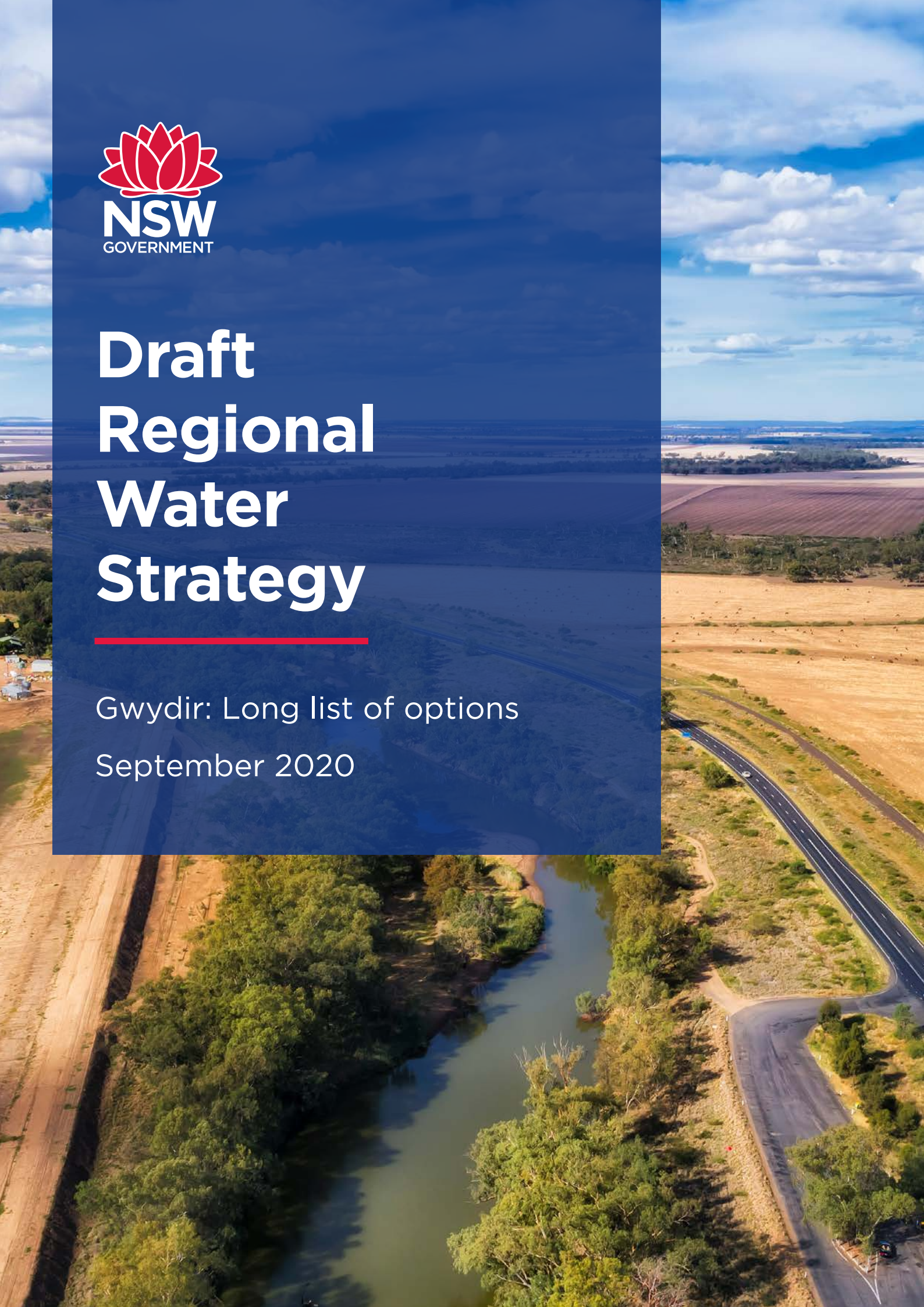

NSW GOVERNMENT

Draft Regional Water Strategy

Gwydir: Long list of options

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Acknowledgments: The input and collaboration of these NSW Government agencies is acknowledged: WaterNSW, NSW Health, Office of Local Government, and Aboriginal Affairs NSW. The feedback of these groups on the Aboriginal Water Coalition is also acknowledged: NSW Aboriginal Land Council, NTSCORP, Murray Lower Darling Rivers Indigenous Nations and Northern Basin Aboriginal Nations.

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 Gomeroi/Kamilaroi/Gamilaroi/Gamilaraay Nation hold a significant connection to the lands in which the Gwydir Regional Water Strategy falls upon.

The Gwydir 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 Gwydir 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. We thank the Elders, representatives of the Gomeroi/Kamilaroi/Gamilaroi/Gamilaraay Nation and Aboriginal community members who provided their knowledge throughout the regional water strategy development process.

Options for the Draft Gwydir Regional Water Strategy

As outlined in the Draft Gwydir Regional Water Strategy, we have developed a long list of options 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 Gwydir 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 Gwydir 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 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 with these five categories and the challenges and opportunities we identified in the Draft Gwydir Regional Water Strategy.

