

Regional Water Strategy

Macquarie–Castlereagh – Executive Summary

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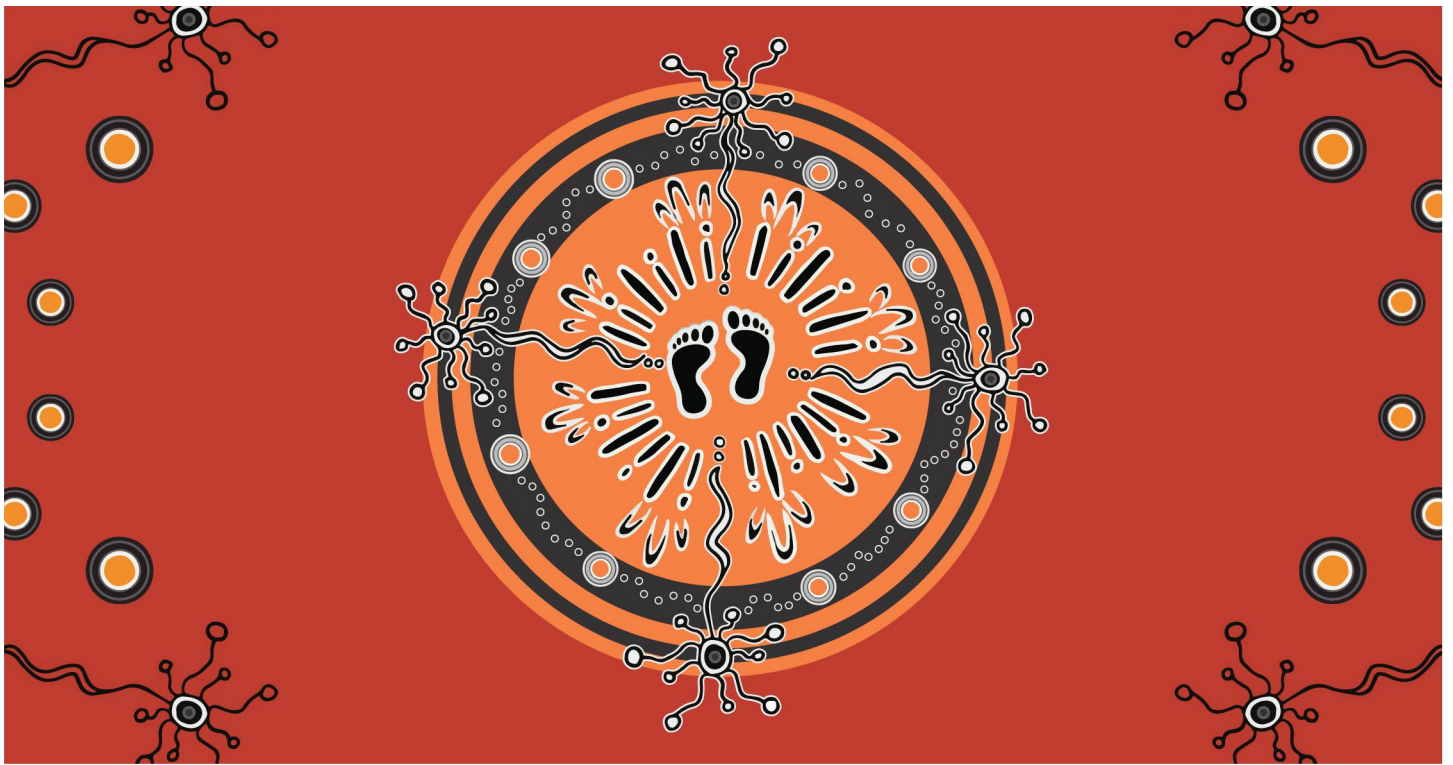
Cover image Image courtesy of Destination NSW. Macquarie River Rail Bridge, Dubbo.

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Acknowledging First Nations people

The NSW Government acknowledges First Nations people as the first Australian people and the traditional owners and custodians of the country's lands and water. First Nations people have lived in NSW for over 60,000 years and have formed significant spiritual, cultural, and economic connections with its lands and waters.

Today, they practise the oldest living culture on earth.

The NSW Government acknowledges the Gomeroi/Kamilaroi/Gamilaroi/Gamilaraay, Ngemba, Ngiyampaa, Wailwan and Wiradjuri nations from the Macquarie–Castlereagh region as having an intrinsic connection with the lands and waters of the Macquarie–Castlereagh Regional Water Strategy area. The landscape and its waters provide the First Nations people with essential links to their history and help them to maintain and practise their traditional culture and lifestyle.

We recognise the Traditional Owners as the first managers of Country. Incorporating their culture and knowledge into management of water in the region is a significant step towards closing the gap.

