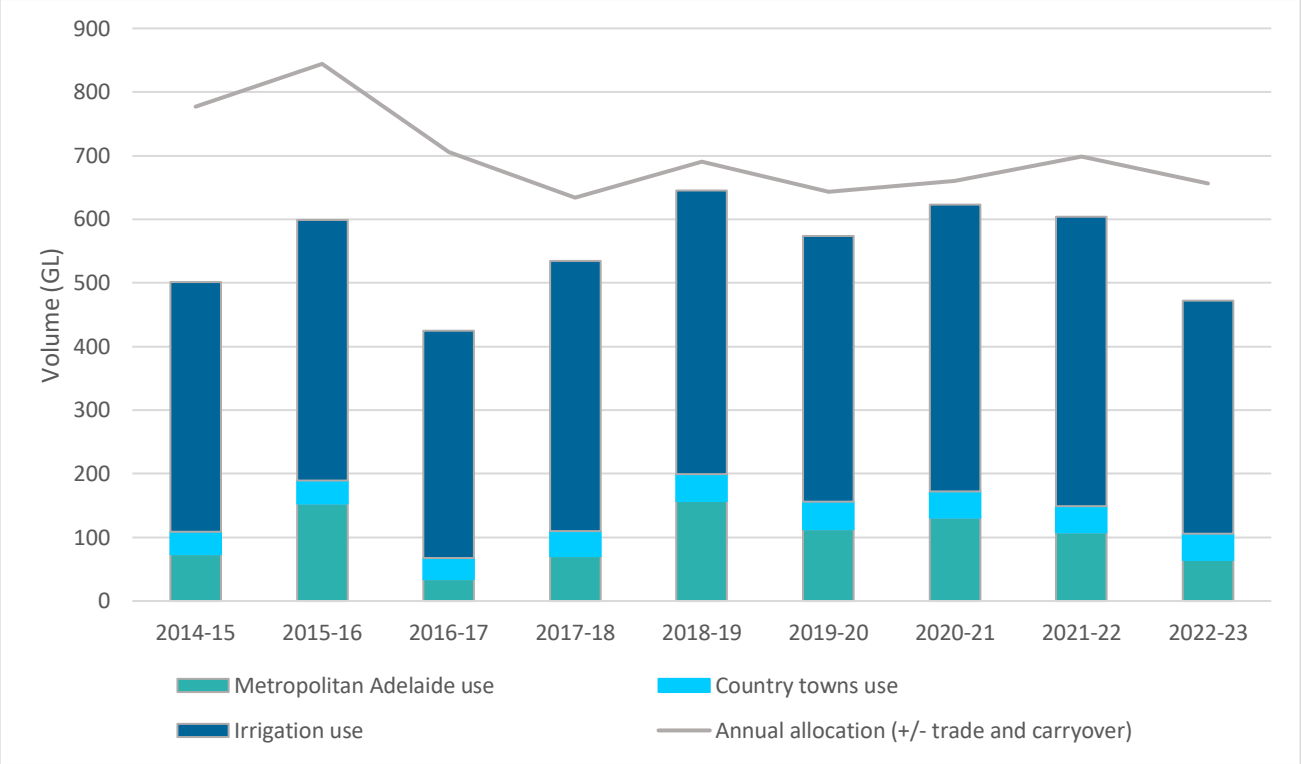


Figure 9. Volume of River Murray water used in South Australia for irrigation, country towns and metropolitan Adelaide[11]

Delivery of environmental water

A significant portion of River Murray water that passes into South Australia must be used for the benefit of the environment in accordance with the Basin Plan. The delivery of water for the environment to South Australia in the 2022-23 water year was guided by the 2022-23 Water for the Environment Annual Plan for the South Australian River Murray, the Long-Term Environmental Watering Plan for the South Australian River Murray and the Basin-Wide Environmental Watering Strategy. These documents, together with site-based management plans, describe key ecological targets and objectives for annual water for the environment delivery to South Australia. Water for the environment delivered to South Australia is provided by a number of water holders including the Commonwealth Environmental Water Holder, The Living Murray program, the South Australian Minister for Climate, Environment and Water and the Victorian Environmental Water Holder.

The 2022-23 water year saw very wet climatic conditions across the Murray–Darling Basin, following wet conditions the previous year (BOM 21 September 2023). In 2022-23, around 1,227 GL of water for the environment were delivered either side of the flood peak. The unregulated flow event, which commenced on 15 July 2021, continued for the entire 2022-23 water year, bringing the duration of the event to over 715 days. Unregulated flows contributed over 19,153 GL to the total volume of 23,085 GL that arrived in South Australia in 2022-23, which is more than 12-times the volume of South Australia's Entitlement volume under the Murray-Darling Basin Agreement.

Notable environmental benefits from the delivery of water for the environment and unregulated flows in the South Australia River Murray in 2022-23 include the following:

- The flood event inundated almost the entire South Australian River Murray floodplain with water reaching areas that had not received water in decades.
- Prolonged, elevated flood waters resulted in the flushing and freshening of large areas of floodplain soils, benefiting thousands of hectares of native vegetation.
- Connectivity along the main river channel and with the floodplain, supported native fish movement and breeding.

[11] Basic Rights are not included in irrigation, country town and metropolitan Adelaide use totals. Approximately 6 GL per year is assigned to Basic Rights.

- An estimated peak in barrage outflows of 120 GL contributed to the freshening of the Coorong and Lower Lakes, with many fish species and macroinvertebrates being detected in the northern South Lagoon for the first time since 2004.
- Scouring of the Murray Mouth by 11-15 metres as a result of the floodwaters that saw dredging cease for the first time since August 2017.
- Operation of regulators on Chowilla and Pike floodplains in conjunction with raising Locks 5 and 6, as well as raising of Lock 2, in order to wet up 7,647 hectares of floodplain before being taken over by flood waters.

Water delivery and associated operations were managed through a collaborative effort by multiple state government agencies, Australian government agencies and non-government organisations.

The management and delivery of environmental water in 2022-23 was in accordance with the basin annual watering priorities and Basin Plan requirements.

Specific information about the delivery of water for the environment and the associated outcomes from various site-based and system scale actions will be reported in the South Australian River Murray Water for the Environment Report 2022-23 (DEW unpublished).

Water use Mallee, Peake Roby and Sherlock, and Marne Saunders

Total water use in the in the Mallee, Peake Roby and Sherlock, and Marne Saunders prescribed areas during the 2022-23 water use year was lower than in the previous 5 years but was generally consistent with historical volumes for all surface and groundwater resources (Figure 10).

Licensed extraction of groundwater has ranged from 28 GL to 39 GL per year over the period 2015-16 to 2022-23. In general, water use patterns reflect rainfall trends: less water is used in higher rainfall years compared to lower rainfall years. Rainfall varies across the 3 prescribed areas; rainfall data for the Mallee is displayed in Figure 10 to demonstrate the relationship between rainfall and water use.

The annual volume of surface water used in the Marne Saunders prescribed area has ranged from approximately 0.2 GL to 0.7 GL over the years 2015-16 to 2022-23. As with all surface water resources, water can only be accessed when dams and watercourses hold sufficient water.

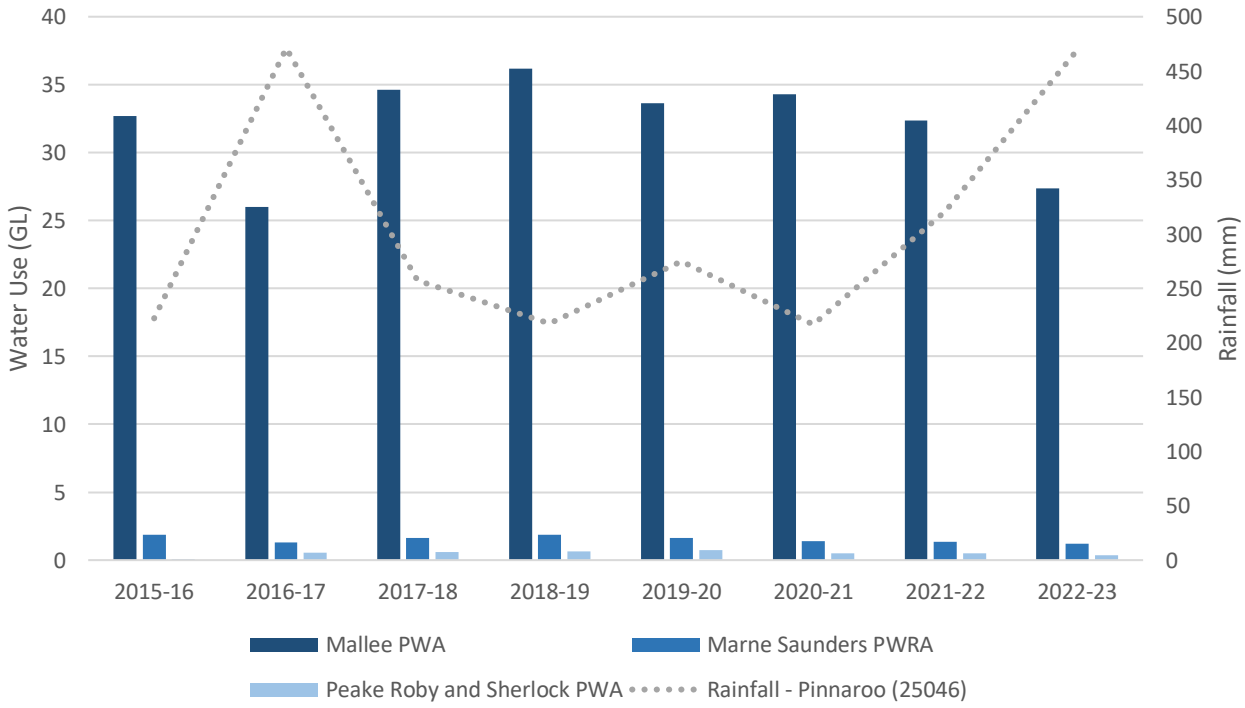


Figure 10. Annual rainfall and groundwater use in the Murraylands and Riverland region, by prescribed water resource

Water resources

River Murray

Irrigation, regulation and river management (operation of dams, locks and weirs) significantly influence streamflow patterns in the River Murray; for this reason, different indicators are shown in Table 4. Allocation (the delivery and availability of South Australia's entitlement) and salinity (achievement of salinity targets at sites defined in the Basin Plan) have been adopted as measures of water quantity and quality. South Australia's full Entitlement under the Murray-Darling Basin Agreement was delivered and the salinity target was met in 2022-23; hence, 'green ticks' are displayed in Table 4.

Rainfall across the Murray–Darling Basin has declined over the period 1900 to 2021 and is expected to continue declining in coming years.

Table 4. Delivery of allocations and water condition of the River Murray

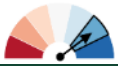
River Murray	Allocation	Salinity	Rainfall
River Murray	✓	✓	↘

Allocation = Availability and delivery of South Australia's entitlement in 2022-23.
Salinity = Salinity target detailed in the Basin Plan (MDBA 2023).
Rainfall = Trend reported in *Trends and historical conditions in the Murray–Darling Basin. A report prepared for the Murray–Darling Basin Authority by the Bureau of Meteorology*, 2020. Date range 1900 to 2021.