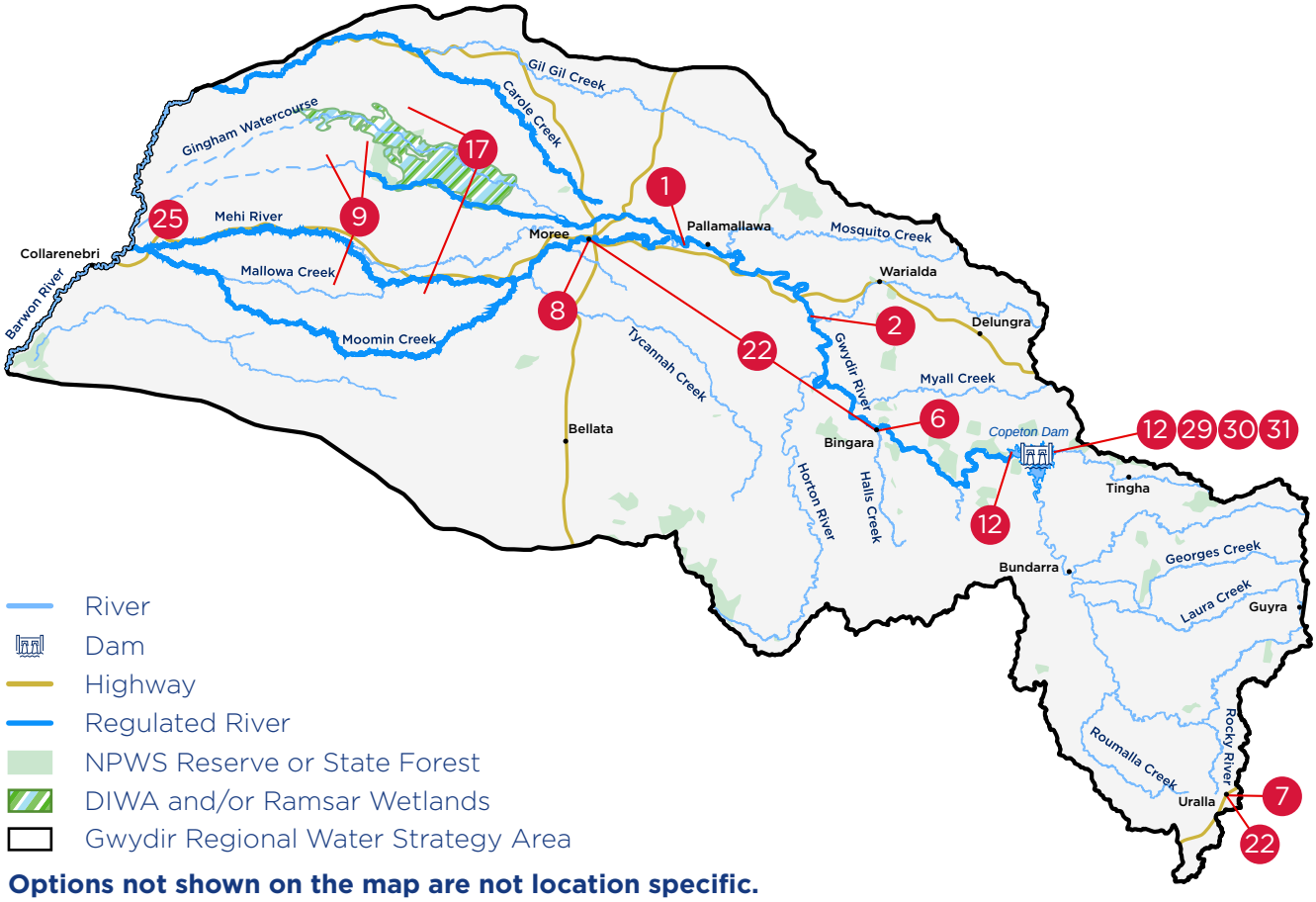
Overall, all options that are progressed will need to contribute to the liveability of the region.

Table 1. Draft long list of options matrix

Category	Maintaining and diversifying water supplies	Protecting and enhancing natural systems
Region-specific challenges and opportunities	**Risks/challenges:** • exacerbation of the inherent water security risks of town water supply systems due to climate variability and change • providing regional towns with multiple sources of supply • changing water needs, both within the agriculture industry and through strategic growth of regional centres (including Moree) • increased climate variability poses additional risks to water supply reliability for industry. **Opportunities:** • improve town water security • maintain or improve water quality • support growth and industries in the region, and new development.	**Risks/challenges:** • treating drinking water that is contaminated by sediments, blue-green algae and heavy metals to the required health standards • increased climate variability will place increased pressure on surface and groundwater resources and the ecosystems they support • protecting critical environmental assets, including the Gwydir Wetlands, and native and threatened species • better managing environmental water in unregulated rivers to ensure that environmental water achieves its intended purpose. **Opportunities:** • improve environmental water outcomes through active management of suitable flows, improving riparian management and augmenting existing infrastructure • recognise wider community benefits that the natural environment provides.
Options	• Enlargement of Tareelaroi Weir • New Lower Gravesend Dam on the Gwydir River downstream of Warialda Creek • Reuse, recycling and stormwater projects • Managed aquifer recharge investigations and policy • Reliable access to groundwater by towns • Town water security planning and investment for Gwydir Shire • Town water security planning and investment for Uralla Shire • Reliable access to groundwater for the Moree Special Activation Precinct	• Removal of system constraints in the Gwydir catchment to improve flows reaching the Gwydir Wetlands • NSW Fish Passage Strategy • Ability to direct excess supplementary flows • Cold water pollution mitigation measures • Diversion screens to prevent fish extraction at pump offtakes • Improved understanding of groundwater processes • Sustainable access to groundwater by all users • Improved clarity in managing groundwater resources sustainably • Active management to share flows between consumptive and other uses • Modification and/or removal of floodwork structures causing adverse impacts • River Ranger Program • Investigation of water quality mitigation measures • Secure flows for water-dependent cultural sites

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
Risks/challenges: • reducing evaporative losses from the region's on-farm storages and more efficient delivery of water • the impact of increased climate variability on water supply reliability for industry. **Opportunities:** • improve water use • maintain, improve productivity and efficiency in delivery • demand management (via price signals, policy and trade) • improving water delivery efficiency to towns has the potential to improve water access reliability.	**Risks/challenges:** • ensuring healthy water sources to support the region's environment, which—in turn—supports liveable communities and thriving industries • increased climate variability poses new risks to towns and communities in the region. **Opportunities:** • fit-for-purpose policies and regulation to protect town water security • strengthen community health and wellbeing • to better manage risks.	**Risks/challenges:** • 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 • Aboriginal people have limited access to water allocations to use for cultural and economic purposes • Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways • lack of culturally appropriate information about how governments manage water. **Opportunities:** • protect and strengthen cultural landscapes, practices, knowledge and traditions • support the empowerment, self-determination and economic advancement of Aboriginal people • strengthen the community wellbeing of Aboriginal people.
• Water efficiency projects (towns and industries) • Review of water markets in the Gwydir region • Connectivity with downstream systems • Review urban water restriction policy • Addressing inefficient delivery system management	• New drought operation rules (Gwydir River) • Review of surface water accounting and allocation process • Investigation of licence conversions • Improved data collection and storage • Training and information sharing programs: – new climate data/modelling – managing groundwater resources sustainably • Land use change impact on water resources	• Culturally appropriate water knowledge program • Water-dependent cultural practices and site identification project • Shared benefit project (environment and cultural outcomes) • Regional Cultural Water Officer employment program • Regional Aboriginal Water Advisory Committee • Water portfolio project for Aboriginal communities • Co-management investigation of Travelling Stock Reserves • Aboriginal cultural water access licence review

Gwydir long list of options map



Options not shown on the map are not location specific.