Under this regional water strategy, we seek to establish meaningful and collaborative relationships with First Nations people. We will seek to shift our focus to a Country-centred approach, respecting, recognising and empowering cultural and traditional Aboriginal knowledge in water management processes at a strategic level.

We show our respect for Elders past and present through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places where First Nations people are included socially, culturally and economically.

As we refine and implement the regional water strategy, we commit to helping support the health and wellbeing of waterways and Country by valuing, respecting and being guided by Traditional Owners/First Nations people, who know that if we care for Country, it will care for us.

We acknowledge that further work is required under this regional water strategy to inform how we care for Country and ensure First Nations people/Traditional Owners hold a strong voice in shaping the future for all communities.

Artwork by Nikita Ridgeway.

Water is a most precious resource. Water supports the essential needs of communities in the Macquarie–Castlereagh region and is vital for maintaining our aquatic environments and Aboriginal cultural heritage. It is central to the region’s liveability and supports its industries and employment.

The NSW Government is committed to having healthy, reliable and resilient water resources. We want the Macquarie–Castlereagh region to remain a place where people want to live, work and play, both now and for future generations. This means making the best use of existing water resources and preparing for future uncertainties, such as a more variable and changing climate and changing industries, populations and water needs.

The Macquarie–Castlereagh region, in central west NSW, stretches from the western fringes of the Great Dividing Range to the floodplains of the Barwon River. It is part of the Murray–Darling Basin and lies within the traditional lands of the Gomeroi/Kamilaroi/Gamilaroi/Gamilaraay, Ngemba, Ngiyampaa, Wailwan and Wiradjuri people, who have been caretakers of this region for over 60,000 years. A wide variety of aquatic ecosystems are spread across the region, including the internationally and culturally significant Macquarie Marshes.

Within the region are the large regional centres of Bathurst, Orange and Dubbo, which supply important health, education and retail services for residents and surrounding communities. Mudgee, Narromine, Nyngan and Gilgandra are other important strategic centres.

Water supports the region’s towns and recreation, cultural and environmental needs, as well as critical industry uses such as agriculture, mining and tourism. However, access to reliable surface water and good quality groundwater varies across the region.

During climate extremes the region’s environment, residents and businesses are tested. For example, between 2017 and early 2020, severe drought conditions saw:

- many rivers and creeks stop flowing
- the urban water supplies for the regional cities of Bathurst, Orange and Dubbo fall to critical levels
- sharp declines in groundwater levels in some groundwater sources.

The drought was followed by floods and some of the wettest years on record. We know that extreme droughts and floods will happen again. We need to be prepared so that critical needs in the region are protected, the environment can recover, and regional towns and industries can grow sustainably.

The Macquarie–Castlereagh Regional Water Strategy will help set the region up so it is prepared for a changing climate, and support it to be an attractive place to live, work and visit.

