



# Draft Regional Water Strategy

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Border Rivers: Long list of options  
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The NSW Government acknowledges Aboriginal people as Australia's first people practicing the oldest living culture on earth and as the Traditional Owners and Custodians of the lands and waters.

We acknowledge that the people of the Bigambul, Githabul, Kambuwal, Gomeroi/Kamilaroi/Gamilaroi/Gamilaraay, Kwiambul and Ngarabal Nations hold a significant connection to the lands in which the Border Rivers Regional Water Strategy falls upon. Please note, throughout this document we will refer to Gomeroi/Kamilaroi/Gamilaroi/Gamilaraay as Gomeroi nation as per consistency with Native Title.

The Border Rivers Region holds areas of great spiritual, cultural and economic importance to Aboriginal people and the NSW Government recognises the connection of the water to the people of these nations.

We recognise the intrinsic connection of Traditional Owners to Country and acknowledge their contribution to the management of the Border Rivers Regional Water Strategy area landscape and natural resources.

NSW Department of Planning, Industry and Environment understands the need for consultation and inclusion of Traditional Owner knowledge, values and uses in water quality planning to ensure we are working towards equality in objectives and outcomes.

NSW Department of Planning, Industry and Environment is committed to continue future relationships and building strong partnerships with Aboriginal people. Due to COVID-19, face-to-face engagement with Aboriginal communities has been put on hold. We are committed to engaging with the Elders, representatives of the Bigambul, Githabul, Kambuwal, Gomeroi and Ngarabal Nations and Aboriginal community members about the regional water strategy in late 2020.

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# Options for the Draft Border Rivers Regional Water Strategy

As outlined in the Draft Border Rivers Regional Water Strategy, we have developed a long list of options and government commitments that could be included in the final strategy.

**It is important to note that the options have not been prioritised and not all options have been costed.**

In preparing this list, we recognise that a great deal of work has been done over the last few years to identify initiatives that could improve water management, water security and water reliability in the Border Rivers region. We have collated options from previous studies and supplemented them with further options derived from recent experience, community engagement and current NSW Government initiatives and programs. Bringing all of these options together will also help to align and better sequence the various water reform processes underway to deliver the best outcomes for the Border Rivers region.

These options aim to address the challenges the region may face in the future, while maximising opportunities arising from the growing agricultural sector, other emerging and expanding industries, and new investments in transport and community infrastructure.

**The draft long list of options and government commitments focus on:**

- maintaining and diversifying water supplies
- protecting and enhancing natural systems
- supporting water use efficiency and conservation
- strengthening community preparedness for climate extremes
- improving the recognition of Aboriginal people's water rights, interests and access to water.

Table 1 shows a snapshot of how we have matched the draft options and government commitments with these five categories and the challenges and opportunities we identified in the Draft Border Rivers Regional Water Strategy.

Overall, all options that are progressed will need to contribute to the liveability of the region.

**Table 1. Draft long list of options matrix**

| Category                                     | Maintaining and diversifying water supplies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Protecting and enhancing natural systems                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Region-specific challenges and opportunities | <p><b>Risks/Challenges:</b></p> <ul style="list-style-type: none"> <li>increased climate variability will have an impact on surface water availability, which poses new risks to towns, communities and industries in the Border Rivers</li> <li>limited capacity in existing dams to store water efficiently from infrequent high flow events</li> <li>water storages are affected by blue-green algae in the summer months which impacts on the availability of water supplies and causes release of cold water in the dams</li> <li>improving town water security</li> <li>addressing groundwater quality.</li> </ul> <p><b>Opportunities:</b></p> <ul style="list-style-type: none"> <li>diversify sources of supply for regional towns</li> <li>maintain or improve water quality</li> <li>support growth and industries in the region, and new development.</li> </ul> | <p><b>Risks/Challenges:</b></p> <ul style="list-style-type: none"> <li>delivering water to the end of the system</li> <li>protection of natural flow events</li> <li>protection of native and threatened aquatic species</li> <li>protecting critical environmental assets including the Morella Watercourse, Boobera Lagoon and Pungboulal Lagoon and in-stream ecological values (especially during extreme dry times)</li> <li>dams and other water delivery infrastructure alter natural flow regimes which impacts on water quality, native species and ecosystems</li> <li>increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support</li> <li>sustainable access to groundwater resources by all water users.</li> </ul> <p><b>Opportunities:</b></p> <ul style="list-style-type: none"> <li>recognise wider community benefits that the natural environment provides</li> <li>improve coordination and planning to improve environmental outcomes</li> <li>improve our knowledge and understanding of the region's water resources.</li> </ul>          |
| Options and Government commitments           | <ul style="list-style-type: none"> <li>Final business case for building a new dam on the Mole River</li> <li>Raising Pindari Dam's full supply level</li> <li>Raising Mungindi Weir</li> <li>Piping water to stock and domestic users in the unregulated section of Boomi River</li> <li>Improve cross-border management of flows at major breakout points</li> <li>Reliable access to groundwater by towns</li> <li>Intra- and inter-regional connections project investigation</li> <li>Inland diversions from the east</li> <li>Managing groundwater salinity</li> </ul>                                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>NSW Fish Passage Strategy</li> <li>Diversion screens to prevent fish extraction at pump offtakes</li> <li>Cold water pollution mitigation measures</li> <li>Investigation of surface water quality mitigation measures</li> <li>Implement state-wide groundwater quality monitoring program and management program</li> <li>Modification and/or removal of existing floodwork structures causing adverse impacts</li> <li>Providing incentives to landholders to conserve and rehabilitate riparian, wetland and floodplain vegetation</li> <li>Riparian habitat restoration and re-establishing threatened species</li> <li>Investigate land use change impacts on water resources</li> <li>Revise water sharing plan provisions for planned environmental water</li> <li>Improve benefits of planned environmental water</li> <li>Active management to protect water for the environment in unregulated rivers</li> <li>Improve understanding of water use in unregulated water sources</li> <li>Improve connectivity with downstream systems</li> <li>Protecting ecosystems that depend on groundwater resources</li> </ul> |

| Supporting water use and delivery efficiency and conservation                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Strengthening community preparedness for climate extremes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Improving the recognition of Aboriginal people's water rights, interests and access to water                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Risks/Challenges:</b></p> <ul style="list-style-type: none"> <li>• difficulties in delivering water to the end of the system in dry periods</li> <li>• increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> </ul> <p><b>Opportunities:</b></p> <ul style="list-style-type: none"> <li>• improve water use</li> <li>• maintain/improve productivity/efficiency in delivery</li> <li>• demand management (via price signals, policy and trade).</li> </ul> | <p><b>Risks/Challenges:</b></p> <ul style="list-style-type: none"> <li>• healthy water sources support the region's environment, which—in turn—supports liveable communities and thriving industries</li> <li>• increased climate variability poses new risks to towns, communities and industries in the Border Rivers</li> <li>• sustainable access to groundwater resources by all water users</li> <li>• addressing groundwater quality.</li> </ul> <p><b>Opportunities:</b></p> <ul style="list-style-type: none"> <li>• fit-for-purpose policies and regulation to protect town water security</li> <li>• strengthen community health and wellbeing</li> <li>• better manage risks</li> <li>• review of regulated river water accounting and allocation process</li> <li>• education and capacity building program on new climate data/modelling, managing groundwater resources sustainably, and intra- and interstate water trading products/systems and processes.</li> </ul> | <p><b>Risks/Challenges:</b></p> <ul style="list-style-type: none"> <li>• Aboriginal people's rights and obligations are not adequately recognised or provided for in current water laws and policies, and there are limited opportunities to influence management decisions</li> <li>• Aboriginal people have limited access to water allocations to use for cultural and economic purposes</li> <li>• Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways</li> <li>• lack of culturally appropriate information about how governments manage water.</li> </ul> <p><b>Opportunities:</b></p> <ul style="list-style-type: none"> <li>• protect and strengthen cultural landscapes, practices, knowledge and traditions</li> <li>• support the empowerment, self determination and economic advancement of Aboriginal people</li> <li>• strengthen the community wellbeing of Aboriginal people.</li> </ul> |
| <ul style="list-style-type: none"> <li>• Review of water markets in the Border Rivers region</li> <li>• Reuse, recycle and stormwater projects</li> <li>• Water efficiency projects (towns and industries)</li> <li>• Review urban water restrictions policy</li> </ul>                                                                                                                                                                                                                                                 | <ul style="list-style-type: none"> <li>• New drought operational rules</li> <li>• Review of regulated river water accounting and allocation process</li> <li>• Investigation of licence conversions</li> <li>• Improved data collection</li> <li>• Training and information sharing program</li> <li>• Investigation to maintain amenity for regional towns during drought</li> <li>• Sustainable access to groundwater</li> <li>• Improved clarity in managing groundwater resources sustainably</li> <li>• Improved understanding of groundwater processes</li> <li>• Extending the Cap and Pipe the Bores Program</li> <li>• Maintaining the Great Artesian Basin for the future</li> <li>• Support reforms to simplify and strengthen cross-border groundwater management</li> <li>• Improved knowledge of fractured rock groundwater sources in the upper catchment</li> </ul>                                                                                                    | <ul style="list-style-type: none"> <li>• Culturally appropriate water knowledge program</li> <li>• Water-dependent cultural practice and site identification project</li> <li>• Secure flows for water-dependent cultural sites</li> <li>• Shared benefit project (environment and cultural outcomes)</li> <li>• Establish a regional Aboriginal Water Advisory Committee</li> <li>• Water allocations for Aboriginal communities</li> <li>• Aboriginal cultural water access licence review</li> <li>• Co-management investigation of Travelling Stock Reserves</li> <li>• Regional Cultural Water Officer Employment Program</li> <li>• River Ranger Program</li> </ul>                                                                                                                                                                                                                                                                                                  |

**Figure 1. Border Rivers long list of options and government commitments map**



**Options not shown on the map are not location specific.**

#### Long list of options

##### Maintaining and diversifying water supplies

1. Final business case for building a new dam on the Mole River
2. Raising Pindari Dam's full supply level
3. Raising Mungindi Weir
4. Piping water to stock and domestic users in the unregulated section of Boomi River
5. Improve cross-border management of flows at major breakout points
6. Reliable access to groundwater by towns
7. Intra- and inter-regional connections project investigation
8. Inland diversions from the east
9. Managing groundwater salinity

##### Protecting and enhancing natural systems

10. NSW Fish Passage Strategy
11. Diversion screens to prevent fish extraction at pump offtakes
12. Cold water pollution mitigation measures
13. Investigation of surface water quality mitigation measures
14. Implement state-wide groundwater quality monitoring program and management program
15. Modification and/or removal of existing floodwork structures causing adverse impacts
16. Providing incentives to landholders to conserve and rehabilitate riparian, wetland and floodplain vegetation
17. Riparian habitat restoration and re-establishing threatened species

18. Investigate land use change impacts on water resources
19. Revise water sharing plan provisions for planned environmental water
20. Improve benefits of planned environmental water
21. Active management to protect water for the environment in unregulated rivers
22. Improve understanding of water use in unregulated water sources
23. Improve connectivity with downstream systems
24. Protecting ecosystems that depend on groundwater resources

##### Supporting water use and delivery efficiency and conservation

25. Review of water markets in the Border Rivers region
26. Reuse, recycle and stormwater projects
27. Water efficiency projects (towns and industries)
28. Review urban water restrictions policy

##### Strengthening community preparedness for climate extremes

29. New drought operational rules
30. Review of regulated river water accounting and allocation process
31. Investigation of licence conversions
32. Improved data collection
33. Training and information sharing program
34. Investigation to maintain amenity for regional towns during drought
35. Sustainable access to groundwater

36. Improved clarity in managing groundwater resources sustainably
37. Improved understanding of groundwater processes
38. Extending the Cap and Pipe the Bores Program
39. Maintaining the Great Artesian Basin for the future
40. Support reforms to simplify and strengthen cross-border groundwater management
41. Improved knowledge of fractured rock groundwater sources in the upper catchment

##### Improving the recognition of Aboriginal people's water rights, interests and access to water

42. Culturally appropriate water knowledge program
43. Water-dependent cultural practice and site identification project
44. Secure flows for water-dependent cultural sites
45. Shared benefit project (environment and cultural outcomes)
46. Establish a regional Aboriginal Water Advisory Committee
47. Water allocations for Aboriginal communities
48. Aboriginal cultural water access licence review
49. Co-management investigation of Travelling Stock Reserves
50. Regional Cultural Water Officer Employment Program
51. River Ranger Program

Not all options in this long list will be shortlisted. Only feasible options will be progressed, following the evidence-based assessment process described in the *Regional Water Strategies Guide*.<sup>1</sup> Each final package of options will also consider how the implementation of the preferred options should be staged.

This document describes each option and government commitment, its intent and the challenges it seeks to address. Each option is aligned with one or more of the overarching objectives set for the NSW regional water strategies (Figure 2). Additional considerations and further work required to progress the

option are identified. This will need to be supplemented by further analysis and your feedback. Where possible, links and references are provided for further information.

The list also identifies potential combinations of options. These combinations recognise that most options require associated works, further assessments and/or legislative, policy and planning changes to ensure they address the risks and challenges identified in the Border Rivers region and do not have unintended impacts. Our aim is to develop a final strategy with a balanced package of options that delivers on all of these objectives.

**Figure 2. Regional water strategies: objectives**



### **Deliver and manage water for local communities**

Improve water security, water quality and flood management for regional towns and communities.



### **Enable economic prosperity**

Improve water access reliability for regional industries.



### **Recognise and protect Aboriginal water rights, interests and access to water**

Including Aboriginal heritage assets.



### **Protect and enhance the environment**

Improve the health and integrity of environmental systems and assets, including by improving water quality.



### **Affordability**

Identify least cost policy and infrastructure options.

1. *Regional Water Strategies Guide*, [www.industry.nsw.gov.au/water/plans-programs/regional-water-strategies/about](http://www.industry.nsw.gov.au/water/plans-programs/regional-water-strategies/about)



# **Border Rivers: Long list of options and government commitments**

# Maintaining and diversifying water supplies

Opportunities to improve water security, maintain suitable water quality, and support growth and jobs in the region.

## Government commitment 1. Final business case for building a new dam on the Mole River

*Source: WaterNSW is preparing a detailed business case for this project (funding of \$24 million). Commonwealth and NSW Government jointly funded the development of the project.*

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>            | Preparation of a detailed business case for the construction of a new dam on the Mole River approximately 20 kms southwest of Tenterfield.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Intent</b>                 | A new dam will have the potential to store more water in flood sequences and reduce some of the variability in water availability and increase the reliability of water available to water users during drier periods.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>Improving town water security.</li> <li>Limited capacity in existing dams to store water efficiently from infrequent high flow events.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>Option 3. Raising Mungindi Weir</li> <li>Option 7. Intra- and inter-regional connections project investigation.</li> </ul> <p>This option could also be combined with other options to mitigate potential impacts from dams, such as:</p> <ul style="list-style-type: none"> <li>Option 12. Cold water pollution mitigation measures</li> <li>Option 13. Investigation of surface water quality mitigation measures</li> <li>Option 23. Improve connectivity with downstream systems.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Considerations</b>         | <p>Councils in the region have requested that the dam is used to provide greater water security for towns and help support the development of the horticulture industry in the region.</p> <p>The business case will:</p> <ul style="list-style-type: none"> <li>examine options for construction and operation of the dam, including: <ul style="list-style-type: none"> <li>configuration and dam type, including design measures to mitigate cold water pollution</li> <li>cost estimates and cost implications for water users</li> <li>potential changes to water sharing arrangement and whether that will require water sharing plan rule changes</li> <li>ensuring compliance with Basin Plan sustainable diversion limits and the requirement for no net reduction in the protection of planned environmental water</li> <li>exploring the water sharing arrangements between NSW and Queensland under the 1946 NSW-Queensland Border Rivers Agreement and the 2008 Intergovernmental Agreement</li> </ul> </li> <li>assess the potential impacts and benefits of the dam, including on: <ul style="list-style-type: none"> <li>water security</li> <li>Aboriginal cultural heritage</li> <li>water users who extract water from unregulated rivers, floodplain harvesting and supplementary flows</li> <li>planned environmental water</li> <li>the environment, dependent ecosystems and dependent biota including threatened species from altered hydrology and surface water availability, such as reduced flow variability, reduced in-channel habitat, reduced connectivity, reduced fish passage (downstream and upstream of the dam) and cold water pollution</li> <li>connectivity to the downstream Barwon-Darling system</li> <li>possible impact mitigation measures such as biodiversity offsets, environmental flows and fish passage in accordance with requirements of the <i>Fisheries Management Act 1994</i></li> </ul> </li> <li>consider stakeholder views including feedback from communities and the Queensland Government.</li> </ul> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Further information</b>    | <a href="http://www.watarnsw.com.au/projects/new-dams-for-nsw/mole-river-dam">www.watarnsw.com.au/projects/new-dams-for-nsw/mole-river-dam</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## Option 2. Raising Pindari Dam's full supply level

Source: WaterNSW 20 Year Infrastructure Options Study, Rural Valleys—Summary Report

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>            | <p>Raise Pindari Dam's full supply level to increase the dam's storage capacity.</p> <p>This could be achieved by increasing the height of the dam embankment.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>Increased dam capacity to capture and store flows, thereby improving water availability for users in the Border Rivers region.</li> <li>Increased dam capacity will also improve flood mitigation by capturing more flows.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>Limited capacity in existing dams to store water efficiently from infrequent high flow events.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Potential combinations</b> | <p>This option could be an alternative or combined with Government commitment 1. Final business case for building a new dam on the Mole River, depending on the findings of the final business case.</p> <p>This option could also be combined with:</p> <ul style="list-style-type: none"> <li>Option 3. Raising Mungindi Weir</li> <li>Option 12. Cold water pollution mitigation measures</li> <li>Option 13. Investigation of surface water quality mitigation measures</li> <li>Option 23. Improve connectivity with downstream systems.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Considerations</b>         | <p>Hydrological, hydraulic and flood modelling will need to be undertaken to determine the optimal capacity and engineering design.</p> <p>Assessment will be needed of:</p> <ul style="list-style-type: none"> <li>how the dam would change the reliability of water licences for existing users</li> <li>distribution of potential benefits of increased water availability between water users</li> <li>potential changes to water sharing plan rules</li> <li>how compliance with the sustainable diversion limit will be maintained</li> <li>how to meet the Basin Plan requirement for no net reduction in the protection of planned environmental water</li> <li>impacts on the environment, dependent ecosystems and dependent biota including threatened species from altered hydrology and surface water availability, such as reduced flow variability, reduced flushing of the river from spills, reduced in-channel habitat, reduced connectivity, reduced fish passage (downstream and upstream of the dam) and cold water pollution</li> <li>impact of reduced flooding on floodplain habitats</li> <li>impacts or benefits to Aboriginal people's water rights, interests and access to water (including cultural heritage)</li> <li>mitigation measures to reduce impacts on the downstream environment, such as creation of an environmental contingency allowance</li> <li>requirements for fish passage offsets under the <i>Fisheries Management Act 1994</i></li> <li>flood mitigation benefits.</li> </ul> <p>Raising Pindari Dam's full supply level is expected to have less environmental impact on the river ecosystem than building a new dam on the Mole River.</p> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Further information</b>    | <p><a href="http://www.watarnsw.com.au/projects/infrastructure-studies/20-year-infrastructure-options-study">www.watarnsw.com.au/projects/infrastructure-studies/20-year-infrastructure-options-study</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## Option 3. Raising Mungindi Weir

