

Draft Regional Water Strategy

Macquarie–Castlereagh: Shortlisted Actions – Executive Summary

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

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Acknowledgement of Country

The NSW Government acknowledges First Nations people as its first Australian People and the traditional owners and custodians of the country's lands and water. We have recognised that 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 practice the oldest living culture on earth.

The NSW Government acknowledges the Gomeroi/Kamilaroi, Ngemba, Ngiyampaa, Wailwan and Wiradjuri Nations 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 practice their Traditional culture and lifestyle.

We recognise the Traditional Owners were the first managers of Country and by incorporating their culture and knowledge into management of water in the region is a significant step for 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, present and Emerging 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 Indigenous/Aboriginal and non-Aboriginal communities.

Artwork courtesy of Nikita Ridgeway.

The NSW Government is committed to the Macquarie–Castlereagh region having healthy, reliable and resilient water resources so that it remains a place where people want to live, work and play, both now and for future generations. This means that we need to make the best use of existing water resources and prepare for a more variable and changing climate.

The Macquarie–Castlereagh region

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, 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 centres for surrounding communities. Mudgee, Narromine and Gilgandra are other important strategic centres. The region has a productive agricultural, tourism and mineral resources sector, which is sustained by its significant natural resources.

Surface water and groundwater sources support towns and recreation, cultural needs, environmental needs, and commercial uses such as agriculture, mining and tourism. However, access to 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 town water supplies of the region's 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. 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 industries and towns can grow sustainably.



Image courtesy of Nicola Brookhouse, Department of Planning and Environment. Monkeygar Lagoon, South Macquarie Marshes.

Figure 1. Map of the Macquarie–Castlereagh region

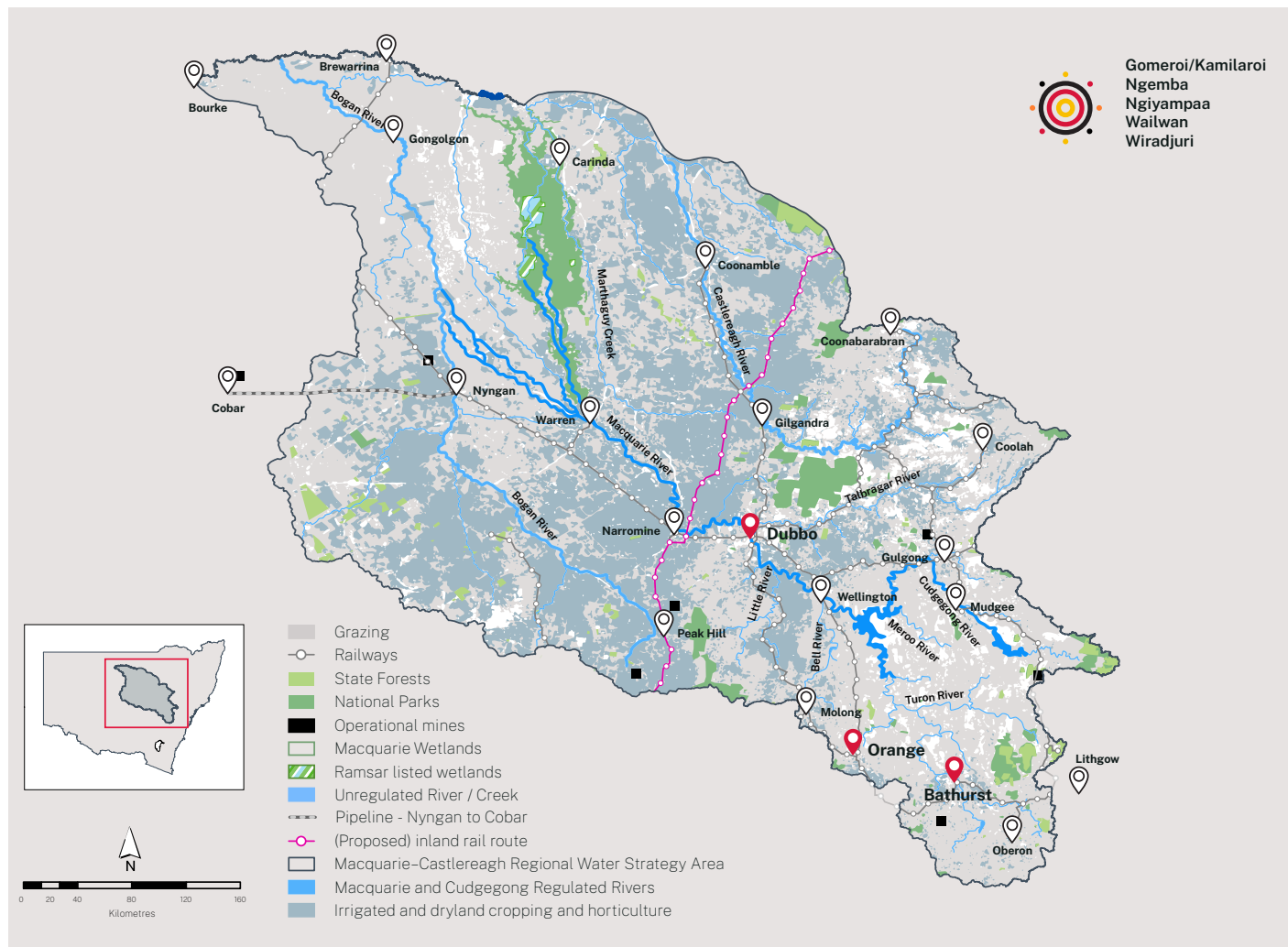


Image courtesy of Destination NSW. Aerial overlooking Neilson Park, Coonabarabran.