Mallee, Peake, Roby and Sherlock, and Marne Saunders

With the exception of the confined aquifer in the Peake, Roby and Sherlock prescribed area, groundwater level status is average or below average in the Murraylands and Riverland region. The salinity of groundwater in the region is stable in most areas but increasing in the fractured rock aquifer of Marne Saunders (Table 5). Streamflow and number of flow days in the Marne River and Saunders Creek are showing a declining trend (Table 6). Rainfall is increasing in the Mallee area and declining elsewhere.

Table 5. Condition of Murraylands and Riverland prescribed groundwater resources

Mallee	Groundwater level status	Salinity	Rainfall
Murray Group Limestone		—	↗
Peake, Roby and Sherlock	Groundwater level status	Salinity	Rainfall
Confined Aquifer		—	↘
Marne Saunders PWRA	Groundwater level status	Salinity	Rainfall
Fractured Rock Aquifers		↗	— ↘
Murray Group Limestone		—	— ↘

Salinity = Trend in groundwater salinity over period 2014 to 2023.
Water level status = Groundwater level compared to the historical range of water levels in wells in the regional monitoring network.
Rainfall = Trend in average annual rainfall over period 1979 to 2023 at Pinaroo weather station (for Mallee prescribed area), Peake weather station (for Peake, Roby and Sherlock), Cambrai weather station (for Marne Saunders). Trend in average annual rainfall over period 1973 to 2023 for Keyneton (for Marne Saunders).

Table 6. Condition of Marne Saunders prescribed surface water resources

Marne Saunders	Streamflow	Flow days	Rainfall
Marne River	↘	↘	↘
Saunders Creek	↘	↘	↘

Streamflow = Trend in annual streamflow (July to June) over period 1986-87 to 2022-23 at the Marne Gorge (A4260605) and the Saunders Creek (A4261174) streamflow monitoring sites.
Flow Days = Trend in number of flowing days 1986-87 to 2022-23 at Marne Gorge (A4260605) and the Saunders Creek (A4261174) streamflow monitoring sites.
Rainfall = Trend in average annual rainfall over period 1979 to 2023 at Cambrai weather station (for Marne Saunders). Trend in average annual rainfall over period 1973 to 2023 for Keyneton.

Water security summary

River Murray

Given that rainfall is expected to decline across the entire Murray-Darling Basin, implementation of the Basin Plan in full is critical for the water security of all regions that rely on the supply of River Murray water.

South Australia has made significant progress towards full implementation of the Basin Plan including:

- implementing new Sustainable Diversion Limits (SDL) for surface water and groundwater that came into effect from 1 July 2019; all associated water recovery targets have been met
- all 3 water resource plans submitted on time and accredited by the Commonwealth minister
- all SDL adjustment projects for which South Australia has lead responsibility are either complete or on schedule for completion by the new statutory deadline
- efficiency measures projects that contribute towards completion of the recovery of the final 450 GL of water for the environment
- continuing to work with a range of partners and water holders to coordinate the effective delivery of water to our priority assets to achieve our short- and long-term environmental outcomes in South Australia.

Implementation of the Basin Plan to date has supported:

- improved connectivity between the Lakes, Coorong and Murray Mouth with over 10 years of continuous flow and increased barrage flows, providing critical pathways for movement and recruitment of key diadromous fish species
- improvements in black bream and greenback flounder populations in the Murray estuary and Coorong and small-mouthed hardyhead in the Coorong
- overbank and spring-summer flows, and more localised fast-flowing habitats, which may have supported the recruitment and dispersal of Murray cod and an increase in food resources for these fish
- improvements in the abundances, distribution and breeding of Lakes waterbird communities
- managed floodplain inundations that have contributed to improvement in river red gum and black box condition in inundated areas.

The WAP for the River Murray Prescribed Watercourse has been amended and was formally adopted by the Minister for Climate, Environment and Water on 27 April 2023. The amendments relate to the private carryover policy for South Australian Class 3 (High Security) water entitlement holders. Carryover is a drought management measure to keep industries productive in dry years and help maintain resilient communities; it works by increasing the volume of water available for irrigation in dry years through under-use of available water in previous years.

Schedule G of the Murray Darling Basin Agreement allows South Australia to defer a portion of its annual entitlement for delivery in future dry years to provide critical human water needs and private carryover for irrigators. Wet conditions across the Basin in 2022-23 meant that the full volume previously stored by South Australia spilled. South Australia is continuing to consider various deferral strategies to rebuild the volume at the earliest opportunity. With a large volume of water available in the system, it is unlikely South Australia will need to call water from the Storage Right (water deferred and stored as part of its annual entitlement) in the years immediately following the 2022-23 flooding.

Mallee and Peake, Roby, Sherlock

The declining water level trend being observed in the Mallee prescribed area is within the limits permitted under the Mallee WAP. Due to the slow moving, robust nature of the aquifer and large amount of storage in the Murray Group limestone aquifer, extraction of the full volume permitted under the WAP will lead to a depletion of 15% of the total resource volume of water in storage after 300 years.

The Mallee WAP is currently being amended. The amended plan will consider availability of water for critical human water needs and will also provide details on protection of soaks that are culturally important to First Nations. The Peake, Roby and Sherlock WAP is also being amended at the same time and will also be considering critical human water needs. Within the timescale since the first WAP was adopted over 10 years ago, the volumes of extracted water have remained well below extraction limits set by the WAP, allowing for a sustainable approach to water security within the region.

Marne Saunders

A desktop review of the Marne Saunders WAP was completed in 2019, which determined further operational monitoring of low flow bypasses. First Nations engagement was also required before a comprehensive review would be undertaken at a later stage. The restoration of low flows is critical for the health of Marne Saunders waterways and associated habitats. The Marne Saunders prescribed area is included in the Flows for the Future Program[12].

Since 2019, further decline in the condition of waterways and associated habitats has been observed (Gannon, Whiterod, and Green 2021 and Aboriginal waterway assessments). Given the declining trends, the Murraylands and Riverland Landscape Board has engaged with the community to identify potential mitigating actions. Proposed strategies have been examined through a risk analysis process, which has resulted in the Landscape Board resolving to undertake a comprehensive review of the water allocation plan. It is anticipated that the review of the WAP will occur in 2024.

River Murray flooding

The 2022-23 River Murray flood was the largest flood on the River Murray in South Australia for more than 60 years. The River Murray flood event damaged or overtopped 20 of the 27 levee banks in the Lower Murray Reclaimed Irrigation Area (LMRIA) and inundated the primary production land behind the levees. The inundation also impacted other essential assets to the state, such as infrastructure for drinking water, telecommunications, electricity and transport routes. As part of the state government's River Murray flood recovery response, immediate stabilisation works were undertaken to repair the damaged levees so the inundated areas could be dewatered.

Further remediation work to the flood-damaged sections of the levees will be undertaken with the state and Australian governments collectively providing $17.1 million for the state government-owned levees. In addition, the Government of South Australia is allocating $14.2 million for intermediate works to the privately owned levees. The remediation works will return flood-damaged sections of the levees to their pre-flood height (equivalent to the 1974 flood level for government levees) and help to mitigate the effects of high-flow events on agricultural land until longer-term engineered solutions can be implemented.

The floods brought water quality challenges in upstream areas of the Murray–Darling Basin with high levels of organic matter and low dissolved oxygen levels. While blackwater events and associated fish kills were reported in New South Wales and Victoria, this did not eventuate in South Australia. With regard to drinking water, careful management of water treatment processes and reservoir storages ensured that water quality stayed within compliance targets based on Australian Drinking Water Quality Guidelines.

Elevated salinity levels were experienced during the flood recession in the River Murray in South Australia. Increased salinity levels are common during flood recessions; however, the higher river flow provided a significant dilution benefit. With declining river flow, the risk of elevated salinity is forecast to remain until the middle of 2024 due to the delayed effect of flooding, which can force more saline groundwater into the river, particularly as flow recedes.

[12] For more information see Mount Lofty Ranges summary section.

Mount Lofty Ranges

The Mount Lofty Ranges separate the Adelaide Plains from the extensive plains that surround the Murray River. For the purpose of water resource management, the Eastern Mount Lofty Ranges (EMLR) incorporate the eastern slopes of the Mount Lofty Ranges and the Murray Plains as well as the Angas Bremer PWA. Ground and surface waters are managed under the EMLR WAP.

The Western Mount Lofty Ranges (WMLR) prescribed area incorporates the western slopes of the Mount Lofty Ranges and extends down to the Fleurieu Peninsula. These regions' water sources are managed under 2 WAPs:

- WMLR
- McLaren Vale.

The McLaren Vale WAP manages groundwater only. The WMLR WAP manages surface and groundwater. Rivers that extend across the Adelaide Plains (Gawler, Little Para, Torrens and Onkaparinga) are managed under the WMLR WAP.

The location of the EMLR, Angas Bremer and WMLR prescribed resources are shown in Figure 11 (the location of the McLaren Vale PWA is provided in Figure 14).

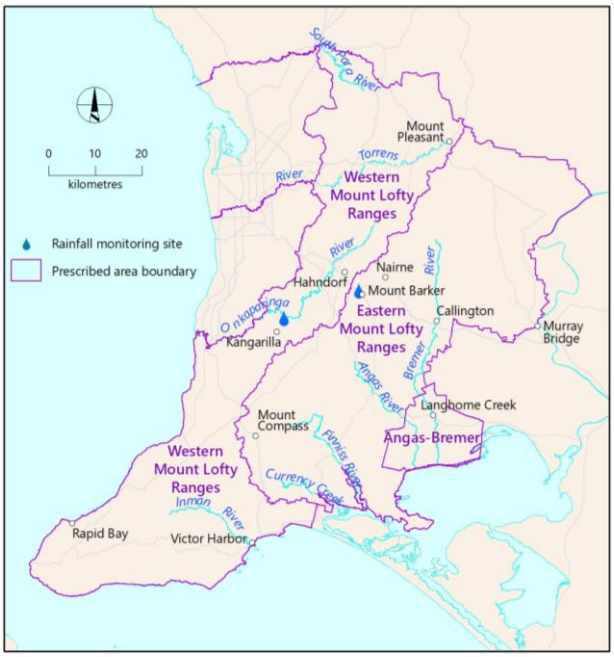


Figure 11. Map of Mount Lofty Ranges region

Eastern Mount Lofty Ranges water use

Over the last 8 years, the total volume of licensed extraction in the EMLR has ranged from 7.7 GL to 14.5 GL. In 2022-23 total water use was 9.1 GL (Figure 12). Groundwater was the predominant water source in the EMLR in 2022-23 with a total of 7.3 GL of groundwater used compared to 1.8 GL of surface water. In general, annual water use patterns reflect annual rainfall trends: less water is used in higher rainfall years compared to lower rainfall years. Annual rainfall data for Mt Barker is displayed in Figure 12 to demonstrate the relationship between rainfall and water use.

The Angas Bremer PWA falls within the boundary of the EMLR. In this region the use of groundwater is low (on average 1.8 GL per year) compared to the volume of River Murray water used. River Murray water is delivered to the area via a number of pipelines connected to Lake Alexandrina and higher reaches of the River Murray. In the 2022-23 water use year, the Creeks Pipeline Company Limited supplied 12.2 GL of River Murray water to townships, communities and irrigators in Langhorne and Currency creeks. Water sourced from the River Murray is an important water source for the Angas Bremer region.