Source: WaterNSW 20 Year Infrastructure Options Study, Rural Valleys—Summary Report

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>            | Raising Mungindi Weir to increase end-of-system storage capacity, improving system efficiency and delivery of water to users in the lower reaches of the Macintyre River and the top end of the Barwon-Darling River reach.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Intent</b>                 | <p>This option would improve efficiency in water delivery. It would result in more water being stored at the end of the regulated river system to meet demand (rather than needing to be released from the dams) and reduce conveyance losses.</p> <p>This option would also increase the reliability of supply for Mungindi. Mungindi has a secure secondary groundwater source, but surface water is preferred for aesthetic reasons. Surface water also provides greater recreational benefits, such as fishing and bushwalking.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>Limited capacity in existing dams to store water efficiently from infrequent high flow events.</li> <li>Difficulties in delivering water to the end of the system.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>Government commitment 1. Final business case for building a new dam on the Mole River</li> <li>Option 2. Raising Pindari Dam's full supply level.</li> </ul> <p>An alternative to this option could be constructing an off-stream storage.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Considerations</b>         | <p>Mungindi Weir is being considered in WaterNSW's Western Weirs strategic business case.</p> <p>This option will need hydrological, hydraulic and flood modelling to determine the optimal storage capacity and engineering design.</p> <p>The option will also need to assess:</p> <ul style="list-style-type: none"> <li>potential benefits and impacts on water users, communities, Aboriginal cultural heritage, the environment and the downstream Barwon-Darling system and the distribution of those benefits and impacts</li> <li>impacts on the environment, dependent ecosystems and dependent biota including threatened species from: <ul style="list-style-type: none"> <li>altered hydrology and surface water availability such as reduced flow variability, altered or reduced in-channel habitat, reduced connectivity, reduced fish passage (downstream and upstream of the weir) and reduced connectivity with the Barwon-Darling River</li> <li>channel deepening such as increased risk of stratification, increased risk of algal blooms and fish kills, and raised water levels (potential for impacts on terrestrial vegetation such as river red gums). There are significant drinking water treatment costs associated with algal blooms</li> </ul> </li> <li>how compliance with the sustainable diversion limit will be maintained</li> <li>how to meet the Basin Plan requirement for no net reduction in the protection of planned environmental water</li> <li>mitigation measures to reduce impacts on the downstream environment, such as construction of a suitable fish passage and water releases to enable fish movement</li> <li>potential changes to water sharing plan rules</li> <li>how a gated weir structure could be operated to provide flexibility in how water is managed for the town and the environment</li> <li>cost and resource allocation arrangements between NSW and Queensland</li> <li>suitability of potential off-stream storage sites.</li> </ul> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Further information</b>    | <p><a href="http://www.waternsw.com.au/projects/new-dams-for-nsw/western-weirs-program">www.waternsw.com.au/projects/new-dams-for-nsw/western-weirs-program</a></p> <p><a href="http://www.waternsw.com.au/projects/infrastructure-studies/20-year-infrastructure-options-study">www.waternsw.com.au/projects/infrastructure-studies/20-year-infrastructure-options-study</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## Option 4. Piping water to stock and domestic water users in the unregulated section of Boomi River

Source: WaterNSW 20 Year Infrastructure Options Study, Rural Valleys—Summary Report

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>          | Piped supply to stock and domestic water users in unregulated section of the Boomi River in lieu of replenishment flow releases from Pindari Dam.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Intent</b>               | Improve the efficiency of water supply and delivery for stock and domestic water users in the unregulated section of the Boomi River by reducing conveyance losses from replenishment flow releases from Pindari Dam.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Challenges addressed</b> | <ul style="list-style-type: none"> <li>Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>Difficulties in delivering water to the end of the system in dry periods.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Considerations</b>       | <ul style="list-style-type: none"> <li>Options for construction and operation of pipeline, including: <ul style="list-style-type: none"> <li>pipeline route, length and dimensions</li> <li>estimated costs.</li> </ul> </li> <li>Assessment of potential benefits and impacts of the pipeline on: <ul style="list-style-type: none"> <li>water users with increased water security</li> <li>recreational value of Boomi River as piping would reduce the availability of surface water for the community for recreational activities such as fishing</li> <li>landowners who may have to fence boundaries where this has traditionally been provided by the unregulated section of the river</li> <li>Aboriginal people's water rights, interests and access to water (including cultural heritage)</li> <li>river channel morphology and hydrology from pipeline construction and operation</li> <li>the environment, dependent ecosystems and biota including threatened species from altered hydrology and surface water availability such as reduced in-channel habitat, connectivity, and fish passage</li> <li>how to meet the Basin Plan requirement for no net reduction in the protection of planned environmental water</li> <li>potential to return water saved through increased delivery efficiency to the Boomi River for environmental purposes to supplement the return to a more natural flow regime</li> <li>implementing an environmental water management plan.</li> </ul> </li> <li>Stakeholder views including feedback from communities.</li> <li>Potential amendments to rules in the water sharing plans.</li> </ul> |
| <b>Objectives</b>           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Further information</b>  | <a href="http://www.waterrnsnsw.com.au/projects/infrastructure-studies/20-year-infrastructure-options-study">www.waterrnsnsw.com.au/projects/infrastructure-studies/20-year-infrastructure-options-study</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## Option 5. Improve cross-border management of flows at major breakout points

Source: WaterNSW

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|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>            | <p>This option involves improving the monitoring and management of cross-border flows between NSW and Queensland at key breakout structures.</p> <p>There are several flood runners and anabranches where flows can break out of the main river channel when certain flow levels are reached. Major locations include Whalan, Callandoon and Dingo Creeks, the Boomi River and the Little Weir River.</p> <p>At Newinga, the Weir River and Macintyre River almost join. At certain high flow levels above 600 ML/day in the Macintyre River, water can flow into the lower Weir River. A high flow in the Weir River reverses this situation. Currently, at the Newinga Breakout, there is a weir structure with removable drop boards that are manually operated. The boards are placed to protect NSW regulated flows and environmental water during uncontrolled flow events.</p> <p>There is concern that:</p> <ul style="list-style-type: none"> <li>• ineffective and inefficient operation of the Newinga Breakout structure allows regulated river water from NSW to flow into Queensland</li> <li>• bank erosion causes the Dingo Creek and Callandoon Creek mouth to widen, allowing more water to flow from NSW into Queensland.</li> </ul> <p>Potential projects include:</p> <ul style="list-style-type: none"> <li>• upgrading and automating the operation of the Newinga Breakout structure</li> <li>• implementing improvement works at Dingo Creek and Callandoon Creek.</li> </ul> |
| <b>Intent</b>                 | <p>Recover water for regulated river water users in NSW through improved delivery efficiency.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Challenges addressed</b>   | <p>Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Potential combinations</b> | <p>This option could be combined with Option 32. Improved data collection.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Considerations</b>         | <p>Consideration would need to be given to:</p> <ul style="list-style-type: none"> <li>• quantification of the volume of water that could flow from NSW to Queensland to determine whether it is significant and warrants action</li> <li>• water sharing arrangements between NSW and Queensland under the 1946 NSW-Queensland Border Rivers Agreement and the 2008 Intergovernmental Agreement, and the role of the Border Rivers Commission</li> <li>• assessment of costs of upgrades</li> <li>• cost sharing arrangements between NSW and Queensland.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## Option 6. Reliable access to groundwater by towns

Source: Department of Planning, Industry and Environment—Water and consultation with councils

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| <b>Description</b>            | <p>Groundwater can provide additional security for town water supplies in the Border Rivers region. In 2019 during the drought, Tenterfield Shire Council expanded its groundwater infrastructure with an additional bore. Inverell is considering accessing groundwater to increase its supply. Moree Plains Shire Council is also considering increasing the security of Boggabilla's town water supply with a new bore.</p> <p>This option would include a strategic review and planning to identify:</p> <ul style="list-style-type: none"> <li>towns where future water demands could exceed the capacity of surface water resources (including the adaptive nature of river operations during drought conditions, such as rivers being cut-off upstream of a given town)</li> <li>the likelihood and consequences of such exceedances (for example, is water carting feasible and economically sound?)</li> <li>towns where future water demands could exceed current entitlements</li> <li>groundwater resources that could be used as a complementary water supply (identified with field-based and numerical modelling-based information)</li> <li>regulatory issues potentially slowing or preventing access to these groundwater resources</li> <li>what infrastructure investments (borefields and pipelines) are needed and their timing</li> <li>impact of changing groundwater access on other users (such as domestic and stock, and industry).</li> </ul> <p>This option would improve processes and policies to address challenges faced by towns accessing groundwater during the current drought.</p> <p>This option would not replace the need for councils to have an integrated water cycle management plan.</p> |
| <b>Intent</b>                 | <p>Increase the security and resilience of town water supplies by using groundwater resources as an alternative water supply.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Challenges addressed</b>   | <p>Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>Option 9. Managing groundwater salinity</li> <li>Option 14. Implement state-wide groundwater quality monitoring program and management program</li> <li>Option 24. Protecting ecosystems that depend on groundwater resources</li> <li>Option 32. Improved data collection</li> <li>Option 33. Training and information sharing program</li> <li>Option 35. Sustainable access to groundwater</li> <li>Option 36. Improved clarity in managing groundwater resources sustainably</li> <li>Option 37. Improved understanding of groundwater processes</li> <li>Option 38. Extending the Cap and Pipe the Bores Program</li> <li>Option 39. Maintaining the Great Artesian Basin for the future</li> <li>Option 40. Support reforms to simplify and strengthen cross-border groundwater management</li> <li>Option 41. Improved knowledge of fractured rock groundwater sources in the upper catchment.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Considerations</b>         | <p>This option requires an assessment of the roles and responsibilities of state and local governments in ensuring secure access to town water supplies.</p> <p>Further investigation is needed into:</p> <ul style="list-style-type: none"> <li>access to reasonable quality groundwater for towns</li> <li>potential impacts on alluvial groundwater users, groundwater dependant ecosystems and adjacent river flows</li> <li>how compliance with the sustainable diversion limit will be maintained</li> <li>how to meet the Basin Plan requirement for no net reduction in the protection of planned environmental water.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## Option 7. Intra- and inter-regional connections project investigation

Source: Tenterfield Shire Council and Glen Innes Severn Council

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| <b>Description</b>            | Investigation of potential additional intra-regional pipeline connections in the east and north-east, and inter-regional pipeline connections such as to Stanthorpe in Queensland. This option could also consider a pipeline from the Great Artesian Basin to the east of the catchment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Intent</b>                 | Increase the connections between water supplies to provide access to more than one water source, in order to increase security and reliability of supply for towns and to facilitate industry growth, such as horticulture developments.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>Improving town water security.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>Government commitment 1. Final business case for building a new dam on the Mole River</li> <li>Option 2. Raising Pindari Dam's full supply level</li> <li>Option 8. Inland diversions from the east.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Considerations</b>         | <ul style="list-style-type: none"> <li>Level of risk to security and reliability for specific towns would be identified through a secure yield analysis as part of the development of an integrated water cycle management strategy by local councils.</li> <li>Assessment of piping water from under-allocated groundwater sources to towns that need it (subject to cost-benefit analysis). It will also require reviewing existing supply plans by councils.</li> <li>Options for construction and operation of pipelines, including: <ul style="list-style-type: none"> <li>sources of water, including water from the Great Artesian Basin</li> <li>pipeline route, length and dimensions</li> <li>estimated costs.</li> </ul> </li> <li>Assessment of potential benefits and impacts of the pipeline, including: <ul style="list-style-type: none"> <li>benefits for water users with increased water security</li> <li>impacts on downstream water sources, water users and the environment from potentially reduced supplies</li> <li>Basin Plan requirements such as compliance with the sustainable diversion limit and no net reduction in the protection of planned environmental water</li> <li>impacts on Aboriginal people's water rights, interests and access to water (including cultural heritage).</li> </ul> </li> <li>Stakeholder views including feedback from communities.</li> </ul> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## Option 8. Inland diversions from the east

Source: WaterNSW 20 Year Infrastructure Options Study, Rural Valleys—Summary Report; Border Rivers Food and Fibre

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|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>            | Investigation of potential diversion of flows from the east of the Great Dividing Range or Queensland.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Intent</b>                 | A diversion scheme has the potential to increase the water security of the region.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>• Improving town water security.</li> <li>• Limited capacity in existing dams to store water efficiently from infrequent high flow events.</li> <li>• Difficulties in delivering water to the end of the system.</li> <li>• Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Potential combinations</b> | <p>This option could be combined with Option 7. Intra- and inter-regional connections project investigation.</p> <p>This option could also be combined with other options to improve water availability for the environment.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Considerations</b>         | <p>This option requires comprehensive investigation of a number of matters including:</p> <ul style="list-style-type: none"> <li>• previous investigations into inter-valley transfers (Bradfield and Coffey schemes)</li> <li>• present and future water requirements of coastal basins from which water may be diverted</li> <li>• impacts on coastal water users (including communities, fishing and agricultural industries) and the environment from reduced water availability, reduced floods and freshes (which are necessary for habitat maintenance, water quality and ecological functions) and reduced estuarine productivity</li> <li>• impacts on Aboriginal people's water rights, interests and access to water (including cultural heritage)</li> <li>• infrastructure required to enable transfer of water from the coast to the Border Rivers region and store the water</li> <li>• hydrological, hydraulic and flood modelling to determine the optimal location, capacity, and engineering design of infrastructure</li> <li>• benefits and costs for water users in the Border Rivers region, including whether the cost is affordable</li> <li>• risk of translocation of exotic species (including pest fish such as Mozambique Tilapia and Banded Grunter, which is prohibited under the <i>Biosecurity Act 2015</i>) or closely related species causing hybridization and competition (such as Eastern Freshwater Cod and Murray Cod)</li> <li>• opportunities to integrate pumped hydro power schemes to offset costs.</li> </ul> <p>The NSW Government has committed \$25 million for scoping and investigating options for major water diversion schemes, contingent on matching funding from the Commonwealth and other states.</p> <p>Previous investigations into major water diversion schemes have found these to be technically, economically or environmentally unfeasible. If met by the Commonwealth and other states, the NSW Government's commitment will enable a renewed focus on these challenges.</p> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## Option 9. Managing groundwater salinity

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>Salinity is a key water quality measure that determines whether groundwater can be used for drinking water, watering stock, irrigation or the water needs further treatment. Some groundwater is naturally saline, and the level of salinity varies between groundwater sources and within the same source.</p> <p>A key groundwater challenge is increasing groundwater levels from irrigation runoff contributing to dryland salinity and elevated salt in rivers; however, this is comprehensively managed by the Basin Salinity Management 2030 strategy.</p> <p>Other groundwater challenges include:</p> <ul style="list-style-type: none"> <li>• contamination from high salinity groundwater via pumping induced flow</li> <li>• groundwater in some aquifers naturally too saline to be useful</li> <li>• mobilisation of salt as groundwater chemistry and groundwater levels change.</li> </ul> <p>This option would:</p> <ul style="list-style-type: none"> <li>• review the definition of groundwater beneficial use categories</li> <li>• develop policy around contamination of fresh groundwater</li> <li>• state-wide stocktake of available groundwater salinity information, including studies, to identify knowledge gaps</li> <li>• quantify the entrained salt load in alluvial aquifers to better forecast groundwater quality if changes to water level or chemistry mobilises the salt</li> <li>• improve data quality by implementing data management methods</li> <li>• quantitative risk assessment of salinity induced by land management and pumping in all groundwater sources</li> <li>• manage local extraction levels to prevent pumping induced salinity in high risk groundwater sources</li> <li>• investigate feasibility of desalination of groundwater in areas where there is high water demand but groundwater sources are too saline</li> <li>• develop policy on the risk of mining activities increasing groundwater salinity</li> <li>• develop policy on environmental protection of saline groundwater from other contaminants</li> <li>• implementation of Aboriginal land care practices to manage salinity.</li> </ul> |
| <b>Intent</b>                 | <p>Prevent further salinisation of groundwater sources and increase the usability of saline groundwater.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Increased climate variability, particularly during dry times will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> <li>• Healthy water sources support the region's environment which, in turn—supports liveable communities and thriving industries.</li> <li>• Addressing groundwater quality including the contamination of high-quality groundwater from the intrusion of saline groundwater due to pumping.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Potential combinations</b> | <p>This option could be combined with Option 14. Implement state-wide groundwater quality monitoring program and management program.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Considerations</b>         | <p>Risk assessment of mining on groundwater salinity will require consultation with other government departments including Department of Planning, Industry and Environment—Planning.</p> <p>Inter-jurisdictional coordination will be required for groundwater sources shared across borders.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |



# Protecting and enhancing natural systems

Opportunities to protect and enhance environmental outcomes and realise broader community benefits through a healthy environment.

