



Upper Collie

water allocation plan: 2018–24 evaluation statement

The *Upper Collie water allocation plan 2009* manages groundwater and surface water resources in the Collie Coal Basin and the Collie River catchment, including the Wellington Reservoir. More than a hundred years of coal mining, which has supported the state's power demands, has altered the scientifically complex water resources in this area.

The Collie area is now undergoing a significant industrial transition. This will provide new priorities for water management in the Upper Collie and further opportunities to adapt to changing rainfall, streamflow and groundwater recharge as the climate changes.



Acknowledgement of Country

The Department of Water and Environmental Regulation acknowledges the Noongar people as the Traditional Owners and custodians of the Upper Collie water allocation plan area. The area is home to the Ganeang, Pinjarup and Wilman people of the Noongar Nation. The people of this land have a strong connection to land and waters of this region.

We pay our respects to Elders past, present and emerging, and to all members of the Aboriginal communities in Noongar Boodja and their cultures. We acknowledge that Traditional Owners have been custodians of Country for countless generations and that water is integral to life.

We recognise that Aboriginal people and their culture across Noongar Boodja are diverse and that continued custodianship of the land and water is fundamental to their health, spirit, culture, and community.

We embrace the spirit of reconciliation, and we seek to listen, learn, and build strong partnerships with genuine opportunities for Aboriginal people throughout our business.



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1. Upper Collie catchment

The Upper Collie water allocation plan 2009 (the allocation plan) area features a unique and contrasting landscape. It includes areas of natural beauty, such as the Collie River Valley, and an emerging tourism sector – all set against a backdrop of more than a hundred years of farming, coal mining and power generation (Figure 1).

The Collie region has generated most of the electricity for the South West Interconnected System supplying electricity to more than 1.1 million homes and businesses in Western Australia (WA). The State Government's decision to retire the Muja and Collie A power stations by 2030 is driving significant economic and social change in the area. The State Government supports the transition away from coal-fired power generation in Collie through the [Collie Just Transition](#) plan – a \$660 million dollar investment package to support the community and economic transition. A key part of the transition plan is to diversify the region's economy into new industries, reducing reliance on power generation and coal mining.



Figure 1 Contrasting landscape across the Upper Collie catchment

The allocation plan manages the ground and surface water resources in the proclaimed Collie groundwater area and the proclaimed Collie River Irrigation District upstream of, and including, the Wellington Dam (Figure 2).

People have abstracted water from the Upper Collie surface and groundwater resources for over a century. The allocation plan was developed to manage water abstraction and the already modified water resources to meet the water demands for power generation, coal mining and irrigated agriculture. Under the *Collie Coal (Griffin) Agreement Act 1979* and *Collie Coal (Western Collieries) Agreement Act 1979*, the State Government has supported coal mine operations, including dewatering requirements and supplying surplus mine dewater for power generation.

The state agreements make commitments to coal mining and power generation that have led to decades of abstraction above the allocation limit causing groundwater mining where water is extracted faster than it can be naturally replenished. Dewatering for coal mining has significantly modified the groundwater resources, causing large declines in groundwater levels. Since the release of the allocation plan, the department has stopped issuing new groundwater licences, except for mine dewatering needs, to support the long-term management of groundwater as the volume of dewatering gradually declines.

In addition to these impacts, the Upper Collie catchment is experiencing the effects of dry land salinity as well as the consequences of hotter summers, decreased rainfall and changed rainfall patterns. These changes have led to reduced river flows and increased salinity that affect the ecology and usability of the surface water resources.

This is the second published plan evaluation showing how the allocation plan has performed against its water resource objectives. The evaluation shows continued progress towards some of the plan objectives. However, abstraction above the allocation limit and the ongoing warming and drying climate has raised challenges for managing water in the region.

These challenges include:

- reduced volume and quality of water into Wellington Reservoir from climate change
- residual groundwater drawdown or longer than anticipated groundwater recovery timelines
- further declining of groundwater quality through salinisation
- acid and/or metalliferous drainage (AMD).