Legend:

Maintaining and diversifying water supplies

1. Enlargement of Tareelaroi Weir
2. New Lower Gravesend Dam on the Gwydir River downstream of Warialda Creek
3. Reuse, recycling and stormwater projects
4. Managed aquifer recharge investigations and policy
5. Reliable access to groundwater by towns
6. Town water security planning and investment for Gwydir Shire
7. Town water security planning and investment for Uralla Shire
8. Reliable access to groundwater for the Moree Special Activation Precinct

Protecting and enhancing natural systems

9. Removal of system constraints in the Gwydir catchment to improve flows reaching the Gwydir Wetlands
10. NSW Fish Passage Strategy
11. Ability to direct excess supplementary flows
12. Cold water pollution mitigation measures
13. Diversion screens to prevent fish extraction at pump offtakes
14. Improved understanding of groundwater processes
15. Sustainable access to groundwater by all users
16. Improved clarity in managing groundwater resources sustainably
17. Active management to share flows between consumptive and other uses
18. Modification and/or removal of existing priority floodwork structures causing adverse impacts
19. River Ranger Program
20. Investigation of water quality mitigation measures
21. Secure flows for water-dependent cultural sites

Supporting water use and delivery efficiency and water conservation

22. Water efficiency projects (towns and industries)
23. Review of water markets in the Gwydir region
24. Connectivity with downstream systems
25. Review urban water restriction policy
26. Addressing inefficient delivery system management

Strengthening community preparedness for climate extremes

27. New drought operational rules (Gwydir River)
28. Review of surface water accounting and allocation process
29. Investigation of licence conversions
30. Improved data collection and storage
31. Training and information sharing programs:
    - new climate data/modelling
    - managing groundwater resources sustainably
32. Land use change impact on water resources

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

33. Culturally appropriate water knowledge program
34. Water-dependent cultural practices and site identification project
35. Shared benefit project (environment and cultural outcomes)
36. Regional Cultural Water Officer employment program
37. Regional Aboriginal Water Advisory Committee
38. Water portfolio project for Aboriginal communities
39. Co-management investigation of Travelling Stock Reserves
40. Aboriginal cultural water access licence review

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

This document describes each option, 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 1). 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 on the option.

The list also identifies potential combinations of options. These combinations recognise that most options require associated works, further assessments and/or legislative and policy and planning changes to ensure they address the risks and challenges identified in the Gwydir 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 1. NSW 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.

Gwydir: Long list of options

Maintaining and diversifying water supplies

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

Option 1: Enlargement of Tareelaroi Weir

Source: WaterNSW

Description	Tareelaroi Weir is a major re-regulating structure on the Gwydir River approximately 20 km east of Moree. The weir services water users on the Mehi River, Moomin Creek, lower Gwydir and Carole Creek. Enlargement of Tareelaroi Weir (by raising the height by 2.7 m) and modification of Mehi Regulator would increase the weir's storage capacity from 2.5 GL to 6 GL. This would result in an estimated additional 3.65 GL/year of water through efficiency savings.
Intent	• Enable greater operating flexibility for delivering flows to the lower reaches of the Gwydir system and the Mehi system. • Reduce evaporative losses from the system.
Challenges addressed	Increased climate variability poses additional risks on water supply reliability for industry.
Potential combinations	This option could be combined with targeted environmental works and measures to improve native fish movement and habitat.
Considerations	Since the development of the study that identified this option, the NSW Government has invested in more detailed and sophisticated data and modelling methods. In particular: • floodplain harvesting—we now have more accurate representation of floodplain harvesting take. The models used in this study underestimate floodplain harvesting take • climate modelling—we are using additional data to better understand climate risks and assess the potential costs and benefits of new infrastructure, policy and operational options • environmental water—we have improved how we represent held and planned environmental water in our modelling. As a result, the benefits of this option may change when assessed against the updated models. This option requires: • assessment of potential impacts on cultural heritage sites • assessment of changes to existing river flow patterns and planned environmental water, including from unregulated tributary flows in the mid-Gwydir reaching the lower Gwydir • consideration of the distribution of benefits amongst consumptive water users and the environment • compliance with the Murray-Darling Basin Baseline Diversion Limit and an assessment of potential impacts on general security, supplementary and future floodplain harvesting licence holders from having to maintain compliance with the Basin Plan's Sustainable Diversion Limits • assessment of potential impacts on the Sustainable Diversion Limit • assessment of flow modifications or changed operational regime on connectivity including fish passage, native fish (including threatened species), ecological communities and ecosystems, along with the outcomes of the Gwydir Long Term Water Plan. Native fish populations include threatened Freshwater Catfish, Murray Cod, Purple-spotted Gudgeon and Olive Perchlet (impacts could include reduced flowing water habitats that are critical to life history stages, such as Murray Cod breeding) • amendments to the water sharing plan for the Gwydir regulated river • assessment of cold water pollution impacts. In line with requirements of the *Fisheries Management Act 1994*, a range of mitigation measures including biodiversity offsets, environmental flows and fish passage may be required. Enlargement of the weir will reduce waterway connectivity and fish passage regardless of whether a fishway is included within the design.
Objective	
Further information	**A complete description of the objectives, benefits, costs, environmental and social considerations is in the WaterNSW Gwydir Valley Priority Catchment Study.**

Option 2: New Lower Gravesend Dam on the Gwydir River downstream of Warialda Creek

Source: WaterNSW

Description	Building a new 175 GL capacity storage on the Gwydir River downstream of Warialda Creek, near the town of Gravesend. Various capacities were investigated in reaching the preferred storage capacity option.
Intent	Provide more efficient storage compared to existing on-farm storage. The estimated savings from reduced evaporative losses is estimated to be in the order of 29.1 GL/year. This option would also provide some flood mitigation measures for Moree.
Challenges addressed	• Increased climate variability poses new risks to towns and communities in the region. • Changing water needs, both within the agriculture industry and through strategic growth of regional centres.
Potential combinations	This option could be combined with targeted environmental works and measures to improve native fish movement and habitat.
Considerations	Since the development of the study that identified this option, the NSW Government has invested in more detailed and sophisticated data and modelling methods. In particular: • floodplain harvesting—we now have more accurate representation of floodplain harvesting take. The models used in this study underestimate floodplain harvesting take • climate modelling—we are using additional data to better understand climate risks and assess the potential costs and benefits of new infrastructure, policy and operational options • environmental water—we have improved how we represent held and planned environmental water in our modelling. As a result, the benefits of this option may change when assessed against the updated models. This option requires: • assessment of potential impacts on cultural heritage sites • assessment of inundation impacts on landholders in the immediate vicinity of the weirs • assessment of changes to existing river flow patterns and planned environmental water, including from unregulated tributary flows in the mid-Gwydir reaching the lower Gwydir • assessment of cold water pollution impacts • assessment of potential impacts on floodplain industries • consideration of the distribution of benefits amongst consumptive water users and the environment • compliance with the Murray-Darling Basin Baseline Diversion Limit and an assessment of potential impacts on general security, supplementary and future floodplain harvesting licence holders from having to maintain compliance with the Basin Plan's Sustainable Diversion Limits • assessment of potential impacts on the Sustainable Diversion Limit • assessment of flow modifications or changed operational regime on connectivity including fish passage, native fish (including threatened species), ecological communities and ecosystems, along with the outcomes of the Gwydir Long Term Water Plan. Native fish population, include threatened Freshwater Catfish, Murray Cod, Purple-spotted Gudgeon and Olive Perchlet (impacts could include reduced flowing water habitats that are critical to life history stages, such as Murray Cod breeding) • review and amendments to the water sharing plan for the Gwydir regulated river. In line with requirements of the *Fisheries Management Act 1994*, a range of mitigation measures including biodiversity offsets, environmental flows and fish passage will be required. Full impacts on native fish outcomes are unlikely to be fully offset or mitigated. Environmental assessment processes require sufficient scope to consider the cumulative impact of combined infrastructure options.
Objective	
Further information	**A complete description of the objectives, benefits, costs, environmental and social considerations is in the WaterNSW Gwydir Valley Priority Catchment Study.**