## Option 10. NSW Fish Passage Strategy

*Source: Department of Planning, Industry and Environment—Water, consultation with joint organisations and councils*

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| <b>Description</b>          | <p>Many native fish species in the Border Rivers require unimpeded access through waterways to carry out natural reproductive and migratory processes. Physical waterway barriers such as weirs and dams can limit these processes, leading to a decline in the health and viability of native fish populations. Department of Primary Industries—Fisheries have identified over 300 barriers to fish passage in the Border Rivers region.</p> <p>Currently, native fish can only move through the Border Rivers system during high flow conditions when water overflows weirs and other in-stream barriers.</p> <p>This option will look at a staged remediation of fish passages at 10 priority weirs and other barriers within the Border Rivers region.</p> <p>These 10 priority weirs are proposed for remediation to facilitate fish access to an additional 660 km of the Macintyre and Dumaresq Rivers along the NSW-Queensland Border. This river section has been identified as key habitat for four threatened fish species, with stretches of high quality aquatic and riparian habitat. Importantly, this project builds upon the significant outcomes that would be achieved from the proposed Barwon-Darling Fish Passage Remediation Program and is also considered a high remediation priority by the Ministerial Taskforce on Fish Passage.</p> <p>Locations proposed are: Macintyre Blockbank A and Macintyre Blockbank B; Boomi Weir; Goondiwindi Weir; Boggabilla Weir; Toomelah Weir; Glenarbon Weir; Cunningham Weir; Bonshaw Weir; Holdfast Crossing.</p> |
| <b>Intent</b>               | <ul style="list-style-type: none"> <li>• Maintain and improve native fish access to core habitat in the Border Rivers region and to the Barwon River.</li> <li>• Improve fish movement through fishways and encourage breeding and spawning activities, especially for threatened species.</li> <li>• Enable fish to move to refuges during drought.</li> <li>• Improve recreational fishing and regional tourism opportunities.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Challenges addressed</b> | <ul style="list-style-type: none"> <li>• Dams and other water delivery infrastructure alter natural flow regimes which impacts on water quality, native species and ecosystems.</li> <li>• Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## Option 10. NSW Fish Passage Strategy (continued)

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| <b>Potential combinations</b> | <p>This option will have significant additional value when combined with other environmental options to protect native fish and support a healthy regional environment.</p> <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 11. Diversion screens to prevent fish extraction at pump offtakes</li> <li>• Option 12. Cold water pollution mitigation measures</li> <li>• Option 17. Riparian habitat restoration and re-establishing threatening species</li> <li>• Option 19. Revise water sharing plan provisions for planned environmental water</li> <li>• Option 20. Improve benefits of planned environmental water</li> <li>• Option 21. Active management to protect water for the environment in unregulated rivers.</li> </ul> <p>There is also potential for fish passage remediation work to complement proposed options that support the objective to recognise and protect Aboriginal rights, interests and access to water. Identification of the specific co-benefits would be developed through consultation with Aboriginal groups.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Considerations</b>         | <p>Suitable environmental water management settings need to be in place to secure hydrological connectivity between connected river reaches. Fish passage remediation assists in mitigating the impact of barriers to fish passage in hydrologically connected systems. The Government could partner with local Aboriginal communities on these initiatives.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Further information</b>    | <p><b>Office of Environment and Heritage 2018, <i>NSW Border Rivers Long Term Water Plan Parts A and B – draft for exhibition</i>:</b><br/> <a href="http://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-border-rivers-long-term-water-plan-parts-a-and-b">www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-border-rivers-long-term-water-plan-parts-a-and-b</a></p> <p><b>Barriers to fish passage:</b><br/> <a href="http://www.dpi.nsw.gov.au/fishing/habitat/threats/barriers">www.dpi.nsw.gov.au/fishing/habitat/threats/barriers</a></p> <p><b>Murray-Darling Basin Authority 2020, <i>Native Fish Recovery Strategy</i>:</b><br/> <a href="http://www.mdba.gov.au/publications/governance/native-fish-recovery-strategy">www.mdba.gov.au/publications/governance/native-fish-recovery-strategy</a></p> <p><b>Murray-Darling Basin Authority 2019, <i>Basin-wide Environmental Watering Strategy</i>:</b><br/> <a href="http://www.mdba.gov.au/publications/mdba-reports/basin-wide-environmental-watering-strategy">www.mdba.gov.au/publications/mdba-reports/basin-wide-environmental-watering-strategy</a></p> <p><b>Victorian Department of Sustainability and the Environment 2010, <i>National Recovery Plan for the Murray Cod - Maccullochella peelii peelii</i>:</b><br/> <a href="http://www.environment.gov.au/resource/national-recovery-plan-murray-cod-maccullochella-peelii-peelii">www.environment.gov.au/resource/national-recovery-plan-murray-cod-maccullochella-peelii-peelii</a></p> |

## Option 11. Diversion screens to prevent fish extraction at pump offtakes

Source: Department of Primary Industries—Fisheries and Local Land Services, Department of Planning, Industry and Environment—Environment, Energy and Science

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| <b>Description</b>            | <p>This option will install screens on major irrigation pumps and diversion channels to reduce the amount of fish being extracted at pump sites.</p> <p>Every year, large numbers of native fish are extracted by pumps and diverted into irrigation channels, never to return to the Border Rivers system. There are approximately 220 pump offtakes with a diameter greater than 200 mm in the Border Rivers system.</p> <p>Installation of screens at pump sites and diversion regulators will retain native fish within the region's waterways by preventing entrainment of adults, larvae and eggs.</p> <p>Screening infrastructure also improves pump operation, water delivery and extraction efficiency for asset owners through fewer blockages caused by debris, resulting in on-farm cost savings.</p> <p>Diversion screens have been used successfully for decades overseas (for example, in western USA, Europe and New Zealand) and have been successfully installed at Trangie-Nevertie.</p>                                                 |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Significantly reduce the loss of native fish from the Border Rivers region, and increase fish populations.</li> <li>• Improve water delivery and extraction efficiency.</li> <li>• Improve environmental outcomes and water user benefits in the Border Rivers region.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Challenges addressed</b>   | <p>Protection of native and threatened aquatic species.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Potential combinations</b> | <p>This option will have significant additional value when combined with other environmental options to protect native fish and support a healthy regional environment.</p> <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 10. NSW Fish Passage Strategy</li> <li>• Option 12. Cold water pollution mitigation measures</li> <li>• Option 17. Riparian habitat restoration and re-establishing threatening species</li> <li>• Option 19. Revise water sharing plan provisions for planned environmental water</li> <li>• Option 20. Improve benefits of planned environmental water</li> <li>• Option 21. Active management to protect water for the environment in unregulated rivers.</li> </ul> <p>There is also potential for diversion screening works to complement proposed options that support the objective to recognise and protect Aboriginal rights, interests and access to water. Identification of the specific co-benefits would be developed through consultation with Aboriginal groups.</p> |
| <b>Considerations</b>         | <p>This option would require:</p> <ul style="list-style-type: none"> <li>• assessment of the cost-benefits of screening, including environmental outputs, water delivery efficiency and long-term social and financial implications for water users</li> <li>• consideration of potential implementation options, such as incentive schemes for landholders to install screens.</li> </ul> <p>Long term, the benefits of diversion screening could be supported by ensuring that suitable environmental water management settings are in place to secure hydrological connectivity between river reaches.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## Option 12. Cold water pollution mitigation measures

Source: Department of Primary Industries—Fisheries and Local Land Services, Department of Planning, Industry and Environment—Environment, Energy and Science

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| <b>Description</b>          | <p>Cold water pollution has damaging impacts on riverine ecological function, particularly in summer where biological cues such as fish spawning are disrupted. It also has social and economic impacts, with recreational use (such as swimming and fishing) around Pindari and Glenlyon dams constrained due to cold summertime water temperatures.</p> <p>Cold water pollution from Pindari Dam affects over 100 km of the Severn and Macintyre rivers, affecting not only the life histories of native fish but also the condition of upstream and downstream habitats.</p> <p>Pindari Dam has a variable level offtake (bulkhead gate and trash rack system) to assist in mitigating cold water pollution. However, the presence of potentially toxic surface algae often prevents positioning of the variable level offtake to take warmer surface water.</p> <p>As it is not currently possible to remove the risk of algal blooms, cold water pollution management actions remain relevant.</p> <p>This option involves assessing and optimising existing infrastructure, exploring infrastructure improvements and new technologies, and developing effective and feasible operation plans in conjunction with dam operators to enhance water quality outcomes.</p> <p>Implementation of appropriate cold water pollution management actions provides the opportunity to significantly improve water quality, contributing to major outcomes for native fish and riverine productivity across the Northern Basin, as well as enhancing social and economic outcomes from existing water recovery efforts.</p> <p>This option would address one of the two most significant ecological impacts of Pindari Dam (the other being altered flow regimes, which is currently being addressed via alternate mechanisms).</p> |
| <b>Intent</b>               | <ul style="list-style-type: none"> <li>• Improve water quality to over 220 km of waterway along the Severn and Macintyre rivers.</li> <li>• Increase reproduction and survivorship of the whole fish community along the Severn and Macintyre rivers especially for key native fish species such as Murray Cod, Golden Perch, Silver Perch, Southern Purple Spotted Gudgeon, Olive Perchlet and Freshwater Catfish, resulting in improved population structures and expanded distributions.</li> <li>• Reinstate natural levels of riverine productivity.</li> <li>• Increased tourism opportunities as native fish populations increase and water temperature improves for recreational uses.</li> <li>• Help deliver on some Aboriginal interests and cultural values, as native fish and good water quality are important Aboriginal cultural values.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Challenges addressed</b> | <ul style="list-style-type: none"> <li>• Dams and other water delivery infrastructure alter natural temperature regimes which impacts on water quality, native species and ecosystems.</li> <li>• Water storages are affected by blue-green algae in the summer months which impacts on the availability of water supplies and causes release of cold water in the dams.</li> <li>• Protection of native and threatened aquatic species.</li> <li>• Healthy water sources support the region's environment, which—in turn—supports liveable communities and thriving industries.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## Option 12. Cold water pollution mitigation measures (continued)

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| <b>Potential combinations</b> | <p>This option will have significant additional value when combined with other environmental options to protect native fish and support a healthy regional environment.</p> <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 11. Diversion screens to prevent fish extraction at pump offtakes</li> <li>• Option 13. Investigation of surface water quality mitigation measures</li> <li>• Option 17. Riparian habitat restoration and re-establishing threatening species</li> <li>• Option 19. Revise water sharing plan provisions for planned environmental water</li> <li>• Option 20. Improve benefits of planned environmental water</li> <li>• Option 21. Active management to protect water for the environment in unregulated rivers.</li> </ul> <p>There is also potential for these works to complement proposed options that recognise and protect Aboriginal rights, interests and access to water. Identification of the specific co-benefits would be developed through consultation with Aboriginal groups.</p>                                                                 |
| <b>Considerations</b>         | <p>Funding of cost effective and timely methods of sampling and testing for algal toxins.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Further information</b>    | <p><b>Foster, N. 2013, <i>Pindari Dam Stimulus Flow - An Assessment of the December 2012 Release</i>, Department of Primary Industries—Office of Water, Tamworth:</b><br/> <a href="http://www.researchgate.net/publication/236736983_Pindari_Stimulus_Flow_Release_-_2012">www.researchgate.net/publication/236736983_Pindari_Stimulus_Flow_Release_-_2012</a></p> <p><b>Lugg, A. and Copeland, C. 2014, Review of cold water pollution in the Murray-Darling Basin and the impacts on fish communities, <i>Ecological Management &amp; Restoration</i>, 15, p71-79:</b><br/> <a href="https://doi.org/10.1111/emr.12074">doi.org/10.1111/emr.12074</a></p> <p><b>NSW Cold Water Pollution Strategy</b></p> <p><b>Department of Primary Industries—Office of Water 2017, <i>Report on the implementation of Stage 2 of the NSW Cold Water Pollution Strategy</i>:</b><br/> <a href="http://www.water.nsw.gov.au/__data/assets/pdf_file/0010/547714/quality_cold_water_pollution_strategy_report_stage_one.pdf">www.water.nsw.gov.au/__data/assets/pdf_file/0010/547714/quality_cold_water_pollution_strategy_report_stage_one.pdf</a></p> |

## Option 13. Investigation of surface water quality mitigation measures

Source: Department of Primary Industries—Fisheries, Department of Planning, Industry and Environment—Water, Department of Planning, Industry and Environment—Environment, Energy and Science

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| <p><b>Description</b></p> | <p>Implementation of surface water quality mitigation measures provides the opportunity to significantly improve water quality, contributing to major outcomes for native fish and riverine productivity across the Northern Basin, as well as enhancing social and economic outcomes from existing water recovery efforts.</p> <p>There are locations where turbidity, nutrients, pH and dissolved oxygen results are outside of target ranges, which can impact on the availability of water supplies for water users, the region's environment and Aboriginal people's health and wellbeing, and their cultural and spiritual values.</p> <p>Diffuse pollution sources include run-off from agricultural land, urban housing and industrial developments. Other drivers include poor riparian vegetation leading to erosion, reduced groundcover leading to increased sediment loads, turbidity and nutrient loads. Run-off from grazing areas results in increased pathogens from soil and faecal matter washed into waterways. Most of these diffuse pollution sources cannot be addressed solely through water management—land, soil and vegetation management and good agronomic practices are required to reduce the volume of pollutants entering water sources.</p> <p>Blue-green algal blooms occur in some years in Pindari Dam, Boggabilla Weir and the Macintyre River at Mungindi during warmer months. Blue-green algal blooms are caused by still, clear, warm water and a high level of nutrients. NSW currently manages the risk of human exposure to blue-green algal blooms through a coordinated regional approach with the Regional Algal Coordination Committees.</p> <p>Blackwater can occur when organic material such as sticks, leaves, bark and grass is broken down by bacteria in flood water. This can lead to a sudden decrease in the oxygen available to fish and other aquatic organisms. The black colour occurs as the organic matter decays. There is a greater risk of blackwater events on first flows following prolonged dry periods.</p> <p>This option aims to investigate opportunities to support the water quality management plans that have been prepared for the Border Rivers surface water and groundwater water resource plans.</p> <p>This could include:</p> <ul style="list-style-type: none"> <li>• real time water quality monitors/loggers to monitor dissolved oxygen and other water quality parameters at key infrastructure and refuge pools to assist with environmental management decisions including as part of an early warning network to detect potential fish kills</li> <li>• cost-effective and timely methods of sampling and testing for algal toxins</li> <li>• investigation of diffuse pollution sources and pathways to improve our understanding of sources of pollution, specific pollution hotspots, and potential mitigation strategies</li> <li>• working with partner agencies to identify better flow management priority actions to mitigate the risk of harmful algal blooms</li> <li>• an environmental water quality allowance in the water sharing plans to help manage water quality issues (in addition to the existing volume of planned environmental water and licensed environmental water)</li> <li>• re-introduction of wetlands (rehabilitated or constructed) where a wetland may have been located within a water source in the past. Wetlands capture and absorb nutrients and other pollutants in run-off that would otherwise be transported into the downstream river. This also promotes bird habitat and refugia, and potentially nurseries for juvenile fish during high flow events</li> <li>• designing a strategic plan to improve water quality in surface water sources.</li> </ul> |
| <p><b>Intent</b></p>      | <ul style="list-style-type: none"> <li>• Reduce water quality impacts on water sources and the risks of blue-green algae outbreaks to provide better environmental and water quality outcomes.</li> <li>• Reduce the risk of blackwater events and fish kills.</li> <li>• Make progress towards the Basin Plan water quality target.</li> <li>• Reduce treatment costs in the drinking water supply network.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## Option 13. Investigation of surface water quality mitigation measures (continued)

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| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>Water storages are affected by blue-green algae in the summer months which impacts on the availability of water supplies.</li> <li>Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> <li>Healthy water sources support the region's environment, which—in turn—supports liveable communities and thriving industries.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Potential combinations</b> | <p>This option will have significant additional value when combined with other environmental options to support a healthy regional environment.</p> <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>Option 11. Diversion screens to prevent fish extraction at pump offtakes</li> <li>Option 12. Cold water pollution mitigation measures</li> <li>Option 17. Riparian habitat restoration and re-establishing threatening species</li> <li>Option 19. Revise water sharing plan provisions for planned environmental water</li> <li>Option 20. Improve benefits of planned environmental water</li> <li>Option 21. Active management to protect water for the environment in unregulated rivers.</li> </ul> <p>There is also potential for these works to complement proposed options that support the objective to recognise and protect Aboriginal rights, interests and access to water. Identification of the specific co-benefits would be developed through consultation with Aboriginal groups.</p> |
| <b>Considerations</b>         | Water quality management plans have been completed for the Border Rivers surface water and alluvial water sources.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Further information</b>    | <p><b>Department of Primary Industries—Water 2017, NSW Border Rivers Water Resource Plan (Surface Water SW16) Status and Issues Paper:</b><br/> <a href="http://www.industry.nsw.gov.au/water/plans-programs/water-resource-plans/status">www.industry.nsw.gov.au/water/plans-programs/water-resource-plans/status</a></p> <p><b>Department of Primary Industries—Water 2017, NSW Border Rivers Alluvium Water Resource Plan (Ground Water GW 18) Status and Issues Paper:</b><br/> <a href="http://www.industry.nsw.gov.au/water/plans-programs/water-resource-plans/status">www.industry.nsw.gov.au/water/plans-programs/water-resource-plans/status</a></p> <p><b>Department of Planning, Industry and Environment 2019, Water Quality Management Plan for the NSW Border Rivers Water Resource Plan Area SW16: Schedule H:</b><br/> <a href="http://www.mdba.gov.au/publications/mdba-reports/nsw-border-rivers-water-resource-plan">www.mdba.gov.au/publications/mdba-reports/nsw-border-rivers-water-resource-plan</a></p>              |

## Option 14. Implement state-wide groundwater quality monitoring program and management program

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>Groundwater quality determines what the groundwater within an aquifer can be used for and whether it needs further treatment. Risks to groundwater quality include:</p> <ul style="list-style-type: none"> <li>• diffuse pollution where a pollutant or contaminant is introduced slowly over a large area and cannot be easily attributed to one source, such as agricultural runoff</li> <li>• point source pollution where a pollutant comes from a discrete source, such as a pipe or drain flowing from an industrial activity</li> <li>• contamination from creating connections between saline and fresh aquifers.</li> </ul> <p>Currently, monitoring is focused in high use systems; however, a better understanding of water quality in under-committed groundwater systems may support growth in use of these groundwater sources. This option would:</p> <ul style="list-style-type: none"> <li>• revise the groundwater quality framework and policy</li> <li>• review legislation and legislative mechanisms for managing groundwater quality</li> <li>• review legislation around point and diffuse pollution sources and define the roles and responsibilities for both types of pollution across government agencies</li> <li>• review and assess the risk to groundwater quality from diffuse pollution sources (pesticides and fertilisers), with groundwater quality sampling</li> <li>• review beneficial use categories for groundwater</li> <li>• improve data quality management and increase sampling compliance by implementing a quality management program</li> <li>• implement water quality sampling of the state observation bore network where a proportion of bores are measured each year within a five-year period and sampling every five years (more frequent in identified hotspot areas).</li> <li>• coordinate with WaterNSW to undertake audit of monitoring bore integrity and replace where necessary</li> <li>• collate groundwater quality data for industry and government into one database</li> <li>• update bore approval rules to include water quality parameters</li> <li>• develop 3D geological, numerical flow, and reactive transport models to inform future management practices.</li> </ul> |
| <b>Intent</b>                 | <p>Improve long-term management and sustainability of groundwater quality.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Sustainable access to groundwater resources by all water users.</li> <li>• Addressing groundwater quality.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Potential combinations</b> | <p>This option could be combined with Option 9. Managing groundwater salinity.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Considerations</b>         | <p>Coordination between different government agencies is required to carry out tasks involving reviewing legislation and auditing the bore network (asset is owned by WaterNSW).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## Option 15. Modification and/or removal of existing priority floodwork structures causing adverse impacts