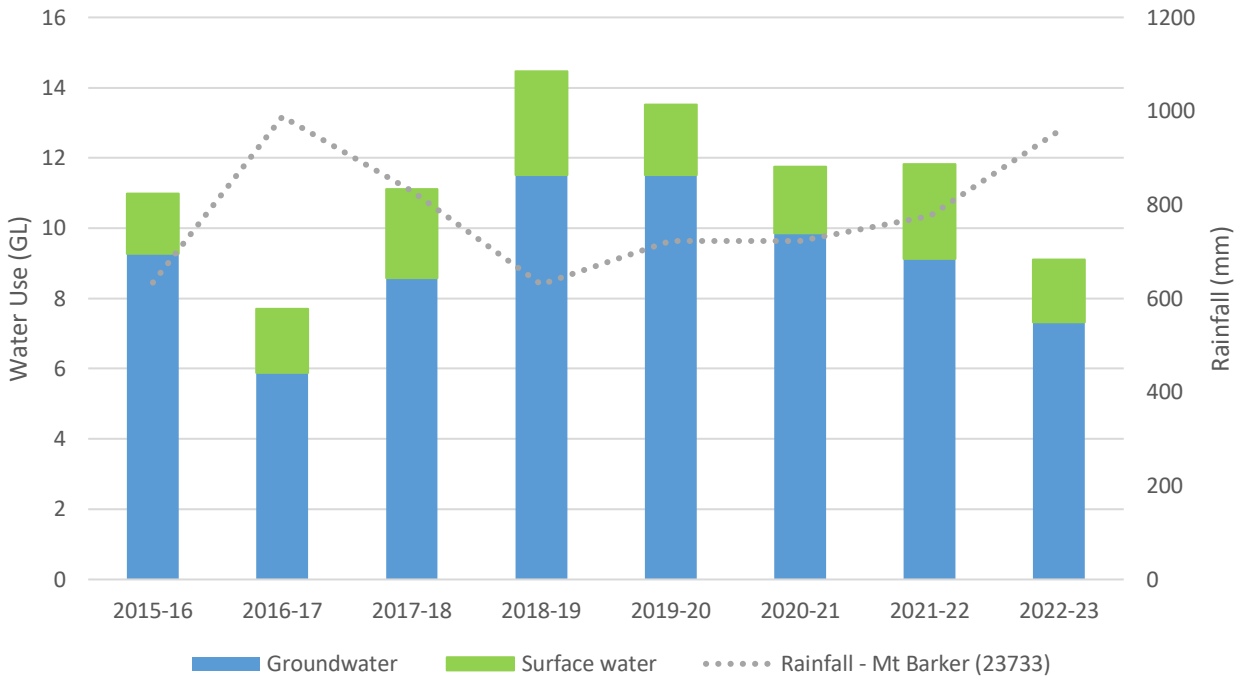


Figure 12. Eastern Mount Lofty Ranges annual rainfall and water use by resource type (2015-16 to 2022-23)[13]

Western Mount Lofty Ranges water use

Over the last 8 years, the total volume of licensed extraction in the WMLR has ranged from 31.4 GL to 137.3 GL. In 2022-23 total water use was 123.4 GL (Figure 13). Surface water is the predominant water source in the WMLR with 112.8 GL of surface water used in 2022-23 compared to 10.5 GL of ground water. The volume of surface water used in the WMLR is influenced by its role in Adelaide's public water supply. When reservoirs in the WMLR are holding sufficient water, they are used as a source of public water supply in preference to water from the River Murray or the Adelaide desalination plant. In an average year, 60% of Adelaide's mains water is sourced from reservoirs in the WMLR prescribed area. However, this percentage varies with the annual rainfall in the WMLR. In 2016-17, this figure increased to 86% (128 GL) and in 2017-18 the percentage was 66% (106 GL). In 2022-23, 67% (99.5 GL) of Adelaide's water supply was sourced from the WMLR reservoirs.

[13] Groundwater totals include EMLR and Angas Bremer groundwater use. Surface water totals represent the volume of EMLR surface water used in the region (meaning that River Murray water use is not included).

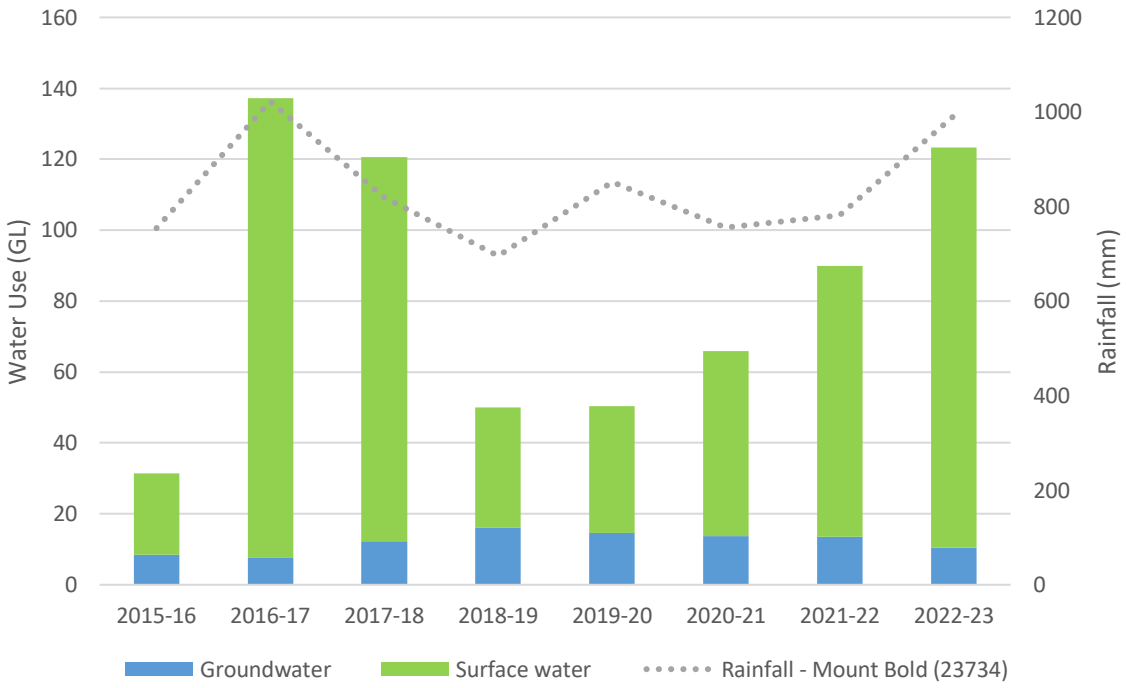
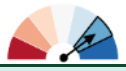


Figure 13. Western Mount Lofty Ranges annual rainfall and water use by resource type (2015-16 to 2022-23)

Water resources

Rainfall in the Mount Lofty Ranges over the period 1986 to 2022 is showing 2 distinct trends: increasing in the EMLR and declining in the WMLR. The 2023 recovered groundwater level median ranked well for use as an indication of groundwater level status showing that the resources are at or above average across the region. Salinity is stable (±10%) in most groundwater resources but increasing in the EMLR Murray Group Limestone. Streamflow is showing a declining trend for all rivers in the EMLR; the trend in the number of flowing days is stable for the Angas, Finniss and Currency rivers, while the Bremer River is showing a declining trend. In the WMLR, streamflow is showing a declining trend, except for the Inman Valley, where streamflow appears to be increasing. The trend in the number of flowing days is stable in some catchments (Myponga, Yankalilla and Inman Valley) and declining in others (Torrens and Onkaparinga).

Table 7. Condition of Mount Lofty prescribed groundwater resources

Angas Bremer	Groundwater level status	Salinity	Rainfall
Murray Group Limestone			
EMLR	Groundwater level status	Salinity	Rainfall
Fractured Rock			
Murray Group Limestone			
Permian Sand Finniss			
Permian Sand Tookayerta			
WMLR	Groundwater level status	Salinity	Rainfall
Fractured Rock			

Permian Sand		NA	↘
Tertiary Limestone		NA	↘

Water level status = Groundwater level compared to the historical range of water levels in wells in the regional monitoring network.
Salinity = Trend in groundwater salinity (January to December) over period 2013 to 2023 for Angas Bremer Murray Group Limestone and WMLR Fractured Rock, 2014 to 2023 for EMLR fractured rock, 2017 to 2023 for EMLR Permian Sand Finniss and EMLR Permian Sand Tookayerta, and from 2009 to 2023 for EMLR Murray Group Limestone.
Rainfall = Trend in average annual rainfall over period 1976 to 2023 at Mount Barker weather station for EMLR and Mt Bold for WMLR.

Table 8. Condition of Mount Lofty prescribed surface water resources

EMLR	Streamflow	Flow days	Rainfall
Angas River	↘	—	↘
Bremer River	↘	↘	—
Finniss River	↘	—	↘
Currency Creek	↘	—	↘
WMLR	Streamflow	Flow days	Rainfall
Torrens	↘	↘	—
Onkaparinga	↘	↘	↘
Myponga	↘	—	↘
Yankalilla	↘	—	↘
Inman Valley	↗	—	↘

Streamflow = Trend in annual streamflow (July to June) over period 1986–87 to 2022–23 at monitoring sites for Finniss River (A4260504), Currency Creek (A4260530), Bremer River (A4260533), Angas River (A4260503) streamflow monitoring sites – EMLR. Trend in streamflow over period 1986-87 to 2022-23 for Kersbrook (A5040525), Mount Pleasant (A5040512) and Sixth Creek (A5040523) for Torrens Catchment; Scott Creek (A5030502) and Bakers Gully (A5030503) for Onkaparinga Catchment; Myponga (A5020502), Yankalilla (A501 1006) and Inman Valley (A5010503) for Myponga, Yankalilla and Inman Valley catchments respectively.
Flow days = Trend in number of flowing days 1986-87 to 2022-23 at sites described above.
Rainfall = Trend in average annual rainfall over period 1983 to 2022 at Mount Barker (23733) weather station (for Bremer River), Macclesfield (23728) weather station (for Angus River). Meadows (23730) weather station (for Finniss River and Currency Creek). Gumeracha (23719) and Birdwood (23705) weather stations (for Torrens). Uraidla (23750) Bridgewater (23707), Cherry Gardens (23709), Lobethal (23726) and Hahndorf (23720) and Echunga (23713) weather stations (for Onkaparinga). Yankalilla (23754) weather station (for Yankalilla and Inman Valley). Second Valley (23744) weather station (for Myponga) (Savadamuthu and McCullough).

Water security summary

The declining surface water trends presented above highlight that there are some water security risks in the Mount Lofty region. There is a need for a resource management response to address these declining trends and this may be achieved through the review and amendment of the Western and Eastern Mount Lofty Ranges WAPs. The review of both plans is currently in progress and the review and amendment of both plans will occur concurrently. To ensure ecologically sustainable water resource management, there will be a need to review progress associated with the securing of low flows from farm dams and at watercourse diversion points. The provision of low flows by landholders is one of the primary ways that environmental water provision targets in the Eastern and Western Mount Lofty Ranges WAPs can be achieved. Low flows are

small flow events in creeks and rivers that create or maintain water flow through the channel, keeping in-stream habitats wet and pools topped up throughout the year, especially over summer and autumn.