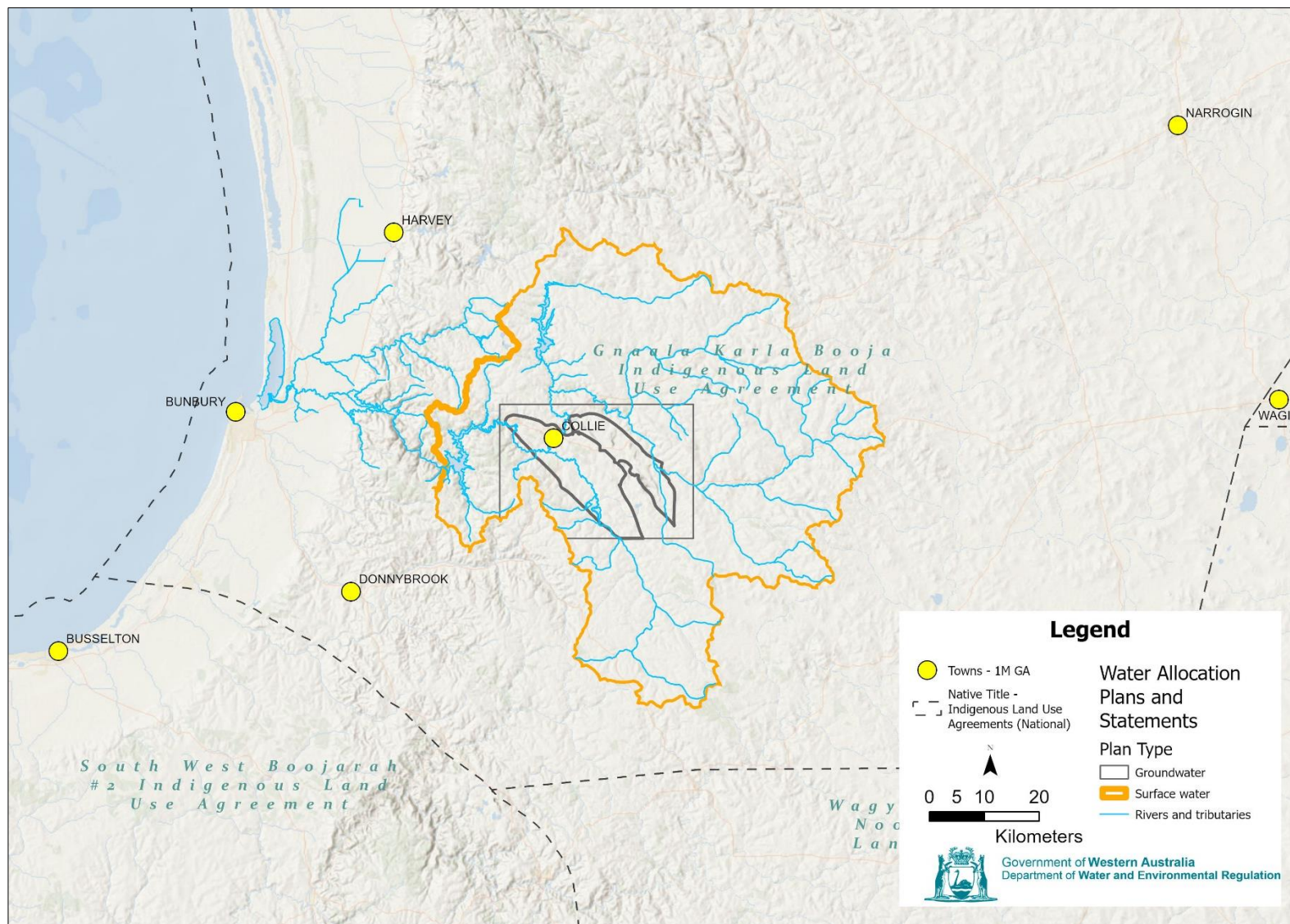


Figure 2 Water resources covered under the allocation plan – the surface water catchment area (orange), and the groundwater area (black) including the Collie Coal Basin (grey)

1.1 History of water management in the Upper Collie region

In 1931, the State Government proclaimed the Collie River Irrigation District under the *Rights in Water and Irrigation Act 1914* (RiWI Act). In 1933, the State Government constructed the Wellington Dam and later enlarged it in 1946 and 1960, to meet growing water demands. Clearing of native forest for pasture and agriculture in the upstream areas of the Upper Collie catchment has increased salinity levels in the rivers and waters within the Wellington Reservoir. This prompted the construction of Harris Dam in 1987 to provide drinking water to the Great Southern Town Water Supply Scheme (GSTWSS). Water from Wellington Reservoir still supports irrigated agriculture but faces the challenges of decreasing inflow and increasing salinity as the climate changes. The State Government continues to seek ways to optimise water use from this strategic asset.

In 1977, the State Government proclaimed groundwater resources in the Collie Groundwater Area under the RiWI Act. The Collie Coal Basin (Figure 2) contains the only operational coal mine in the state. In 1979, the State Government approved two state agreements to support coal operations in the Collie Coal Basin. These agreements allow for the abstraction of water beyond the allocation limits set in the allocation plan.

State agreements

The *Collie Coal (Griffin) Agreement Act 1979* and the *Collie Coal (Western Collieries) Agreement Act 1979* ratified an agreement between the State of Western Australia and The Griffin Coal Mining Company Limited and Premier Coal Limited respectively. The agreements outline requirements in relation to planning, development, mining and rehabilitation of coal resources in the Collie Coal Basin.

In 2024, the Government of Western Australia agreed to extend the *Collie Coal (Griffin) Agreement Act 1979* to 30 June 2026. Premier Coal's current agreement expires in 2028.

The State Government intends to retire state-owned coal-fired power generation in Collie by 2029.

2. Status of water resources

Rainfall has declined more in south-west WA than anywhere else in Australia. The observed drying trend is projected to continue, with expected declines in annual, winter and spring rainfall. We expect that the time spent in low rainfall and dry conditions, including the length and area of multiyear dry conditions, will increase (DWER 2024).

Climate change will cause average, maximum, and minimum temperatures and evapotranspiration rates to increase. These temperature increases will affect vegetation water demand and evaporation from water bodies, including riverine pools, pit-lakes and shallow groundwater systems.

Lower rainfall and higher temperatures will lead to drier and hotter conditions resulting in decreased soil moisture, reduced runoff and recharge.

2.1 Status of surface water resources

Since 2009, when the allocation plan was released, average annual rainfall in Collie has been about 790 mm, 40 mm lower than the 1975 to 2008 annual average of 830 mm. This declining rainfall has led to lower streamflow. At Mungalup Tower, the average annual streamflow since 2009 has been 51 GL, about half the annual average recorded from 1975 to 2008, which was 96 GL (Figure 3). The post-2009 streamflow also recorded the lowest annual total on record, 7 GL in 2010.

Mining operators remove groundwater to purposefully lower the watertable to facilitate mining operations. This removal of groundwater, referred to as dewatering, is encouraged to be repurposed to meet operational water demands or to meet third party's water demands. It is common that the volume of dewater is in surplus to the water demands and is disposed of into the Collie River East Branch, that eventually flows into Wellington Reservoir. The highest annual volume of disposed surplus mine dewatering into the river was 18 GL in 2012, which has since reduced to 0.9 GL in 2023 (surplus mine dewatering volumes are shaded light blue in Figure 3).

The disposal of mine dewatering into the river has masked some of the impacts of climate change, particularly during summer through the Collie town site. We expect the disposal of surplus mine dewater to continue to decrease and potentially cease by 2030.

Since 2009, average annual salinity at Mungalup Tower has increased (Figure 4). Average annual salinity is now 25 per cent higher than the 1975 to 2008 average. The disposal of surplus mine dewater has diluted the effect of secondary salinisation on streamflow in the main Collie River and tributaries. The Department of Water and Environmental Regulation (the department) will conduct salinity monitoring along the Collie River East Branch to monitor changes in salinity over the 2024–25 dry season and in response to declining disposal of surplus mine dewater.