What is the purpose of the consultation paper?

The NSW Government is developing 12 regional water strategies that bring together the best and latest climate evidence with a wide range of tools and solutions to plan and manage each region's water needs over the next 20 to 40 years.

The first draft of the Macquarie–Castlereagh Regional Water Strategy, including a long list of options, was released for public consultation in September 2020. Since then, we have taken on board stakeholder

feedback, conducted further analysis to prioritise the challenges in the region that need to be tackled first and shortlisted actions to help meet these challenges. This consultation paper presents the outcomes of this work, which is summarised in Figure 4.

No decisions have been made on the proposed shortlisted actions. We are seeking your views on the best actions for the region before a final strategy and implementation plan are developed.



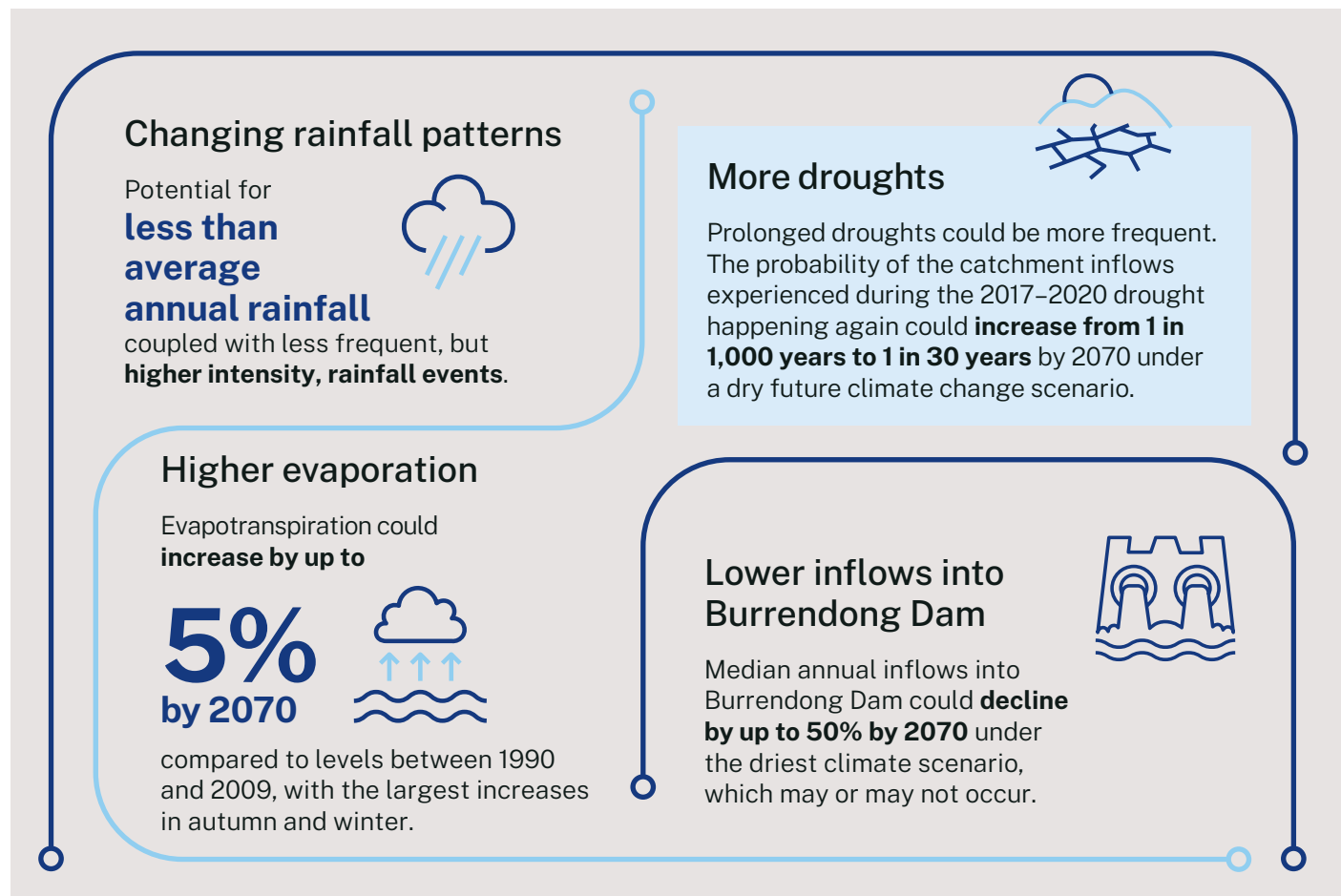
Image courtesy of Destination NSW. Windamere Dam, near Mudgee.

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

We don't know for certain what the future climate will be like. It may be similar to what we have experienced in the past, or it might be drier than we have seen in our lifetimes. Our analysis of different climate scenarios tells us that droughts could become hotter and longer,

there could be higher evaporation rates and more unpredictable rainfall events and variable river flows. We need to plan for these uncertainties and continue to refine our understanding of the water-related risks in the region.

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



Where should we focus first?