Figure 1. Map of the Macquarie–Castlereagh region

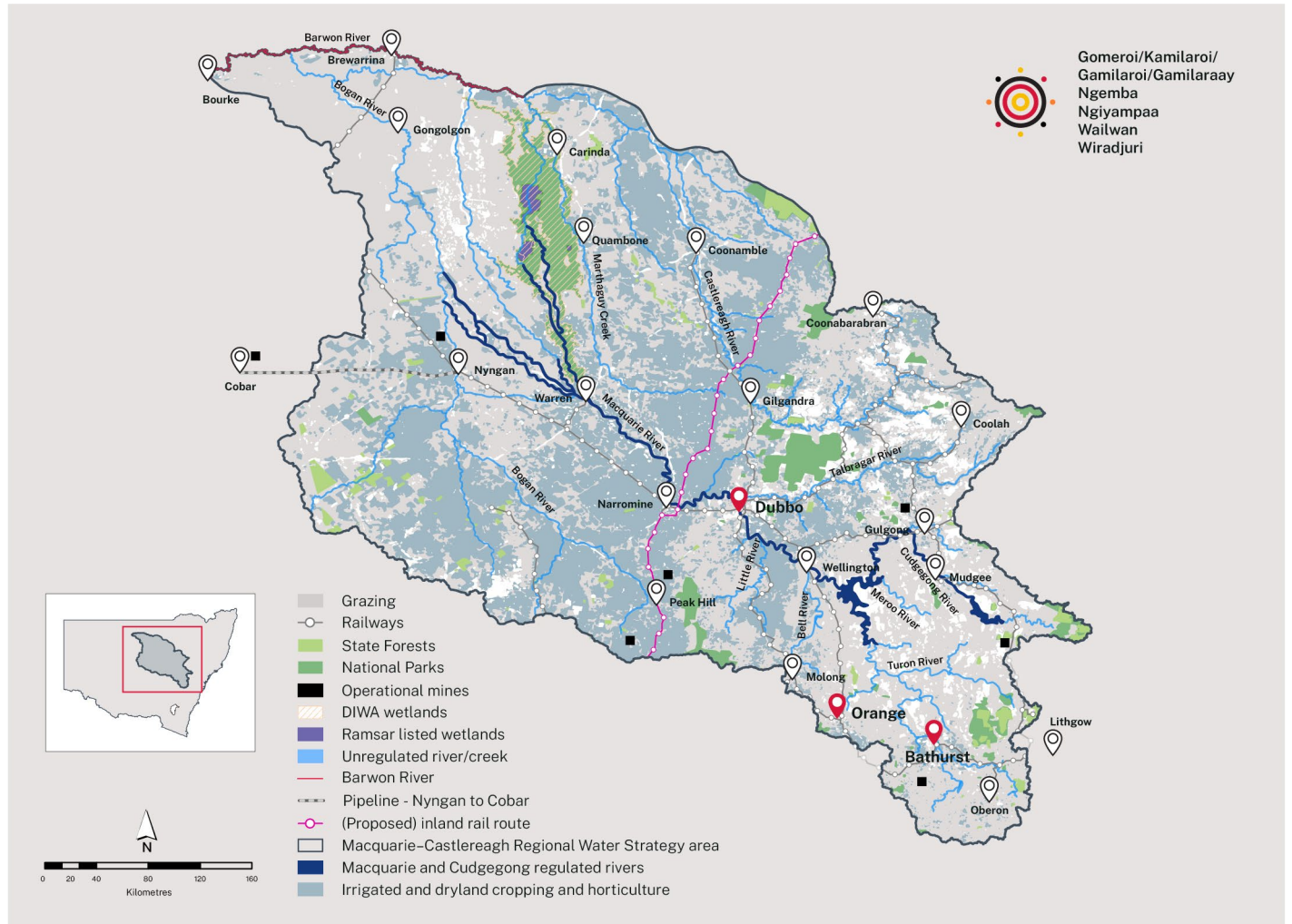


Image courtesy of Destination NSW. Aerial overlooking Neilson Park, Coonabarabran.

Environmental significance of the Macquarie–Castlereagh region

The Macquarie–Castlereagh’s expansive river systems, floodplains, wetlands and aquifers underpin the health of the natural environment, support threatened and endangered plants and animals and are an integral part of the broader Murray–Darling Basin. Some areas in the Macquarie Valley have also been listed as part of the Lowland Darling Endangered Ecological Community under the *NSW Fisheries Management Act 1994*, recognising the ecological value and significance of all native fish and aquatic invertebrates in these systems.

The Macquarie Marshes – an internationally recognised environmental asset

The region is home to the Macquarie Marshes, one of the largest remaining inland semi-permanent wetlands in south-eastern Australia, despite their extent having reduced by up to 50% since the mid-1900s.¹ The Marshes form the heart of the traditional country of the Wailwan people, who valued them as an important Aboriginal settlement because of their rich and reliable resources and iconic cultural values. The Marshes continue to be important for the Wailwan and other Aboriginal people.

The Macquarie Marshes, a non-terminal wetland, is situated in the lower reaches of the Wambuul / Macquarie River catchment. The Marshes commence at Marebone Weir north of Warren and extend for 120 km until the many watercourses form into a single defined channel near Carinda.

Approximately 19,000 ha of the Macquarie Marshes is listed as internationally significant under the Convention of Wetlands of International Importance (Ramsar). It supports threatened species, endangered ecological communities and species of conservation concern. This includes iconic water birds, fish, aquatic animals and vegetation communities. The Marshes contain the largest river red gum woodland in the northern Murray–Darling Basin (approximately 40,000 ha) and extensive areas of coolabah and black box woodland. As well as being a nationally significant breeding site for waterbirds, the Marshes are an important refuge for wildlife during dry times.²

Conserving the Macquarie Marshes is a strategic priority stated in the long-term water plan for the region.³ To maintain them into the future, the wetlands need a mix of regular inundation – for vegetation such as reedbeds and water couch meadows – as well as inundation provided by only the largest floods.



Image courtesy of John Spencer, Department of Planning and Environment. Macquarie Marshes, NSW.

1. Kingsford R.T and Thomas R.F 1995, *The Macquarie Marshes in arid Australia and their waterbirds: a 50-year history of their decline*, Environmental Management, 19, 867-78.
2. Department of Environment, Climate Change and Water NSW 2010, *Macquarie Marshes – Adaptive Environmental Management Plan*, retrieved 19 September 2023 from www.environment.nsw.gov.au/research-and-publications/publications-search/macquarie-marshes-adaptive-environmental-management-plan
3. Department of Planning, Industry and Environment 2020, *Macquarie–Castlereagh Long Term Water Plan Part A: Macquarie–Castlereagh catchment*, retrieved 19 September 2023 from www.environment.nsw.gov.au/topics/water/water-for-the-environment/planning-and-reporting/long-term-water-plans/macquarie-castlereagh

Purpose of the Macquarie–Castlereagh Regional Water Strategy

Pressure on valuable water resources is increasing and the climate is changing. We need to prepare our regions for the future now. Regional water strategies do this by bringing together the best and latest climate evidence with a wide range of tools and solutions to plan and manage the water needs of regional NSW over the next 20 years.