Low flows are critical to ecosystems that depend on water. By keeping refuge pools wet and fresh during drier seasons, low flows allow plants and animals that rely on, or live in or near water to survive. These organisms can then reproduce and recolonise other areas once higher flows occur. Low flows also connect in-stream pools, enabling the movement of fish and invertebrates up and down the system. Low flows wet up different parts of the streambed, such as benches and riffles (shallow, fast-flowing sections), which is essential to allow aquatic plants and animals to use these different types of habitats for living, feeding and breeding. Low flows at the break of season also help trigger breeding responses in some native fish species.

Programs have been underway to secure low flows since the adoption of the current WAPs (DEW 2024). To date, low flows are released at more than 400 sites in the Mount Lofty Ranges (including the Marne Saunders region) but there is significant work still to be done, particularly in the WMLR. Healthy river systems are a sign of sustainable water use.

McLaren Vale

In McLaren Vale, groundwater and recycled water are important water resources. The McLaren Vale PWA falls within the boundary of the WMLR; however, groundwater use is managed through the McLaren Vale WAP. The location of the McLaren Vale prescribed area is shown in Figure 14. Recycled water sourced from the Christies Beach wastewater treatment plant is also an important water source for the region.

Water use

Over the last 8 years, groundwater licensed extraction has ranged from 3.0 GL to 5.1 GL. Over the same period, the use of recycled water has ranged from 3.6 GL to 6.1 GL (Figure 15). Recycled water on average makes up 56% of the water used in the McLaren Vale region. In 2022-23, 3.4 GL of groundwater and 4.5 GL of recycled water were used. Rainfall data for Willunga is also displayed in Figure 15.

Figure 14. Map of McLaren Vale region

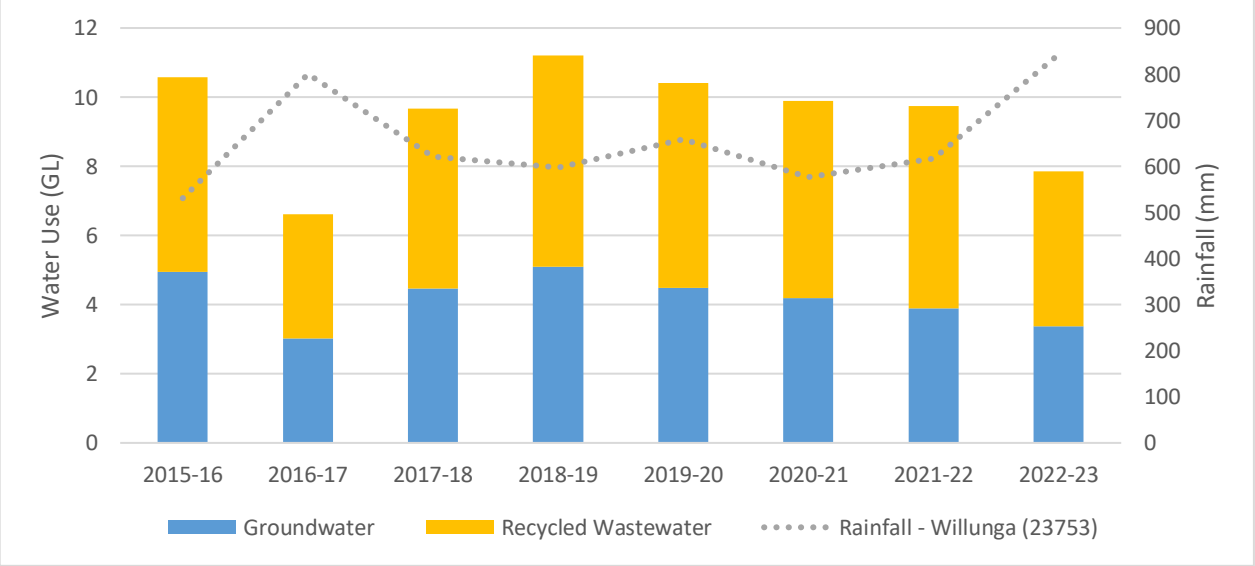


Figure 15. McLaren Vale annual rainfall and water use by resource type (2015-16 to 2022-23)

Water resources

Below-average water levels are showing in the majority of wells in the Maslin Sands and Port Willunga Formation aquifers, while the water levels in the fractured rock aquifers are around the long-term average. Salinity levels are stable in the Port Willunga Formation and Fractured Rock aquifers but has an upward trend in the Maslins Sands aquifer. The long-term rainfall trend is stable or increasing.

Table 9. Condition of McLaren Vale prescribed groundwater resources

McLaren Vale	Groundwater level status	Salinity	Rainfall	
Fractured Rock				*
Maslin Sands				*
Port Willunga Formation				*

*****The rainfall trend at Mt Bold Reservoir is stable, while at Willunga the rainfall trend is slightly increasing.

Water level status = Groundwater level compared to the historical range of water levels in wells in the regional monitoring network.

Salinity = Trend in groundwater salinity over period 2009 to 2023.

Rainfall = Trend in average annual rainfall over period 1980 to 2023 at Willunga weather station.

Water security summary

McLaren Vale is a region where existing water supplies of a suitable quality are likely to be insufficient to meet demand in the future, especially when climate change is increasing. Several projects are underway which have relevance to water security challenges within the McLaren Vale region:

- The Resilient Water Futures project is a 50-year urban water strategy to deliver integrated water management for Greater Adelaide, including the McLaren Vale region. This strategy includes all water uses and all sources of water for Greater Adelaide.
- The McLaren Vale Regional Water Security Strategy will have a regional focus and delve deeper into community and primary production needs (not urban water needs) of the McLaren Vale region.

DEW is leading the development of the McLaren Vale Regional Water Security Strategy and is working in partnership with key stakeholders. At the time of writing, 2 of 3 community workshops have been held with an assessment phase now underway. Results of the assessment phase will be presented at a third workshop, proposed for mid-2024. The water security strategy will be finalised in late-2024. The water security strategy will identify potential water supply options, technologies, sources of demand and detail possible investment staging and sequencing to assist in long-term (50-year) planning for the region.

Alongside the development of a water security strategy, a business case is being developed to determine viability of constructing a new reservoir that could hold up to an additional 1,350 ML of recycled water for irrigation in the region. The Australian Government, through the NWGA, is providing $470,000 towards the $500,000 business case with the remaining funds coming from the Government of South Australia and other partners. The business case is due for completion in mid-2024.

There will be an opportunity to ensure water management frameworks provide water for critical human water needs, the environment and other uses in a changing climate when the McLaren Vale WAP is amended. This amendment process follows a review of the McLaren Vale WAP that was completed in 2022. The review found 2 areas of elevated salinity, or 'hot spots', in the McLaren Vale region which are of concern for future water management. The Board is working with the affected licence holders to identify appropriate methods to stabilise and reduce the salinity in future. A key component of the review considered the importance of integrating the management of groundwater and surface water resources, recognising their inherent connectivity. Currently the groundwater in the McLaren Vale and Willunga Basin area is managed in the McLaren Vale Water Allocation Plan while the surface waters of this region are managed in the WMLR Water Allocation Plan.

Barossa

In the Barossa region, prescribed ground and surface water resources as well as water imported from the River Murray (Barossa Infrastructure Limited (BIL) water) are used to meet water needs across the region. Water imported from the River Murray is the main source of water. Prescribed resources are managed through the Barossa WAP. The location of the Barossa prescribed area is shown in Figure 16.

Water use

Over the last 8 years, demand for prescribed surface and groundwater has ranged from 3.9 GL to 5.4 GL. Over the same period, the use of imported River Murray water has ranged from 7.8 GL to 13.7 GL (Figure 17). Imported water on average makes up 70% of the water used in the Barossa region (Figure 17). In 2022-23, a total of 3.0 GL of ground and surface water and 8.0 GL of imported River Murray water were used. Rainfall data for Tanunda is displayed in Figure 17.

Figure 16. Map of Barossa region

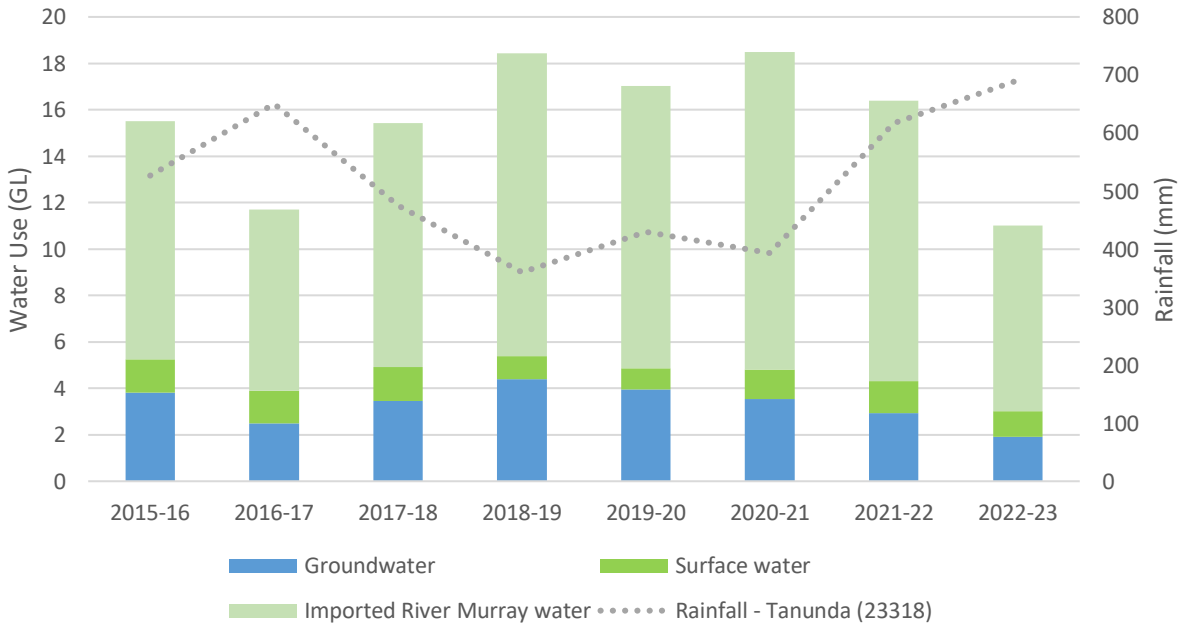


Figure 17. Barossa annual rainfall and water use by resource type (2015-16 to 2022-23)

Water resources

Below average resource conditions and groundwater level status and decreasing rainfall trends are observed in the Barossa region. The salinity of the lower aquifer is stable (±10%). The salinities of the fractured rock aquifer, the primary aquifer used for licensed purposes, and the upper aquifer are showing increasing salinity trends.

Table 10. Condition of Barossa prescribed groundwater resources

Barossa	Groundwater level status	Salinity	Rainfall	
Fractured Rock				*
Upper Aquifer				*
Lower Aquifer				*

*****The rainfall trend at Tanunda is stable, while at Williamstown the rainfall trend is declining.

Water level status = Groundwater level compared to the historical range of water levels in wells in the regional monitoring network.

Salinity = Trend in groundwater salinity over period 2008 to 2023.

Rainfall = Trend in average annual rainfall over period 1977 to 2023 at Tanunda weather station.