The Draft Macquarie–Castlereagh Regional Water Strategy identified current and future water-related challenges and opportunities. Following feedback from public consultation and further technical analysis, we have identified 5 key challenges we propose should be the initial focus for the region. Other water challenges described in the Draft Macquarie–Castlereagh Regional Water Strategy are important and will be revisited in future reviews of the strategy, which are expected to occur every 3 to 4 years.



Reducing water supply risks for regional cities, towns and villages

Bathurst, Orange and Dubbo are large and growing regional cities in the Macquarie Valley. These cities are expected to grow by 20–30% 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 immediate 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 many towns in Castlereagh River Valley, Warren and Narromine. It is also an important backup source for Dubbo and Wellington. 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 lower river system 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:

- internationally important 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 also provides flows into the Barwon and Darling-Baaka rivers during median to high flows, 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.

Our new climate risk modelling shows that Burrendong Dam could more often sit at or below levels that trigger drought operations and management 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.



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. 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 all these adaptations, severe droughts place great pressure on the viability of farm businesses and resilience of the broader regional economy.

Climate change could reduce water availability for these existing industries, leading to adverse economic and social impacts. For example, if practices don’t change, we could see a 45% reduction in profit generated by irrigated annual agriculture under a dry climate change scenario. While there is also significant potential for future development in high value industries, a shortage of reliable water supplies may hinder this growth.



Addressing barriers to Aboriginal water rights

The lands and waters of the Macquarie–Castlereagh region have been occupied by the Wiradjuri, Gomeroi, Ngemba, Wailwan and Ngiyapaa 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. We need to support access to water, improve our engagement with Aboriginal people, and secure flows for water dependent cultural sites – so we can all benefit from traditional knowledge in managing our water resources.



Maintaining and improving the health and resilience of the region’s aquatic and floodplains ecosystems

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

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

Different ecosystems and species within the region rely on a range of flows at different times of the year to survive and reproduce. However, river regulation, extraction and water infrastructure has changed the flow regime in the Macquarie–Castlereagh region. There are now fewer large flows in the system, and less connectivity between the Wambuu/Macquarie River and its floodplain. Reinstating these flows is difficult, particularly during non-flood times, 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. Implementing floodplain harvesting licensing and regulation, and addressing unauthorised structures in the floodplain will help deliver more water to the region’s wetlands and floodplains.

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 the times that they need them. 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 the challenges

We need to prepare now for a future where water sources and services may come under even greater stress. We need to use the knowledge we have gained during drought to find smarter and better ways of managing our water resources so that communities, industries and vital natural assets in the Macquarie–Castlereagh region can thrive.

Importantly, there are limits on how much water can be sustainably taken from rivers and groundwater sources without causing short- and long-term impacts, such as other users being deprived of reasonable access to water and permanent damage to ecosystems. Surface water and most groundwater resources in the Macquarie–Castlereagh region are fully or over 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 being provided to one group may result in changes to the timing of water access for other groups.

Getting the balance right means recognising these limits and trade-offs and understanding the stresses on the region's water resources and natural environment. While we may have to make some difficult choices, there are also opportunities to deliver on the water rights of Aboriginal people, enhance water use efficiency, restore river, wetland and floodplain habitats; and develop alternative water supplies that do not add further pressures to finite water resources.

There is no single action that we can take to address the challenges ahead. We have identified 4 regional priorities to meet the challenges for the region. Each priority is supported by a suite of actions. In shortlisting these actions, we have considered Murray–Darling Basin Plan rules, including the rules relating to sustainable levels of water take and the risks that the future climate poses.



Image courtesy of Peter Robey, Department of Planning and Environment. Country landscape during a road trip between Dubbo and Newcastle.

Priority 1: Secure water supplies for growing regional cities and towns

A portfolio of actions is needed to improve water security for growing strategic centres in the region and reduce uncertainty for groundwater dependent towns. The shortlisted actions under this priority focus on:

- confirming the level of water security needed to support large regional towns and whether we need to move towards planning for an 'enduring level of supply' approach – i.e. delivering a level of demand that we can be confident of supplying indefinitely, irrespective of the intensity and duration of drought
- demand management and water efficiency measures
- innovative water supply options such as stormwater harvesting, recycled water and managed aquifer recharge
- longer-term water augmentation for Bathurst and Orange that need further investigation, such as connecting upper Macquarie towns to the Fish River or Cocks River catchment, supplying water to Bathurst and/or Orange from the Lachlan Valley, new infrastructure in the upper Macquarie, and increasing the volume of water Orange can access each year from the Wambuul/Macquarie River – noting that we are likely to need multiple actions to secure water supplies for these cities
- improving knowledge of groundwater systems at regional and local council level scales
- supporting management of Oberon's town water quality challenges.

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.

Priority 2: Reduce water security risks in the region's west

Water supports major economic activity, important ecological assets and towns in the region's west. Much of this water is supplied from Burrendong Dam, which is located upstream of Dubbo on the Wambuul/Macquarie River. A more variable or drier climate will mean there will be more times when Burrendong Dam is sitting at low levels and there is no water in the lower reaches of Macquarie River. This will increase water security risks for towns at the end of the system and make it difficult to meet water needs downstream of Burrendong Dam.

This priority 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. These actions may also provide the additional benefit of improved water security for other users in the Lower Macquarie. The actions include:

- continue to investigate regional water security solutions for the lower Macquarie
- investigating an additional off-river storage at Nyngan
- creating water savings through the changed operation of regulated effluent creeks
- investigating ways to improve connectivity with the Barwon–Darling on a multi-valley scale.