The Macquarie–Castlereagh Regional Water Strategy identifies the critical challenges we need to tackle over the coming decades. It also lays out the strategic priorities and actions that will set us up to respond to these challenges.

The actions that make up the regional water strategy provide a foundation for building resilience. Meaningful engagement and a collaborative approach to planning and decision making will be key to achieving sustainable and equitable outcomes over the strategy's 20-year horizon and beyond.

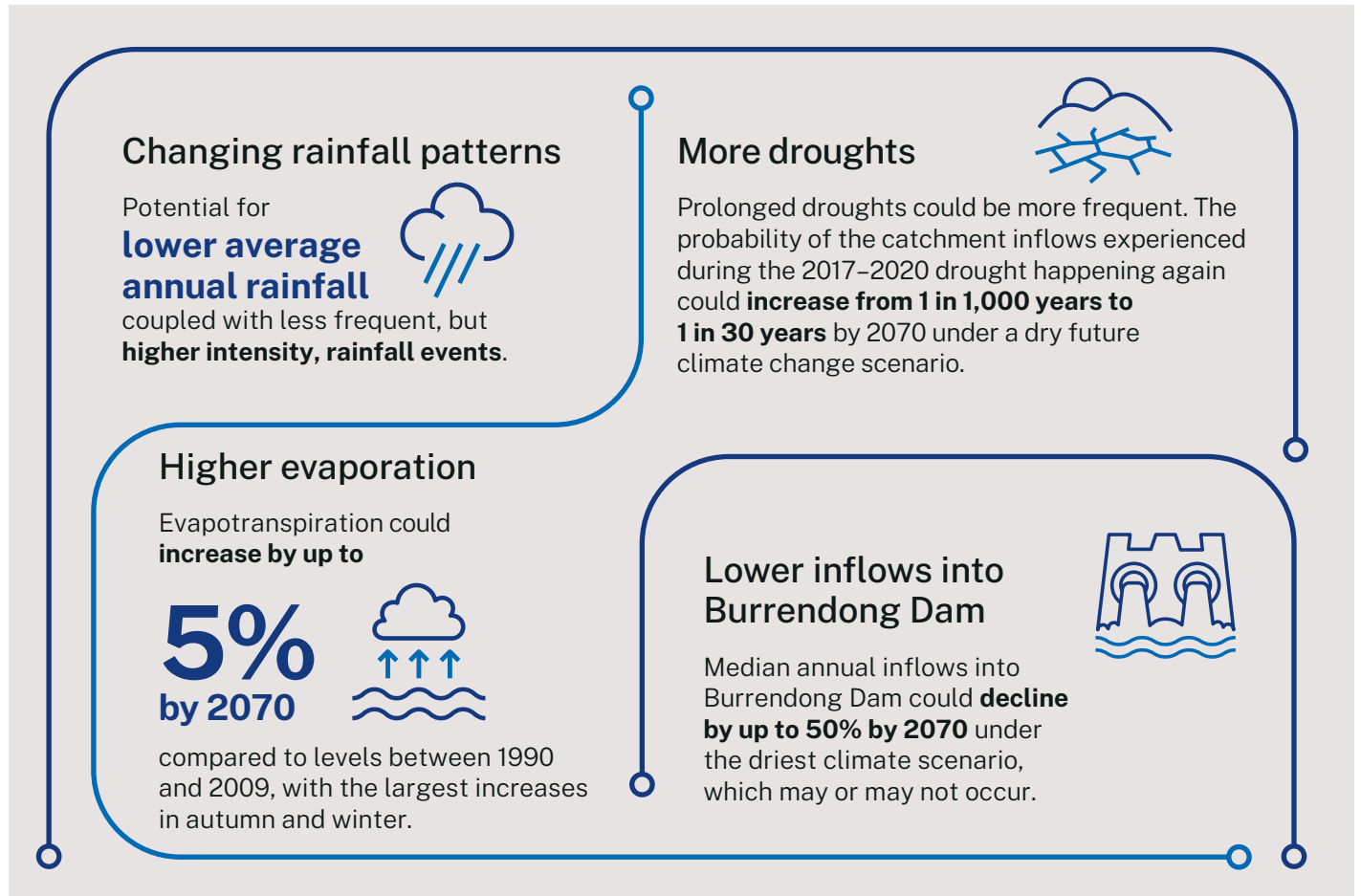


Image courtesy of Destination NSW. Sun sets over a water tank and windmill in Gulargambone.