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>Some vital ecological assets in the region rely on floodplain connection to replenish and maintain critical elements. Works undertaken on the floodplain can prevent water moving to these areas.</p> <p>This option would modify and/or remove identified priority floodplain structures and barriers that impede delivery of water to priority ecological assets (such as wetlands and floodplain areas), specifically in Ottleys Creek and Turkey Lagoon. This option would explore how Aboriginal cultural heritage values and ecological balance can be restored in partnership with Aboriginal communities.</p>                                                                                                                                                                                                                                                                                                                      |
| <b>Intent</b>                 | Protect priority ecological assets and improve water security by identifying and removing the risks posed by identified priority floodplain structures.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Dams and other water delivery infrastructure alter natural flow regimes which impacts on water quality, native species and ecosystems.</li> <li>• Protecting critical environmental assets including the Morella Watercourse, Boobera Lagoon and Pungbougul Lagoon and in-stream ecological values (especially during extreme dry times).</li> <li>• Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Potential combinations</b> | <p>This option will have significant additional value when combined with other environmental options to support a healthy regional environment.</p> <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 10. NSW Fish Passage Strategy</li> <li>• Option 11. Diversion screens to prevent fish extraction at pump offtakes</li> <li>• Option 12. Cold water pollution mitigation measures</li> <li>• Option 16. Providing incentives to landholders to conserve and rehabilitate riparian, wetland and floodplain vegetation</li> <li>• Option 17. Riparian habitat restoration and re-establishing threatening species</li> <li>• Option 19. Revise water sharing plan provisions for planned environmental water</li> <li>• Option 20. Improve benefits of planned environmental water</li> <li>• Option 21. Active management to protect water for the environment in unregulated rivers.</li> </ul> |
| <b>Considerations</b>         | <p>Modifying and/or removing existing identified floodwork structures presents significant costs. It also raises challenges in managing the permanent loss of production capability for some individuals.</p> <p>There is the potential for floodplain harvesting infrastructure remediation works to complement proposed options that support the objective to recognise and protect Aboriginal rights, interests and access to water (including cultural heritage). Identification of the specific co-benefits would be developed via consultation with relevant Aboriginal groups.</p>                                                                                                                                                                                                                                                                                                                                                     |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Further information</b>    | <a href="http://www.industry.nsw.gov.au/water/plans-programs/healthy-floodplains-project/plans/border-rivers">www.industry.nsw.gov.au/water/plans-programs/healthy-floodplains-project/plans/border-rivers</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## Option 16. Providing incentives to landholders to conserve and rehabilitate riparian, wetland and floodplain vegetation

Source: Department of Planning, Industry and Environment—Environment, Energy and Science

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| <b>Description</b>            | <p>As part of the Border Rivers Long Term Water Plan, complementary measures are needed to ensure the Border Rivers Long Term Water Plan objectives and targets are achieved. This option would provide incentives to landholders to improve land conservation and rehabilitate riparian, wetland and floodplain vegetation.</p> <p>This option will improve the condition and resilience of habitats and landscapes through protection and enhancement of priority areas using best practice management while building the skills and sharing the knowledge of local landholders and community groups. A range of environmental and social benefits can be achieved through landscape restoration. These include improved habitat for threatened species, improvements in water quality arising from vegetated buffers, bank stabilisation from replanting and increased drought resilience.</p> <p>Protection and active management of high conservation values can be achieved through incentive schemes for private landholders, councils and other agencies. These range from perpetual arrangements through to short-term landholder incentive agreements. Conservation works will largely rely on the voluntary engagement of landholders.</p> <p>Different types of arrangements and funding mechanisms are possible. Funding is available through regional Local Land Services, which coordinate grants available through the National Landcare Program and Catchment Action NSW. Fisheries Habitat Action Grants are also another possible source of funding.</p> <p>Other long term conservation mechanisms and incentives include BioBanking, Conservation Agreements, Conservation Property Vegetation Plans and Landholder Incentive Agreements.</p> <p>Projects funded under this option could include supporting the move to native pasture that is more drought tolerant, soil control works to ensure reductions in runoff and changing rotations between grazing and cropping. Projects could also include information on land use and land management practices that will enable landholders to more effectively use rainfall onsite and minimise runoff.</p> <p>A buy-back program of land for habitat restoration could also be part of this option.</p> |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Restore near natural river water habitats and vegetation with the necessary land management and conservation practices.</li> <li>• Mitigating the impact of intensive agriculture and grazing to provide opportunities for native vegetation to regenerate river sections and surrounding habitats.</li> <li>• Give landholders an incentive to adopt low-impact agriculture practices and develop native pastures to increase resilience to future droughts.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Challenges addressed</b>   | <p>Protecting critical environmental assets including the Morella Watercourse, Boobera Lagoon and Pungboulal Lagoon and in-stream ecological values (especially during extreme dry times).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Potential combinations</b> | <p>This option will have significant additional value when combined with other environmental options to support a healthy regional environment.</p> <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 10. NSW Fish Passage Strategy</li> <li>• Option 11. Diversion screens to prevent fish extraction at pump offtakes</li> <li>• Option 12. Cold water pollution mitigation measures</li> <li>• Option 13. Investigation of surface water quality mitigation measures</li> <li>• Option 17. Riparian habitat restoration and re-establishing threatening species</li> <li>• Option 19. Revise water sharing plan provisions for planned environmental water</li> <li>• Option 20. Improve benefits of planned environmental water</li> <li>• Option 21. Active management to protect water for the environment in unregulated rivers.</li> </ul> <p>This option could also be combined with options to improve the recognition of Aboriginal people's rights, interests and access to water.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## Option 16. Providing incentives to landholders to conserve and rehabilitate riparian, wetland and floodplain vegetation (continued)

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| <b>Considerations</b>      | <p>Considerations include:</p> <ul style="list-style-type: none"> <li>• long-term planning and maintenance of on-ground activities and their outcomes</li> <li>• on a large scale, this option has the potential to produce major improvements to the river but on a small scale the benefits could be negligible</li> <li>• engagement of private landholders</li> <li>• multi-stakeholder partnerships including with government agencies</li> <li>• opportunities for training and capacity building in land management activities for community groups and Aboriginal communities</li> <li>• engagement and partnerships with Aboriginal land managers, including assistance in identifying native plant species that will help improve water quality and provide biodiversity benefits</li> <li>• development of management strategies to counteract effects of reduced flooding of riparian, wetland and floodplain vegetation and habitats.</li> </ul> |
| <b>Objectives</b>          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Further information</b> | <p><b>Office of Environment and Heritage 2018, <i>NSW Border Rivers Long Term Water Plan, Parts A and B Draft for exhibition</i>:</b><br/> <a href="http://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-border-rivers-long-term-water-plan-parts-a-and-b">www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-border-rivers-long-term-water-plan-parts-a-and-b</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## Option 17. Riparian habitat restoration and re-establishing threatened species

Source: Department of Primary Industries—Fisheries

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| <b>Description</b>            | <p>This option involves a package of on-ground activities at targeted high-priority locations to restore, conserve and protect riparian habitat and re-establish threatened species in the Border Rivers region.</p> <p>The ecosystem restoration project would use a catchment management framework and will be structured as a five-year partnership in three key phases:</p> <ul style="list-style-type: none"> <li>• Phase 1, 18 months: Undertake a scoping study, including stakeholder consultation, to identify target locations and landholders to establish a demonstration reach project.</li> <li>• Phase 2, 12 months: On-ground implementation of works.</li> <li>• Phase 3, in parallel with and continuing from Phase 2, 18 months: Undertake evaluation of environmental, social and economic outcomes.</li> </ul> <p>The following works will be scoped for their need and feasibility during Phase 1:</p> <ul style="list-style-type: none"> <li>• habitat mapping (wetland and riparian)</li> <li>• identification of high quality drought refugia</li> <li>• riparian restoration work (replanting including aquatic planting for example)</li> <li>• fencing, off-stream stock watering points</li> <li>• re-snagging</li> <li>• wetland management</li> <li>• landholder incentives</li> <li>• development of a monitoring and evaluation framework</li> <li>• threatened species reintroduction and protection.</li> </ul> |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Develop a series of catchment based strategies to support recovery of native fish through ecosystem restoration.</li> <li>• Improved water quality has additional benefits for the cultural, social and economic wellbeing of river reliant communities.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> <li>• Healthy water sources support the region's environment, which—in turn—supports liveable communities and thriving industries.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Potential combinations</b> | <p>This option will have significant additional value when combined with other environmental options to support a healthy regional environment.</p> <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 10. NSW Fish Passage Strategy</li> <li>• Option 11. Diversion screens to prevent fish extraction at pump offtakes</li> <li>• Option 12. Cold water pollution mitigation measures</li> <li>• Option 13. Investigation of surface water quality mitigation measures</li> <li>• Option 16. Providing incentives to landholders to conserve and rehabilitate riparian, wetland and floodplain vegetation</li> <li>• Option 19. Revise water sharing plan provisions for planned environmental water</li> <li>• Option 20. Improve benefits of planned environmental water</li> <li>• Option 21. Active management to protect water for the environment in unregulated rivers</li> <li>• Option 51. River Ranger Program.</li> </ul> <p>There is potential for these works to complement proposed options that support the objective to recognise and protect Aboriginal rights, interests and access to water. Identification of the specific co-benefits would be developed through consultation with Aboriginal groups.</p>                                                                                                                                                                           |

## Option 17. Riparian habitat restoration and re-establishing threatened species (continued)

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| <b>Considerations</b>      | <p>Considerations include:</p> <ul style="list-style-type: none"> <li>• long-term planning and maintenance of on-ground activities and their outcomes</li> <li>• suitable environmental water management settings to help secure threatened species distribution and population growth in the long term</li> <li>• on a large scale, this option has the potential to produce major improvements to the river but on a small scale the benefits could be negligible</li> <li>• engagement of private landholders</li> <li>• engagement and partnerships with Aboriginal land managers, including assistance in identifying native plant species that will help improve riparian habitat and provide biodiversity benefits</li> <li>• multi-stakeholder partnerships including with government agencies</li> <li>• opportunities for training and capacity building in land management activities for community groups and Aboriginal communities.</li> </ul> |
| <b>Objectives</b>          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Further information</b> | <p><b>Northern Tablelands Local Strategic Plan 2016-2021:</b><br/> <a href="http://www.lis.nsw.gov.au/what-we-do/plans-and-publications/strategic-plans">www.lis.nsw.gov.au/what-we-do/plans-and-publications/strategic-plans</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## Option 18. Investigate land use change impacts on water resources

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>This option would investigate the potential impacts on water resources and water quality due to land use changes in the Border Rivers region.</p> <p>This option includes reviewing land management practices to:</p> <ul style="list-style-type: none"> <li>• assess impacts on water quality, including review of groundwater quality standards to include contaminants from fertilisers and pesticides</li> <li>• assess salinity impacts due to: <ul style="list-style-type: none"> <li>– lateral flow and shallow groundwater</li> <li>– over watering and landscape recharge</li> </ul> </li> <li>• investigate ways to support industries to adopt land use practices that are more water efficient and have environmental benefits.</li> </ul> <p>This option also aims to provide important information to the NSW Government to help in its decision-making process regarding future land use applications in the region. This will include examining for example the feasibility of land use planning controls.</p> |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Provide important information to the NSW Government to help in its decision-making processes regarding current land management practices and future land use applications in the region.</li> <li>• Examine the feasibility of land use planning controls.</li> <li>• Supporting industries in a more variable climate.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Challenges addressed</b>   | Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 15. Modification and/or removal of existing priority floodwork structures causing adverse impacts</li> <li>• Option 16. Providing incentives to landholders to conserve and rehabilitate riparian, wetland and floodplain vegetation</li> <li>• Option 17. Riparian habitat restoration and re-establishing threatened species.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Considerations</b>         | <p>This option requires:</p> <ul style="list-style-type: none"> <li>• detailed assessment of existing planning controls</li> <li>• improved understanding of impacts on water resources from land use changes.</li> </ul> <p>Note: This option will require close collaboration with other government agencies.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Further information</b>    | <p><b>Department of Planning, Industry and Environment 2020, <i>Water quality technical report for the Border Rivers surface water resource plan area (SW16)</i>:</b><br/> <a href="http://www.industry.nsw.gov.au/water/science/reporting/water-quality-technical-reports">www.industry.nsw.gov.au/water/science/reporting/water-quality-technical-reports</a></p> <p><b>Department of Environment and Climate Change 2008, <i>Salinity Audit: Upland catchments of the New South Wales Murray-Darling Basin</i>:</b><br/> <a href="http://www.environment.nsw.gov.au/research-and-publications/publications-search/salinity-audit-upland-catchments-of-the-new-south-wales-murray-darling-basin">www.environment.nsw.gov.au/research-and-publications/publications-search/salinity-audit-upland-catchments-of-the-new-south-wales-murray-darling-basin</a></p>                                                                                                                                                                  |

## Option 19. Revise water sharing plan provisions for planned environmental water

Source: Department of Primary Industries—Fisheries

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| <b>Description</b>            | <p>Reduced rainfall, increased evapotranspiration and any additional regulation and storage of flows will likely lead to longer and more frequent cease-to-flow periods, lower average flows and longer dry periods, increasing the need for environmental water to support ecological outcomes.</p> <p>Adaptative adjustments to planned environmental water will be required to respond to changing environmental conditions and needs.</p> <p>Under this option, water sharing plan provisions for the release of planned environmental water (translucent flows) would be reviewed to accommodate practical considerations in dam operation during periods of low flow.</p> <p>The water sharing plan is proposed to be amended to extend the protection of stimulus flows from Pindari Dam from the junction of the Severn River and Fraser's Creek to the junction of the Severn River with the Dumaresq River.</p> <p>This will improve environmental outcomes further down the river.</p> |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Improved flow management to provide better environmental and water quality outcomes.</li> <li>• Ensure delivery of water to environmental assets.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Challenges addressed</b>   | Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Potential combinations</b> | This option could be combined with Option 20. Improve benefits of planned environmental water and other environmental options to support a healthy regional environment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Further information</b>    | <p>NSW NRC 2018, <i>Review of the water sharing plan for the Border Rivers Regulated River</i></p> <p>Water source 2009:</p> <p><a href="http://www.nrc.nsw.gov.au/2017-2018-wsp-reviews">www.nrc.nsw.gov.au/2017-2018-wsp-reviews</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## Option 20. Improve benefits of planned environmental water

Source: Department of Primary Industries—Fisheries

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| <b>Description</b>            | <p>This option involves reviewing or amending the water sharing plan for the NSW Border Rivers Regulated River Water Source and the NSW Border Rivers Unregulated and Alluvial Water Sharing Plan to:</p> <ul style="list-style-type: none"> <li>• examine the adequacy of environmental water and access rules in meeting environmental water requirements under a more variable and drier climate</li> <li>• enable amendments that allow for adaptive adjustments to planned environmental water over time in response to a more variable or drier climate</li> <li>• formalise channel sharing arrangements to permit the use of environmental water on top of consumptive or stock and domestic deliveries.</li> </ul> |
| <b>Intent</b>                 | To identify and adequately protect and restore the environmental values of pools and share water equitably among water users.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> <li>• Protection of native and threatened aquatic species.</li> <li>• Protecting critical environmental assets including the Morella Watercourse, Boobera Lagoon and Pungbougul Lagoon and in-stream ecological values (especially during extreme dry times).</li> <li>• Healthy water sources support the region's environment, which—in turn—supports liveable communities and thriving industries.</li> </ul>                                                                                            |
| <b>Potential combinations</b> | <p>This option could be combined with Option 19. Revise water resource plan provisions for planned environmental water and other environmental options to support a healthy regional environment.</p> <p>There may also be alternative options that could potentially provide for more efficient and effective use of held environmental water, such as arrangements similar to the prerequisite policy measures whereby held environmental water could be released with other water orders.</p>                                                                                                                                                                                                                            |
| <b>Considerations</b>         | <p>Consideration would be given to:</p> <ul style="list-style-type: none"> <li>• ecological assessment of key pools undertaken by Department of Planning, Industry and Environment—Water</li> <li>• identification of key river reaches for native fish</li> <li>• any further relevant recommendations by the Interagency Working Group for Better Environmental Water Management.</li> </ul>                                                                                                                                                                                                                                                                                                                              |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Further information</b>    | <p><b>NSW Government 2011, <i>Macro water sharing plans – the approach for unregulated rivers. Access and trading rules for pools</i>, ISBN 978 0 7313 3915 0:</b><br/> <a href="http://www.water.nsw.gov.au/__data/assets/pdf_file/0003/547473/wsp_access_trading_rules_pools_unreg_rivers.pdf">www.water.nsw.gov.au/__data/assets/pdf_file/0003/547473/wsp_access_trading_rules_pools_unreg_rivers.pdf</a></p>                                                                                                                                                                                                                                                                                                            |