Our strategic analysis has identified there are a number of shortlisted options that merit further analysis and could be investigated as part of the business case for replacement of the aged and damaged Gin Gin Weir. These include:

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

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 Macquarie River and into the Barwon–Darling River.

Priority 3: Support industry and community climate adaptation

The Macquarie–Castlereagh region is one of the most productive regions in Australia. Agriculture will continue to be important to the regional economy in coming decades – however, potentially declining water availability could reduce farm productivity and have flow-on impacts on the regional economy. The mining and renewable energy sectors contribute significantly to the regional and state economy and are expected to grow in future. Reliable water supplies will be critical to support this growth. The transitioning energy sector in the Lithgow region may provide new opportunities from the use of this water in the future.

This priority focuses on strengthening the resilience of the regional economy, including existing businesses and industries, and its adaptation to a drier future climate.

To support future industries and investments, the actions shortlisted under this priority:

- provide a better understanding of our groundwater resources and their sustainability, and transparently manage them
- improve the evidence and information base to support decision making, risk management and innovation
- explore opportunities to make sure the water entitlement and access framework can cater to the development of emerging industries, while observing legislated limits on water take
- support Aboriginal people to be more involved in water management by sharing their traditional knowledge and contributing to decision making.

Priority 4: Best use of existing water for the environment

The Macquarie–Castlereagh is richly endowed in environmental assets and ecosystems. Environmental water managers use both preventative and responsive strategies to manage the needs of its aquatic ecosystems. Watering events target a range of outcomes; from building resilience and promoting ecological restoration when water is abundant, to minimising losses or damage by maintaining drought refuges when water is scarce. Where possible, environmental managers work with communities to take local actions that have catchment-wide outcomes and protect important environmental and cultural sites.

The actions under this priority focus on:

- achieving shared benefits from water delivery and maximising environmental, social, cultural and economic outcomes when water is used
- limiting or removing pressures and impacts directly related to water infrastructure and land management as complementary catchment management activities are often needed to achieve environmental watering outcomes
- building knowledge and understanding of the region's water-dependent ecosystems and the impacts of climate change on their health and resilience.

The proposed actions to support these priorities are listed in Attachment A. We want your views on whether these actions are the best way to set the region up for the future.

These priorities and actions can improve the Macquarie–Castlereagh’s readiness to adapt to a more variable climate and support the difficult decisions we may need to make to deliver healthy, reliable and resilient water resources for the region’s future.

These proposed actions can help to position the Macquarie–Castlereagh region for a future where well-managed, sustainable water resources are available for thriving communities, towns, industries, places and ecosystems. They can give us a better understanding of the vulnerabilities of the region, put in place measures to improve the region’s resilience and establish the conditions for using our existing water resources more efficiently, effectively and sustainably.

Implementing some of the actions may involve difficult decisions and may impact when water is available for different uses. Many of the shortlisted actions will need more detailed analysis and engagement. By starting to consider the benefits and implications of implementing the actions now, we will be in a better-informed position to make difficult decisions, should the need arise.

When will the actions be implemented?

A critical feature of the final Macquarie–Castlereagh Regional Water Strategy will be to identify clearly what actions and investments are needed now and those that will or may be needed further into the future. The strategy considers a 20-year timeframe, aiming to chart a progressive journey that enables us to meet existing challenges, identify and prepare for foreseeable coming challenges and lay the groundwork for adapting to future uncertainties and changed circumstances.

Following public consultation, we will develop an implementation plan that will set out when we plan to commence each action and what we plan to achieve by when. The implementation plan will also identify key partners in effectively delivering these actions, including local councils, other government agencies and local Aboriginal communities.

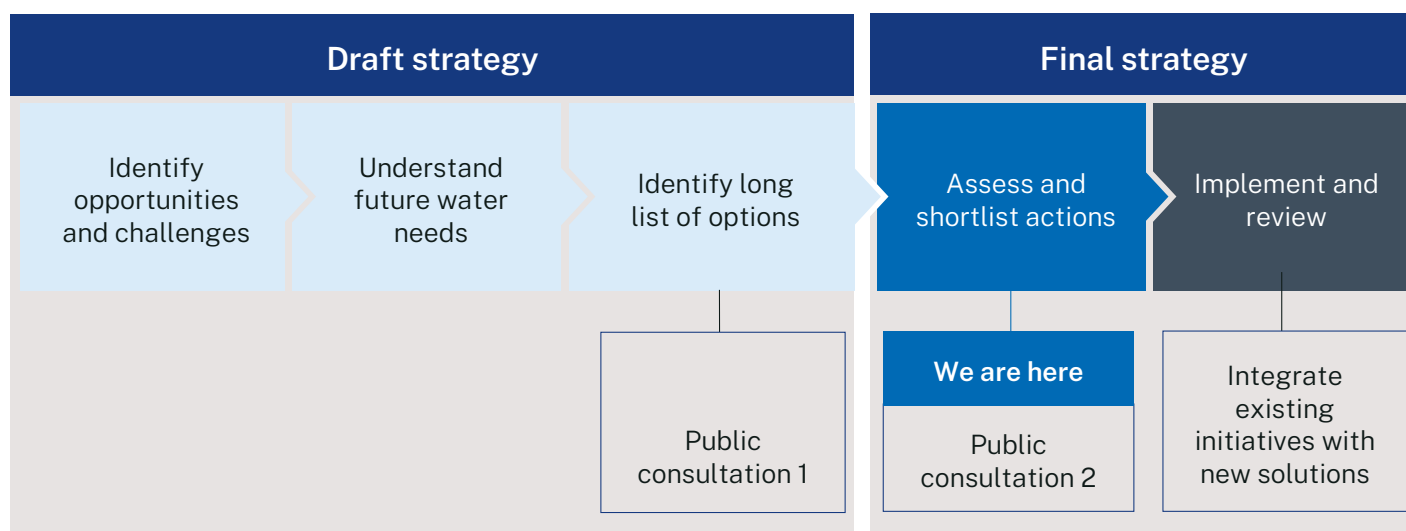
Not all actions will commence at once, and funding will be a key consideration in planning when and how the actions will be implemented. The regional water strategies will be a key tool in securing funding as future opportunities arise.