What the future climate could look like in the Macquarie–Castlereagh region

We do not know what the future climate will be like. It may be like similar to what we have experienced in the past, or it might be drier than we have seen in the past. Analysis of different climate projections tells us there could be more extreme wet and dry periods – droughts could become hotter and longer, and there could be higher evaporation rates and more unpredictable rainfall and river flows. This long-term water strategy will help us plan for this uncertainty and give us a better understanding of the future risks we face.

Figure 2. What the future climate could look like in the Macquarie–Castlereagh region



The challenges facing the Macquarie–Castlereagh region

Five key challenges have been identified as immediate priorities for the region:

- Reducing water supply risks for regional cities and rural and remote towns
- Supplying water to high priority needs in the west of the catchment and connected valleys
- Maintaining and improving river, floodplain and wetland health
- Addressing barriers to Aboriginal people’s water rights
- Supporting a growing regional economy in a future of potentially reduced water availability.

Other water challenges, as described in the Draft Macquarie–Castlereagh Regional Water Strategy, will be revisited in future reviews of the strategy.



Reducing water supply risks for regional cities and rural and remote towns

Bathurst, Orange and Dubbo are large and growing regional cities in the Macquarie Valley. These cities are expected to grow by 20–34% over the next 20 years. The water supplies for these cities also underpin the water security of surrounding smaller towns, communities and rural residents during times of drought.

Even with recent investments in water security measures, Bathurst and Orange require further investment over the next few years to ensure the security of their water supplies is maintained.

Groundwater is an important water source for towns in the region, being the primary source of supply for Warren, Narromine and many towns in the Castlereagh Valley. It is also an important backup source for Dubbo, Wellington and Nyngan. There is uncertainty about water security in severe drought for towns that use groundwater, especially from the alluvial groundwater systems.



Supplying water to high priority needs in the west of the catchment and connected valleys

The Macquarie River system is over 960 km long and there are a range of high priority needs towards the end of the system, including:

- the internationally significant Macquarie Marshes
- the towns of Warren, Nyngan and Cobar
- critical mineral mines
- landholders on rivers and creeks with stock and domestic water needs.

There are also high value irrigated agriculture and livestock enterprises in the lower system. The Macquarie–Castlereagh catchment provides flows into the Barwon and Darling–Baaka rivers, supporting communities, industries and the environment downstream.

The long river system presents challenges for delivering water to the end of the system, particularly during dry periods, as a large portion of the water released from Burrendong Dam seeps into the dry riverbed and evaporates along the way. During the last drought, approximately 27 GL of water needed to be released from Burrendong Dam to deliver 1 GL of supply to Nyngan and Cobar.⁴

New climate risk modelling shows that Burrendong Dam could more often sit at or below levels that trigger drought measures. This would make it harder to deliver water to the end of the system and increase the risk for communities, the environment and industries downstream.

4. In drought it takes 15 GL to get water into Warren Weir and another 12 GL to top up Nyngan Weir down the Albert Priest Channel.



Maintaining and improving river, floodplain and wetland health

Water infrastructure, water extraction, poor land management practices and pest species have impacted water-dependent ecosystems and native aquatic species in the Macquarie–Castlereagh region. This includes the Ramsar-listed Macquarie Marshes, which is ecologically, culturally, socially and economically important.

While water reforms have partially improved the condition and resilience of these environmental assets, parts of the catchment are still in poor condition.

Different ecosystems and species within the region rely on a range of river flows at different times of the year to survive and reproduce. River regulation and water infrastructure have changed the flow regime in the Macquarie–Castlereagh region. There are now fewer large flows in the system and less connectivity between the Wambuul / Macquarie River and its floodplain. Reinstating these flows is difficult, due to operational constraints of Burrendong Dam and potential competition between environmental water managers and consumptive users when water needs to be delivered at the same time.

To maintain and improve the region’s ecological assets into the future, we need to ensure that the right mix of flows are available at important times. This will become increasingly difficult under a drier future climate, where the potential for extended dry periods could increase the risk for many critical environmental assets.



Addressing barriers to Aboriginal people’s water rights

The lands and waters of the Macquarie–Castlereagh region have been occupied by the Gomerioi/Kamilaroi/ Gamilaroi/Gamilaraay, Ngemba, Ngiyampaa, Wailwan and Wiradjuri nations for over 60,000 years. They have always been closely linked to rivers, groundwater, billabongs and wetlands, and this relationship is essential to culture, community and connection to Country.

Water management arrangements, limited water ownership, and poor access to waterways and culturally important sites impact Aboriginal people’s ability to care for Country. Aboriginal people need better access to water, improved engagement with governments, and secure flows for water dependent cultural sites so everyone can benefit from traditional knowledge in managing water resources.

The NSW Government is investing \$15 million to develop an Aboriginal Water Strategy that will identify a program of measures to deliver on First Nations’ water rights and interests in water management. It is being informed by direct engagement and co-design with Aboriginal people and communities.