Table 11. Condition of Barossa prescribed surface water resources

Barossa	Streamflow	Flow days	Rainfall	
North Para River				*

*****The rainfall trend at Tanunda is stable, while at Williamstown the rainfall trend is declining.

Streamflow = Trend in annual streamflow (July to June) over period 1986-87 to 2022-23 at Yaldara (A5050502) streamflow monitoring site.

Flow days = Trend in number of flowing days 1986–87 to 2022–23 at Yaldara (A5050502) streamflow monitoring site.

Rainfall = Trend in average annual rainfall over period 1977 to 2023 at Tanunda weather station.

Water security summary

The Barossa is a region where it is likely that water supplies of a suitable quality will be insufficient to meet established future demand for water. To address this water security risk, DEW has worked in partnership with key stakeholders to develop a water security strategy for the region. The strategy relates to the Barossa Valley and Eden Valley and sets out a shared vision for the region's future. It includes strategic actions to improve water security in a changing climate in the Barossa out to 2050. Under a mid-range climate scenario for the 2050s, it is estimated an additional 8 GL per year (5.7 GL for Barossa Valley and 2.4 GL for Eden Valley) will be needed to ensure on average there is no irrigation shortfall for the existing planted area in the driest years (DEW 2022c). This increases to more than 14 GL per annum (10.2 GL for Barossa Valley and 3.8 GL for Eden Valley) for a high-end climate change projection, for the 2050s (DEW 2022c).

Since finalising the strategy in November 2022, DEW has worked with key stakeholders to assist with the implementation of the strategy.

Consistent with the water security strategy, new water supply options for the Barossa Valley and Eden Valley have been investigated though the Barossa New Water Project (PIRSA 2022). This project was jointly funded by the Australian and South Australian governments. A Detailed Business Case has now been completed and considered options for delivering new water infrastructure to the Barossa Valley and Eden Valley. The business case found evidence of potential grower demand for recycled water in Barossa depending on price and water quality. However, to ensure the viability of the project, further work is required to identify and secure additional volumes of demand for recycled water.

Following the release of the business case, the Government of South Australia has been working with Barossa Infrastructure Limited (BIL) and Barossa Australia to investigate potentially viable pathways for a recycled water project for the region. However, in parallel to this, the parties are also investigating options to access additional volumes of River Murray water to meet pressing water security issues in parts of the region, particularly in the Eden Valley.

Stakeholder consultation on proposed WAP amendments has commenced. In an effort to further improve water security, the Northern and Yorke Landscape Board is working with landholders, farming groups and stakeholders to deliver on-ground works, including stock exclusion from watercourses and off-stream water points, to improve water quality in the Wakefield River, Light River, North and South Para rivers and Gawler River catchments. Targeted engagement with the Ngadjuri, Peramangk and Kaurna First Nations peoples has occurred to incorporate Aboriginal water interests into the WAP for the first time. A draft amended WAP is currently on track for completion in early/mid 2024 with formal consultation planned to begin later in 2024.

The development of the water security strategy prior to the finalisation of the Barossa WAP amendment has facilitated the alignment of water security objectives with WAP principles. For example, principles relating to surface water dams have been reviewed to consider the storage of alternative water supplies and to facilitate environmental outcomes and cultural water objectives identified in the water security strategy.

Clare Valley

In the Clare Valley, prescribed ground and surface water resources, as well as water imported from the River Murray, are used to meet water needs across the region. Water imported from the River Murray is the main source of water. Prescribed resources are managed through the Clare Valley WAP. The location of the Clare Valley prescribed area is shown in Figure 18.

Water use

Over the last 8 years, annual demand for prescribed surface water has ranged from 0.14 GL to 0.85 GL, and prescribed groundwater 0.4 GL to 1.2 GL (Figure 19). Over the same period, the use of imported River Murray water has ranged from 1.3 GL to 3.2 GL. Imported water on average makes up 61% of the water used in the Clare region (Figure 19). In 2022–23, a total of 1.4 GL of ground and surface water was used and 1.8 GL of imported River Murray water. Rainfall data for Clare (Calcannia weather station) is displayed in Figure 19 to illustrate the relationship between rainfall and water use.

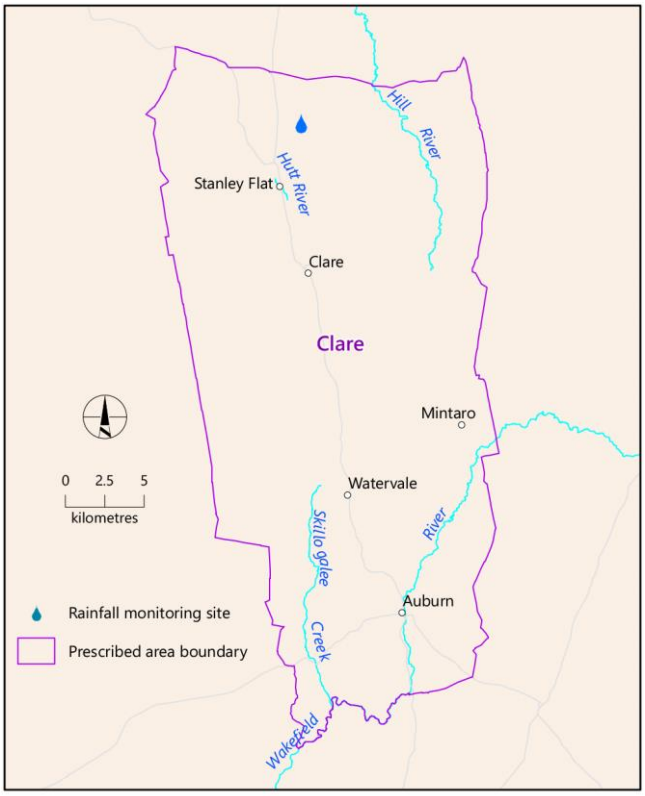


Figure 18. Map of Clare Valley

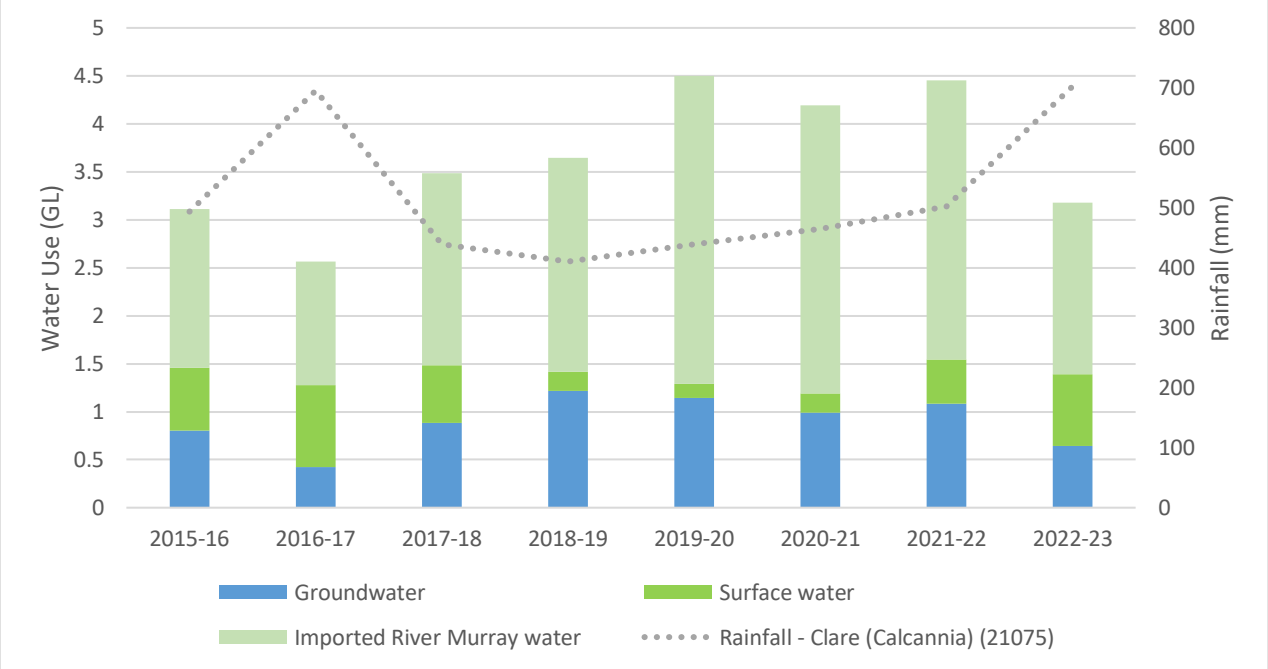


Figure 19. Clare Valley annual rainfall and water use by resource type (2015-16 to 2022-23)

Water resources

The groundwater water level status is average with salinity stable (±10%). The long-term rainfall trend (1971-2023) is declining across the Clare Valley. Streamflow and flow days are decreasing in the Hill River and Hutt River while they remain stable in the Wakefield River.

Table 12. Condition of Clare Valley prescribed groundwater resources

Clare Valley	Groundwater level status	Salinity	Rainfall
Fractured Rock Aquifer		—	↘

Water level status = Groundwater level compared to the historical range of water levels in wells in the regional monitoring network.
Salinity = Trend in groundwater salinity over period 2014 to 2023.
Rainfall = Trend in average annual rainfall over period 1971 to 2023 at Clare station.

Table 13. Condition of Clare Valley prescribed surface water resources

Clare Valley	Streamflow	Flow days	Rainfall
Wakefield River	—	—	↘
Hill River	↘	↘	↘
Hutt River	↘	↘	↘

Streamflow = Trend in annual streamflow (July to June) over period 1986-87 to 2022-23 at Wakefield (A5060500), Hill River (A5070500) and Hutt River (A5070501) streamflow monitoring sites.
Flow days = Trend in number of flowing days 1986-87 to 2022-23 at monitoring sites listed above.
Rainfall = Trend in average annual rainfall over period 1986 to 2023 at Calcannia weather station.

Water security summary

There are ongoing water security challenges in the Clare Valley related to both water availability and affordability. Further engagement is required with the Clare Valley community regarding water security. An assessment of water demand and the identification of options for bringing additional water to the Clare Valley has been completed (PIRSA 2023). A potential solution for the Clare Valley will be investigated by DEW via a joint government-industry working group. The Clare Valley Grape and Wine Association and SA Water are key members of the working group.

In an effort to further improve catchment health, the Northern and Yorke Landscape Board is also working with landholders, farming groups and stakeholders to deliver on-ground works to improve water quality in the Wakefield River catchment in the Clare region.

Adelaide Plains

The Adelaide Plains takes in most of the metropolitan Adelaide region. It stretches from Kangaroo Flat in the north, to the Onkaparinga River in the south, to the coast in the west, and to the top of the 'hills face zone' in the east.

Three separate PWAs make up the Adelaide Plains region (Northern Adelaide Plains, Dry Creek and Central Adelaide). Groundwater resources are managed under a single water allocation plan – the Adelaide Plains Water Allocation Plan. Historically groundwater extractions in the Kangaroo Flat region have been reported on separately; hence, water use and resource trends are presented separately for Kangaroo Flat and the Northern Adelaide Plains. The location of the prescribed areas is shown in Figure 20. The location of Kangaroo Flat can also be seen on the map.

Surface water is not prescribed in the Adelaide Plains region.