We want your feedback on which actions should be prioritised for implementation over the next 3 to 5 years, and which ones should be implemented in the medium or longer term.



Image courtesy of Destination NSW. Bogan River, Nyngan.

Figure 3. Macquarie–Castlereagh Regional Water Strategy delivery timeline



Your voice is important. The Macquarie–Castlereagh Regional Water Strategy: Shortlisted Actions – Consultation Paper is on public exhibition in October – November. Supporting information is available at water.dpie.nsw.gov.au/plans-and-programs/regional-water-strategies/public-exhibition/macquarie-castlereagh-regional-water-strategy

You can also have your say by providing written feedback to the Department of Planning and Environment via:

Web: water.dpie.nsw.gov.au/plans-and-programs/regional-water-strategies/public-exhibition/macquarie-castlereagh-regional-water-strategy

Email: regionalwater.strategies@dpie.nsw.gov.au

We would also be interested in your thoughts on:

- whether any of the proposed actions in this consultation paper should not be shortlisted and why?
- how the proposed actions should be staged and which actions should be implemented first?

Please note that all submissions will be published on the Department of Planning and Environment’s website, unless you let us know in your submission that you do not wish the content to be released.

We will be holding community engagement sessions to give participants an understanding of the context for the regional water strategy and an overview of the proposed priorities and actions. Face-to-face sessions will be held subject to COVID-19 restrictions and risks; otherwise, they will be held online. Details of these sessions can be found at the website listed above.

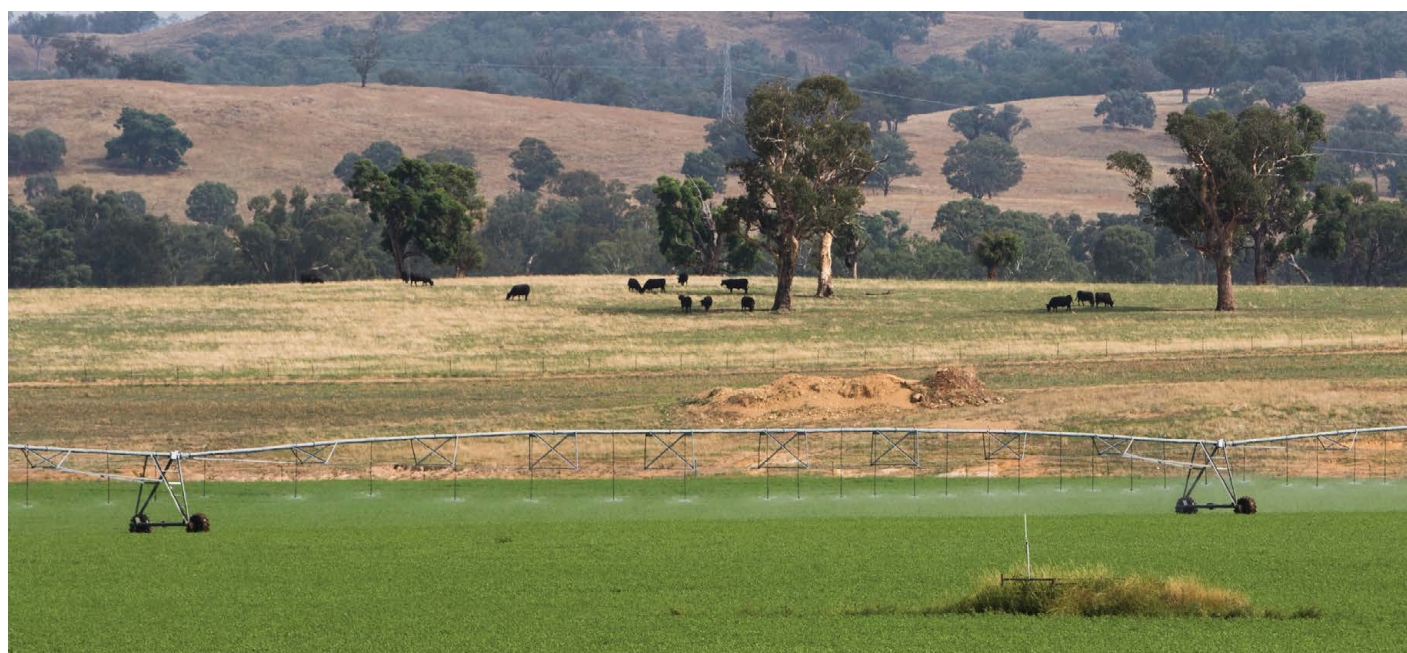


Image courtesy of Quentin Jones, Department of Planning and Environment. Irrigation farmland, Gulgong.