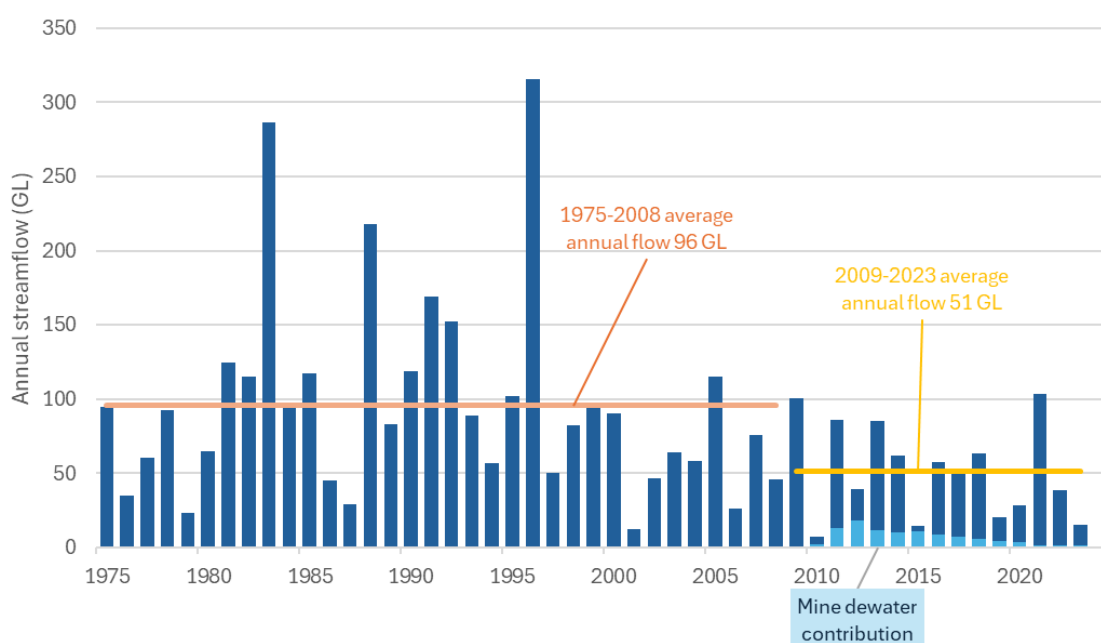


Figure 3 Annual streamflow at Mungalup Tower gauging station

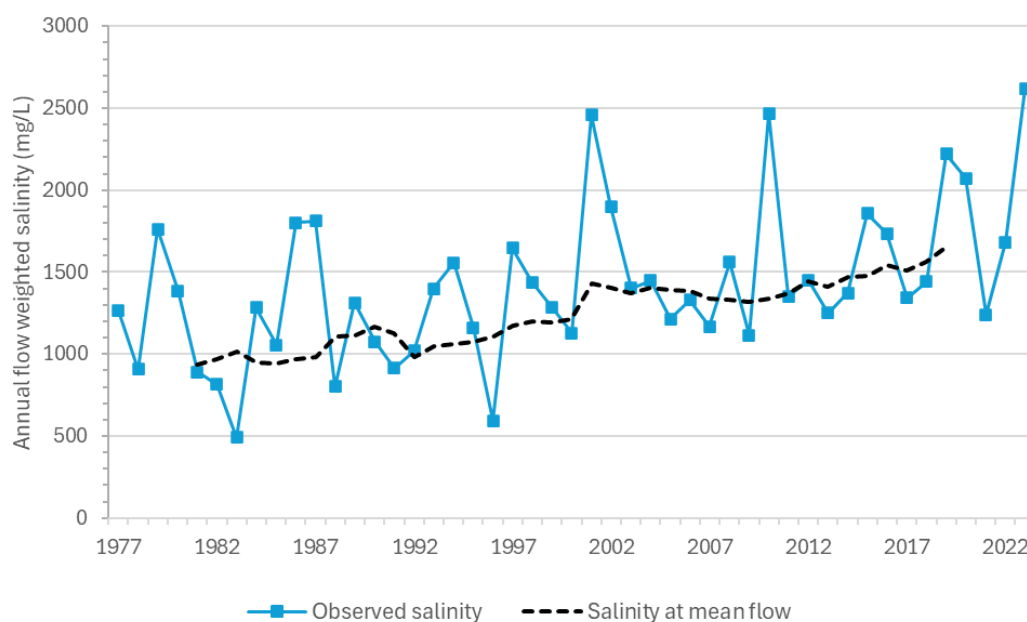


Figure 4 Annual average salinity at Mungilup Tower gauging station

2.2 Status of ecological values

River health assessments in the summers of 2018 and 2022 show little change in fish and crustacean assemblages in the Upper Collie catchment (An example of a sampling site is shown in Figure 5). We observed a slight increase in the variety of species at most sites in 2022. The department observed four species of endemic freshwater fish species (nightfish, western minnow, western pygmy perch and freshwater cobbler) (Figure 6), one native fish species (blue-spot goby), two non-native fish species (eastern gambusia and redfin perch) and three species of endemic freshwater crustaceans (smooth marron, gilgie and south-west glass shrimp).

Other notable native species included the south-western snake-necked turtle, rakali (water rat) and Carter's freshwater mussel. The Carter's freshwater mussel is listed as vulnerable under the *Biodiversity Conservation Act 2016* (state, Western Australia), and the rakali is a Priority 4 species under the *Biodiversity Conservation Act 2016*.



Figure 5 Cardiff Town Pool river health sampling location

Sites with the highest variety of species and abundances were generally associated with healthy and intact native vegetation along the river corridor. At some locations, common species such as gilgie, western minnow, and blue-spot goby were found in low numbers or were absent. These results were consistent with suboptimal habitat and/or water-quality conditions associated with historical de-snagging (the removal of large woody debris from a river channel) and secondary salinisation.

Suboptimal water-quality conditions were recorded at three of the nine river health monitoring sites, including sites on both the Collie River East and South branches. Dissolved oxygen levels dropped to around 4 mg/L for short periods at some sites, which is at the lower end of optimal conditions for most aquatic fauna. High salinities were recorded in some locations, particularly in the upper reaches of the Collie River East Branch. Duderling Pool had a daily salinity reading of 7,000 mg/L in 2018, the highest of all the sample locations. In 2022, Duderling Pool recorded salinity around 3,500 mg/L, which is still considered above tolerances of many aquatic species.