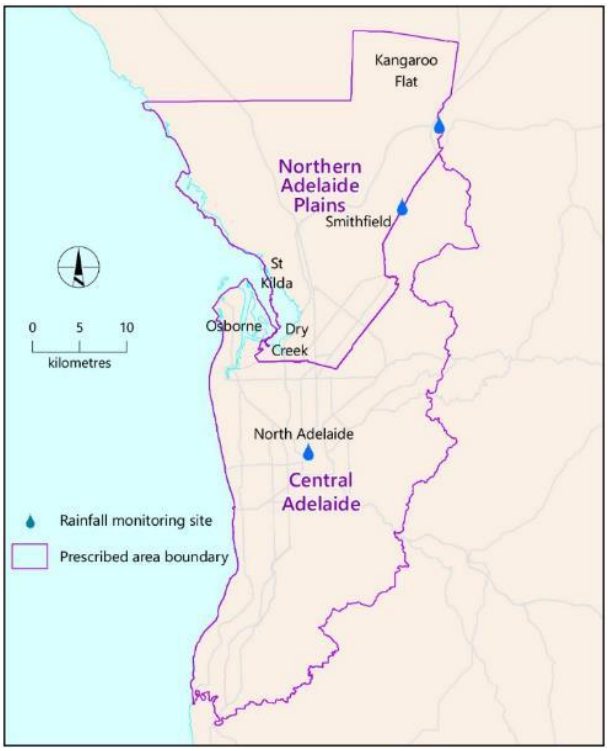


Figure 20. Map of Adelaide Plains region

Water use

Annual licensed extraction of groundwater in Dry Creek, Central Adelaide and the Northern Adelaide Plains (including the Kangaroo Flat region) has ranged from 10.1 GL to 14.5 GL over the period 2015-16 to 2022-23. In the 2022-23 year, 10.1 GL was used (Figure 21). In general, water use patterns reflect rainfall trends: less water is used in higher rainfall years compared to lower rainfall years. Rainfall varies across the 3 prescribed areas. Rainfall data for Smithfield (deemed to represent the Northern Adelaide Plains) is displayed in Figure 21 to demonstrate the relationship between rainfall and water use. In the Adelaide Plains region, the greatest volume of groundwater is used from the aquifers of the Northern Adelaide Plains. Data for the Central Adelaide region has only recently become available due to metering being initiated in the 2022-23 water use year.

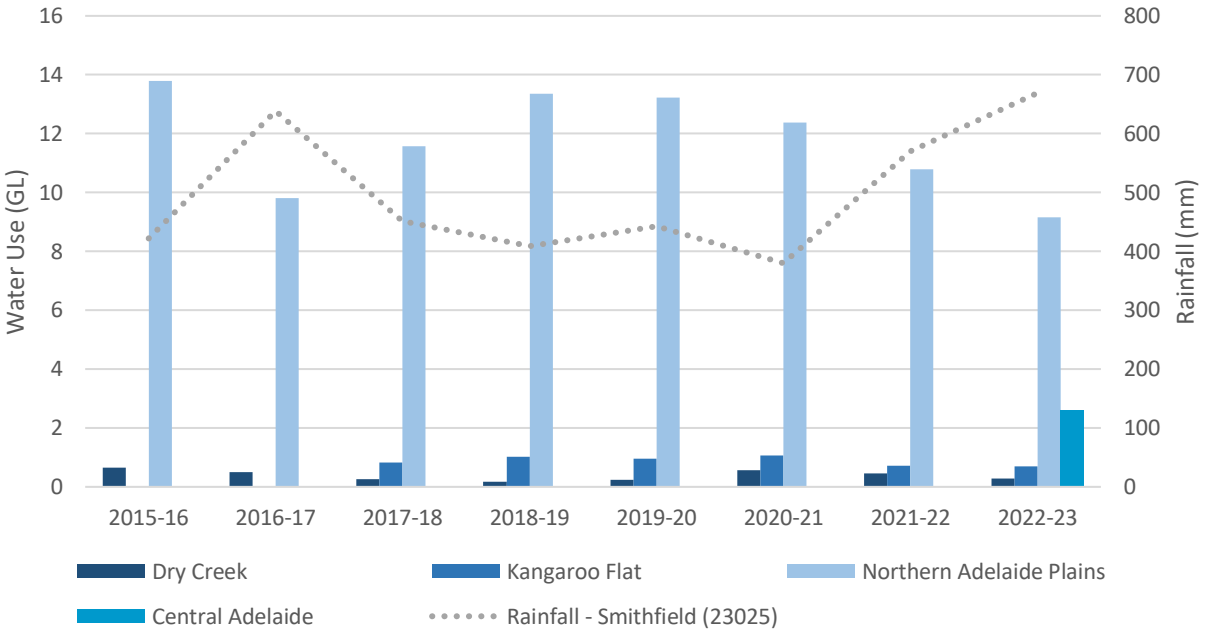
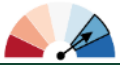


Figure 21. Adelaide Plains annual rainfall and water use by resource (2015-16 to 2022-23)[14]

Water resources

The groundwater level status across the Northern Adelaide Plains varies from average in Kangaroo Flat T2[15], to well above average in Central Adelaide T1 and Northern Adelaide T1. Despite the current groundwater level status being average or above average, the groundwater level trends in the Northern Adelaide Plains are declining. Salinity trends are stable (±10%) across the region. Rainfall in the Northern Adelaide Plains is increasing, whereas a declining rainfall trend is being observed in the Central Adelaide PWA.

Table 14. Condition of Adelaide Plains prescribed groundwater resources

Central Adelaide	Groundwater level status	Salinity	Rainfall
T1		—	↘
Kangaroo Flat	Groundwater level status	Salinity	Rainfall
T2		—	—
Northern Adelaide	Groundwater level status	Salinity	Rainfall
T1		—	↗
T2		—	↗

Water level status = Groundwater level compared to the historical range of water levels in wells in the regional monitoring network.
Salinity = Trend in groundwater salinity over period 2013 to 2023 for Central Adelaide T1. Trend in groundwater salinity over period 2014 to 2023 for remainder of water resources.
Rainfall = Trend in average annual rainfall over period 1980 to 2023 at North Adelaide weather station for Central Adelaide, at Gawler weather station for Kangaroo Flat, and Smithfield weather station for Northern Adelaide Plains.

[14] Central Adelaide metered water use data is available from 2022-23, with data representing 30% of bores in the prescribed area. Kangaroo Flat metered water use data is available from 2017-18 onwards.

[15] T1 and T2 are the two Tertiary limestone aquifers that are main sources of groundwater in the Adelaide Plains region.

Water security summary

The Adelaide Plains WAP became operational on 1 July 2022, replacing the former Northern Adelaide Plains WAP. It is the first WAP for the Dry Creek and Central Adelaide PWAs.

The WAP includes an adaptive trigger-level management approach. The adaptive management approach works by limiting the volume of groundwater that can be extracted from the T1 and T2 aquifers, of the Northern Adelaide Plains where the resource is at higher risk. This is achieved through the use of resource condition triggers. The resource condition triggers act as an early warning system that the resource condition limit is at risk of being breached and initiates a management response that greatly reduces the risk of this occurring.

The Adelaide Plains WAP also includes rules for managing water that is drained or discharged into aquifers, also known as managed aquifer recharge. The principles in the WAP enable further storage of water in the aquifers for future use where it is sustainable and therefore enhance the water security of the region.

The Northern Adelaide Irrigation Scheme is providing additional water security in the region, unlocking up to 6 GL of recycled wastewater sourced from the Bolivar Wastewater Treatment Plant (SA Water 2023). Recycled water from the Bolivar Wastewater Treatment Plant is a climate-resilient water source that is helping to build resilience to drought.

Eyre Peninsula

Eyre Peninsula's mains water supply needs are currently met by a mix of local groundwater and imported River Murray water. Further to these sources, there is a recognised need for a new climate-resilient water source in the region, to reduce the pressure on existing resources, while enabling future economic development in the region.

There are 2 prescribed wells areas on the Eyre Peninsula – Musgrave and Southern Basins. The fresh groundwater resources in both areas are used for a variety of purposes but mainly for public water supply, stock and domestic use, irrigation of open spaces and industrial purposes. The location of the prescribed areas can be seen in Figure 22.

Figure 22. Location of the Eyre Peninsula Prescribed Wells Areas

Water use

In the 2022–23 water year, 73% of water used on the Eyre Peninsula was sourced from the River Murray with 11.04 GL supplied to the township of Whyalla and the remaining 3.7 GL supplied to other Eyre Peninsula towns including Iron Knob, Kimba, Lock, Wudinna, Minnipa, Poochera, Streaky Bay, Smokey Bay and Ceduna. Beyond those locations, the groundwater resources of the Southern Basins PWA provide 85% of the peninsula's reticulated water supply , the majority of which is sourced from Uley South. Over the last 8 years, annual groundwater use from the Musgrave PWA has ranged from 0.06 GL to 0.09 GL. Use from Southern Basins PWA has ranged from 5.1 GL to 5.5 GL. In 2022-23 groundwater use was 0.06 GL in Musgrave and 5.4 GL in Southern Basins. Unlike other regions, water use patterns do not closely correlate to annual rainfall volumes due to the majority of water extracted being used to meet potable demand. Rainfall varies across the 2 prescribed areas; rainfall data from the Westmere weather station (located approximately 20 km south-west of Port Lincoln) is displayed in Figure 23.

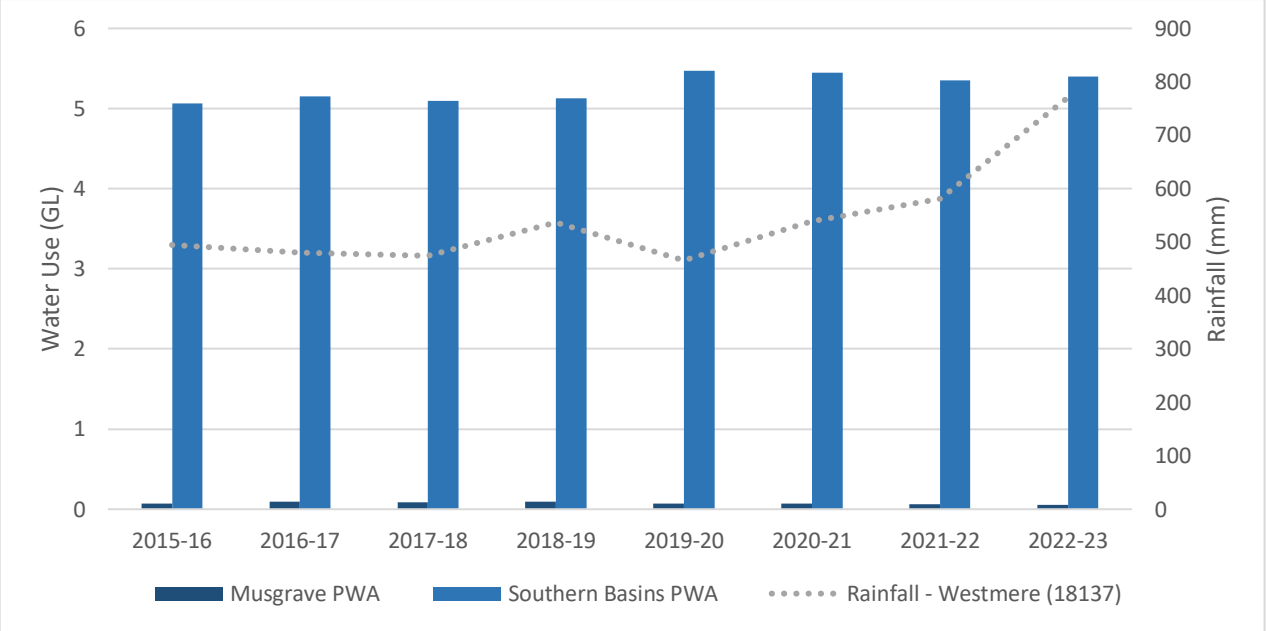


Figure 23. Eyre Peninsula annual rainfall and groundwater use by resource (2015-16 to 2022-23)

Water resources

Rainfall trends across the Eyre Peninsula region are declining. Salinity trends are increasing and, except for Coffin Bay and Uley South, the 2023 groundwater level status are below average.