Image courtesy of Destination NSW. Coonamble Water Tower, Coonamble.

Attachment A: Macquarie–Castlereagh Regional Water Strategy–shortlist of proposed actions

Figure 4. Proposed water security challenges and priorities for the Macquarie–Castlereagh region

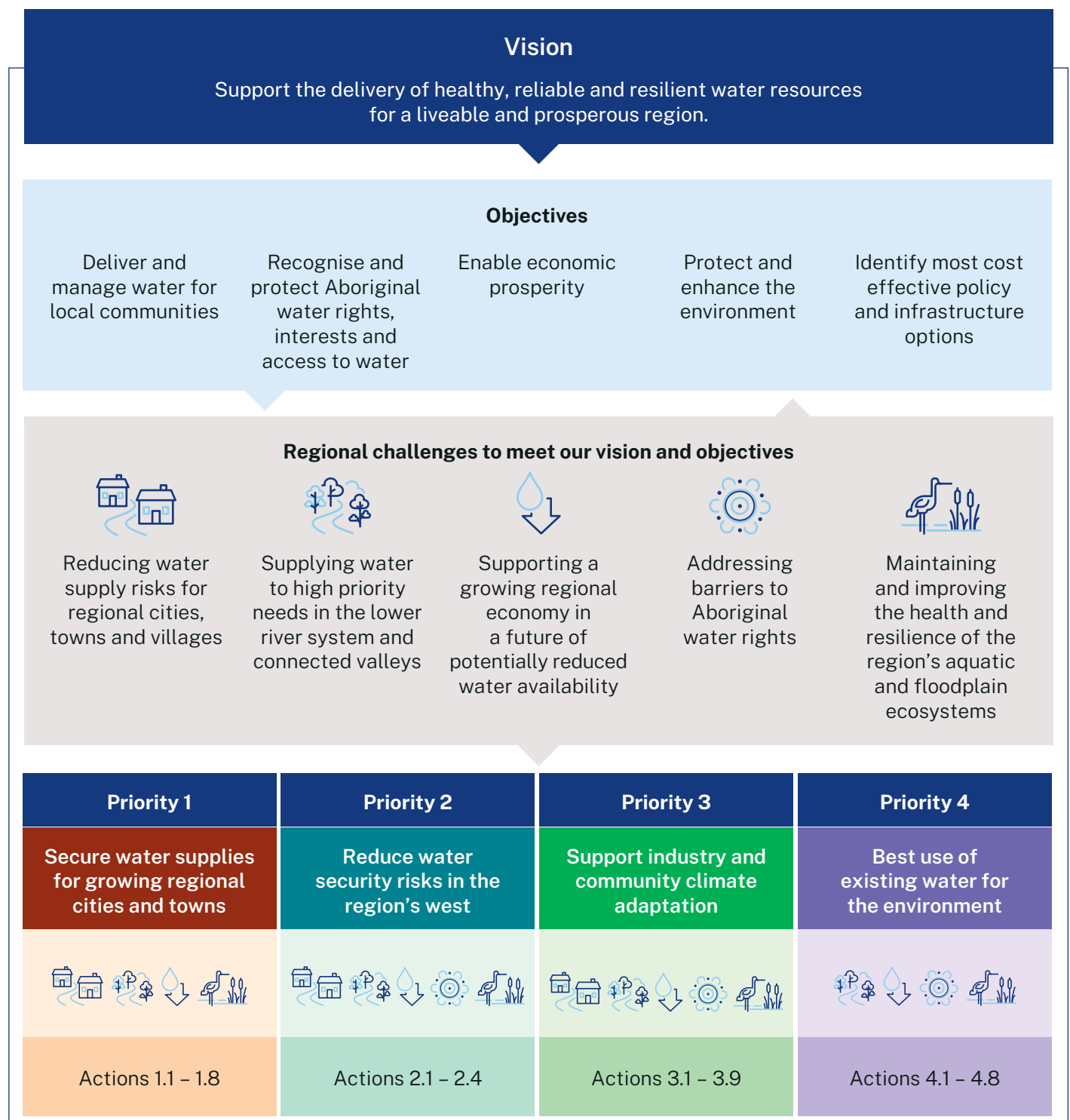
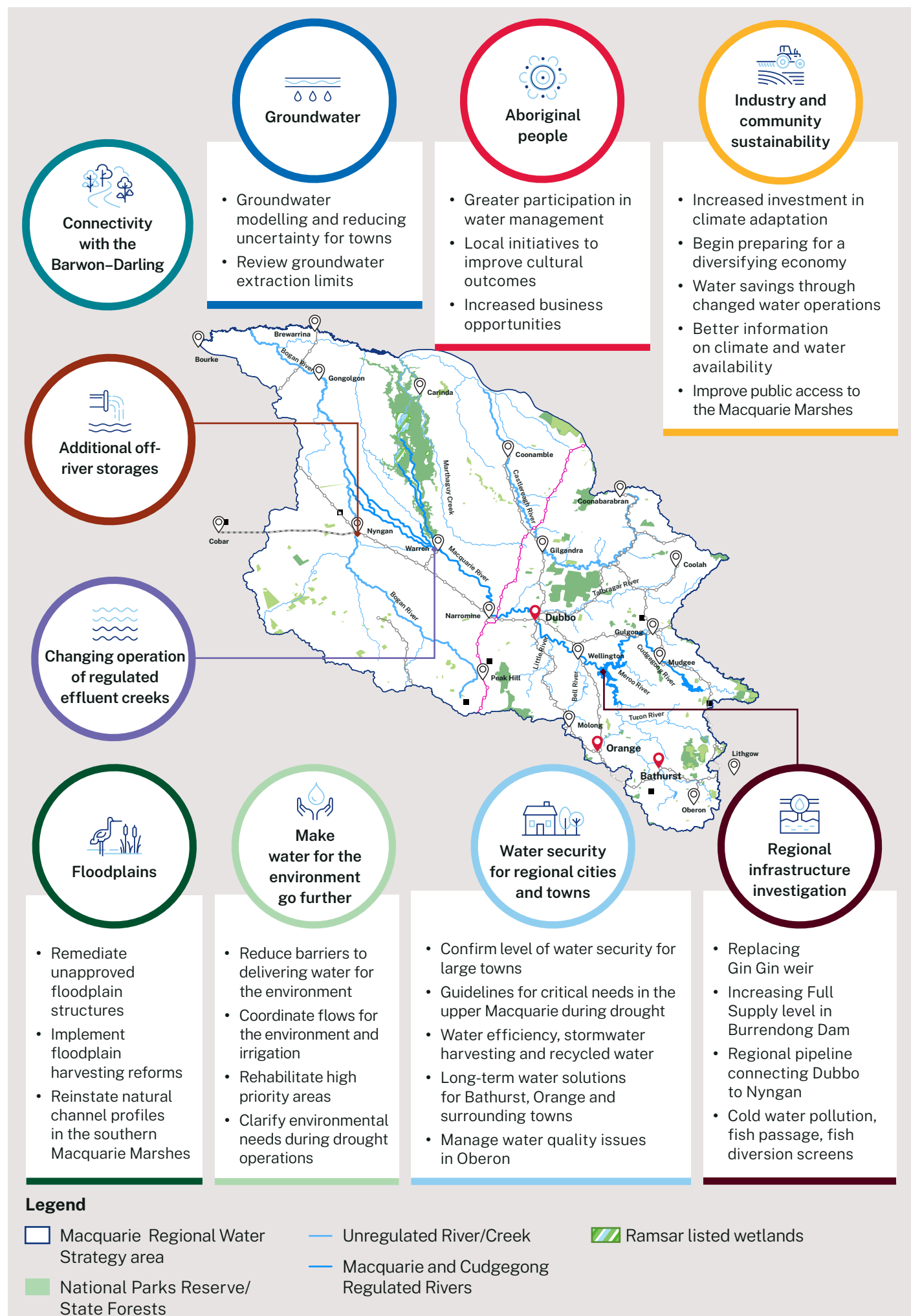