Pressure on the Collie River ecosystems is increasing in the drying and warming climate. Areas where native vegetation has been cleared are particularly at risk given the role of vegetation in buffering temperature extremes, maintaining groundwater levels to mitigating secondary salinity and maintaining habitat in refuge pools. The historical disposal of surplus mine dewater into the Collie River has masked some of the effects of drying climate. We expect lower summer water levels and higher salinity with the reduced volume of mine dewater discharge into the Collie River. River health assessments will be conducted in 2025 to continue to monitor aquatic biota and water-quality conditions, with long-term loggers to be deployed at specific locations to monitor water-quality responses due to changes in climate and streamflow.



Figure 6 Sampling and identification of fish species in Collie

Upper Collie River Aquatic Habitat Restoration project

The Collie River system, like most rivers and streams across the South West, naturally ceases to flow and becomes disconnected through summer. Native species are highly adapted to these conditions, rapidly retreating to dry season refuge pools as flows reduce.

The potential for biodiversity to withstand the ongoing decline in streamflow is largely reliant on maintenance of habitat quality in these refuges. This potential is at significant risk in many parts of the Collie River due to the removal of large woody debris from many areas, largely to reduce flood risk. This means that pools can support fewer animals (less habitat) and those that exist are exposed to predation, particularly by introduced predators such as redfin perch.

In 2024, through a collaborative partnership between the department, Leschenault Catchment Council, Ozfish, Shire of Collie, and Traditional Owners, priority pools were selected for habitat restoration. Large woody debris including 12 fish hotels were deployed into one pool in 2024, and a second pool will be covered in 2025.

Monitoring is underway with support from local schools to assess the success of the restoration work to improve populations of native fish and crayfish.



3. Status of groundwater resources

The State Government installed groundwater monitoring through the Collie Basin Shallow and Collie Regional Water Monitoring bore networks which are now monitored by private entities. These private entities monitor groundwater under regulatory requirements or to support their coal mining and power generation operations. The department is working with industry to implement the Collie Regional Water Monitoring program to align water measurement and improve the efficiency of groundwater monitoring across the Collie Coal Basin.

3.1 Groundwater levels

Coal mining has significantly lowered groundwater levels across areas of the Collie Coal Basin through over-abstraction for mine dewatering. Historical abstraction above the allocation limit has largely disconnected the groundwater system from the surface water system, changing many surface water features from gaining (groundwater discharging to surface water systems) to losing (surface water recharging the groundwater system).

In the Cardiff sub-basin, dewatering for mining ceased by the late 1990s. Since then, groundwater levels around underground mines have risen. The recent rate of groundwater rise between 2008 and 2022 was slower than that observed between 1998 and 2008. While groundwater levels continue to recover in the Cardiff sub-basin, we need to carefully manage current water use to maintain this recovery into the future.

In the Premier sub-basin, open-cut coal mining is ongoing. Although coal production and mine dewatering have declined since the release of the allocation plan, groundwater mining still occurs to support coal mining and power generation. We expect groundwater levels in the Premier sub-basin to decline further until at least the end of the decade. Post-2030, groundwater levels may take significantly longer than expected to recover, and there is a risk they may never fully recover to pre-mining conditions. As the climate continues to dry, we expect rainfall and groundwater recharge to decrease, which will influence the eventual groundwater levels and rate of groundwater recovery.

3.2 Groundwater quality

The department has reviewed water-quality data collected by industry and the department since 2005.

Across the Collie Coal Basin, groundwater salinity varies based on location and depth, with salinity observations ranging from 150 mg/L to above 5,000 mg/L. Many bores show an increasing salinity trend over time. There is a risk of saltwater intrusion where saline water within the Collie River East Branch and Chicken Creek recharges the underlying freshwater groundwater resource in the Premier sub-basin (Figure 7). Surface water salinities in these areas are increasing, and currently range from ~1,000 mg/L to over 17,000 mg/L. The department is investigating the localised extent of saltwater intrusion at river pools near the confluence of the Collie River East Branch and Chicken Creek as part of the State Groundwater Investigation Program (SGIP) Collie project.

There are observations of elevated concentrations of metals such as iron, aluminium, nickel, zinc and copper, combined with low pH (typically <4) and/or high acidity. These are typical signatures of Acid and/or Metalliferous Drainage (AMD), which is a common legacy issue at many mine sites worldwide. Coal mining areas are often associated with sulphidic sediments that naturally exist below the water table. Under normal circumstances they pose very little risk to the environment. Dewatering activities that lower the watertable can expose sulphidic sediments to air, causing an oxidising process that produces acidic run-off. This acidic water can dissolve metals in the surrounding rock. When dewatering ceases and groundwater levels rise, the groundwater passes through the acidified and metallic soils, decreasing the pH levels and increasing the soluble metal concentrations. In Collie, many bores exhibit low alkalinity, which indicates a limited potential for neutralisation of acidic water as groundwater recovers.

For instance, in the Premier sub-basin, the department has observed decreasing pH and increasing concentrations of iron, manganese and aluminium [for instance in the Ewington 2 mine area (Figure 7)]. Indicators of AMD are also observed in the Cardiff sub-basin, such as elevated concentrations of metal/metalloids and acidity in some production bores located in the abandoned underground mine voids (Figure 7).

Rising groundwater levels in underground mines can lead to overflow and discharge of AMD into nearby rivers and streams. Similar observations were made at the abandoned Wallsend Colliery (Figure 7), near the Collie Townsite (Figure 7). The department will conduct additional monitoring near the discharge location of the Wallsend Colliery to further define the localised extent of AMD as part of the SGIP Collie project.