## Option 21. Active management to protect water for the environment in unregulated rivers

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>This option would implement active management in the Border Rivers unregulated rivers.</p> <p>Water sharing plans do not currently protect held (licensed) environmental water from extraction in unregulated rivers if it is used in-stream for environmental purposes.</p> <p>For example, the water sharing plan does not protect held environmental water released from storage in the regulated Border Rivers system when it flows into the unregulated Boomi River.</p> <p>Active management is a new operational tool that ensures that water released for the environment remains in-stream to be used for its intended environmental purpose.</p> <p>Active management is not currently implemented in the Border Rivers region, but it is being implemented in other regions in NSW.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Intent</b>                 | <p>Active management has been identified as a potential enduring solution to better manage environmental water, especially in circumstances where both held environmental water releases and other inflows are present.</p> <p>Active management will reduce the need to use temporary water restrictions to manage environmental water used in-stream and help improve water sharing, compliance and transparency by:</p> <ul style="list-style-type: none"> <li>• protecting environmental water used in-stream for environmental purposes</li> <li>• making it clearer for licence holders to understand when they can take water</li> <li>• increasing public understanding about when water can and cannot be taken</li> <li>• sharing access between licence holders during an unregulated flow event when flows are above cease-to-pump thresholds and demand exceeds available flow.</li> </ul> <p>Active management in the Border Rivers region will help to maximise environmental outcomes from:</p> <ul style="list-style-type: none"> <li>• regulated held environmental water released from upstream storages that flows through the Macintyre River and into the unregulated Boomi River</li> <li>• planned environmental water from a regulated water source that is protected from being taken by the rules in the downstream unregulated actively managed river water source</li> <li>• held environmental water in unregulated water sources when the water is used in-stream.</li> </ul> |
| <b>Challenges addressed</b>   | Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Potential combinations</b> | This option could be combined with Option 20. Improve benefits of planned environmental water and other environmental options to support a healthy regional environment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Considerations</b>         | <p>Public consultation undertaken for the NSW Water Reform Action Plan has informed development of this option.</p> <p>Amendments would be required to the water sharing plan for the NSW Border Rivers Unregulated Water Sources to support implementation of active management of environmental water.</p> <p>The rules for operation of active management in the Border Rivers would need to provide sufficient flexibility to respond to each flow event while also providing clarity about when and how active management to share flows is implemented.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Further information</b>    | <p><a href="http://www.industry.nsw.gov.au/water/news/snapshot-of-environmental-water-in-the-nsw-northern-basin">www.industry.nsw.gov.au/water/news/snapshot-of-environmental-water-in-the-nsw-northern-basin</a></p> <p><a href="http://www.industry.nsw.gov.au/water/plans-programs/water-resource-plans/drafts/border-rivers-surface">www.industry.nsw.gov.au/water/plans-programs/water-resource-plans/drafts/border-rivers-surface</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## Option 22. Improve understanding of water use in unregulated water sources

Source: Department of Planning, Industry and Environment—Water, Department of Primary Industries—Agriculture

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| <b>Description</b>            | <p>Information about water use in unregulated water sources is limited.</p> <p>This option involves:</p> <ul style="list-style-type: none"> <li>• understanding how much water is being extracted from unregulated water sources through implementation of new metering regulations (an existing NSW Government commitment)</li> <li>• improving our river flow monitoring systems through the installation of additional gauges at the end of the system (such as Boomi River and Whalan Creek) and in unregulated water sources where extraction is concentrated</li> <li>• monitoring to determine if the number or volume of farm dams is increasing</li> <li>• developing our hydrologic models of unregulated water sources.</li> </ul> <p>This information can be used to inform:</p> <ul style="list-style-type: none"> <li>• future water planning and management decisions in the region</li> <li>• review of the water sharing plan for the NSW Border Rivers Unregulated Water Sources</li> <li>• risk assessments for environmental outcomes and assets</li> <li>• risk assessments for town water supplies from unregulated water sources, such as for Tenterfield and Glen Innes.</li> </ul> |
| <b>Intent</b>                 | <p>Provide information on water flows and water take in unregulated systems to improve system management.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>• Protecting critical environmental assets including the Morella Watercourse, Boobera Lagoon and Pungboulal Lagoon and in-stream ecological values (especially during extreme dry times).</li> <li>• Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> <li>• Healthy water sources support the region's environment, which—in turn—supports liveable communities and thriving industries.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 21. Active management to protect water for the environment in unregulated rivers</li> <li>• Option 23. Improve connectivity with downstream systems.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Considerations</b>         | <p>This option would need to be sequenced as follows:</p> <ol style="list-style-type: none"> <li>1. Implementing metering and gauging.</li> <li>2. Implementing monitoring program for farm dams.</li> <li>3. Developing modelling.</li> </ol> <p>A key consideration would be the costs associated with installing and maintaining monitoring systems.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Further information</b>    | <p><b>Department of Primary Industries—Water 2017, New South Wales Border Rivers Water Resource Plan (Surface Water SW16), Status and Issues Paper:</b><br/> <a href="http://www.industry.nsw.gov.au/water/plans-programs/water-resource-plans/status">www.industry.nsw.gov.au/water/plans-programs/water-resource-plans/status</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## Option 23. Improve connectivity with downstream systems

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>The Barwon-Darling River and communities along the river rely on flows from Queensland as well as the Border Rivers, Gwydir, Namoi and Macquarie-Castlereagh catchments. Improving connectivity to the Barwon-Darling River was a recommendation of the Independent Assessment of the 2018/19 Fish Deaths in the Lower Darling (Vertessy Report) and the Natural Resources Commission's review of the Barwon-Darling Water Sharing Plan and the <i>Independent Panel Assessment of the Management of the 2020 Northern Basin First Flush Event</i>.</p> <p>Potential options to improve connectivity between the Border Rivers region and the Barwon-Darling River include:</p> <ul style="list-style-type: none"> <li>• developing clear arrangements around how decision makers will aim to achieve connectivity within and between water sources after an extended dry period and embedding these into the regulatory and policy framework. This was recommended by the <i>Independent Panel Assessment of the Management of the 2020 Northern Basin First Flush Event</i></li> <li>• establishing additional end of system flow targets</li> <li>• implementing flow plan targets for unregulated water sources</li> <li>• using environmental water to achieve connectivity objectives</li> <li>• using temporary water restrictions more frequently to achieve connectivity objectives</li> <li>• working with Queensland to enable more water to flow into NSW by reviewing and protecting it from extraction downstream into NSW</li> <li>• reviewing water sharing rules in the northern tributary valleys to enable greater connectivity with downstream catchments.</li> </ul> |
| <b>Intent</b>                 | <p>Enable critical human and environmental downstream needs to be met.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Increased climate variability poses new risks to towns, communities and industries in the Border Rivers and connected downstream systems.</li> <li>• Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> <li>• Healthy water sources support the region's environment, which—in turn—supports liveable communities and thriving industries.</li> <li>• Delivering water to the end of the system.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Potential combinations</b> | <p>This option could be combined with targeted environmental works and options that would improve native fish movement and habitat such as:</p> <ul style="list-style-type: none"> <li>• Option 10. NSW Fish Passage Strategy</li> <li>• Option 11. Diversion screens to prevent fish extraction at pump offtakes</li> <li>• Option 12. Cold water pollution mitigation measures</li> <li>• Option 13. Investigation of surface water quality mitigation measures</li> <li>• Option 14. Implement state-wide groundwater quality monitoring program and management program</li> <li>• Option 15. Modification and/or removal of existing floodwork structures causing adverse impacts</li> <li>• Option 16. Providing incentives to landholders to conserve and rehabilitate riparian, wetland and floodplain vegetation</li> <li>• Option 17. Riparian habitat restoration and re-establishing threatened species.</li> </ul> <p>This option could also be combined with potential opportunities to use water stored in the proposed dam on the Mole River to improve connectivity in dry periods.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Considerations</b>         | <p>This option requires:</p> <ul style="list-style-type: none"> <li>• assessment of impacts of existing government reforms to improve connectivity</li> <li>• assessment of potential impacts on the environment and water users in the Border Rivers region</li> <li>• assessment of changes to existing river flow patterns and planned environmental water, including from unregulated tributary flows</li> <li>• assessment of the relative contribution of all major tributaries to the Barwon-Darling River</li> <li>• amendments to the water sharing plan for the NSW Border Rivers Unregulated Water Sources that support implementation of active management of environmental water.</li> </ul> <p>Note: This option will be informed by connectivity options arising from the Western Regional Water Strategy and the Western Weirs Program.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## Option 24. Protecting ecosystems that depend on groundwater resources

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>A healthy and functioning water cycle is critical to a productive economy and healthy society. A critical, but often overlooked element of the water cycle is groundwater and groundwater dependent ecosystems. Groundwater dependent ecosystems support a range of species and provide important ecosystem services such as habitats. They also have inherent environmental value.</p> <p>Groundwater dependent ecosystems are classified broadly as terrestrial (vegetation communities), aquatic (wetlands and springs) or subterranean (aquifers and caves). These ecosystems support a variety of fauna and flora communities. During droughts when groundwater is needed to support communities, it is critical that groundwater dependent vegetation is also maintained.</p> <p>In this option, a series of projects would be initiated to advance our knowledge and management of groundwater dependent ecosystems. These projects would:</p> <ul style="list-style-type: none"> <li>• review and develop new methods to monitor the vegetation condition of groundwater dependent ecosystems (including root depth and response to drought)</li> <li>• develop policy that supports recognition and protection of all groundwater dependent ecosystem types including those that are only partially reliant on groundwater</li> <li>• formalise water quality guidelines for groundwater dependent ecosystems</li> <li>• create guidelines on how to characterise a groundwater dependent ecosystem and what an impact assessment should consider</li> <li>• develop a state-level sampling method and assessment guidelines for all groundwater dependent ecosystem types</li> <li>• identify groundwater bioregions to provide a basis for management and setting baseline conditions for future monitoring and create an information source for offsetting</li> <li>• determine groundwater regimes for groundwater dependent ecosystems and include climate change in determining threshold changes to groundwater dependent ecosystems</li> <li>• implement a groundwater health index monitoring program and establish baseline conditions for the groundwater health index</li> <li>• ground truth groundwater dependent ecosystems listed in the groundwater dependent ecosystem schedule in the water sharing plans and 'High Probability Groundwater Dependent Ecosystems' identified from geographic information system (GIS) analysis</li> <li>• standardise data/sample collection and reporting by third parties to feed into a centralised database</li> <li>• create a NSW portal for 'one point of truth' for groundwater dependent ecosystems (including government and industry data) and high-quality meta-data (such as who collected the data and the method used)</li> <li>• collaborate with universities and other research organisations (for example, via future projects included in the Water Science Research Prospectus)</li> <li>• revise the 'High Ecological Value Aquatic Ecosystems' GIS layer used for assessments.</li> </ul> |
| <b>Intent</b>                 | <p>Support groundwater dependent ecological processes that support soils, fauna and flora, and establish and maintain valuable environments in NSW.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Healthy water sources support the region's environment, which—in turn—supports liveable communities and thriving industries.</li> <li>• Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> <li>• Addressing groundwater quality.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 14. Implement state-wide groundwater quality monitoring program and management program</li> <li>• Option 32. Improved data collection</li> <li>• Option 37. Improved understanding of groundwater processes.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## Option 24. Protecting ecosystems that depend on groundwater resources (continued)

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| <b>Considerations</b> | <p>This option requires:</p> <ul style="list-style-type: none"> <li>• increased bore network to target groundwater dependent ecosystem locations for monitoring and evaluation</li> <li>• better quantification of the relationship between groundwater availability, extraction volumes and groundwater dependent ecosystems</li> <li>• groundwater salinity monitoring and management</li> <li>• educational and communication material to promote awareness of groundwater dependent ecosystems including the relationships between above and underground processes and benefit to the local environment</li> <li>• inclusion of Aboriginal cultural connections to groundwater dependent ecosystems.</li> </ul> |
| <b>Objectives</b>     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

# Supporting water use and delivery efficiency and conservation

Opportunities to improve the efficiency of existing water delivery systems, increase productivity and address water security challenges through demand management options.



## Option 25. Review of water markets in the Border Rivers region

Source: Department of Planning, Industry and Environment—Water, Department of Primary Industries—Agriculture

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| <b>Description</b>            | <p>A review of the efficiency and effectiveness of the inter-state and intra-state surface water and groundwater markets in the Border Rivers region, including their ability to contribute to improved water security outcomes in the region.</p> <p>Interstate water trade of licensed entitlements and water allocations between NSW and Queensland occurs under a tagged trading system. Most water markets assessments in the Murray-Darling Basin have concentrated on the Southern Connected Basin. There have been no assessments of trade in the Border Rivers in the Northern Basin, although the General Purpose Regulated River Water Accounting Reports indicate the extent of trade in the regulated systems.</p> <p>Reviewing the efficacy of the water market with regard to opportunities, challenges and complexities of trade in the Northern Basin provides an opportunity to improve water reliability.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Provide transparency and confidence to water users in the Border Rivers region.</li> <li>• Educate water users about the operation of and rules governing inter-state and intra-state water trade in the Border Rivers region.</li> <li>• Improve and broaden the market to create opportunities to trade water more effectively to meet business and industry needs.</li> <li>• Provide flexibility for water users to respond to variable water availability.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Challenges addressed</b>   | <p>Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Potential combinations</b> | <p>Depending on the outcome of the review, this option could be combined with water efficiency and conservation options.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Considerations</b>         | <ul style="list-style-type: none"> <li>• The review could investigate the complexity of inter-state trading, different carryover arrangements between NSW and Queensland, accounting for losses, trade timeliness, the ability to broaden the trading framework into unregulated systems once metering has been implemented and real-time trading of supplementary allocation.</li> <li>• The review could be aligned/coordinated with the current Australian Competition and Consumer Commission inquiry, which seeks to recommend options that would enhance the operations, transparency, regulation, competitiveness and efficiency of the water market in the Murray-Darling Basin.</li> <li>• The review could be aligned/coordinated with the Murray-Darling Basin Authority's Trade Working Group's review of inter-state trade arrangements between Queensland and NSW in the Border Rivers. The Authority is undertaking a quick audit of Tagged Water Trading arrangements to improve transparency and ensure a robust accounting process.</li> <li>• Stakeholders have expressed, through the water resource planning process, a desire for real time trading capability to facilitate efficient movement of water to its highest value use within 'Event Trading' for supplementary water. The onset of supplementary events in the Border Rivers region can happen over a very short period of time (hours in some cases), making real time event trading challenging. Department of Planning, Industry and Environment—Water and WaterNSW could work together to develop and implement provisions to better facilitate trade of supplementary water.</li> <li>• Stakeholders have expressed, through the Australian Competition and Consumer Commission inquiry, the need to retain carryover rules to enable better planning of farming operations and to acknowledge that rules are built into the value of the property right.</li> <li>• Trade restrictions should be based on real physical constraints, avoidance of impacts on the water rights of those not party to the trade and backed by transparent expert analysis of system capacity without adding administrative burden or additional costs.</li> <li>• The role of the environmental water holder in the market would also need to be considered.</li> </ul> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Further information</b>    | <p><b>ACCC 2020, Australian Competition and Consumer Commission Inquiry into the Murray-Darling Basin Water Market:</b><br/> <a href="http://www.accc.gov.au/focus-areas/inquiries-ongoing/murray-darling-basin-water-markets-inquiry">www.accc.gov.au/focus-areas/inquiries-ongoing/murray-darling-basin-water-markets-inquiry</a></p> <p><b>Aither 2019, 2019 Aither Water Markets Report:</b><br/> <a href="http://www.aither.com.au/2019-water-markets-report/">www.aither.com.au/2019-water-markets-report/</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## Option 26. Reuse, recycle and stormwater projects

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>Investigation of opportunities to maximise the use of surface water and groundwater for potable and non-potable uses through reuse or recycling initiatives, or stormwater harvesting.</p> <p>Suitable options would need to be scoped. Options could focus on improving the water security of individual towns, support the establishment of new industry and provide options to maintain 'green' spaces during extended drought. Options would also be scoped for communities not connected to town water supplies.</p> <p>This option could be used to enable more water to be left in rivers for a range of other purposes during droughts. This option could also consider whether additional storage or water treatment facilities are needed for towns.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Increase water security for individual towns in the Border Rivers region and maintain local parks, town water lakes and green spaces during droughts.</li> <li>• Encourage innovation in the water reuse and water recycling sector.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>• Improving town water security.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 27. Water efficiency projects (towns and industries)</li> <li>• Option 34. Investigation to maintain amenity for regional towns during drought.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Considerations</b>         | <p>This option requires:</p> <ul style="list-style-type: none"> <li>• consultation with local councils and communities to understand the level of acceptance for these alternative water supply and reuse options. This particularly relates to the use of recycled wastewater</li> <li>• an assessment of how the option should interact with individual town integrated water cycle management strategies. For cases where there is no integrated water cycle management strategy, consultation is critical to understand council and community appetite for such initiatives</li> <li>• consideration of policy gaps on stormwater reuse, return flow credits, and direct or indirect potable reuse or any other regulatory barriers.</li> </ul> <p>There is also a need to consider:</p> <ul style="list-style-type: none"> <li>• whether additional storage facilities are needed—for example Glen Innes Severn Council is considering exploring options for expanding the existing storage ponds and a green field sites</li> <li>• required upgrades to water treatment facilities based on the water quality requirements for the end use or whether water can be cost-effectively stored and treated at an alternative site</li> <li>• whether changes to state-wide policy and regulation are required to support urban stormwater harvesting and use in urban centres</li> <li>• state-wide whole of government policy and regulation on return flow credits.</li> </ul> <p>This option could be investigated as part of each council's integrated water cycle management strategy. Councils could seek co-funding under the Safe and Secure Water Program for preparing their integrated water cycle management strategies.</p> <p>We heard from councils that they want the NSW Government to facilitate reuse, recycling and stormwater projects by modernising the regulatory framework, progressing a community education program, encouraging community acceptance of water reuse and recycling, and potentially mandating certain standards.</p> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Further information</b>    | <p><b>Information on broad water sensitive city principles:</b><br/> <a href="https://watersensitivecities.org.au/what-is-a-water-sensitive-city">watersensitivecities.org.au/what-is-a-water-sensitive-city</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## Option 27. Water efficiency projects (towns and industries)

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>Investigation of water efficiency opportunities that can be deployed in regional communities and within businesses. This option may also require further research and development to identify suitable case studies (including for the food processing sector).</p> <p>This option could also be used to enable more water to be left in rivers for environmental purposes during droughts.</p>                                                                                                          |
| <b>Intent</b>                 | <p>Improve water security for regional communities and encourage water efficiencies measures for industries to maintain and drive regional economic growth and productivity.</p>                                                                                                                                                                                                                                                                                                                            |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>• Delivering water to the end of the system.</li> </ul>                                                                                                                                                                                                                                                                                          |
| <b>Potential combinations</b> | <p>This option could be combined with water efficiency and conservation options including:</p> <ul style="list-style-type: none"> <li>• Option 26. Reuse, recycle and stormwater projects</li> <li>• Option 28. Review urban water restrictions policy.</li> </ul>                                                                                                                                                                                                                                          |
| <b>Considerations</b>         | <p>This option requires:</p> <ul style="list-style-type: none"> <li>• assessment needs to be considered as part of each council's integrated water cycle management strategy study</li> <li>• assessment of viable opportunities within and across the regions.</li> </ul> <p>Considerations include:</p> <ul style="list-style-type: none"> <li>• findings of water efficiency investigation projects</li> <li>• possible implementation programs to assist industry and local water utilities.</li> </ul> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                          |