Figure 5. Location of Macquarie–Castlereagh Regional Water Strategy – Shortlisted actions



Priority 1

Secure water supplies for growing regional cities and towns

Legend



Reducing water supply risks for regional cities, towns and villages



Supplying water to high priority needs in the lower river system and connected valleys



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



Addressing barriers to Aboriginal water rights



Maintaining and improving the health and resilience of the region's aquatic and floodplain ecosystems

Proposed action	Summary	Challenges addressed
Action 1.1 Confirm the level of water security needed to support regional cities	Develop guidelines on whether water security planning for large regional towns should be guided by an 'enduring level of supply' approach.	
Action 1.2 Establish a governance framework to coordinate actions under Priority 1	Establish a governance framework and arrangements in consultation with local councils and local water utilities to support coordination of actions under Priority 1 and improve timely decision-making during extreme events.	
Action 1.3 Develop guidelines for managing extreme events in the upper Macquarie	Update planning and preparation for how to respond and protect the water supply for critical needs in the upper Macquarie during extreme drought conditions.	
Action 1.4 Adopt a stronger focus on urban water conservation and efficiency	Support local water utilities in investing in measures to improve the efficiency of supplying water for domestic, commercial and industrial water uses, and encourage water users to minimise demands for water.	
Action 1.5 Invest in innovative water supply options	Support local water utilities to progress stormwater harvesting, recycled water and managed aquifer recharge projects for domestic and commercial water uses.	

Proposed action	Summary	Challenges addressed
Action 1.6 Plan for the best long-term augmentation solution for the upper Macquarie	In collaboration with local councils, progress work to identify the best way to sequence water security projects across the upper Macquarie and neighbouring areas. This will include assessing the medium to long-term feasibility, costs and benefits of: - supplying water to upper Macquarie towns from the Fish River or Cocks River catchment - supplying water to Bathurst and/or Orange from the Lachlan Valley - new infrastructure in the upper Macquarie, which could include a new Ulmarrah Dam at Dixons Long Point - increasing the volume of water Orange can access each year from the Wambuul/Macquarie River.	
Action 1.7 Reduce uncertainty in groundwater security for the region's towns	Support local water utilities undertake local level investigations to understand and improve the security of groundwater supplies using the latest data.	
Action 1.8 Support management of Oberon's town water quality issues	Continue to provide Council with technical support and guidance to help manage water quality matters and explore options to support Council with the financial costs associated with sourcing water from the Fish River Scheme.	



Image courtesy of David Roma, Destination NSW. Bathurst Winter Festival, Bathurst.