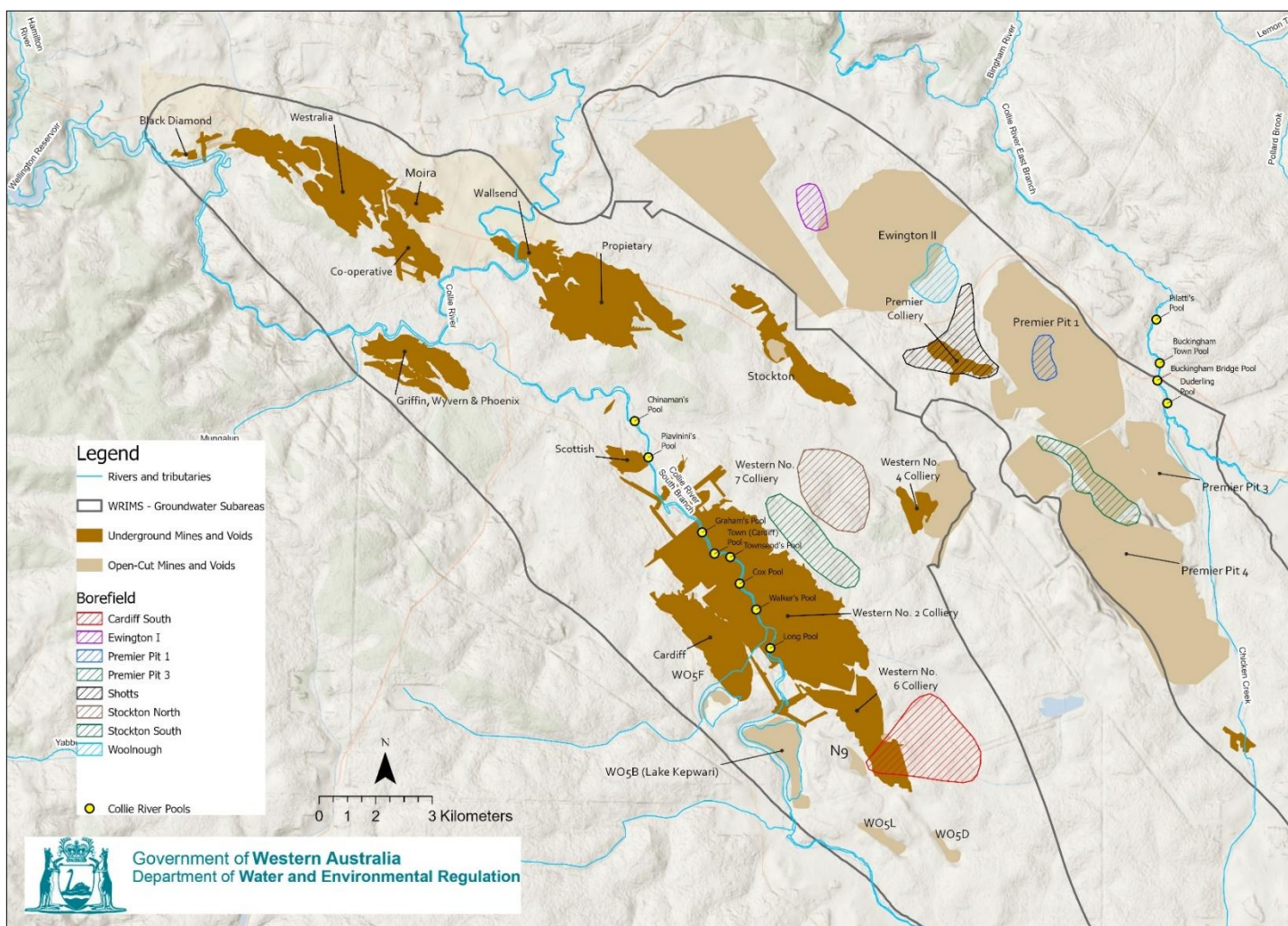


Figure 7 Location of open-cut and underground coal mines with borefield locations to 2022 (map information sourced from PSM 2024)

3.3 Surface to groundwater interaction

The groundwater-dependent river pools in the Collie River South and East branches support diverse environmental, social, cultural and recreational values. Significant groundwater abstraction and climate change continue to influence these river pools.

The department maintains the supplementation position established in the 2017 evaluation statement, supporting supplementation on the Collie River East Branch until at least 2030. Supplementation aims to mitigate dewatering impacts on the two groundwater dependent pools, Buckingham and Duderling, located on the east branch.

The need for pool supplementation post 2030 will be informed by ongoing monitoring being conducted by industry and the department's [Healthy Rivers program](#).

4. Status of water resource use

4.1 Surface water use

Surface water users in the Upper Collie rely mainly on water stored in dams or behind weirs. Small self-supply dams support a variety of irrigation demand including vineyards, orchards, stock and for domestic purposes. The largest surface water users rely on water captured and released from Wellington Reservoir located at the downstream end of the Upper Collie plan area.

In town, most users pump water directly from the river to irrigate public open space and recreational areas like ovals, golf courses and gardens during summer. Access to this water is assisted by two weirs, Venn Street and Roberts Rocks, both of which hold water in the river during summer. Both weirs have had major upgrades since 2016. The Shire of Collie manages these weirs for irrigation, recreational and aesthetic purposes during the dry season.

Wellington Reservoir

Water from the Wellington Reservoir is used to support irrigation in the Collie River Irrigation District, industrial use and the downstream environment. The allocation limit for Wellington Reservoir was set in the allocation plan and reduced in 2018 to 68 GL/yr in response to reduced inflows.¹ The department provides technical support to initiatives seeking to sustain the benefits of Wellington Reservoir.

Harris Reservoir

Harris Reservoir continues to provide potable water supply through Water Corporation's Great Southern Towns Water Supply (GSTWSS) network. However, due to declining flows, Water Corporation relies less on Harris Reservoir and has diversified its supply options for the GSTWSS to include Stirling and Binningup desalination water.

¹ Decision announced in the [Wellington Reservoir allocation statement](#).

4.2 Groundwater use

Groundwater abstraction for mine dewatering accounts for the largest volumes of water allocated in the Premier sub-basin. Mine dewater is used or stored on site for operational needs (e.g. dust suppression and consumption), supplied to third parties for power generation, used to supplement river pools, or released into the river. In the Premier sub-basin, since 2009, the annual volume of water abstracted for dewatering has exceeded the allocation limit (Figure 8).