## Option 28. Review urban water restrictions policy

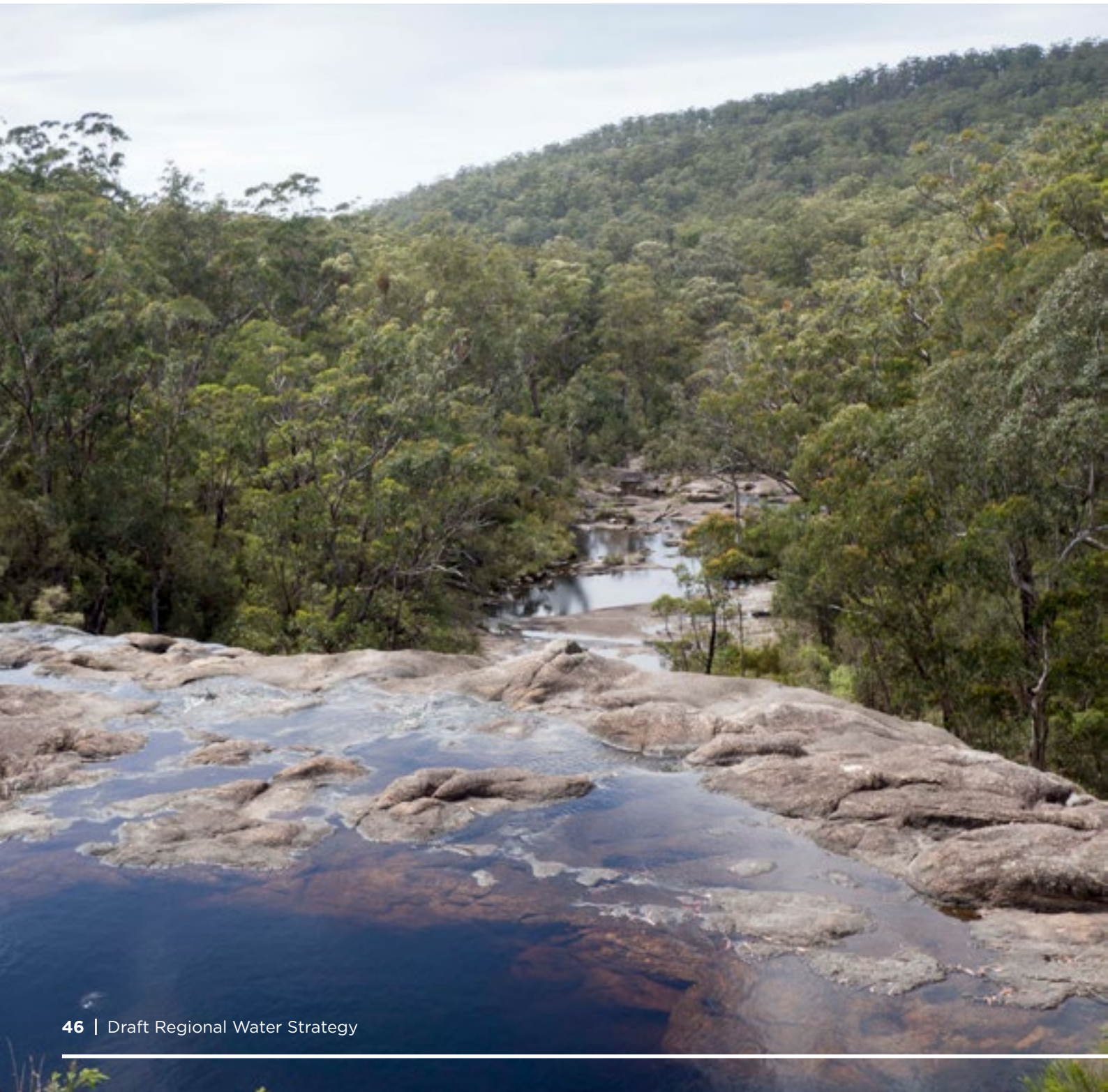
Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>Development of a comprehensive policy on water use standards and appropriate temporary water restriction triggers and levels for regional towns.</p> <p>This could complement the Border Rivers Incident Response Guide and assist councils and local water utilities to revise drought management plans.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Intent</b>                 | <p>Demand management approaches, such as temporary water restrictions, have proven to be a very effective way to avoid major augmentations to date for some local water utilities in NSW. They also assist local water utilities manage water supply shortages during drought by slowing the depletion of available supplies.</p> <p>Applying temporary urban water restrictions for residents and commercial operators in regional NSW is the responsibility of the state's 92 local water utilities. This has resulted in statewide inconsistencies in:</p> <ul style="list-style-type: none"> <li>• water restriction definitions and gradings</li> <li>• triggers for introducing and lifting of urban water restrictions</li> <li>• the delegated authority for imposing and lifting urban water restrictions (such as Mayor, General Manager).</li> </ul> <p>The intent of this option is to investigate the range of issues that are relevant to improving the consistency of temporary urban water restrictions in NSW and identify options for delivering improvements in this area of urban water demand management.</p> <p>This option could be complemented by the development of community water efficiency campaigns.</p> |
| <b>Challenges addressed</b>   | <p>Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Potential combinations</b> | <p>This option could be combined with other demand and supply options for regional towns including:</p> <ul style="list-style-type: none"> <li>• Option 27. Water efficiency projects (towns and industries)</li> <li>• Option 29. New drought operational rules.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Considerations</b>         | <p>Considerations include:</p> <ul style="list-style-type: none"> <li>• a facilitation role for joint organisations</li> <li>• consistency in water restriction definitions</li> <li>• flexibility for individual councils to apply restrictions based on local circumstances.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |



# Strengthening community preparedness for climate extremes

Opportunities to develop fit-for-purpose policies and regulation to protect town water security, strengthen community health and wellbeing and better manage risks.



## Option 29. New drought operational rules

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>The NSW Border Rivers Incident Response Guide outlines the framework for managing extreme events in the Border Rivers region based on the principles outlined in the NSW Extreme Events Policy. This guide provides an expanding toolkit of approaches for water managers to select from as an event becomes more severe.</p> <p>Applying the new climate data and updated modelling undertaken for the regional water strategies, this option would review the effectiveness of the NSW Border Rivers Incident Response Guide, including assessing the merit of changing the current system operation rules.</p> <p>For example, limiting the delivery of water to different sections of the regulated river has been used to minimise delivery losses during extreme events. However, this approach can impact on flows necessary to sustain refuge pools and lead to severe impacts on threatened species and ecological communities, especially those that require permanent water.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Intent</b>                 | <p>Improve water delivery and maintain effective reserves for high priority needs (regional towns, basic landholder rights and environment) during extreme events.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Challenges addressed</b>   | <p>Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 30. Review of regulated river water accounting and allocation process</li> <li>• Option 31. Investigation of licence conversions.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Considerations</b>         | <p>This option requires:</p> <ul style="list-style-type: none"> <li>• assessment of the potential water security risk to regional towns and stock and domestic users in the lower catchment, such as Boggabilla and Mungindi</li> <li>• assessment of potential environmental impacts (such as impacts on threatened species and ecological communities) and implications for planned environmental water (for example, changing the timing and nature of water releases could have implications on threatened species populations in some sections of the regulated river)</li> <li>• consideration of possible (environmental) offsets needed to meet Basin Plan requirements</li> <li>• consideration of whether amendments to the current water sharing plan for the NSW Border Rivers regulated river are required</li> <li>• assessment of the impacts on water licence holders in the lower catchment</li> <li>• equity considerations between different types of water users and different locations</li> <li>• feedback on public acceptance of the option.</li> </ul> <p>A review of the effectiveness of the incident response guide may require changes to the Border Rivers Surface Water Resource Plan, which would likely trigger the review and amendment requirements in the Basin Plan 2012. This option could be supported by local water utility drought management plans that consider the possibility of an extreme drought, an order of magnitude larger than has been experienced previously, and a strategy to implement if such an event unfolds.</p> <p>Note: This option would provide operational efficiency to meet acceptable levels of supply risk, but feedback from the community is required on the potential impacts on environmental, stock and domestic, cultural and groundwater users.</p> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Further Information</b>    | <p><b>Extreme Events Policy:</b><br/> <a href="http://www.industry.nsw.gov.au/water/what-we-do/legislation-policies/eep">www.industry.nsw.gov.au/water/what-we-do/legislation-policies/eep</a></p> <p><b>Incident Response Guide for the Border Rivers:</b><br/> <a href="http://www.mdba.gov.au/publications/mdba-reports/nsw-border-rivers-water-resource-plan">www.mdba.gov.au/publications/mdba-reports/nsw-border-rivers-water-resource-plan</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## Option 30. Review of regulated river water accounting and allocation process

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>This option would review different settings of the current water accounting and water allocation process for the NSW Border Rivers regulated river, including:</p> <ul style="list-style-type: none"> <li>• reviewing the water allocation process, such as changing to a more conservative water allocation process to ensure more water is reserved in storage for basic landholder rights, stock and domestic water users and local water utility licences by providing a longer planning horizon</li> <li>• the effects of updating the ‘worse inflow sequence’ reference in the water sharing plan (for example, to incorporate more recent inflow records and climate change modelling, or climate change considerations) and what this means for allocating water to different users</li> <li>• investigating changes to the volume of water reserved in Pindari Dam for regional towns and stock and domestic water users (and applying different water delivery mechanisms)</li> <li>• investigating how conveyance ‘losses’ are estimated and accounted for</li> <li>• investigating the inclusion of provisions for cultural flows.</li> </ul> |
| <b>Intent</b>                 | <p>More effectively meet basic landholder rights, the needs of stock and domestic water users and high security licence holders, the environment and Aboriginal people’s water needs, particularly during dry times or under potential climate change conditions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>• Increased climate variability will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Government commitment 1. Final business case for building a new dam on the Mole River</li> <li>• Option 2. Raising Pindari Dam’s full supply level</li> <li>• Option 29. New drought operational rules</li> <li>• Option 31. Investigation of licence conversions.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Considerations</b>         | <p>A more conservative water allocation process could improve the reliability of water for critical human needs by expanding the essential supplies reserve requirement to multiple years.</p> <p>This would require review of the rules in the water sharing plan.</p> <p>Consideration would need to be given to:</p> <ul style="list-style-type: none"> <li>• likely impacts on general security licence holders</li> <li>• likely benefits or impacts of any changes (including any accounting or operational changes to the delivery of water) on key environmental processes and cultural values</li> <li>• benefits for towns and communities during drier times and extreme events.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Further information</b>    | <p><a href="http://www.industry.nsw.gov.au/water/allocations-availability/allocations/how-water-is-allocated">www.industry.nsw.gov.au/water/allocations-availability/allocations/how-water-is-allocated</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## Option 31. Investigation of licence conversions

Source: WaterNSW, Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>This option would consider the potential benefits from voluntary conversion of general security licences to high security licences.</p> <p>The investigation would help to determine the level of water security achievable in the Border Rivers region.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Intent</b>                 | <p>Provide greater flexibility in agricultural production, including the long-term transition to higher value enterprises (such as vegetables and horticulture) that may require high security water.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>Delivering water to the end of the system.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>Government commitment 1. Final business case for building a new dam on the Mole River</li> <li>Option 2. Raising Pindari Dam's full supply level</li> <li>Option 29. New drought operational rules</li> <li>Option 30. Review of regulated river water accounting and allocation process.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Considerations</b>         | <p>This option requires:</p> <ul style="list-style-type: none"> <li>consideration of current policy, regulatory, water management constraints and risks to other water licence holders and planned environmental water</li> <li>consideration of environmental implications, especially changes to flow regime, water availability and flow delivery</li> <li>consideration of the types of licences able to be converted: <ul style="list-style-type: none"> <li>all general security licence holders including environmental water holders</li> <li>general security A class only, which would be beneficial for the remaining general security A and B class water users as there will be less demand for general security A class. Under the current water sharing plan rules, general security A class must receive 100% water allocations before general security B class can receive water allocations</li> </ul> </li> <li>consideration of how the conversion rate is determined (for example, is there a common conversion rate for the entire length of the river or is a scaling factor, or similar, applied based on the distance the option is downstream of the dam)</li> <li>amendments to the water sharing plan for the NSW Border Rivers Regulated River Water Source</li> <li>feedback on public acceptance of the option</li> <li>significant consultation will be required to ensure the methodology for determining the conversion rate is accepted by key stakeholders.</li> </ul> <p>Note: Conversions from general security to high security are not currently permitted under the water sharing plan. Significant consultation will be required to ensure the methodology for determining the conversion rate is accepted by key stakeholders.</p> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## Option 32. Improved data collection

*Source: Department of Planning, Industry and Environment—Water, Department of Primary Industries—Agriculture and consultation with councils*

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| <b>Description</b>            | <p>This option involves opportunities to improve data collection around water use by industry, the environment and towns in the Border Rivers region. This would generate better information to inform future water management decisions in the region.</p> <p>This option would investigate opportunities to refurbish existing infrastructure (such as groundwater monitoring bores) and install new infrastructure and technology to enable better collection of water flows, levels and quality parameters.</p> <p>It would also investigate ways to harness water data collected by industries (for example, in environmental impact statements and annual compliance reports).</p> <p>The option would review the water monitoring programs that utilise the monitoring infrastructure and prepare a unified state-wide monitoring program strategy.</p> |
| <b>Intent</b>                 | Inform future water management in the NSW Border Rivers region (such as the operation of water sharing plans and water resource plans).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>Healthy water sources support the region's environment, which—in turn—supports liveable communities and thriving industries.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Potential combinations</b> | <p>This option would provide the basis for:</p> <ul style="list-style-type: none"> <li>Option 35. Sustainable access to groundwater</li> <li>Option 36. Improved clarity in managing groundwater resources sustainably</li> <li>Option 37. Improved understanding of groundwater processes.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Considerations</b>         | <p>The implementation of the NSW Government's non-urban water metering framework will assist in improving data collection on water use. Further investigation is required to identify the level of water quality required for different water users (for example, industry users versus town water users).</p> <p>Consideration of how this option can contribute to monitoring, evaluation and reporting as part of an adaptive management approach for managing water in the Border Rivers and its hydrologically connected systems.</p> <p>Note: The department received comments on the need for improved climate data during consultation on the water resource plan development.</p>                                                                                                                                                                     |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## Option 33. Training and information sharing program

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>Training and information sessions on the new regional water strategies climate data and modelling to build confidence in the new approach and identify opportunities for wider use of the new datasets.</p> <p>Providing training and information about groundwater resources and how they are managed. This will assist councils and other water users to make more informed decisions about their water supply security.</p> <p>Providing information sessions on NSW and Queensland water market products, systems and processes, as well as on water trading rules between water sources within NSW to facilitate water moving to higher value uses that will support the regional economy.</p> <p>This option would also consider how best to publicly share data, and what data analytics and information products are needed for different types of water users including councils, Aboriginal people, environmental water managers and industries.</p> |
| <b>Intent</b>                 | Assist councils to make informed decisions about their water supply security, provide greater transparency around water management and water modelling, and inform councils in the development of their own integrated water cycle management strategies and regional town water strategies.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Challenges addressed</b>   | Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Potential combinations</b> | This option could be linked to other options designed to strengthen community preparedness for climate extremes, maintaining and diversifying water supplies, and protecting and enhancing natural systems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## Option 34. Investigation to maintain amenity for regional towns during drought

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>Investigate opportunities to maintain town water features, local parks and recreational areas during extended drought and make them less 'climate dependent' so they can be permanent features of regional towns.</p> <p>These decisions are generally made by local communities and local water utilities based on the utility's integrated water cycle management strategy and agreed levels of service.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Intent</b>                 | <p>Enable regional town centres to remain green, particularly during dry times.</p> <p>This would provide multiple benefits to the community, including town amenity, improved mental and physical health (access to recreational facilities, appealing spaces for social gatherings, general amenity value of the town) and potential economic diversity for the towns (ability to attract tourism and host events to support local businesses).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Healthy water sources support the region's environment, which—in turn—supports liveable communities and thriving industries.</li> <li>• Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 26. Reuse, recycle and stormwater projects</li> <li>• Option 27. Water efficiency projects (towns and industries).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Considerations</b>         | <p>This option requires:</p> <ul style="list-style-type: none"> <li>• identification of high value community 'green' assets (such as town water features, local parks and recreational facilities, street trees)</li> <li>• an assessment of the quantity of water required to maintain 'green' regional centres</li> <li>• an assessment of available alternative water sources such as through an integrated water cycle management strategy, including treated wastewater and groundwater. Harvested stormwater is unlikely to be an option as it is not available during dry times (although it could be encouraged for passive irrigation of street trees as part of future town planning):             <ul style="list-style-type: none"> <li>– for recycled wastewater, the assessment will need to consider existing treatment systems and the water quality requirements of the end use, proximity of the treatment facility to key assets, and operational costs</li> <li>– for groundwater and surface water use, the assessment will need to consider the impact of using these sources on critical needs</li> </ul> </li> <li>• an assessment of how the options should interact with individual town integrated water cycle management strategies.</li> </ul> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## Option 35. Sustainable access to groundwater