Option 3: Reuse, recycling and stormwater projects

Source: Department of Planning, Industry and Environment—Water

Description	Investigate opportunities to maximise the use of surface water and groundwater for potable and non-potable uses through reuse, recycling initiatives or stormwater harvesting. Suitable options would need to be scoped; however, options could focus on improving water security for individual towns, supporting the establishment of new industry (for example within the Moree Special Activation Precinct) and maintaining 'green' spaces during extended drought.
Intent	Potential to improve water reliability for individual towns in the Gwydir region and maintain local parks, town water lakes and green spaces during droughts.
Challenges addressed	• Increased climate variability poses new risks to towns and communities in the region. • Changing water needs, both within the agriculture industry and through strategic growth of regional centres. • Ensuring healthy water sources to support the region's environment, which—in turn—supports liveable communities and thriving industries.
Potential combinations	This option could be combined with other options such as *Managed aquifer recharge investigations and policy* (as stormwater and/or wastewater could be managed through managed aquifer recharge).
Considerations	• Consultation is required 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. • Options 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 the council and community appetite for such initiatives. • There is also a need to consider: – whether changes to state-wide policy and regulation are required to support urban stormwater harvesting and use in urban centres for the needs identified impact on users downstream of effluent and urban stormwater discharge points – state-wide whole of government policy and regulation on return flow credits. 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.
Objective	

Option 4: Managed aquifer recharge investigations and policy

Source: Department of Planning, Industry and Environment—Water

Description	Investigation of possible sites for temporary storage of stormwater and river flows in aquifers to improve storage efficiencies. This is normally referred to as managed aquifer recharge. This option would develop a supporting policy to regulate the storage and recovery of this water.
Intent	More efficient use (by minimising evaporation) of stored water in areas where demand is high.
Challenges addressed	• Changing water needs, both within the agriculture industry and through strategic growth of regional centres. • Providing regional towns with multiple sources of supply.
Potential combinations	This option builds on options such as *Sustainable access to groundwater by all users*. It will be combined with *Reliable access to groundwater by towns*.
Considerations	This option requires: • consideration of the distribution of benefits (such as additional water because of reduced evaporation) amongst consumptive water users and the environment • consideration of equity issues between industries and cross-subsidies in implementing a managed aquifer recharge policy • an assessment of the engineering and economic challenges of managed aquifer recharge • an assessment of the licensing and accounting framework for surface water temporarily stored as groundwater • an assessment of public acceptance of this option (including specific pilot schemes) • an assessment of required policy and legislative changes • an assessment of biosecurity risks associated with transferring water from surface water to groundwater • pumping screens.
Objective	

Image courtesy of Jane Humphries.

Option 5: Reliable access to groundwater by towns

Source: Department of Planning, Industry and Environment—Water

Description	Strategic review and planning across the state to identify: • 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) • likelihood and consequences of such exceedances (for example: is water carting feasible and economically sound?) • towns where future water demands could exceed current entitlements • groundwater resources that could be used as a complementary water supply (identified with field- and numerical modelling-based information) • regulatory issues potentially slowing or preventing access to these groundwater resources • what infrastructure investments (borefields and pipelines) are needed and their timing • impact of changing groundwater access on other users (such as domestic, stock and industry users). This option would improve processes and policies to address for future droughts the challenges faced by towns accessing groundwater during the current drought. This option would not replace the need for councils to have an integrated water cycle management strategy.
Intent	Support town industry water security by diversifying existing portfolios.
Challenges addressed	Changing water needs, both within the agriculture industry and through strategic growth of regional centres.
Potential combinations	This option builds on the options focused on managing groundwater resources sustainably using best-available science. It could be combined with *Managed aquifer recharge investigations and policy*. This option also relies on *Improved data collection and storage* and *Training and information sharing programs*.
Considerations	This option requires an assessment of the roles and responsibilities of state versus local government.
Objective	

Option 6: Town water security planning and investment for Gwydir Shire

Source: Department of Planning, Industry and Environment—Water, local council

Description	Investigation of long-term water security measures for Gwydir Shire. Options for Bingara could include connecting the town water supply with the pipeline that services Inverell, local access to groundwater resources or a small off-river storage.
Intent	• Improve town water security for Bingara, which currently relies on supply provided via run-of-river from Copeton Dam. A diverse water supply portfolio may be more ideal in terms of resilience to future climate risks and uncertainties. • Providing long-term continuous access to reliable drinking water supply and water for sanitation enables communities to grow and thrive by ensuring good public health, strategic economic growth opportunities, social cohesion and liveability, and revenue for utilities to meet fixed costs.
Challenges addressed	• Changing water needs, both within the agriculture industry and through strategic growth of regional centres. • Providing regional towns with multiple sources of supply.
Potential combinations	This could be combined with *Reuse, recycling and stormwater projects*.
Considerations	Options would need to consider: • disturbance impacts to channel geomorphology and hydrology, and the implications of any changed flow regime on connectivity including fish passage, in-channel habitat and native fish (including threatened species, communities and ecosystems), along with the outcomes of the *Gwydir Long Term Water Plan* • increased extraction from Copeton Dam may require review of the water sharing plan • pump screening at waterways and reservoirs will be required • impacts on the availability and use of water sources for other water users. Council could seek co-funding under Safe and Secure Water Program for preparing its integrated water cycle management strategy.
Objective	