The largest groundwater abstractions in the Cardiff sub-basin are for power generation. Current licensed entitlements exceed the allocation limits (Figure 9), but active management to guide the location and amount of abstraction has resulted in rising groundwater levels. Reducing mining in the Cardiff sub-basin has decreased groundwater abstraction since the release of the allocation plan. Groundwater is still used for power generation, and if water demands cannot be satisfied by surplus mine dewatering, additional supplies may be required.

Currently, the supply of mine dewatering water occurs between the coal mining and the coal-fired power generation sector. State agreements and policies in the allocation plan largely regulate these supply arrangements.

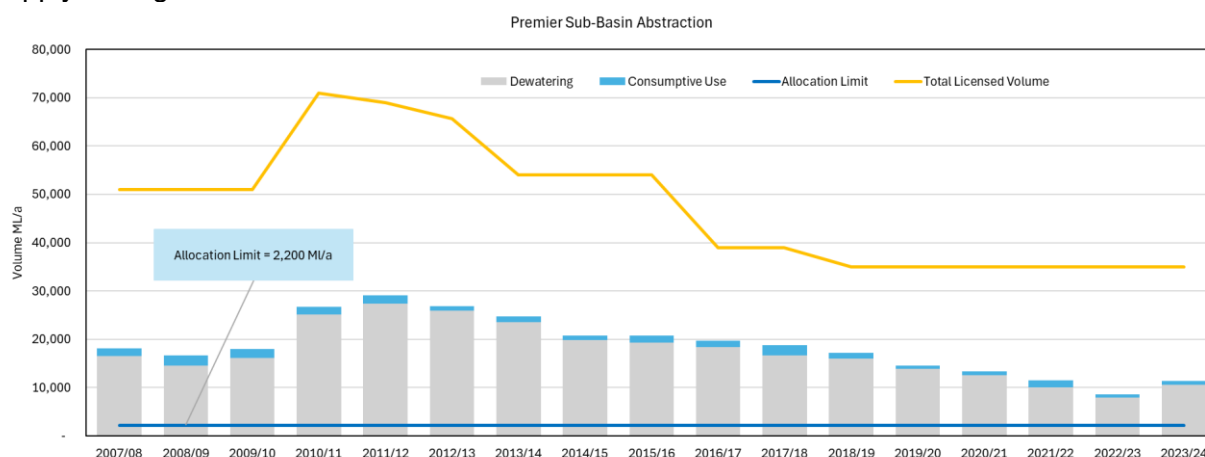


Figure 8 Annual abstraction volumes and allocation limit for the Premier subarea

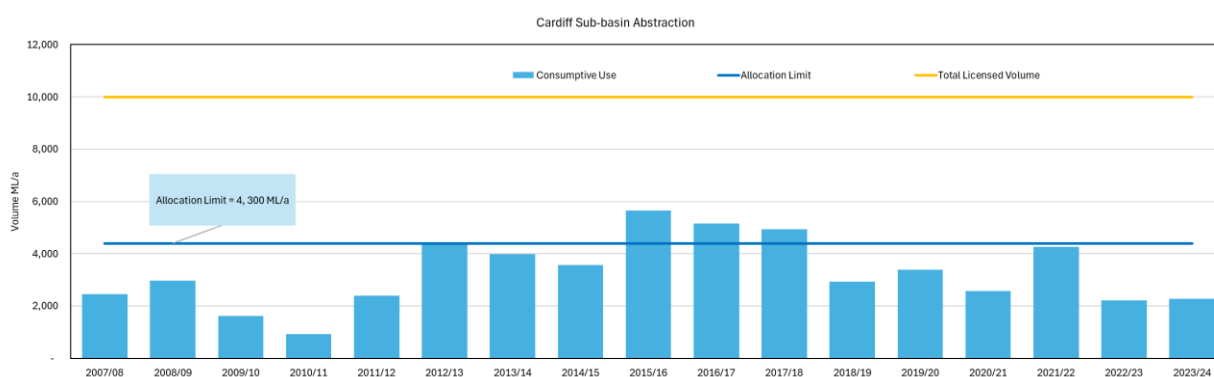


Figure 9 Annual abstraction volumes and allocation limit for the Cardiff subarea

5. Evaluation of water resource objectives

In evaluating the allocation plan, we consider recent information on rainfall, streamflow, allocation status and environmental values to inform whether the water resource objectives are being met.

While managing water resources within the Upper Collie presents significant challenges, the department continues to progress the allocation plan objectives and adaptively responds to current and emerging issues. Ongoing climate changes and overallocation has meant limited progress towards some of the plan's objectives.

Upper Collie water allocation plan evaluation		
Objective 1	Increase accountability for water use and its associated impacts	Met
<ul style="list-style-type: none">• Collie Coal Basin water use balance tool: We continue to use and develop this tool, which tracks the volume of groundwater used, supplied, supplemented and disposed of annually. This helps ensure accurate accounting of water use.• Reporting: We maintained monthly, annual and triennial reports to ensure compliance and identify water resource risks. This supports continual improvements and a shared understanding of the water resource.• Collie Technical Advisory Group: We established this group to focus on water management across the entire Collie Coal Basin. Chaired by the department, the group includes industry representatives.• Collie Regional Water Monitoring program: In collaboration with industry, we are developing this program to replace site-based monitoring with a comprehensive whole-of-basin approach. This aims to improve the efficiency and effectiveness of groundwater monitoring.		
Objective 2	Limit abstraction of water up to or equal to the allocation limit for a resource (other than mine dewatering)	Partially met
<ul style="list-style-type: none">• No new groundwater entitlements: Since 2016, no new groundwater entitlements have been approved and the level of overallocation of the groundwater resources has been maintained or reduced. In the Cardiff subarea, licence entitlements for groundwater exceed the allocation limit; however, abstraction has been kept at or below the allocation limit through a hands-on management approach. In the Premier subarea, the licence entitlements and abstraction for dewatering remained above the allocation limit. There has been a 51 per cent reduction in annual dewatering volumes between 2017 (15.2GL) and 2022 (7.4GL).• Wellington Reservoir allocation limit: In 2018, the allocation limit for the Wellington Reservoir reduced from 85.1GL/yr to 68GL/yr due to observed and projected reductions in streamflow caused by climate change. This change capped the allocation limit at the current level of licensed surface water.• Lake Kepwari: The successful rehabilitation and return of Lake Kepwari to the state has resulted in 1.5 GL/yr of water being recouped on the Collie River South Branch (see <i>Our response and future planning – Whole-of-basin approach to mine closure and rehabilitation</i>).• Future planning: The department will work with industry to plan for water resource management during the transition to 2030, rehabilitation and post-mining phases beyond 2030.		