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>Groundwater extraction limits balance environmental and economic-social benefits and impacts.</p> <p>This option would establish a systematic state-wide process to ensure ongoing access to groundwater resources by the environment, landholders, towns, agriculture, mining and other industries.</p> <p>It will review existing groundwater resource extraction limits, current and future pressures on groundwater systems to incorporate up-to-date information, including:</p> <ul style="list-style-type: none"> <li>• scientific studies that incorporate new climate variation and climate change datasets to give an improved understanding of groundwater processes</li> <li>• insights into ways to improve the integration of surface water and groundwater management</li> <li>• knowledge about social and economic impacts under different development scenarios</li> <li>• consistent methodologies and policy principles that fairly and transparently share the groundwater resource with all groundwater users</li> <li>• policy/guidelines to increase security of access for basic landholder rights and town water supply</li> <li>• investigate the resilience of bores extracting water as a basic landholder right, and the impact of these bores on the security of town water supplies.</li> </ul> <p>This option would also consider how to incorporate Aboriginal knowledge, cultural heritage and science in setting sustainable extraction limits.</p> |
| <b>Intent</b>                 | <p>This option would consider what groundwater resource extraction limits would need to be set in the future to ensure sustainable access to groundwater by both consumptive water users and the environment. This option could also consider whether additional guidelines are needed to support water users taking water from groundwater sources and managing impacts on all other water users.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Challenges addressed</b>   | <p>Sustainable access to groundwater resources by all water users.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Potential combinations</b> | <p>This option would apply the outcomes from Option 37. Improved understanding of groundwater processes. It also provides the basis for Option 36. Improved clarity in managing groundwater resources sustainably.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Considerations</b>         | <p>This option would need to consider:</p> <ul style="list-style-type: none"> <li>• required policy or regulatory changes</li> <li>• commitments made under the Basin Plan 2012 and the mandatory review of sustainable diversion limits in 2026.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Further information</b>    | <p><b>Basin Plan 2012:</b><br/> <a href="http://www.legislation.gov.au/Details/F2018C00451">www.legislation.gov.au/Details/F2018C00451</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## Option 36. Improved clarity in managing groundwater resources sustainably

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>This option will review, revise and develop the necessary policies to give greater transparency and clarity in managing:</p> <ul style="list-style-type: none"> <li>• extraction within sustainable diversion limits—this project would require a review of account rules and the annual groundwater allocation process. It would make the assessment process for available water determinations more formulaic and transparent</li> <li>• groundwater systems where the entitlements (plus basic rights) exceed the extraction limit—this project would look at ways to better manage those systems where the entitlement and water required for basic landholder rights exceeds the resource extraction limit, particularly those systems where extraction is currently or will likely exceed the extraction limit. It would give clarity to water users about how these groundwater systems will be managed as use increases over the next 30 years</li> <li>• areas of concentrated extraction (for example, where groundwater extraction is causing declines in water levels in some areas to unacceptable levels)—this project would develop a policy with a series of escalating management actions corresponding to stages of water level decline. It would provide certainty to all water users about what actions government will take and when.</li> </ul> |
| <b>Intent</b>                 | <p>Within a framework of sustainable access to groundwater by all users, this option would provide greater transparency and certainty to water users about actions the NSW Government will take to manage groundwater resources at the water source and at local scales.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Challenges addressed</b>   | <p>Sustainable access to groundwater resources by all water users.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Potential combinations</b> | <p>This option would apply the outcomes from:</p> <ul style="list-style-type: none"> <li>• Option 35. Sustainable access to groundwater</li> <li>• Option 37. Improved understanding of groundwater processes.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Considerations</b>         | <p>This option would need to consider required policy or regulatory changes. This option could also consider how to incorporate Aboriginal knowledge, cultural heritage and science in managing groundwater resources.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## Option 37. Improved understanding of groundwater processes

Source: Department of Planning, Industry and Environment—Water

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>            | <p>Groundwater management decisions are made using the best available information. Our understanding needs to continually improve based on the latest science.</p> <p>This option would progress the scientific understanding of five key groundwater processes:</p> <ul style="list-style-type: none"> <li>• recharge or through flow rates and their spatial-temporal variations, including the impacts from climate variation/change, on- and off-farm water efficiency projects, and adapting river operations</li> <li>• dynamics of groundwater levels under stressed and evolving development conditions (such as the shift from seasonal crops to permanent plantings)</li> <li>• connectivity between groundwater and surface water systems</li> <li>• changing patterns in groundwater quality over time</li> <li>• water needs of ecosystems that are partly or wholly dependent on groundwater and the impact on these ecosystems under different development scenarios. This would consider what ecosystems need in terms of groundwater levels or baseflows from aquifers to river systems.</li> </ul> <p>This option would be delivered in collaboration with consultancies and research centres. A combination of desktop studies, field studies and numerical models would be used.</p> <p>The outcomes from the option would provide the scientific evidence-base for future groundwater management decisions.</p> |
| <b>Intent</b>                 | <p>Increase scientific knowledge of the processes occurring in NSW's groundwater resources, from areas of recharge to areas of discharge and their complex interactions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Sustainable access to groundwater resources by all water users.</li> <li>• Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>• Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Potential combinations</b> | <p>This option would build on Option 32. Improved data collection. It also provides the basis for options to manage groundwater resources sustainably such as:</p> <ul style="list-style-type: none"> <li>• Option 35. Sustainable access to groundwater</li> <li>• Option 36. Improved clarity in managing groundwater resources sustainably.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Considerations</b>         | <p>This option requires an assessment of how it could be implemented given the time required for scientific studies and the timing of the revision/replacement of water sharing plans across NSW. This option could also consider how to incorporate Aboriginal knowledge, cultural heritage and science in managing groundwater resources.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## Option 38. Extending the Cap and Pipe the Bores Program

Source: Department of Planning, Industry and Environment—Water

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| <b>Description</b>            | <p>This option would extend the Cap and Pipe the Bores Program (such as to 2040 or 2060) and set up an enduring framework around financial and maintenance responsibilities for existing bores and the monitoring of capped bores to determine the long-term efficacy of the program.</p> <p>The program was initiated in 1999 to rehabilitate the Great Artesian Basin and is funded to 2024.</p> <p>The department has been partnering with the Commonwealth and landholders across western NSW through this program providing financial incentives to replace ageing artesian bores and bore drains with new bores and reliable and efficient reticulated water supply systems.</p> <p>From 1 July 2019, the Cap and Pipe the Bores Program started a new five year phase aimed at supporting NSW Great Artesian Basin landholders to improve their water security and drought resilience. Landholders with eligible Great Artesian Basin bores that have uncontrolled flow or are failing can apply for efficient piped water supply systems for improved drought resilience and water security on their properties.</p> |
| <b>Intent</b>                 | <p>More efficient use of groundwater from the Great Artesian Basin to provide increased drought resilience and water security to landholders and improved pressure in, and ecological health of, the Great Artesian Basin artesian springs and the groundwater dependent ecosystems they support.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Sustainable access to groundwater resources by all water users.</li> <li>• Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>• Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Potential combinations</b> | <p>This option would apply the outcomes from:</p> <ul style="list-style-type: none"> <li>• Option 35. Sustainable access to groundwater</li> <li>• Option 37. Improved understanding of groundwater processes</li> <li>• Option 39. Maintaining the Great Artesian Basin for the future.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Further information</b>    | <p><b>Cap and Pipe the Bores Program:</b><br/> <a href="http://www.industry.nsw.gov.au/water/plans-programs/water-recovery-programs/cap-and-pipe-the-bores">www.industry.nsw.gov.au/water/plans-programs/water-recovery-programs/cap-and-pipe-the-bores</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## Option 39. Maintaining the Great Artesian Basin for the future

Source: Department of Planning, Industry and Environment—Water

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|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>            | <p>The Great Artesian Basin Strategic Management Plan was developed by the Australian, state and territory governments. The Strategic Management Plan sets out a series of guiding principles to manage the Great Artesian Basin to achieve economic, environmental, cultural and social outcomes.</p> <p>Under this option, NSW would develop and fund an implementation plan to deliver the Strategic Management Plan outcomes within NSW. This will require a policy framework that includes:</p> <ul style="list-style-type: none"> <li>• management of the recovery of groundwater pressures and associated water savings from infrastructure projects to reduce wastage of groundwater from the Great Artesian Basin (such as reserved and planned environmental water made available as new access licences via controlled allocations, incentives for private investment to save water and access to groundwater for towns).</li> <li>• bore owners' rights and responsibilities with respect to infrastructure installation and maintenance, and education and compliance programs to promote the shared management of the resource</li> <li>• design and implement water use practices that minimise the amount of groundwater extracted. This would include developing a policy for reasonable use guidelines for domestic and stock bores.</li> </ul> |
| <b>Intent</b>                 | Improve long-term management and sustainability of groundwater systems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Sustainable access to groundwater resources by all water users.</li> <li>• Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>• Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Potential combinations</b> | This option could be combined with Option 38. Extending the Cap and Pipe the Bores Program.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Further information</b>    | <p><b>Great Artesian Basin Strategic Management Plan:</b><br/> <a href="http://www.agriculture.gov.au/water/national/great-artesian-basin/strategic-management-plan">www.agriculture.gov.au/water/national/great-artesian-basin/strategic-management-plan</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## Option 40. Support reforms to simplify and strengthen cross-border groundwater management

Source: Department of Planning, Industry and Environment—Water

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|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>            | <p>The Border Rivers Alluvium in NSW extends into Queensland and is hydraulically connected, with the same origin, composition and structure across both sides of the border. The alluvium falls within the operational area of the Border Rivers Commission, created under the 1946 NSW-Queensland Border Rivers Intergovernmental Agreement. Cross-border water management arrangements can be challenging due to the differences in legislation and rules between NSW and Queensland.</p> <p>Each State is responsible for managing groundwater on its own side of the border through its own legislation.</p> <p>This option would support reforms to simplify and strengthen cross-border groundwater management. Potential reforms include:</p> <ul style="list-style-type: none"> <li>• agreement on a common management framework with common principles, common management rules and common trade assessment criteria (that is, one resource managed by one set of rules)</li> <li>• reconcile the definition and delineation of joint aquifer management areas across the border.</li> </ul> |
| <b>Intent</b>                 | More efficient and sustainable use of alluvial groundwater through common management rules to provide further drought resilience and longer term water security to landholders.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Sustainable access to groundwater resources by all water users.</li> <li>• Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>• Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Potential combinations</b> | This option could be combined with Option 37. Improved understanding of groundwater processes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Considerations</b>         | <p>This option would need to consider:</p> <ul style="list-style-type: none"> <li>• water sharing arrangements between NSW and Queensland under the NSW-Queensland Border Rivers Intergovernmental Agreement 2008</li> <li>• stakeholder views including feedback from communities and the Queensland Government</li> <li>• existing water sharing plans and water resource plans.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## Option 41. Improve knowledge of fractured rock groundwater sources in the upper catchment

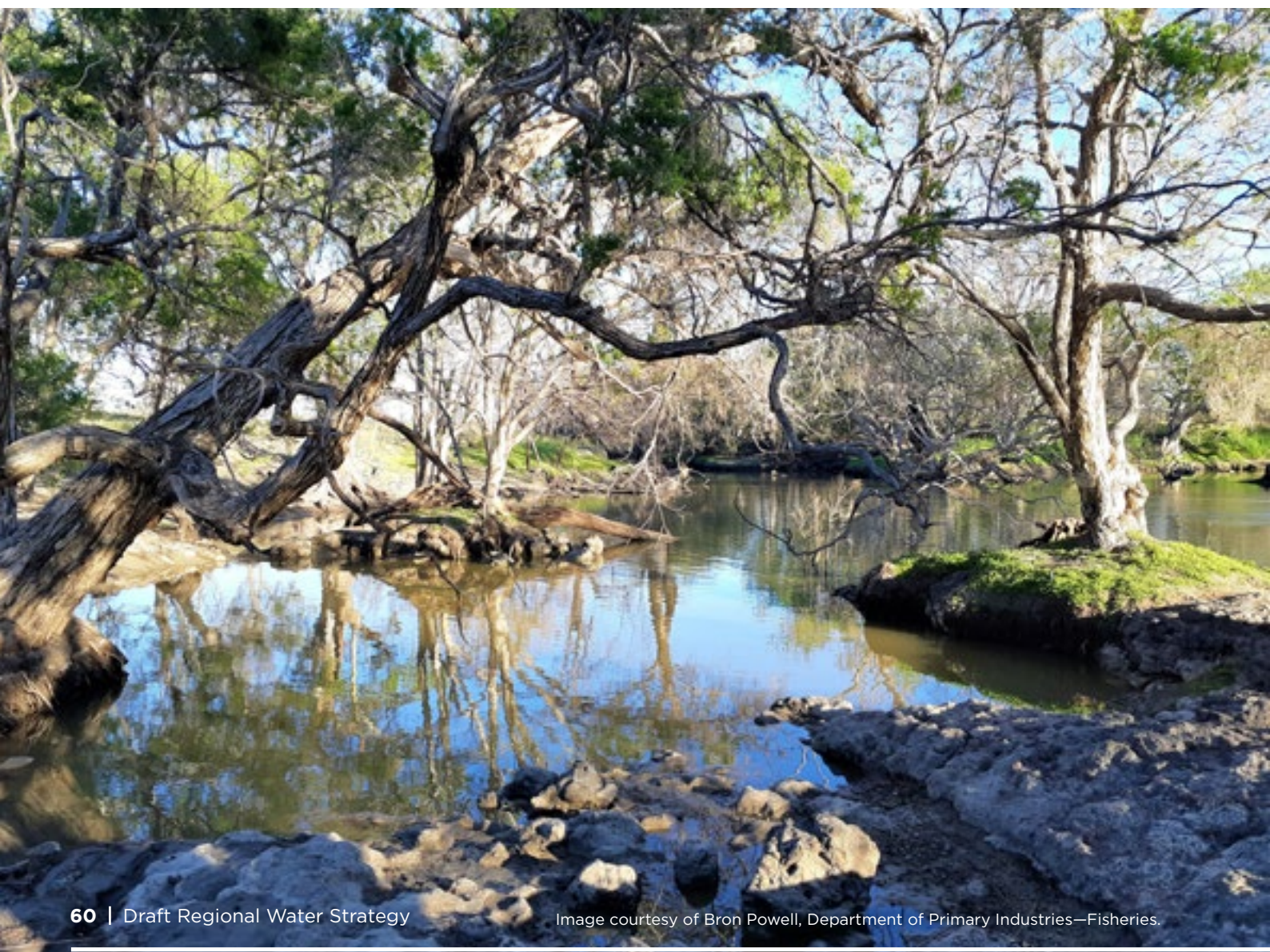
Source: Department of Planning, Industry and Environment—Water

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|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>            | <p>Opportunities for maximising the use of fractured rock groundwater sources in the Border Rivers region depend on increasing our understanding of these resources.</p> <p>The Geological Survey of NSW undertakes mineral, energy and water exploration and this option would develop a project for the joint exploration of fractured rock systems. This option could provide information to improve town water supply security.</p> <p>This option could include regional and locally targeted geophysics to identify potential resources followed by drilling, testing and water quality analysis to assess the resource's suitability as supply.</p> <p>This option could also consider how to incorporate Aboriginal knowledge, cultural heritage and science in understanding groundwater resources.</p> |
| <b>Intent</b>                 | Identifying reliable water supply and storage for future growth.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Sustainable access to groundwater resources by all water users.</li> <li>• Increased climate variability poses new risks to towns, communities and industries in the Border Rivers.</li> <li>• Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Potential combinations</b> | This option could be combined with Option 37. Improved understanding of groundwater processes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Further information</b>    | <p><b>NSW Murray-Darling Basin (MDB) Fractured Rock Water Resource Plan:</b><br/> <a href="http://www.mdba.gov.au/publications/mdba-reports/nsw-murray-darling-basin-fractured-rock-water-resource-plan">www.mdba.gov.au/publications/mdba-reports/nsw-murray-darling-basin-fractured-rock-water-resource-plan</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

# Improving the recognition of Aboriginal people's water rights, interests and access to water

Opportunities to protect and strengthen cultural landscapes, practices, knowledge and traditions. Supporting empowerment, self-determination and economic advancement of Aboriginal people, as well as strengthening community wellbeing.

Given the challenges and risks raised by COVID-19 in 2020, the Department of Planning, Industry and Environment have not yet engaged with Aboriginal communities in the Border Rivers region on the Draft Border Rivers Regional Water Strategy. Engagement will begin in late 2020. The options that follow are options raised by Aboriginal communities in other regions. We have included these options here as a starting point for discussions. These options will be amended or replaced based on the specific feedback and aspirations of the Border Rivers Aboriginal communities.



## Option 42. Culturally appropriate water knowledge program

*Source: Department of Planning, Industry and Environment—Water, Aboriginal consultation in the Macquarie-Castlereagh, Lachlan and Gwydir regions*

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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| <b>Description</b>            | The management of water can often be complex with many layers of government playing different roles in the management and delivery of water across the Border Rivers region. This option would develop a culturally appropriate water knowledge program that would aim to increase the capacity of Aboriginal people across the region so that they can more effectively participate in negotiations on water management and policy related matters that affect them. This program could include training opportunities, development of learning resources and increased communication between Aboriginal groups and relevant government agencies on key topics.                                                                                                                                                                                                                                           |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Improve the ability of Aboriginal community to engage with the complexities of water management in NSW.</li> <li>• Improve water knowledge and participation across all ages and communities.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Lack of culturally appropriate information about how governments manage water.</li> <li>• Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.</li> <li>• Aboriginal people's rights and interests are not adequately recognised or provided for in current water laws and policies, and there are limited opportunities to influence management decisions.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 43. Water-dependent cultural practices and site identification project</li> <li>• Option 46. Establish a regional Aboriginal Water Advisory Committee</li> <li>• Option 51. River Ranger Program.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Considerations</b>         | <p>Program training would need to be created and delivered in a culturally appropriate manner. This may include:</p> <ul style="list-style-type: none"> <li>• building skills and accreditations/qualifications for key Aboriginal people who can take this back to the community</li> <li>• hosting training in the community or in appropriate settings</li> <li>• ensuring Aboriginal people have a chance to assist in the development and delivery of training programs</li> <li>• hosting training with school aged children at important sites to improve knowledge and appreciation.</li> </ul> <p>Aboriginal people raised the need for water knowledge sharing to be two ways since there was a need for local, State and Federal governments to have better cultural awareness.</p> <p>Note: This option could be considered at a state level through a state-wide Aboriginal water policy.</p> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## Option 43. Water-dependent cultural practices and site identification project

*Source: Department of Planning, Industry and Environment—Water, Aboriginal consultation in the Macquarie-Castlereagh, Lachlan and Gwydir regions*