Option 7: Town water security planning and investment for Uralla Shire

Source: Department of Planning, Industry and Environment—Water, local council

Description	Investigation of long-term water security measures for Uralla Shire. Options for Uralla could include accessing groundwater or raising the wall of Kentucky Dam to increase storage capacity. Options for Bundarra could include re-instating Emu Crossing Bridge Causeway. Alternative, climate-independent water sources could also be considered for both towns. This could be considered as part of Uralla Shire Council's integrated water cycle management strategy.
Intent	Increase town water security for towns in Uralla Shire, in particular Uralla and Bundarra. Uralla's town water supply is sourced from the 500 ML Kentucky Creek Dam, of which 75 ML is considered dead storage. The catchment area for Kentucky Dam is small—as a result, the dam fills and empties quickly. In early 2020, the town water supply was as low as 29% and the town was at risk of running out of water by the middle of this year. Uralla also has access to groundwater, but this is a limited backup supply. Kentucky Creek Dam is also susceptible to algal growth in summer and was recently contaminated with arsenic, which reached levels well above the Australian Drinking Water Guidelines. The water supply for Bundarra is sourced from Taylor's Pond, a shallow in-channel pool on the Gwydir River. This system is vulnerable to low flows in the Gwydir River. Upstream users can place stress on town water supply. Severe restrictions were applied in 1994 and 2016. Bundarra is considered to have a relatively low level of supply security. A diverse water supply portfolio may be more ideal in terms of building Uralla Shire's resilience to future climate risks and uncertainties. Providing long-term continuous access to reliable drinking water supply and water for sanitation enables communities to grow and thrive by ensuring good public health, strategic economic growth opportunities, social cohesion and liveability and revenue for utilities to meet fixed costs.
Challenges addressed	• Changing water needs, both within the agriculture industry and through strategic growth of regional centres. • Providing regional towns with multiple sources of supply.
Potential combinations	This could be combined with *Reuse, recycling and stormwater projects* and *Reliable access to groundwater by towns*.
Considerations	• Uralla Shire Council has developed a drought management plan to manage water quality and reliability issues. • Council is preparing to undertake their integrated water cycle management strategy, which would evaluate options for improving the town's long-term water security through accessing groundwater or raising the wall of Kentucky Creek Dam to increase storage capacity or connection to Armidale system. • Options would need to consider the impacts on the availability and use of water by other water users. • Council could seek co-funding under Safe and Secure Water Program for preparing its integrated water cycle management strategy.
Objective	
Further information	**Uralla Shire Council Demand Management Plan (2018)** **Uralla Shire Council Drought Management Plan (2019)** **www.uralla.nsw.gov.au/Council-Services/Water-Supply/Drought-and-Demand-Management-Plans**

Option 8: Reliable access to groundwater by the Moree Special Activation Precinct

Source: Department of Planning, Industry and Environment—Water, local council

Description	Develop a strategic approach to groundwater access to support new industry in the Moree Special Activation Precinct. This option would consider past and predictions of future groundwater extraction volumes, locations and patterns.
Intent	Support the wider government investment in the Moree Special Activation Precinct.
Challenges addressed	Changing water needs, both within the agriculture industry and through strategic growth of regional centres.
Potential combinations	This option builds on the options focused on managing groundwater resources sustainably using best-available science. It could be combined with *Reliable access to groundwater by towns*.
Considerations	Groundwater extractions must remain, in the long term, within extraction limits as specified in water sharing plans. In some groundwater systems, the extractions are already near or at the extraction limits. Furthermore, in some groundwater systems the entitlements exceed the extraction limits (while in others the entitlements are equal to or less than these limits). This option will consider: • what implications the predicted increases in groundwater extraction would have on available water determinations (for example: how many MLs each share is worth each year) • whether there is potential to increase entitlements, either through controlled allocation orders or issued to local water utilities by the Minister • what issuing new entitlements to local water utilities would mean for irrigators/other licence holders • what water market options are available.
Objective	

Protecting and enhancing natural systems

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

Option 9: Removal of system constraints in the Gwydir catchment to improve flows reaching the Gwydir Wetlands

Source: NSW Government agencies are developing a detailed feasibility proposal for consideration by the Australian Government for this project

Description	The Gwydir Wetlands supports a range of social, environmental and cultural values for the region. It also contains four sites that are listed under the international Ramsar Convention. The size and health of the Gwydir Wetlands has declined substantially: only 823 hectares remain of a former 220,000 hectare wetland area. If the Australian Government supports its progression, this option will develop a detailed business case for the removal of system constraints in the catchment to improve flows passing to and through the Gwydir Wetlands (as identified in the Northern Basin Review). This business case would investigate the viability of the following: • enhancing connectivity between rivers and their floodplains, both laterally and longitudinally • supporting ecological processes • facilitating flow to maintain the condition of wetland vegetation • supporting the breeding requirements of a range of water dependent fauna and flora • enhancing environmental outcomes achieved from existing and ongoing environmental water management operations managed by the Commonwealth Environmental Water Office and NSW. **The Gwydir Constraints Measures Project is one of several projects being considered under the Northern Basin Toolkit, a complementary program to the implementation of the Murray-Darling Basin Plan.**
Intent	• Optimise the environmental benefits that can be achieved through environmental watering. • Improve the quantity and timing of environmental flows. • Ease system constraints in the Gwydir, which will support the reconnection of floodplains and wetlands to the main river channel, reinforcing ecosystem services and providing water and environmental cues to prompt breeding cycles in a range of fauna and flora. • Facilitate the removal of barriers to improve flow efficiency to more efficiently deliver environmental flows to high-value environmental sites.
Challenges addressed	• Increased climate variability, will place increased pressure on surface and groundwater resources and the ecosystems they support. • Protecting critical environmental assets, including the Gwydir Wetlands, and native and threatened species.
Potential combinations	This option could be combined with environmental options, such as *Ability to direct supplementary excess flows* and *Active management to share flows between consumptive and other uses*.
Considerations	The business case for this option will: • set out a range of management options or configurations and the associated costs and environmental benefits of each • set out potential impacts on the environment and stakeholders and other water users, including impacts on connectivity flows to downstream water sources • be subject to community consultation and include clear expected outcomes.
Objective	
Further information	www.coag.gov.au/about-coag/agreements/intergovernmental-agreement-implementing-water-reform-murray-darling-basin

Option 10: NSW Fish Passage Strategy

Source: The Australian Government and NSW Government

Description	Many native fish species in the Gwydir 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. Currently native fish can only move through the Gwydir system during high flow conditions when water overflows weirs and other instream barriers. This option will look at a staged remediation of fish passages at 26 priority weirs within the Gwydir catchment. This opening of fish passages would: • improve the ability of fish to move along waterways to access important habitat and food sources • improve the ability of fish to access reproductive and spawning grounds in the system. This strategy will be carried out over multiple phases. Phase 1 will involve fishway construction at five sites, four of which are existing legislative requirements under the *Fisheries Management Act 1994* for the Copeton Dam Safety Upgrade Project: Tyreel Weir, Tyreel Regulator, Boolooroo Weir, Tareelaroi Weir and Gundare Bridge. These works will proceed within the next five years. Following the successful completion of Phase 1, the Fish Passage Strategy recommends fishway construction at an additional 21 priority weir barriers that will improve native fish access to over 600 km of waterway.
Intent	• Maintain and improve native fish access to core habitat in the Gwydir while conserving environmental water entitlements. • Improve fish movement through fishways and encourage breeding and spawning activities, especially for threatened species. • Significantly improve water connectivity with the Gwydir Wetlands. • Improve recreational fishing and regional tourism opportunities.
Challenges addressed	Protecting native and threatened aquatic species.
Potential combinations	This option could be combined with *Removal of system constraints in the Gwydir catchment to improve flows reaching the Gwydir Wetlands, Diversion screens to prevent fish extraction at pump offtakes, Cold water pollution mitigation measures* and *Diversion screens to prevent fish extraction at pump offtakes*.
Considerations	This option requires alignment with the *Gwydir Long Term Water Plan*.
Objective	