Priority 2

Reduce water security risks in the region's west

Legend



Reducing water supply risks for regional cities, towns and villages



Supplying water to high priority needs in the lower river system and connected valleys



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



Addressing barriers to Aboriginal water rights



Maintaining and improving the health and resilience of the region's aquatic and floodplain ecosystems

Proposed action	Summary	Challenges addressed
Action 2.1 Investigate an additional off-river storage at Nyngan	Undertake detailed investigations for a third off-river, town water storage at Nyngan.	
Action 2.2 Create water savings through changed operation of regulated effluent creeks	Progress investigations to return the regulated Gunningbar, Duck and the upper part of Crooked Creek to a more variable flow regime with occasional periods of no flow, including alternative ways to supply water to the essential stock and domestic needs in dry periods through bores or pipelines.	
Action 2.3 Continue to investigate regional water security solutions for the lower Macquarie	Assess in detail the following options: • use some of the flood mitigation storage in Burrendong Dam for water supply • a new re-regulating weir in the mid-Macquarie (Gin Gin) • a regional pipeline connecting Dubbo to Nyngan and other towns.	
Action 2.4 Investigate ways to improve connectivity with the Barwon-Darling on a multi-valley scale	Develop the most effective coordinated options to improve connectivity across all Barwon-Darling tributaries through the Western Regional Water Strategy.	



Image courtesy of Ines Richter, Department of Planning and Environment. Gin Gin Weir, NSW

Priority 3

Support industry and community climate adaptation

Legend



Reducing water supply risks for regional cities, towns and villages



Supplying water to high priority needs in the lower river system and connected valleys



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



Addressing barriers to Aboriginal water rights



Maintaining and improving the health and resilience of the region's aquatic and floodplain ecosystems

Proposed action	Summary	Challenges addressed
Action 3.1 Invest in continuous improvement to surface and groundwater modelling	Continue to improve the river and groundwater system models that underpin water management planning in the Macquarie–Castlereagh region.	
Action 3.2 Improve public access to climate information and water availability forecasts	Design and deliver suitable training and information products and communication platforms.	
Action 3.3 Support adoption of farm climate adaptation and water efficiency measures	Continue to invest in ways that support farm climate adaptation and improve water use efficiency.	
Action 3.4 Undertake research to inform reviews of groundwater extraction and condition limits	Increase our knowledge of groundwater resources to inform future decisions on sustainable groundwater extraction limits.	
Action 3.5 Develop ongoing arrangements for participation of local Aboriginal people in water management	Investigate ways to improve the participation of Aboriginal people in water management through new approaches, programs, partnerships and funding.	

Proposed action	Summary	Challenges addressed
Action 3.6 Support place-based initiatives to deliver cultural outcomes for Aboriginal people	Support the continued development of tailored, place-based initiatives to improve water and other outcomes for Aboriginal people in the Macquarie–Castlereagh region.	
Action 3.7 Support the development of new water related Aboriginal business opportunities in the Macquarie–Castlereagh region	Invest in Aboriginal-run businesses and initiatives that address water access needs or identify new water-related business opportunities.	
Action 3.8 Modernise the water management framework so it can continue to support sustainable economic diversification	Address regulatory and policy barriers for emerging industries.	 
Action 3.9 Improve public access to the Macquarie Marshes	Improve visitor experience and access to areas of the Macquarie Marshes that are part of the national parks reserve, and support development of ecotourism opportunities which could be led by local Aboriginal people.	 



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

Priority 4

Best use of existing water for the environment

Legend



Reducing water supply risks for regional cities, towns and villages



Supplying water to high priority needs in the lower river system and connected valleys



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



Addressing barriers to Aboriginal water rights



Maintaining and improving the health and resilience of the region's aquatic and floodplain ecosystems

Proposed action	Summary	Challenges addressed
Action 4.1 Modify or remove barriers to delivering water for the environment	Implement the Macquarie Marshes Enhanced Watering Project. In areas outside of the Macquarie Marshes Enhanced Watering Project, increase the flexibility of delivery of water to environmental assets by investigating the removal of physical barriers.	
Action 4.2 Reinstate natural channel profiles in selected streams in the southern Macquarie Marshes	Undertake channel bed restoration works to allow reconnection with wetlands and floodplains.	
Action 4.3 Mitigate impacts to fish communities	Mitigate the impact of water infrastructure on native fish by: - installing fish passages at priority barriers in the Macquarie region - progressing alternative cold water pollution mitigation measures for Burrendong Dam - implementing diversion screens at priority pump sites in the Macquarie–Castlereagh to protect native fish.	

Proposed action	Summary	Challenges addressed
Action 4.4 Remediate unapproved floodplain structures	Undertake an accelerated compliance program for unapproved floodplain structures in high-risk areas of the Macquarie floodplain.	
Action 4.5 Provide clarity and certainty for environmental needs during drought operations	Clarify when, how and why drought operations are triggered. This will allow more accurate planning of environmental releases and more informed environmental management of the system.	
Action 4.6 Assess gaps in the flow regime and identify cooperative actions to improve ecological outcomes	Identify gaps in the frequency and adequacy of different flow types under the current climate and future climate change scenarios and determine how to fill these flow gaps without significant impacts on water users.	  
Action 4.7 Fully implement the NSW Floodplain Harvesting Program	Finalise floodplain harvesting access licences and works approvals, to regulate, measure and enforce limits on floodplain harvesting water take.	  
Action 4.8 Identify regionally significant riparian, wetland and floodplain areas to protect or rehabilitate	Strategically target on-ground activities at high-priority locations to restore, conserve and protect critical riparian, wetland and floodplain habitat and species, or areas of high cultural value in the Macquarie region.	 