While the Uley South, Bramfield and Polda resources are reported to have a groundwater level status of 'Average' (Uley South) and 'Below average' (Bramfield, Polda) as measured after winter 2023, this does not mean that the resources are in a good condition. This is an indication of the highly responsive nature of the resources to rainfall. The groundwater level status for 2023 is in response to high rainfall in 2022-23 which has resulted in a short-term water level rise. In view of longer-term groundwater level trends in these resources, it is expected they will likely return to near historically low levels before the autumn storage assessment occurs in 2024, potentially resulting in very low allocations from these resources for the 2024–25 water year.

Table 15. Condition of Eyre Peninsula prescribed groundwater resources

Musgrave	Groundwater level status	Salinity	Rainfall
Bramfield		↗	↘
Polda		↗	—
Southern Basins	Groundwater level status	Salinity	Rainfall
Coffin Bay		↗	↘
Lincoln South		↗	↘
Uley South	 ^	↗	↘
Uley Wanilla		↗	↘

Water level status = Groundwater level compared to the historical range of water levels in wells in the regional monitoring network.
Salinity = Trend in groundwater salinity over period 2014 to 2023.
Rainfall = Trend in average annual rainfall over period 1971 to 2022 at Elliston weather station (for Bramfield), at Polda weather station (for Polda), and at Westmere weather station for Southern Basins (for Coffin Bay, Lincoln South, Uley South and Wanilla).

^ The groundwater status rating of 'Average' for the Uley South resource is based on the 2022/23 water level in a network of 37 monitoring wells. The length of monitoring record among those wells ranges from 14 to 63 years. In 2022/23, following two years of above-average rainfall, the groundwater levels observed in the majority of the monitoring wells were in the mid-range of observations in their monitoring records. However, over the past 20 years, groundwater levels in the Uley South aquifer have remained within less than 1 metre of a critical minimum level. In view of this, the reliance of public water supply on this groundwater resource presents a significant water security risk despite its average groundwater level status rating.

Water security summary

Declining groundwater level and rainfall trends represent water security risks to enterprises that rely on dams and/or groundwater to provide water for stock or to meet critical human water needs. In view of the observed trends, the Eyre Peninsula is a region where groundwater supplies of a suitable quality are insufficient to meet future demand.

Recent work undertaken by DEW indicates that the long-term sustainable extraction limit from the Uley South resource, under current climate conditions, is approximately 3.5 GL per year. The resource currently provides up to 5.5 GL of water to the Eyre Peninsula. While the resource can withstand this level of extraction in the short-term, there is a pressing need for a significant additional volume of climate-resilient water to augment supply to ensure water security and long-term groundwater resource sustainability in the region.

Steps are being taken to commission a climate independent water supply within SA Water's 2024-28 regulatory period and prior to the amendment of the water allocation plan. SA Water and the Government of South Australia have identified Billy Lights Point as the preferred location for a 5.3 GL desalination plant to supplement existing groundwater sources to ensure water security for the Eyre Peninsula region. A comprehensive site selection process considered more than 15 potential

locations. This decision was informed by technical investigations, feedback from a Marine Science Review Panel, insights gained from extensive community, industry and government consultation, and assessment of the cost of construction and operation.

The findings from scientific investigations and assessments will inform how the desalination plant is designed, including the position of the intake and outfall pipes. Alongside other approvals, a development application for the plant at Billy Lights Point will be lodged with the State Planning Commission, which will be assessed by multiple agencies and regulators through a comprehensive approval process. This process provides an open, accountable and responsible decision-making approach that includes community consultation. Subject to all required approvals, construction of the plant is planned to begin in mid-2024, with first water to be delivered from the end of 2025. Once operational, the desalination plant will be able to produce 16 ML of safe, clean drinking water per day.

Elliston is a small town of approximately 350 people on the west coast of the Eyre Peninsula, north-west of Port Lincoln. SA Water draws from the nearby Bramfield groundwater resource to supply potable water to the town. Approximately 60 ML of groundwater is extracted by SA Water each year and it is estimated that up to 180 ML is extracted by landholders through private bores to support livestock enterprises and for domestic use. This groundwater resource is also important for ecosystems such as the Bramfield Red Gums. The WAP for the Southern Basins and Musgrave PWAs regulates how much water can be taken from prescribed groundwater resources, including the Bramfield resource, for licenced purposes such as public water supply and irrigation. In recent years, groundwater levels in the Bramfield resource have been falling toward critical trigger levels, as defined in the WAP. The Bramfield groundwater resource is dependent on rainfall for replenishment; however, despite 3 recent years of La Niña weather patterns, rainfall has not resulted in the expected amount of recovery in groundwater levels.

In October and November 2023, the Eyre Peninsula Landscape Board and DEW surveyed wells within the Bramfield groundwater resource and this is being used to improve understanding of current and future access to groundwater by all users and inform future management decisions.

There is sufficient supply available to meet the needs for local SA Water customers in Elliston for the remainder of 2023-24. However, DEW has advised that if groundwater levels continue to decline as predicted, allocations may be reduced to zero percent in the 2024-25 water year. If this occurs, provisions are in place for the 2024-25 water year to ensure critical human water needs for the township of Elliston can be met.

The District Council of Elliston, Eyre Peninsula Landscape Board, SA Water and DEW are working with the Elliston community on investigations to understand the longevity of the resource and to identify and prioritise long-term water security options for Elliston.

Far North

In the Far North the primary source of water is the confined groundwater from the Great Artesian Basin (GAB). Groundwater is the principal source of water for commercial, irrigation, industrial, town water supply, domestic, bore-fed wetlands, watering stock, petroleum and mining production purposes. The surface expression of groundwater, for example springs, supports traditional Aboriginal cultural value and rare native species that are, in some cases, endemic to a single mound spring.

The location of the Far North PWA is shown in Figure 24.

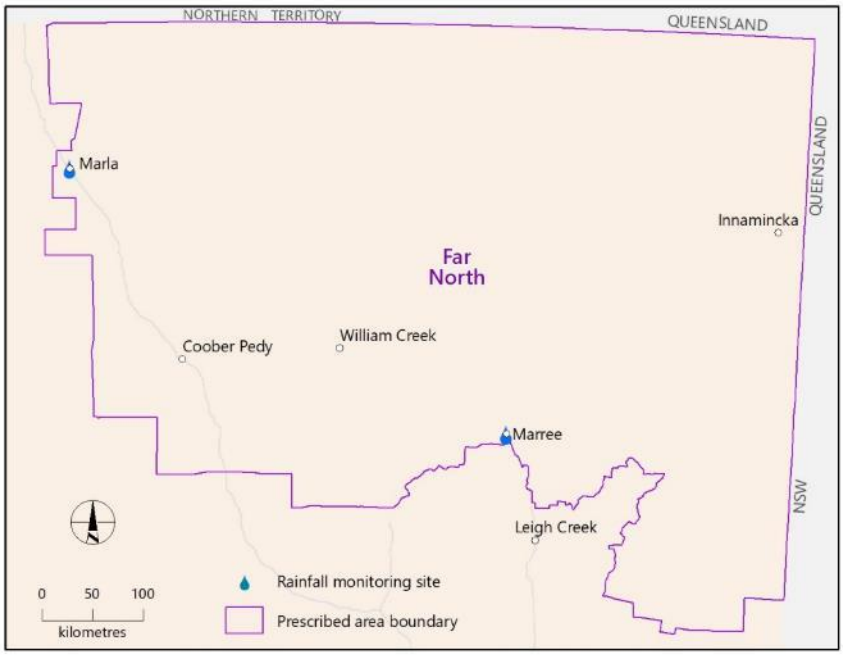


Figure 24. Map of Far North region

Water use

Comprehensive metered groundwater use data for the Far North is not yet available. The annual volume of groundwater authorised for use in mining is approximately 27.4 GL. The petroleum industry is authorised to use approximately 24.6 GL (2.7 GL petroleum industrial water and 21.9 GL co-produced water). Stock use is estimated to equate to approximately 10.1 GL per year.

Groundwater used for mining and petroleum is metered, but groundwater used by pastoralists has not been measured until recently. Due to the difficulties experienced by the pastoral industry in relation to metering water use, the South Australian Arid Lands Landscape Board and DEW are working with pastoralists to identify fit-for-purpose 'water accounting' methods.

The Accounting for Groundwater Take Project aims to identify groundwater accounting solutions that meet the requirements associated with managing a PWA in a way that does not significantly impact a pastoral business, ideally adding value to the businesses.

The project is initially being established for 18 months to investigate and trial metering, measuring and accounting options that may be suitable for the Far North and can be used to support development of the water accounting implementation plan. Trials will be undertaken to evaluate proposed accounting methods against key criteria of reliability, practicality, cost and accuracy. This information will support the development of a groundwater accounting implementation plan for the Far North PWA.

Water resources

The groundwater level status in the GAB (J-K) aquifer is average; salinity level trends are stable; and rainfall trends in the north-west part of the prescribed resource are stable, while in the southern parts rainfall trends are declining.

Table 16. Condition of Far North prescribed groundwater resources

Far North	Groundwater level status	Salinity	Rainfall	
GAB (J-K) aquifer				*

Water level status = Groundwater level compared to the historical range of water levels in wells in the regional monitoring network.
Salinity = Trend in groundwater salinity over period 2014 to 2023.
Rainfall = Trend in average annual rainfall over period 1971 to 2023 at Marree (representative of the southern part of the prescribed area) and Marla (representative of north-west part of the prescribed area).
***The rainfall trend at Marla (representative of the north-west part of the region) is stable, while at Marree (representative of the southern part of the region) the rainfall trend is declining.

Water security summary

An updated water allocation plan was adopted in February 2021. The provisions of the Far North WAP aim to ensure that groundwater use does not have unacceptable impacts on the groundwater pressure or levels that would affect other users' ability to access the groundwater or reduce natural discharges to sites of cultural or ecological significance.

Over the past 2 decades, the state and Australian governments and landholders have invested approximately $29 million to repair and restore uncontrolled wells and to close open drains across the GAB to improve artesian pressure. In South Australia, the Far North WAP further supports this investment by requiring groundwater taken for pastoral use to be through closed delivery systems.

Although resource trends do not raise concern regarding the security of the GAB aquifer, the Northern Water Supply Project has demonstrated the need for a desalination plant and pipelines to meet the increasing demand for water by mining and emerging green energy industries in the Upper Spencer Gulf region (Government of South Australia 2023). The business case for the project has been completed and further development of the project is underway in the lead-up to a final decision on whether to progress with construction of the project in late 2025. Cape Hardy has been selected as the preferred location for the Northern Water Supply Project following a multi-criteria analysis of 4 shortlisted desalination plant location sites. Other recent project developments include:

- the commencement of the Design Build Operate and Maintain procurement processes
- commencement of environmental approvals
- initial land access discussions
- ongoing community and stakeholder consultation.