Upper Collie water allocation plan evaluation

Objective 3	Recoup overallocated water resources to sustainable levels	Limited progress
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- **Future opportunities:** There have been limited opportunities to recoup water in overallocated groundwater resources. The transition away from coal-fired power generation by 2030 may provide the department with opportunities to recoup water entitlements. This transition could reduce the demand for groundwater and return the overallocated resources to align with the allocation limits in the allocation plan.

Objective 4	Protect existing ecological, social and cultural values	Met
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- **River health assessments:** Through its Healthy Rivers program, the department continues to undertake ecological assessments at important river locations. These were done in 2019 and 2022 and will continue every three years to monitor and track river health.
- **Environmental water releases:** The department has adaptively managed water releases from both Harris and Wellington reservoirs to maintain downstream ecological values. These releases help keep waterways healthy and support Indigenous connection to country, beliefs and culture.
- **Upper Collie River Aquatic Habitat Restoration project:** The department supports the Leschenault Catchment Council on a project to restore the foreshore and riverine habitat of the Collie River South Branch. This project aims to improve the natural environment and support local biodiversity.
- **Lake Kepwari:** The lake was successfully integrated into the Collie River South Branch. Lake Kepwari has the potential to be a significant refuge for biodiversity, particularly with the threats posed by drying climate; habitat enhancement could enable the waterbody to support the diversity of native species present in the Collie River.

Objective 5	Protect the security of supply for water users	Met
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- **Collaboration:** We continue to work across government and with industry to manage water resources for the needs of all water users including industry, irrigation and community.
- **Collie River Revitalisation Strategy:** The department supports the Shire of Collie's strategy to revitalise the Collie River. This includes investigating future water sources for public open spaces, such as parks and recreational areas.
- **Technical support:** The department provides technical support to maximise the value of water from the Wellington Reservoir, ensuring it meets agricultural needs and supports the local community. The department also provides advice to the coal-fired power generation sector towards their strategic water supply strategies.

Objective 6	Ensure that water is used in the most efficient way	Met
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- **Collaboration with industry:** We worked with industry to optimise the use of surplus dewater, which helps minimise the need for additional groundwater abstraction. This collaboration ensures that excess water from mining activities is used effectively.
- **Water accounting and review:** We maintain and regularly review water accounting data to identify opportunities for reducing water use. By closely monitoring water use, we can implement strategies to improve efficiency and ensure that water resources are used responsibly.

Upper Collie water allocation plan evaluation

Objective 7	Achieve the highest value use for water resources	Limited progress
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- **Supporting the ‘Just Transition’ plan:** We actively engage with and provide advice to support the State Government’s ‘Just Transition’ plan. This plan aims to transition the local economy away from coal-fired power generation to more sustainable industries.
- **Optimising surplus mine dewater:** We have optimised the reuse and disposal of surplus mine dewater in accordance with the allocation plan and state agreement to support the efficient use of water.
- **Collaboration with other agencies:** As mentioned in Objective 5, we continue to support other agencies, such as the Department of Primary Industries and Regional Development and the Shire of Collie, to meet their future water demands.

Objective 8	Minimise water-quality impacts of abstraction and use, and where possible, increase the quality of the water resources	Limited progress
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- **Increasing salinity:** The salinity of surface water in the catchment continues to rise due to the clearing of native vegetation in the upper catchment. This ongoing issue affects water quality further downstream and into the Wellington Reservoir. The department will continue to monitor this trend.
- **Acid and/or Metalliferous Drainage (AMD) indicators:** AMD indicators show an increase in AMD risk. Some of these indicators are related to legacy or abandoned sites, such as Lake Stockton and Black Diamond, while others are from operational areas. AMD generation has lag effects meaning that indicators often appear long after operations have ceased.
- **Monitoring and response:** We continue to review data submitted by industry and respond to water-quality changes within both surface and groundwater resources. This ongoing monitoring is crucial to managing water quality over time.

6. Response and future planning

With the State Government decision to retire the state-owned coal-fired power stations before 2030, the region is undergoing an exciting transition. This transition will provide an opportunity to address the challenges of climate change, including declines in rainfall and reductions in streamflow and groundwater recharge.

This evaluation highlights the importance of adapting to ongoing climate change and managing overallocation to progress the allocation plan’s objectives. The department is proactively conducting technical studies and collaborating with the Department of Jobs, Tourism, Science, and Innovation; Department of the Premier and Cabinet; and Department of Primary Industries and Regional Development to support future economic and environmental outcomes in the Collie Coal Basin. The department will consider updating the water allocation plan in line with State Government priorities and findings from monitoring and scientific investigations, such as the SGIP Collie project.

6.1 New climate change projections guide

The department has published a new [guide](#) to help scientists, planners and decision-makers manage our water resources using up-to-date climate projections and approaches. The guide was developed by hydroclimate technical experts at the department, and reviewed by the Bureau of Meteorology, CSIRO, Water Corporation, the National Environmental Science Program's Climate Systems Hub, and the Victorian Department of Energy, Environment and Climate Action.

This comprehensive guide is part of a State Government initiative delivering up-to-date climate science resources for WA's water community and supports key directions outlined in the [Climate Adaptation Strategy](#).

The recent climate projections for the Collie area are sourced from the Bureau of Meteorology and based on global climate models from the World Climate Research Programme's Coupled Model Intercomparison Project 5 (CMIP5). The projections show that:

- rainfall and water availability are likely to continue decreasing.
- the magnitude of change is projected to be within a broad range, with a greater change projected under a future without effective climate change mitigation [a high greenhouse gas concentration pathway (Figure 10)].

It is expected that increases in potential evapotranspiration and decreases in rainfall will result in further reductions to streamflow and groundwater recharge.