Supporting a growing regional economy in a future of potentially reduced water availability

Agriculture and mining are major water-reliant industries in the Macquarie–Castlereagh region. The tourist economy is also important across the region, with well-known food and wine destinations such as Mudgee and Orange, nature-based tourism in the Macquarie Marshes and the Warrumbungle Ranges, and attractions such as Dubbo’s Taronga Western Plains Zoo.

The level of economic activity in the region is closely related to water availability, particularly near Narromine, Warren, Trangie and Nyngan. Significant primary industry activities – such as horticulture, livestock grazing and forestry – also exist in the upper Macquarie near Bathurst, Orange and Oberon.

Many farm businesses have adapted to the region’s highly variable climate and water availability by producing annual or seasonal crops and investing in technology and improved management practices. Even with these adaptations, severe droughts place great pressure on the viability of farm businesses and the resilience of the broader regional economy.

Climate change could reduce water availability for existing industries, leading to adverse economic and social impacts. For example, if practices do not change, we could see a 45% reduction in profit generated by irrigated annual agriculture under a dry climate change scenario.

There is also significant potential for future development in high value industries, but a shortage of reliable water supplies may hinder this growth.

A plan to secure water for the Macquarie–Castlereagh region

To address the key challenges facing the Macquarie–Castlereagh region, we need to prepare now for a future where water may come under even greater stress. By using the knowledge we have gained during drought, we can find smarter and better ways of making water go further so that communities, industries, and environmental and cultural assets can thrive.

There are limits on how much water can be taken from rivers and groundwater sources without causing short- and long-term impacts – such as depriving other users of reasonable access to water and permanently damaging ecosystems. Surface water and most groundwater resources in the Macquarie–Castlereagh region are fully committed and there is a risk of reduced water availability in the long term. This means that any new infrastructure or policy change that results in additional water or improved security for one group of water users may lead to some water being taken from another group or the environment.

Getting the balance right means understanding the stresses on the region’s water resources and natural environment and recognising the limits and trade-offs. While we may have to make some difficult choices, there are also opportunities for the region. These include delivering on the water rights of Aboriginal people, enhancing town and on-farm water efficiency, restoring aquatic and floodplain habitats, and developing alternative water supplies.

This strategy sets out 31 actions to ensure the Macquarie–Castlereagh region is well-placed to meet future challenges:

- **Ensure safe and reliable water supplies for growing regional cities and towns**

A portfolio of actions is needed to improve water security for the region’s cities and towns. Actions recommended by the regional water strategy include:

- moving towards an enduring level of supply to support water security for regional cities and towns – working with communities to understand the costs and willingness to deliver a level of demand that we can be confident of supplying indefinitely, irrespective of the intensity and duration of drought
- doing more with the water we have through demand management and water efficiency measures and innovative options such as stormwater harvesting, purified recycled water and managed aquifer recharge
- confirming the best additional long-term water supply actions to secure water for Bathurst and Orange through further investigation. This may include connecting upper Macquarie towns to the Fish River or Coxs River catchment, sourcing water from the Lachlan Valley, new infrastructure in the upper Macquarie catchment, or making changes to Burrendong Dam to support Orange and Bathurst. Multiple actions will be needed over the medium and long-term to secure water supplies for these cities
- developing measures for managing extreme events in the upper Macquarie and establishing an approach to coordinate delivery of urban water security actions by all levels of government
- improving knowledge of groundwater systems at a regional and local council scale to make sure towns have secure access to groundwater to withstand climate extremes
- supporting skills and capacity building in local water utilities.

These actions will help cities and towns in the region to make the best use of the available water resources, and better respond to the needs of a growing population and the risks associated with climate change.

- **Reduce water security risks in the region's west**

Water in the Macquarie catchment downstream of Burrendong Dam plays a critical role in supporting major economic activity as well as globally significant ecological assets and important Aboriginal cultural sites. The strategy focuses on reducing water security risks for towns and high priority needs in the region's west, along with improving the drought security of water dependent industries that drive the economy.

Actions recommended by the regional water strategy include:

- investigating options to improve water delivery efficiency for high priority needs
- upgrading the pipeline from Nyngan to Cobar to secure water for Cobar and surrounding communities
- investigating changes to how much water is set aside in Burrendong Dam for critical needs
- taking the final steps to implement the NSW Floodplain Harvesting Policy.

There are also other options that merit further comparative analysis including:

- using some of the flood mitigation storage in Burrendong Dam for water supply
- constructing a regional pipeline connecting Dubbo to Nyngan and other towns
- replacing the aged and damaged Gin Gin Weir.

It is important to ensure that the actions progressed do not significantly reduce the flows into the Macquarie Marshes or through to the end of the Wambuul / Macquarie River and into the Barwon-Darling.

Together, these actions will make sure the region has the water needed at important times, and that the water is used in the most efficient way.