Another project, the Water and Infrastructure Corridors initiative, is attempting to address water access and productivity constraints to growth by improving knowledge of groundwater resources in targeted regions of South Australia and identifying requirements for developing multi-use infrastructure corridors in priority areas. This initiative is a $5.6 million project delivered by DEW, the Department for Infrastructure and Transport, and the Department for Energy and Mining. The findings of this project may be beneficial to the water security of the Far North.

Non-prescribed resources

There are extensive areas of South Australia where comprehensive management through a WAP and water licensing system is not required because there is not sufficient demand for water or there is a low risk to the water resources. For these non-prescribed areas, water affecting activities are managed through permits to protect the integrity of the water resources and to minimise the impact of the activities.

The Yorke Peninsula, Kangaroo Island and the Alinytjara Wilurara region (north-west third of South Australia) are examples of locations where a permit system is used to protect the integrity of the water resources and to minimise the impact of water affecting activities.

Yorke Peninsula

On the Yorke Peninsula, rural land is largely used for dryland cereal cropping and sheep and cattle grazing. Salt production, mining, fishing and tourism are also important industries for the region. Surface water supplies are limited and almost all groundwater shows high salinity and is not suitable as a supply of drinking water for humans. While drinking water is supplied to many townships in the region from the River Murray (via the Morgan-Whyalla and Swan Reach-Paskeville pipelines), a number of coastal landowners rely on rainwater for drinking water supplies. A desalination plant at Marion Bay supplies water to Marion Bay residents, businesses and visitors to the area. Water affecting activities are managed via the Northern and Yorke Landscape Board Water-Affecting Activities Control Policy (Northern and Yorke Landscape Board 2020).

Alinytjara Wilurara region

The Alinytjara Wilurara region covers over a quarter-of-a-million square kilometres, stretching from the Northern Territory and West Australian borders and south to the Great Australian Bight Marine Park. The primary land tenure is formally recognised Aboriginal Lands and Government Reserves. There are no permanent rivers or creeks in the region and the recharge of groundwater, rock holes, springs and soaks is dependent on infrequent heavy rainfalls. Rock holes and soaks have significance to First Nations as ceremonial, social and trading locations and are central to the health of remote Aboriginal communities. In the past, the presence of water in rock holes and soaks has governed where family groups cluster and travel.

Groundwater remains the predominant water source for Aboriginal settlements. Projects are underway to improve the quality and reliability of supply to communities in the region (see 'Remote Communities' on page 13 for more information). Water affecting activities in Alinytjara Wilurara region are managed via a permitting system.

Kangaroo Island

On Kangaroo Island, cropping and grazing (predominantly sheep for wool and meat) are the main primary industries. Kangaroo Island relies heavily on surface water captured in farm dams to supply water for stock and domestic needs; the largest reservoir on the island is part of the Middle River Water Supply System. There is limited good quality groundwater available on Kangaroo Island.

Together, the Middle River Water Supply System and the Penneshaw Desalination Plant supply drinking water to approximately half of Kangaroo Island's population. In areas outside of the reticulated water networks, rainwater is the main source for household drinking supplies. A new desalination plant is being built near Penneshaw to supplement the existing Penneshaw facility and Middle River Reservoir. A new 50-km water main will connect the new plant to the Middle River–Kingscote network for delivery of safe, clean drinking water to 4 Kangaroo Island communities by mid-2024. Two major milestones have been reached since construction of the new plant recommenced in October 2022. The site's first major concrete pour in February 2023 takes the total amount of concrete poured on site to 245 cubic metres to date. Another significant milestone is the successful installation and testing of 14 km of water main between Pelican Lagoon and Haines, which means the project is almost one third of the way through the total 50-km installation.

Water affecting activities are managed on Kangaroo Island via the Kangaroo Island Water Affecting Activity Control Policy (Kangaroo Island Landscape Board 2019).

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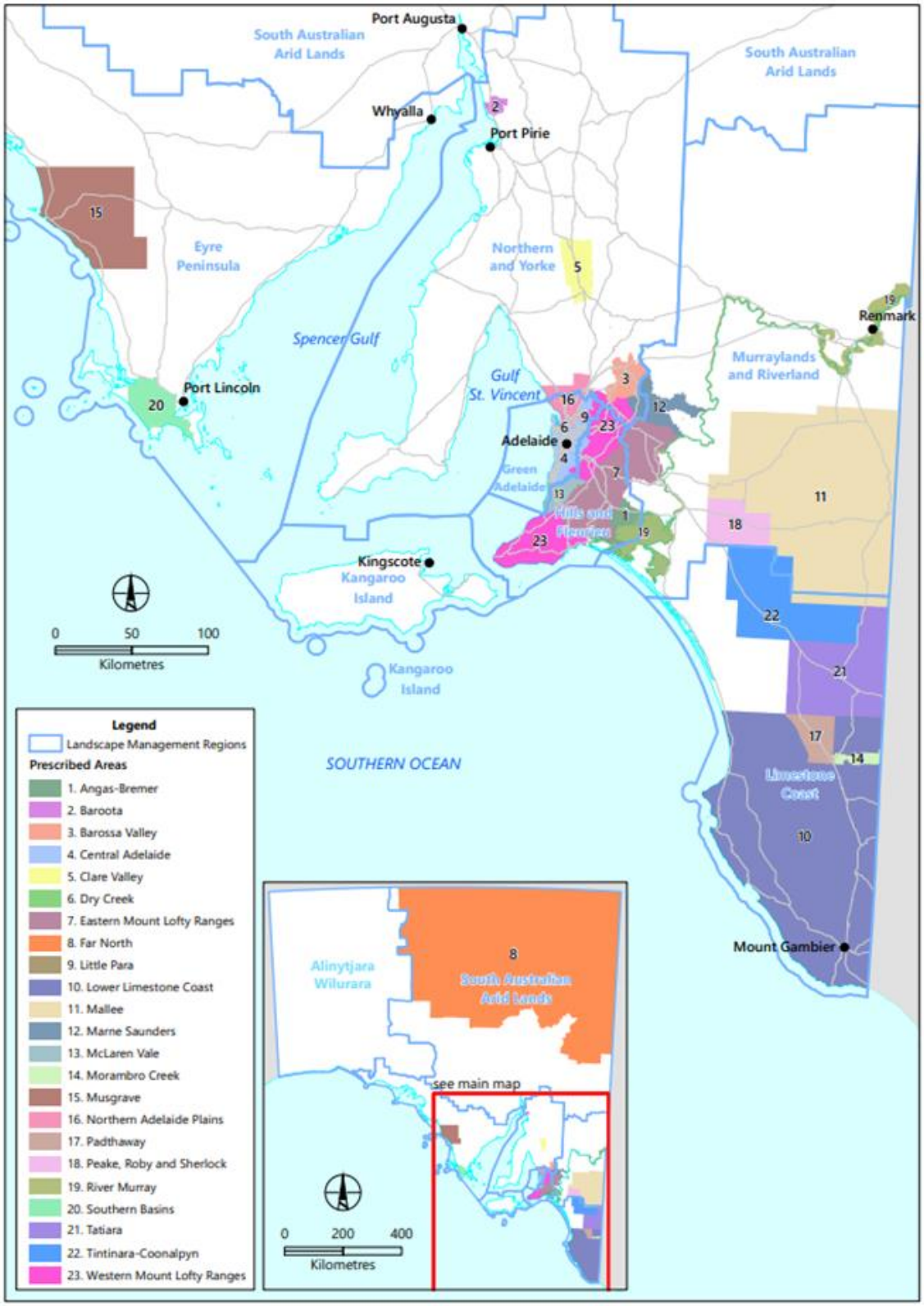
Appendix A: Water allocation plan status and review timeframes

Prescribed water resource	Water allocation plan (WAP)	Landscape region (primary region in bold)	Adoption date of current WAP	Status*
Far North Prescribed Wells Area	WAP for the Far North Prescribed Wells Area	South Australian Arid Lands	February 2021	Review due by 2031
River Murray Prescribed Watercourse	WAP for the River Murray Prescribed Watercourse	Murraylands and Riverland	April 2023	2033
Northern Adelaide Plains Prescribed Wells Area (which includes the Kangaroo Flat region) Central Adelaide Prescribed Wells Area and Dry Creek Prescribed Wells Area	Adelaide Plains WAP	**Green Adelaide** Northern and Yorke Hills and Fleurieu	July 2022	Review due by 2032
Barossa Prescribed Water Resources Area	WAP Barossa Prescribed Water Resources Area	Northern and Yorke	June 2009	Amendment underway
Tatiara Prescribed Wells Area	Tatiara WAP	Limestone Coast	June 2010	Amendment underway
Padthaway Prescribed Wells Area	WAP for the Padthaway Prescribed Wells Area	Limestone Coast	April 2009	Amendment underway
Baroota Prescribed Water Resources Area	WAP for the Baroota Prescribed Water Resources Area	Northern and Yorke	New WAP under development	Review due 10 years following adoption of new WAP
Morambro Creek Prescribed Water Resources Area	Morambro Creek WAP	Limestone Coast	January 2006	Review due 2026

McLaren Vale Prescribed Wells Area	WAP McLaren Vale Prescribed Wells Area	**Hills and Fleurieu** Green Adelaide	2007	Amendment underway
Peake Roby and Sherlock Prescribed Wells Area	WAP for the Peake Roby and Sherlock Prescribed Wells Area	Murraylands and Riverland	March 2011	Amendment underway
Clare Valley Prescribed Water Resources Area	WAP for the Clare Valley Prescribed Water Resources Area	Northern and Yorke	February 2009	Review due by 2029
Mallee Prescribed Wells Area	WAP for the Mallee Prescribed Wells Area	Murraylands and Riverland	May 2012	Amendment underway
Tintinara–Coonalpyn Prescribed Wells Area	WAP for the Tintinara–Coonalpyn Prescribed Wells Area	Limestone Coast	January 2012	Review due by 2026
Western Mount Lofty Ranges Prescribed Water Resources Area	WAP Western Mount Lofty Ranges	**Hills and Fleurieu** Northern and Yorke Green Adelaide	September 2013	Review in progress
Lower Limestone Coast Prescribed Wells Area	WAP for the Lower Limestone Coast Prescribed Wells Area	Limestone Coast	November 2013	Review completed December 2023 Amendment to commence 2024
Eastern Mount Lofty Ranges Prescribed Water Resources Area	WAP Eastern Mount Lofty Ranges	**Hills and Fleurieu** Murraylands and Riverland Northern and Yorke	December 2013	Review in progress
Musgrave Prescribed Wells Area Southern Basins Prescribed Wells Area	WAP for the Southern Basins and Musgrave Prescribed Wells Areas	Eyre Peninsula	June 2016	Review due by 2026
Marne Saunders Prescribed Water Resources Area	WAP for the Marne Saunders Prescribed Water Resources Area	**Murraylands and Riverland** Northern and Yorke	January 2010	Review to occur in 2024

**Status as of 31 March 2024*

Appendix B: Prescribed water resources



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