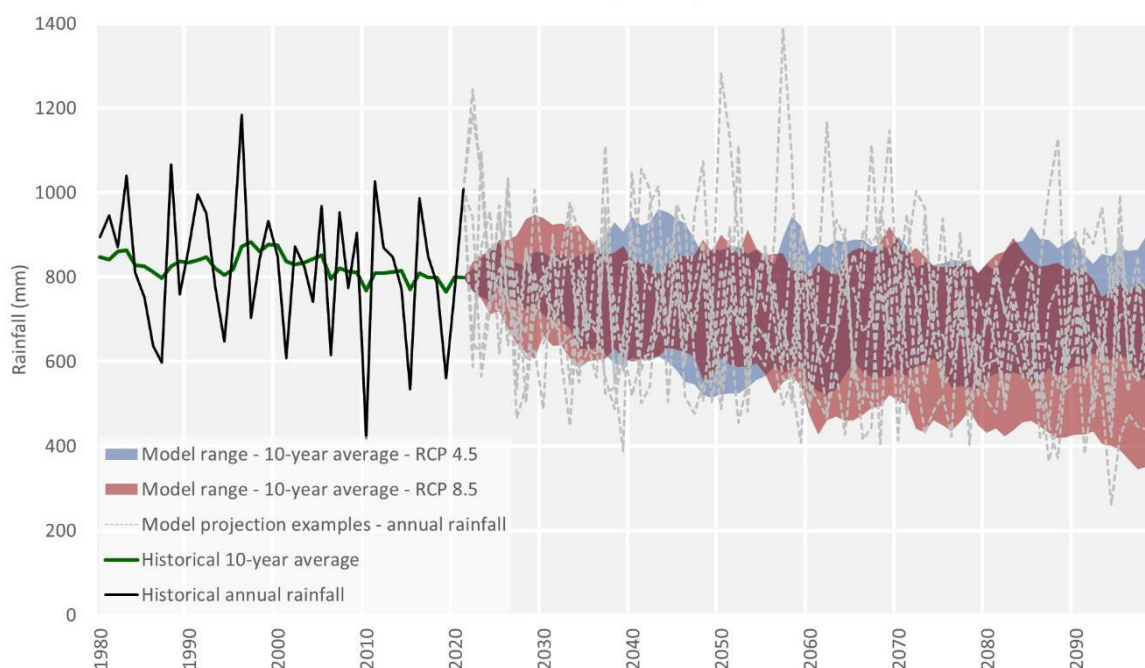


Figure 10 The observed decline in annual rainfall is projected to continue in the Collie plan area, with varied magnitudes of change in the 10-year average between the lower greenhouse gas scenario (blue shaded area) and more decline under a high greenhouse gas scenario (red shaded area)

The allocation plan set surface water allocation limits based on streamflow data from 1975 to 2003 which do not account for the observed drying trend that has occurred since then. Any surface water related advice to support the state's Just Transition and rehabilitation outcomes will need to be informed by contemporary science, including recent streamflow monitoring and the Bureau of Meteorology's latest climate change projections. This information will also be used to inform any future surface and groundwater planning activities in the Upper Collie area.

6.2 Whole-of-basin approach to mine closure and rehabilitation

Generally, coal mining aims to gradually fill in mine pits over its operational life. However, due to factors such as complex geology, market forces, accessibility, weather and cost, many old and current mine areas will end up with a mine void left in the landscape. As dewatering ceases and local groundwater levels recover, these voids start filling with water, via groundwater discharge, catchment inflow and rainfall. The voids form pit-lakes in the environment, as can be seen at Lake Stockton, Black Diamond and Lake Kepwari.

Pit-lakes pose various risks to water resources, including salinisation and AMD. These issues are evident at the abandoned Lake Stockton and Black Diamond lakes. Lake Kepwari is an example of a unique mine void rehabilitation outcome that has achieved some positive social and environmental aspects but still faces water-quality challenges in a drying climate. The future state of water resources in the Upper Collie area heavily depends on the rehabilitation approaches and outcomes. Together with industry and other State Government agencies such as the Department of Energy, Mines, Industry Regulation and Safety, Department of Primary Industries and Regional Development and Department of Biodiversity and Attractions, we will consider closure and rehabilitation outcomes across the Collie Coal Basin.

Lake Kepwari

Lake Kepwari was relinquished back to the state in 2020. Currently managed by Department of Biodiversity, Conservation and Attractions, it has been transformed into a water-skiing, camping and recreational area. This is a significant milestone for mine rehabilitation and closure outcomes in the basin. It represents the first formal relinquishment of coal-mining tenure in the state and represented almost 10 years of work for the department.

Lake Kepwari has been permanently reconnected to the Collie River South Branch. While the lake is seen as a positive outcome for social values in the region, the lake, along with other large water bodies in the South West, faces the challenges of maintaining water quality and ecological values under climate change.



6.3 Collie State Groundwater Investigation Program – Collie Project

The department has commenced a targeted groundwater investigation to improve the conceptual understanding of the groundwater-to-surface water relationship at four investigation areas within the basin. The investigation will consider the potential risks to groundwater quality, including saltwater intrusion in the Premier sub-basin and the potential for AMD discharge in the Cardiff sub-basin.

The investigation builds on existing knowledge and fills data gaps to support potential groundwater modelling and allocation planning work in the future. The work includes an airborne electromagnetic survey, drilling new monitoring bores and 12 months of monitoring water level and quality at groundwater and surface water sites.

Further information

For further information on the allocation plan and this evaluation statement, see the contacts below.

Subject	Contact	Information
General enquires concerning the Collie region	Bunbury regional office	Phone: 61 8 9726 4111 Email: bunbury.admin@dwer.wa.gov.au
General water allocation planning enquires	Water Allocation Planning	Phone: 61 8 6364 7000 Email: allocation.planning@dwer.wa.gov.au

References

Department of Water and Environmental Regulation 2024, [*Guide to future climate projections for water management in Western Australia*](#), Government of Western Australia.

PSM 2024, *Triannual Aquifer Review Technical Studies: Collie Basin 2023*, prepared on behalf of The Griffin Coal Mining Company Pty Ltd (Griffin), and Premier Coal Limited (Premier Coal), and Synergy.

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