- **Support industry and community climate adaptation**

Actions taken through this strategy will focus on strengthening the resilience of the regional economy and communities and their ability to adapt to a drier, more severe future climate by:

- improving knowledge of groundwater systems at regional scales and using new knowledge to review groundwater extraction and condition limits
- improving collection, analysis and public access to water data information, including publishing information in easily accessible formats to allow businesses to make the best decisions at critical times
- modernising the water management framework to cater to the development of emerging industries and sustainable economic diversification in the region
- progressing actions to improve the involvement of Aboriginal people in water management, including the development of an Aboriginal Water Strategy and support for the development of new water-related Aboriginal business opportunities
- supporting public access to Macquarie Marshes Nature Reserve
- investing in research and innovation so agricultural industries continue to be at the forefront of adapting to climate change.

- **Improve the health and resilience of natural systems**

Supporting the long-term resilience of natural systems to future climate extremes will need coordinated and cooperative action across all parts of the community, improved land management practices and a better understanding of how potential future climate scenarios might impact on different parts of the environment.

Actions in the strategy include:

- modifying or removing impediments to effective environmental watering, including further reducing physical constraints that impact on the ability of water to move through rivers and across floodplains
- remediating fish barriers to allow fish unimpeded access across riverways and begin remediating unapproved floodplain structures
- providing clarity and certainty for environmental needs during drought operations, and better understanding how a changing climate could impact flow regimes and identifying adaptation options
- identifying regionally significant riparian, wetland and floodplain areas to protect or rehabilitate, which will help improve the condition of riparian land and the health of waterways
- investigating ways to improve connectivity with the Barwon–Darling on a multi-valley scale.



Image courtesy of Destination NSW. Dunns Swamp in Wollemi National Park, near Rylstone.