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| <b>Description</b>            | Classify and map water-dependent cultural sites throughout the Border Rivers region. This will include the identification and mapping of cultural sites, places of spiritual significance and places used by Aboriginal communities for traditional and contemporary uses, such as hunting, recreation and economic uses. Intellectual property and cultural knowledge would be protected and retained by Aboriginal people.                                                                                                                                                                                                                                                                |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Develop a resource for Aboriginal people to help with planning of cultural and environmental water and possible impacts of other management and development decisions.</li> <li>• Enable Aboriginal communities to educate the wider community to develop a greater understanding of cultural values and connections to rivers and wetlands across the Border Rivers region.</li> </ul>                                                                                                                                                                                                                                                            |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Aboriginal people's rights and interests are not adequately recognised or provided for in current water laws and policies, and there are limited opportunities to influence management decisions.</li> <li>• Aboriginal people have limited access to water allocations to use for cultural and economic purposes.</li> <li>• Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.</li> </ul>                                                                                                                                                                                     |
| <b>Potential combinations</b> | <p>This could be combined with options to protect and enhance natural systems as well as the following:</p> <ul style="list-style-type: none"> <li>• Option 44. Secure flows for water-dependant cultural sites</li> <li>• Option 51. River Ranger Program.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Considerations</b>         | <ul style="list-style-type: none"> <li>• We have heard from Aboriginal people in regions across NSW that they should retain ownership of information they share.</li> <li>• Mapping of different aspects of Aboriginal cultural values has previously been undertaken in the Border Rivers region by various agencies and organisations. These resources can assist with the implementation of this option.</li> <li>• The Aboriginal Waterways Assessment tool has been piloted by the Murray-Darling Basin Authority and is currently being used across the Basin.</li> </ul> <p>Note: This option could be considered at a state level through a state-wide Aboriginal Water Policy.</p> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Further information</b>    | <p><b>Murray-Darling Basin Authority 2015, Aboriginal Waterways Assessment Program.</b><br/> <b>ISBN 978-1-925221-38-1:</b><br/> <a href="http://www.mdba.gov.au/publications/mdba-reports/aboriginal-waterways-assessment-program">www.mdba.gov.au/publications/mdba-reports/aboriginal-waterways-assessment-program</a></p>                                                                                                                                                                                                                                                                                                                                                               |

## Option 44. Secure flows for water-dependent cultural sites

Source: Department of Planning, Industry and Environment—Water, Aboriginal consultation in the Macquarie-Castlereagh, Lachlan and Gwydir regions

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| <b>Description</b>            | <p>Aboriginal people have a close spiritual connection with waterways. In the Border Rivers catchment, water-dependent cultural sites (including places of spiritual significance and places of traditional hunting, recreation and cultural uses) are susceptible to dry conditions. We have heard through other consultations and in other regions that Aboriginal communities are deeply affected during dry periods and drought due to the reduction in their ability to access water for cultural purposes.</p> <p>This option would investigate opportunities to improve the rate and consistency of flows to places of cultural significance. The places of cultural significance will be identified by Aboriginal community members.</p> <p>This option would also investigate supplying water to Aboriginal communities and assets.</p> |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Improve the quality and consistency of flows at water-dependent cultural sites across the Border Rivers catchment.</li> <li>• Improve recognition of cultural sites and their protection and management.</li> <li>• Ensure cultural sites are appropriately considered and supported in the Border Rivers water management system.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Aboriginal people's rights and interests are not adequately recognised in current water laws and policies, and there are limited opportunities to influence management decisions.</li> <li>• Aboriginal people have limited access to water allocations to use for cultural and economic purposes.</li> <li>• Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.</li> </ul>                                                                                                                                                                                                                                                                                                                                                          |
| <b>Potential combinations</b> | <p>This could be combined with options to protect and enhance natural systems as well as the following:</p> <ul style="list-style-type: none"> <li>• Option 43. Water-dependent cultural practices and site identification project</li> <li>• Option 46. Establish a regional Aboriginal Water Advisory Committee</li> <li>• Option 50. Regional Cultural Water Officer Employment Program</li> <li>• Option 51. River Ranger Program.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Considerations</b>         | <p>This option requires consideration of:</p> <ul style="list-style-type: none"> <li>• where water would be sourced—surface water or groundwater</li> <li>• how water would be delivered and whether new infrastructure is needed to deliver water</li> <li>• assessment of potential impacts on the environment and water users in the Border Rivers region.</li> </ul> <p>Note: This option will be informed by connectivity options arising from the Western Regional Water Strategy.</p>                                                                                                                                                                                                                                                                                                                                                     |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## Option 45. Shared benefit project (environment and cultural outcomes)

Source: Department of Planning, Industry and Environment—Water, Aboriginal consultation in the Macquarie-Castlereagh, Lachlan and Gwydir regions

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| <b>Description</b>            | <p>Water for the environment plays a vital role in sustaining the health of rivers and wetlands, and supporting their ecological, cultural and economic values.</p> <p>This option would investigate opportunities for shared benefits from using water for the environment to also achieve cultural environmental outcomes, recognising it does not replace the provision of cultural flows.</p> <p>Shared benefits may include fish movement and support for populations of nesting fish species such as Murray Cod.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Where shared benefits may exist, explore cultural outcomes from the use of water for the environment.</li> <li>• Support, incorporate and implement traditional Aboriginal ecological knowledge into water management action plans for the environment.</li> <li>• Support the cultural connection of Aboriginal people to water-sustained environments.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Aboriginal people's rights and obligations are not adequately recognised or provided for in current water laws and policies, and there are limited opportunities to influence management decisions.</li> <li>• Aboriginal people have limited access to water allocations to use for cultural and economic purposes.</li> <li>• Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Potential combinations</b> | <p>This option could be combined with other options linked to improving the recognition of Aboriginal people's water rights, interests and access to water, as well as options designed to protect and enhance natural systems.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Considerations</b>         | <p>This option would need to consider:</p> <ul style="list-style-type: none"> <li>• development of capacity and resources within Aboriginal communities to support their participation in environmental water planning</li> <li>• appropriate channels for Aboriginal community members to engage with environmental water holders to identify shared watering needs</li> <li>• the need and frequency of watering at different times of the year to achieve cultural outcomes.</li> </ul> <p>Note:</p> <ul style="list-style-type: none"> <li>• Environmental water holders are responsible for the use of environmental water. The primary consideration in using this water is the achievement of environmental outcomes.</li> <li>• Options that identify water-dependent cultural practices and sites across river systems and waterways would provide more resources for Aboriginal people to work with Environmental Water Holders.</li> <li>• This option could be considered at a state level through a state-wide Aboriginal water policy.</li> </ul> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## Option 46. Establish a regional Aboriginal Water Advisory Committee

Source: Department of Planning, Industry and Environment—Water, Aboriginal consultation in the Macquarie-Castlereagh, Lachlan and Gwydir regions

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| <b>Description</b>            | <p>Establish an Aboriginal Water Advisory Committee. This committee would improve the ability of Aboriginal groups across the region to have a unified voice on water matters that affect them and their communities.</p> <p>The committee could also be responsible for matters including:</p> <ul style="list-style-type: none"> <li>• guiding the purchase and management of water entitlements for Aboriginal Nations to receive cultural flows</li> <li>• defining the cultural water flow needs for Aboriginal people in the region</li> <li>• providing representation for the wider Aboriginal community including those not part of a peak organisation or representative body.</li> </ul> <p>This option could facilitate the input and application of Aboriginal knowledge principles to land and water management. It should also consider the priority areas under the Closing the Gap agreement.</p> |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Improve the representation of the Aboriginal people in decision-making.</li> <li>• Provide a point of contact for water managers to engage with the region's Traditional Owners.</li> <li>• Broadly representing Traditional Owners of the region who have cultural knowledge and can speak for their country.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Aboriginal people's rights and obligations are not adequately recognised or provided for in current water laws and policies, and there are limited opportunities to influence management decisions.</li> <li>• Aboriginal people have limited access to water allocations to use for cultural and economic purposes.</li> <li>• Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Potential combinations</b> | <p>This option could be combined with other options linked to improving the recognition of Aboriginal people's water rights, interests and access to water, as well as options designed to protect and enhance natural systems.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Considerations</b>         | <p>Aboriginal people have raised considerations such as having:</p> <ul style="list-style-type: none"> <li>• Aboriginal people with an interest in water and cultural authority to speak for Country</li> <li>• legislative backing for the committee.</li> </ul> <p>This option will need to consider how the regional committee will interact and be involved with other groups, and the process for identifying and electing representatives to sit on the committee and governance framework. It will also need to consider how Aboriginal people are involved in water decision-making outside of this committee.</p> <p>Note: This option could be considered at a state level through a state-wide Aboriginal water policy.</p>                                                                                                                                                                             |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## Option 47. Water allocations for Aboriginal communities

*Source: Department of Planning, Industry and Environment—Water, Aboriginal consultation in the Macquarie-Castlereagh, Lachlan and Gwydir regions*

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| <b>Description</b>            | Funding to support Aboriginal people to purchase water entitlements and infrastructure (such as pumps) that can be used to improve economic and cultural outcomes across the Border Rivers region.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Intent</b>                 | Give Aboriginal people more secure access to water for spiritual, cultural, social, environmental and economic purposes, as well as open up opportunities for investment in water-dependent initiatives and cultural projects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>Aboriginal people's rights and interests are not adequately recognised or provided for in current water laws and policies, and there are limited opportunities to influence management decisions.</li> <li>Aboriginal people have limited access to water allocations to use for cultural and economic purposes.</li> <li>Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.</li> </ul>                                                                                                                                                                                                              |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>Option 42. Culturally appropriate water knowledge program</li> <li>Option 46. Establish a regional Aboriginal Water Advisory Committee.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Considerations</b>         | <p>The option would need to consider the following:</p> <ul style="list-style-type: none"> <li>the Federal Government's pledge of \$40 million in funds to support the acquisition of water entitlements for cultural purposes across the Murray-Darling Basin</li> <li>lessons learned from the Murray-Darling Basin Authority Water Efficiency Measures program in supporting the purchase of water entitlements for cultural flows in NSW</li> <li>providing sufficient funding to meet ongoing Aboriginal needs. Investigation will need to be undertaken into the level of demand.</li> </ul> <p>Note: This option could be considered at a state level through a state-wide Aboriginal water policy.</p> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Further information</b>    | <p><b>National Cultural Flows Research Project:</b><br/> <a href="http://www.culturalflows.com.au/">www.culturalflows.com.au/</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## Option 48. Aboriginal cultural water access licence review

*Source: Department of Planning, Industry and Environment—Water, Aboriginal consultation in the Macquarie-Castlereagh, Lachlan and Gwydir regions*

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| <b>Description</b>            | <p>Water access licences allow licence holders to take water from rivers, lakes or aquifers for certain uses. This includes a category of Specific Purpose water access licences that can only be held by Aboriginal people to access water for Aboriginal cultural uses.</p> <p>The utilisation of this licence category is low. This option will undertake a review of water access licences for Aboriginal cultural uses to determine their effectiveness and identify opportunities for improvement. This could include more clearly defining what the licences can be used for and reviewing the licence application process.</p> |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Optimise water sharing mechanisms that support cultural values and uses, both traditional and contemporary, recognising that Aboriginal cultural values and uses have adapted over time.</li> <li>• Develop a framework for cultural flow allocations.</li> <li>• Improve uptake of water access licences for Aboriginal cultural purposes.</li> <li>• Simplifying processes so as to make it easier for Aboriginal people to apply for licences.</li> <li>• Considering whether cultural access licences could be traded between Aboriginal communities.</li> </ul>                          |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Aboriginal people's rights and interests are not adequately recognised or provided for in current water laws and policies, and there are limited opportunities to influence management decisions.</li> <li>• Aboriginal people have limited access to water allocations to use for cultural and economic purposes.</li> <li>• Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.</li> </ul>                                                                                                                                |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 42. Culturally appropriate water knowledge program</li> <li>• Option 46. Establish a regional Aboriginal Water Advisory Committee</li> <li>• Option 50. Regional Cultural Water Officer Employment Program.</li> </ul>                                                                                                                                                                                                                                                                                                                      |
| <b>Considerations</b>         | <p>This option will need to consider:</p> <ul style="list-style-type: none"> <li>• the application and decision-making process for these water access licences</li> <li>• how the licences fit with the extraction and allocation limits within the region</li> <li>• supporting services—including education and knowledge sharing about water markets and licences.</li> </ul> <p>Note: This option could be considered at a state level through a state-wide Aboriginal water policy.</p>                                                                                                                                           |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## Option 49. Co-management investigation of Travelling Stock Reserves

*Source: Department of Planning, Industry and Environment—Water, Aboriginal consultation in the Macquarie-Castlereagh, Lachlan and Gwydir regions*

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| <b>Description</b>            | <p>Travelling Stock Reserves (TSRs) hold significant importance to Aboriginal people as they provide access and connection to Country, cultural practices and the protection of Aboriginal cultural heritage sites. However, Aboriginal people cannot always easily access and are not resourced to be involved in management decisions about these culturally significant sites.</p> <p>This option would investigate opportunities to improve the involvement of Aboriginal people in the co-management of TSRs that connect them to waterways and water dependent sites of cultural importance.</p> |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Improve access to waterways and other water-dependent sites of cultural importance.</li> <li>• Protect cultural assets, songlines and important flora.</li> <li>• Improve environmental outcomes.</li> <li>• Support Aboriginal people's involvement in the management of TSRs that connect Aboriginal people to waterways.</li> <li>• Support Aboriginal people to have more input on decisions that affect them and their cultural values.</li> </ul>                                                                                                       |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Aboriginal people's rights and interests are not adequately recognised or provided for in current water laws and policies, and there are limited opportunities to influence management decisions.</li> <li>• Aboriginal people have limited access to water allocations to use for cultural and economic purposes.</li> <li>• Aboriginal knowledge and science is not effectively integrated into water management in culturally appropriate ways.</li> </ul>                                                                                                 |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 43. Water-dependent cultural practices and site identification project</li> <li>• Option 50. Regional Cultural Water Officer Employment Program</li> <li>• Option 51. River Ranger Program.</li> </ul>                                                                                                                                                                                                                                                                                                      |
| <b>Considerations</b>         | <p>This option would need to consider Local Land Services' state-wide plan for managing the delivery of better TSR services for the community.</p> <p>Note: This option could be considered at a state level through a state-wide Aboriginal water policy.</p>                                                                                                                                                                                                                                                                                                                                         |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## Option 50. Regional Cultural Water Officer Employment Program

Source: Department of Planning, Industry and Environment—Water, Aboriginal consultation in the Macquarie-Castlereagh, Lachlan and Gwydir regions

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| <b>Description</b>            | <p>Investigate models for establishing Cultural Water Officer roles that assist with engaging with Aboriginal people regarding water management in the Border Rivers. Responsibilities of this role could include:</p> <ul style="list-style-type: none"> <li>• increasing the general knowledge of the broader Aboriginal community about water management matters and the water licencing framework in a culturally appropriate way</li> <li>• coordinating engagement with local Aboriginal people on water management matters</li> <li>• promoting and supporting self-determination and representation</li> <li>• channelling information between Aboriginal people and government bodies and key stakeholders.</li> </ul> |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Improve the awareness and involvement of local Aboriginal community members in the management of water resources across the Border Rivers.</li> <li>• Enable local Aboriginal people to use their local knowledge and skills to assist in decisions about water use and management.</li> <li>• Enable more equitable and collaborative relationships with stakeholders and codesigned programs.</li> </ul>                                                                                                                                                                                                                                                                             |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Aboriginal people's rights and interests are not adequately recognised or provided for in current water laws and policies, and there are limited opportunities to influence management decisions.</li> <li>• Aboriginal people have limited access to water allocations to use for cultural and economic purposes.</li> <li>• Aboriginal knowledge and science is not effectively integrated into water management in culturally appropriate ways.</li> </ul>                                                                                                                                                                                                                          |
| <b>Potential combinations</b> | <p>This option could be combined with Option 51. River Ranger Program.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Considerations</b>         | <p>This option would need to consider:</p> <ul style="list-style-type: none"> <li>• the operational and project budget to support the program</li> <li>• the location of officers and whether they would sit within government or within an Aboriginal organisation.</li> </ul> <p>Note: This option could be considered at a state level through a state-wide Aboriginal water policy.</p>                                                                                                                                                                                                                                                                                                                                     |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## Option 51. River Ranger Program

*Source: Department of Planning, Industry and Environment—Water, Aboriginal consultation in the Macquarie-Castlereagh, Lachlan and Gwydir regions*

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| <b>Description</b>            | <p>Investigate options for the establishment of an Aboriginal River Ranger Program to assist in maintaining the health and management of rivers and wetlands throughout the Border Rivers region. Rangers could be involved in:</p> <ul style="list-style-type: none"> <li>• pest management (fish and weeds)</li> <li>• remediation and mitigation of impacts on waterways</li> <li>• restocking native fish and vegetation species</li> <li>• protecting and managing riparian zones along waterways</li> <li>• working closely with compliance officers</li> <li>• involvement in monitoring, evaluation and research programs run by government.</li> </ul>                                                                                         |
| <b>Intent</b>                 | <ul style="list-style-type: none"> <li>• Improve the involvement of local Aboriginal people in the management and protection of waterways and water dependent cultural sites, including future generations.</li> <li>• Enable a closer relationship with environmental water managers across NSW.</li> <li>• Use local knowledge to improve water management outcomes in a way that is culturally appropriate and respects cultural knowledge and intellectual property.</li> </ul>                                                                                                                                                                                                                                                                     |
| <b>Challenges addressed</b>   | <ul style="list-style-type: none"> <li>• Aboriginal people's rights and interests are not adequately recognised or provided for in current water laws and policies, and there are limited opportunities to influence management decisions.</li> <li>• Aboriginal people have limited access to water allocations to use for cultural and economic purposes.</li> <li>• Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.</li> </ul>                                                                                                                                                                                                                                                 |
| <b>Potential combinations</b> | <p>This option could be combined with:</p> <ul style="list-style-type: none"> <li>• Option 16. Providing incentives to landholders to conserve and rehabilitate riparian, wetland and floodplain vegetation</li> <li>• Option 17. Riparian habitat restoration and re-establishing threatened species</li> <li>• Option 42. Culturally appropriate water knowledge program</li> <li>• Option 46. Establish a regional Aboriginal Water Advisory Committee</li> <li>• Option 50. Regional Cultural Water Officer Employment Program.</li> </ul>                                                                                                                                                                                                          |
| <b>Considerations</b>         | <p>Similar programs exist that may overlap these roles and/or provide partnerships and learnings. These include:</p> <ul style="list-style-type: none"> <li>• Indigenous Land Use Agreement land and waterway managers</li> <li>• Barkandji River Ranger Program</li> <li>• Local Land Services Healthy Rivers Program</li> <li>• Council pest species managers</li> <li>• Local Land Services Aboriginal Community Support Officer.</li> </ul> <p>In September 2020 the Commonwealth Government announced \$3 million for a River Ranger Program. This option will need to consider how to integrate with the Commonwealth commitment.</p> <p>Note: This option could be considered at a state level through a state-wide Aboriginal water policy.</p> |
| <b>Objectives</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |





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