Option 11: Ability to direct excess supplementary flows

Source: Department of Planning, Industry and Environment—Water

Description	Supplementary flows generally occur over wet periods when water flowing through a waterway is surplus to current operational demand and cannot be captured for future use. This water is important for supporting river health and natural floodplain processes, as well as supplementing licence holders who may access this water for on property storage. This option will introduce rules for managing supplementary water events to allow the NSW environmental water manager to direct (where possible) the environment's share of those events to specific environmental assets in the Gwydir regulated or unregulated river water sources. The NSW environmental water manager will also be able to direct water not taken by supplementary licences holders to environmental assets after a certain flow volume is triggered. This element of the option will deliver environmental benefits and also reduce the possibility of flooding agricultural land during key harvesting times. This option will provide the NSW environmental water manager with flexibility to adaptively manage environmental assets in the Gwydir valley. The long-term water plan provides ecological information related to the known environmental assets and their watering requirements for natural functioning. This information supports planning processes and the NSW environmental water manager will work with the operator (WaterNSW) to direct water to environmental assets. **This is an existing NSW Government commitment.**
Intent	• Improved system management to allow water for the environment to deliver intended outcomes and contribute to annual watering priorities. • Improve environmental assets and overall ecosystem health in the Gwydir region.
Challenges addressed	• Increased climate variability will place increased pressure on surface and groundwater resources and the ecosystems they support. • Protect critical environmental assets, including the Gwydir Wetlands, and native and threatened species.
Potential combinations	This option could be combined with *Removal of system constraints in the Gwydir catchment to improve flows reaching the Gwydir Wetlands* and other environmental options, such as targeted floodworks and measures to promote fish movement and habitat.
Considerations	• Stakeholder engagement and public consultation undertaken for the *Draft Gwydir Surface Water Resource Plan* has informed development of this option. Details are available from www.industry.nsw.gov.au/water/plans-programs/water-resource-plans/drafts/gwydir-surface. • Any redirection of supplementary flows must be done in a manner that avoids socio-economic impacts. An annual report prepared by Department of Planning, Industry and Environment—Environment, Energy and Science at the start of the water year will detail the environmental asset being targeted.
Objective	
Further information	**www.industry.nsw.gov.au/water/plans-programs/water-resource-plans/drafts/gwydir-surface**

Option 12: Cold water pollution mitigation measures

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

Description	Augmentation of existing water supply infrastructure to avoid cold water pollution in the Gwydir regulated system. Water releases from Copeton Dam can display temperature decreases of 10°C or more in summer that extend up to 200 km downstream. Cold water pollution has significant damaging impacts on riverine ecological function, particularly in summer where biological cues such as fish spawning are disrupted. It also has social and tourism impacts, with recreational use of the Gwydir River (such as swimming and fishing) downstream of Copeton Dam constrained due to cold summertime water temperatures. Copeton Dam was identified as a high priority dam for Stage 2 of the *Cold Water Pollution Strategy*. Outcomes of Stage 2 include continued installation and maintenance of temperature monitoring equipment for all large water storages across NSW and development and implementation of operating protocols for dams with multi-level offtakes to deliver best management in water temperature releases. As part of Stage 2, an investigation into Copeton Dam explored infrastructure design options, construction and operating costs and made recommendations based on multi-criteria and benefit cost analysis. WaterNSW completed an options study on possible cold water mitigation solutions and further work is planned to develop a preferred solution. A thermal curtain, such as at Burrendong Dam, is not a viable option given Copeton Dam does not have a similar offtake tower.
Intent	• Restore near natural river water temperature to provide native and threatened fish species in the Gwydir system with the necessary environmental cues to spawn, recruit, move and grow. • Mitigating cold water pollution will provide the necessary water quality to enable unimpaired spawning, growth, recruitment, feeding and other lifecycle processes of native fish in the 200 km of affected aquatic habitat of the Gwydir River and associated tributaries. • Improve social amenity through access to recreational activities, which will have flow-on economic benefits for regional communities below Copeton Dam.
Challenges addressed	• Increased climate variability will place increased pressure on surface and groundwater resources and the ecosystems they support. • Protecting critical environmental assets and native and threatened species.
Potential combinations	This option could be combined with other environmental options to support a healthy regional environment.
Considerations	This option requires alignment with the *Gwydir Long Term Water Plan* and the *NSW Cold Water Pollution Strategy*.
Objective	
Further information	**www.dpi.nsw.gov.au/fishing/habitat/threats/cold-water-pollution** **www.environment.nsw.gov.au/topics/water/water-for-the-environment/planning-and-reporting/long-term-water-plans/gwydir**

Option 13: Diversion screens to prevent fish extraction at pump offtakes

Source: Department of Primary Industries—Fisheries

Description	This option will require the installation of screens on pumps and diversion channels to reduce the amount of fish being extracted at pump sites. Every year, large numbers of native fish are extracted by pumps and diverted into irrigation channels, never to return to the Gwydir system. There are over 300 pump offtakes with a diameter greater than 200 mm on the Gwydir River, Moomin Creek, Mehi River and Carole Creek. 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. Screening infrastructure also improves water delivery and extraction efficiency through fewer blockages caused by debris, resulting in on-farm cost savings.
Intent	Significantly reduce the loss of native fish from the Gwydir system, while improving water delivery and extraction efficiency.
Challenges addressed	Protecting native and threatened aquatic species.
Potential combinations	This option could be combined with other environmental options to support a healthy regional environment.
Considerations	This option would require: • assessment of the cost-benefits of screening, including environment outputs, water delivery efficiency and long-term social and financial implications to water licence holders • assessment of incentive schemes for landholders to install screens. If the screens are a legislative requirement, a mandatory condition for applicable works approvals may need to be included in the relevant water sharing plans. This would enable enforcement and monitoring of presence/absence of the devices. Note: Diversion screens have been used successfully for decades overseas (for example, in western USA, Europe and New Zealand).
Objective	

Option 14: Improved understanding of groundwater processes

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

Description	Groundwater management decisions are made using the best available information. Our understanding needs to continually improve based on the latest science. This option would progress the scientific understanding of five key groundwater processes: • recharge rates and their spatial-temporal variations, including the impacts from climate variation/change, on- and off-farm water efficiency projects, and adapting river operations • dynamics of groundwater levels under stressed and evolving development conditions (such as the shift from seasonal crops to permanent plantings) • connectivity between groundwater and surface water systems • changing patterns in groundwater quality over time • water needs of ecosystems that are partly or wholly dependent on groundwater and the impact on those under different development scenarios. This would consider what ecosystems need in terms of groundwater levels or baseflows from aquifers to river systems. 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. The outcomes from the option would provide the scientific evidence-base for future groundwater management decisions.
Intent	Increase scientific knowledge of the processes occurring in NSW's groundwater resources, from areas of recharge to areas of discharge and the complex interactions in-between.
Challenges addressed	• Sustainable access to groundwater resources by all water users. • Increased climate variability will place increased pressure on surface and groundwater resources and the ecosystems they support.
Potential combinations	This option would build on *Improved data collection and storage*. It provides the basis for options to manage groundwater resources sustainably.
Considerations	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 the State.
Objective	