Figure 3. Summary of Macquarie–Castlereagh Regional Water Strategy actions

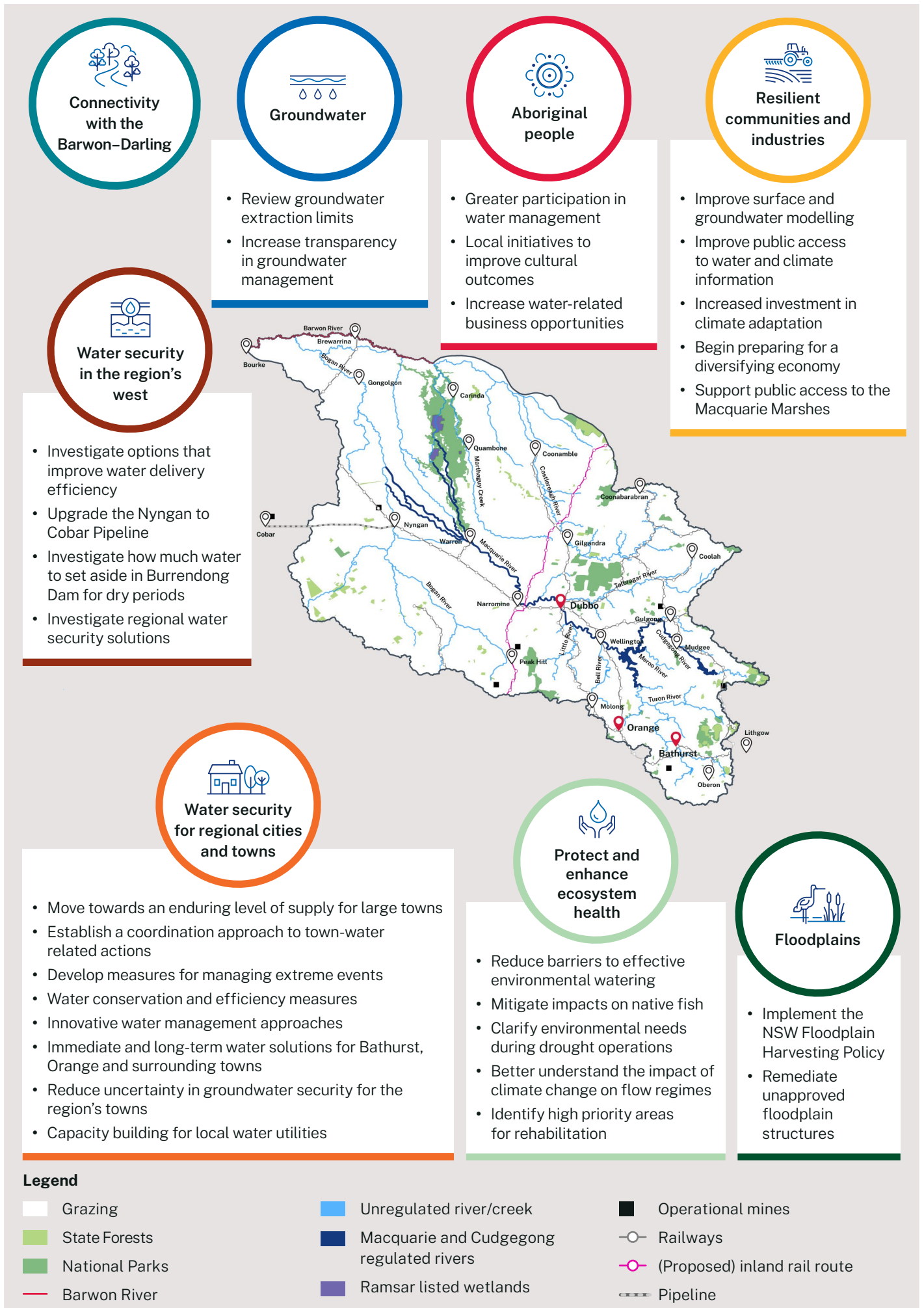






































Figure 4. Priorities and actions to address the region’s key challenges

Legend				
				
Reducing water supply risks for regional cities and rural and remote towns	Supplying water to high priority needs in the west of the catchment and connected valleys	Maintaining and improving river, floodplain and wetland health	Addressing barriers to Aboriginal people’s water rights	Supporting a growing regional economy in a future of potentially reduced water availability

Priority	Actions	Challenges addressed
Priority 1: Ensure safe and reliable water supplies for growing regional cities and towns	Action 1.1: Move towards an enduring level of supply to support regional cities and towns	
	Action 1.2: Establish a coordination approach involving all levels of government for implementing actions under Priority 1	
	Action 1.3: Develop measures for managing extreme events in the upper Macquarie catchment	  
	Action 1.4: Maintain a strong focus on urban water conservation and efficiency	
	Action 1.5: Invest in innovative water management options	 
	Action 1.6: Plan for the best long-term augmentation solution for the upper Macquarie	
	Action 1.7: Reduce uncertainty in groundwater security for the region’s towns	 
	Action 1.8: Support skills, capacity building and water quality in Oberon and other local water utilities	
	Action 1.9: Provide additional water from the Wambuul / Macquarie River for Orange	

Priority	Actions	Challenges addressed
Priority 2: Reduce water security risks in the region's west	Action 2.1: Investigate options to improve water delivery efficiency for high priority needs	
	Action 2.2: Upgrade the Nyngan to Cobar Pipeline and associated infrastructure	
	Action 2.3: Investigate how much water should be set aside in Burrendong Dam for dry periods	
	Action 2.4: Continue to investigate regional water security solutions for the region's west	
	Action 2.5: Fully implement the NSW Floodplain Harvesting Program	
Priority 3: Support industry and community climate adaptation	Action 3.1: Invest in continuous improvement to surface and groundwater modelling	
	Action 3.2: Improve the collection, analysis and public access to water data and information	
	Action 3.3: Support adoption of farm climate adaptation and water efficiency measures	
	Action 3.4: Review groundwater extraction and condition limits using new knowledge	
	Action 3.5: Develop ongoing arrangements for participation of local Aboriginal people in water management	
	Action 3.6: Support place-based initiatives to deliver cultural outcomes for Aboriginal people	
	Action 3.7: Support the development of new water-related Aboriginal business opportunities	
	Action 3.8: Modernise the water management framework so it can continue to support sustainable economic diversification	

Priority	Actions	Challenges addressed
	Action 3.9: Support public access to the Macquarie Marshes Nature Reserve	
	Action 3.10: Increase transparency in the management of groundwater resources in the region	
Priority 4: Improve the health and resilience of natural systems	Action 4.1: Modify or remove impediments to effective environmental watering	
	Action 4.2: Mitigate impacts to native fish communities	
	Action 4.3: Remediate unapproved floodplain structures	
	Action 4.4: Provide clarity for environmental needs during drought operations	
	Action 4.5: Assess gaps and better understand how a changing climate could impact flow regimes and identify adaptation options	
	Action 4.6: Identify regionally significant riparian, wetland and floodplain areas to protect or rehabilitate	
	Action 4.7: Investigate ways to improve connectivity with the Barwon–Darling on a multi-valley scale	

Implementing the strategy

The strategy has a separate implementation plan that prioritises the delivery of actions throughout the life of the strategy. The implementation plan also outlines responsibilities and timeframes for delivery, so that we can monitor the progress of the actions, assess the effectiveness of the strategy and identify areas where we need to adapt.

Not all actions will be commenced at once, and funding will be a key consideration in planning when and how the actions will be implemented. The Macquarie–Castlereagh Regional Water Strategy will be a key tool in seeking funding as future opportunities arise.



Image courtesy of Quentin Jones, Department of Planning and Environment. Narromine Transplant Plant Nursery, NSW.



Image courtesy of Destination NSW. Philip Shaw Wines, Orange.