Option 15: Sustainable access to groundwater by all users

Source: Department of Planning, Industry and Environment—Water

Description	Groundwater extraction limits balance environmental and economic-social benefits and impacts. 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. It would review existing groundwater resource extraction limits to incorporate up-to-date information, including: • scientific studies that incorporate new climate variation/change datasets to give an improved understanding of groundwater processes • insights into ways to improve the integration of surface water and groundwater management • knowledge about social and economic impacts under different development scenarios.
Intent	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.
Challenges addressed	Sustainable access to groundwater resources by all water users.
Potential combinations	This option would apply the outcomes from *Improved understanding of groundwater processes.* It provides the basis for *Improved clarity in managing groundwater resources sustainably*.
Considerations	This option would need to consider: • required policy or regulatory changes • commitments made under the Basin Plan 2012 and the mandatory review of sustainable diversion limits in 2026.
Objective	

Option 16: Improved clarity in managing groundwater resources sustainably

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

Description	This option will review, revise and develop the necessary policies to give greater clarity in managing: • 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 • 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 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 activation and use increases over the next 30 years • 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.
Intent	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.
Challenges addressed	Sustainable access to groundwater resources by all water users.
Potential combinations	This option would apply the outcomes from *Improved understanding of groundwater processes* (scientific understanding of groundwater processes) and *Sustainable access to groundwater by all users*.
Considerations	This option may require policy or regulatory changes.
Objective	

Option 17: Active management to share flows between consumptive and other uses

Source: Department of Planning, Industry and Environment—Water

Description	Water sharing plans do not currently protect this water from extraction in unregulated rivers if it is used in-stream for environmental purposes. 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. Active management only applies in a small part of the Gwydir valley. **This is an existing NSW Government commitment.** The Water Sharing Plan for the Gwydir Unregulated Water Sources was amended on 1 July 2020. Active management provisions in this amended plan will commence from 1 December 2020.
Intent	Active management to share flows between consumptive and other uses 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. Active management will reduce the need to use temporary water restrictions to manage active environmental water used in-stream and help improve water sharing, compliance and transparency by: • protecting active environmental water used in-stream for environmental purposes • making it clearer for licence holders to understand when they can take water • increasing public understanding on when water can and cannot be taken. Active management in the Gwydir will help maximise environmental outcomes from: • regulated held environmental water released from upstream storages that flows through the Gingham Watercourse Water Source and Mallowa Creek (within the Mehi River Water Source) • planned environmental water from the regulated Gwydir River that is assessed as additional to the inflows considered when the water sharing plan commenced, which established the bulk access regime for the Gwydir unregulated water sharing plan.
Challenges addressed	Increased climate variability, particularly during dry times, will place increased pressure on surface and groundwater resources and the ecosystems they support.
Potential combinations	This option could be combined with *Removal of system constraints in the Gwydir catchment to improve flows reaching the Gwydir Wetlands* and *Ability to direct excess supplementary flows*.
Considerations	• Public consultation undertaken for the NSW *Water Reform Action Plan* has informed development of this option. • The rules for operation of active management will 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. For this reason, the Department of Planning, Industry and Environment will develop an active management procedures manual to be published on the department's website. These procedures will set out operational details for implementing active management including how the volume of active environmental water managed in-stream will be determined.
Objective	
Further information	www.industry.nsw.gov.au/water/environmental-water-hub/water-reform-action-plan/better-management www.industry.nsw.gov.au/water/plans-programs/water-resource-plans/drafts/gwydir-surface www.industry.nsw.gov.au/water/plans-programs/water-sharing-plans/water-sharing-plans-recently-on-public-exhibition/gwydir

Option 18: Modification and/or removal of floodwork structures causing adverse impacts

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

Description	Ecological assets in the region rely on a level of floodplain water to replenish and maintain key elements of their systems. If this water cannot naturally move from the floodplain to these areas, then this water will need to be provided from other sources such as Copeton Dam. This option would modify or remove existing floodwork structures and barriers that impede the delivery of water to ecological assets (such as wetlands and floodplain areas).
Intent	• Ensure delivery of water to vital environmental assets. • Improve agricultural productivity (due to improved flow conditions).
Challenges addressed	• Increased climate variability will place increased pressure on surface and groundwater resources and the ecosystems they support. • Protecting critical environmental assets, including the Gwydir Wetlands, and native and threatened species. • Better managing environmental water in unregulated rivers to ensure that environmental water achieves its intended purpose. • Ensuring healthy water sources to support the region's environment, which—in turn—supports liveable communities and thriving industries.
Potential combinations	This option could be combined with *Removal of system constraints in the Gwydir catchment to improve flows reaching the Gwydir Wetlands* and other environmental options to support a healthy regional environment.
Considerations	Modifying or removing existing floodwork structures may present significant costs. It also raises challenges in managing the permanent loss of production capability for some individuals.
Objective	

Option 19: River Ranger Program

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

Description	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 Gwydir region. This role may be involved in: • pest management (fish and weeds) • remediation and mitigation of impacts on waterways • restocking native fish and vegetation species • protecting and managing riparian zones along waterways • working closely with compliance officers • involvement in monitoring, evaluation and research programs run by government.
Intent	• Improve the involvement of local Aboriginal people in the management and protection of waterways and water dependent cultural sites, including future generations. • Enable a closer relationship with environmental water managers across NSW. • Use local knowledge to improve water management outcomes in a way that is culturally appropriate and respects cultural knowledge and intellectual property.
Challenges addressed	• 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. • Aboriginal people have limited access to water allocations to use for cultural and economic purposes. • Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.
Potential combinations	This could be combined with other options for improving the recognition of Aboriginal people's water rights, interests and access to water, such as the *Culturally appropriate water knowledge program, Regional Cultural Water Officer employment program* and *Regional Aboriginal Water Advisory Committee.*
Considerations	Similar programs exist that may overlap these roles and/or provide partnerships and learnings. These include: • Indigenous Land Use Agreement land and waterway managers • Barkandji River Ranger Program • Local Land Services river management program • Council pest species managers • Local Land Services Aboriginal Community Support Officer. Note: This option could be considered at a state level through a state-wide Aboriginal water policy. Considerations will also be given to the interactions between this option and the recent funding commitment made by the Australian Government to create new Indigenous Ranger groups across the Murray-Darling Basin.
Objective	

Option 20: Investigation of 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

Description	Investigate opportunities to support the water quality management plans that have been prepared for the Gwydir surface water and groundwater water resource plans. This could include: • real time water quality monitors/loggers—to monitor dissolved oxygen • a water quality allowance in the Gwydir region water sharing plans to help manage water quality issues.
Intent	Reduce the risks of blue-green algae outbreaks in the Gwydir, reduce upstream pollution impacts on waterways and reduce pest species (such as carp).
Challenges addressed	• Treating drinking water that is contaminated by sediments, blue-green algae and heavy metals to the required health standards. • Protecting critical environmental assets, including the Gwydir Wetlands, and native and threatened aquatic species.
Potential combinations	This option could be combined with other options focused on protecting and enhancing natural systems such as *Cold water pollution mitigation measures* and options designed to strengthen community preparedness for climate extremes such as *New drought operational rules*.
Considerations	Water quality management plans are yet to be finalised in the Gwydir. The effectiveness of these plans needs to be tested before this option is triggered.
Objective	
Further information	**Water quality management plan (surface water):** **www.mdba.gov.au/publications/mdba-reports/gwydir-water-resource-plan** **Water quality management plan (groundwater):** **www.mdba.gov.au/publications/mdba-reports/gwydir-alluvium-water-resource-plan**

Option 21: Secure flows for water-dependent cultural sites

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

Description	Aboriginal people have a close spiritual connection with waterways. In the Gwydir catchment, many water-dependent cultural sites (including places of spiritual significance and places of traditional hunting, recreation and cultural uses) are susceptible to dry conditions. Communities are deeply affected during dry periods and drought due to the reduction in their ability to access water for cultural purposes. This option would investigate opportunities to improve the rate and consistency of flows to places of cultural significance including: • Indigenous Land Use Agreement and indigenous protected land • Sara Creek • Limestone Creek • Mehi River • waterways around Aboriginal communities including Moree, Uralla, Guyra, Bingara, Warialda and Tingha • Gwydir Wetlands. This option would also investigate supplying water to Aboriginal communities and assets, such as Mehi Crescent, Stanley Village and Maayu Mali.
Intent	• Improve the quality and consistency of flows at water-dependent cultural sites across the Gwydir. • Improve recognition of cultural sites and their protection and management. • Ensure cultural sites are appropriately considered and supported in the Gwydir water management system.
Challenges addressed	• 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. • Aboriginal people have limited access to water allocations to use for cultural and economic purposes. • Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.
Potential combinations	This could be combined with other options for improving the recognition of Aboriginal people's water rights, interests and access to water such as *Water-dependent cultural practices and site identification project, Regional Cultural Water Officer employment program, River Ranger Program* and *Regional Aboriginal Water Advisory Committee*.
Considerations	This option would need to consider: • where water would be sourced from • how water would be delivered and whether new infrastructure is needed to deliver water to these sites • work undertaken as part of the cultural site and practices mapping option (Option 34) • protecting groundwater discharges to springs and streams • use of planned and held environmental water.
Objective	

Supporting water use and delivery efficiency and water conservation

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

Option 22: Water efficiency projects (towns and industries)	
Source: Department of Planning, Industry and Environment—Water	
Description	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).
Intent	Improve water security for regional communities and encourage water efficiencies measures for industries to maintain and drive regional economic growth and productivity.
Challenges addressed	• Increased climate variability poses new risks to towns and communities in the Gwydir. • Changing water needs, both within the agriculture industry and through strategic growth of regional centres. • Increased climate variability will place increased pressure on surface and groundwater resources and the ecosystems they support.
Potential combinations	This option could be combined with other options designed to maintain and diversify water supplies, including the *Reuse, recycle and stormwater projects*.
Considerations	This option requires: • assessment needs to be considered as part of each council's integrated water cycle management strategy study • assessment of viable opportunities within and across the regions.
Objective	

Option 23: Review of water markets in the Gwydir region

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

Description	A review of the efficiency and effectiveness of the surface water and groundwater markets in the Gwydir, including their ability to contribute to improved water security outcomes in the region.
Intent	• Provide transparency and confidence to water users in the Gwydir. • Educate water users about the operation of and rules governing the water trade in the Gwydir. • Improve and broaden the market to create opportunities to move water more effectively to meet business and industry needs.
Challenges addressed	• Improved water delivery efficiency. • Increased climate variability poses new risks to towns and communities in the Gwydir. • Increased climate variability poses additional risks to water supply reliability for industry.
Potential combinations	Depending on the outcome of the review, this option could be combined with water efficiency and policy options.
Considerations	• The review could investigate 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, as well as other initiatives in line with the current Australian Competition and Consumer Commission inquiry into the Murray-Darling Basin water markets. • The review would need to take account of previous work that was completed as part of the *Gwydir Surface Water Resource Plan*. • The review could be aligned/coordinated with the 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. • Stakeholders have expressed, through the water resource planning public exhibition process, a desire to have trade rules in the unregulated water sharing plan reviewed. • Stakeholders have expressed, through the Australian Competition and Consumer Commission inquiry, the need to retain catchment specific carryover rules to enable better planning of farming operations and to acknowledge that rules are built into the value of the property right. • 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. • The role of the environmental water holder in the market would also need to be considered.
Objective	
Further information	**Australian Competition and Consumer Commission inquiry into the Murray-Darling Basin Water Market:** **www.accc.gov.au/focus-areas/inquiries-ongoing/murray-darling-basin-water-markets-inquiry**

Option 24: Connectivity with downstream systems

Source: Department of Planning, Industry and Environment—Water

Description	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*, the Natural Resources Commission's review of the Barwon-Darling Water Sharing Plan and the *Independent Panel Assessment of the Management of the 2020 Northern Basin First Flush Event: Final Report*. Potential options to improve connectivity between the Gwydir region and the Barwon-Darling River include: • developing clear arrangements for how decision makers 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 *Independent Panel Assessment of the Management of the 2020 Northern Basin First Flush Event: Final Report* • using environmental water to achieve connectivity objectives • establishing additional end of system flow targets • implementing flow plan targets for unregulated water sources • using temporary water restrictions more frequently to achieve connectivity objectives • reviewing water sharing rules in northern tributary valleys to enable greater connectivity with downstream catchments.
Intent	• Secure water for critical needs during droughts. • Meet basic landholder rights requirements in the Barwon-Darling.
Challenges addressed	• Ensuring healthy water sources to support the region's environment, which—in turn—supports liveable communities and thriving industries. • Protecting critical environmental assets and native and threatened species.
Potential combinations	This option could be linked to *Active management to share flows between consumptive and other uses* and *Ability to direct excess supplementary flows*.
Considerations	This option requires: • assessment of potential impacts on the environment and water users in the Gwydir region • assessment of changes to existing river flow patterns and planned environmental water, including from unregulated tributary flows in the mid–Gwydir reaching the lower Gwydir • assessment of the relative contribution of all the Barwon–Darling major tributaries, and amendments to the relevant water sharing plans in the Gwydir region • consideration of alignment to the *Gwydir Long Term Water Plan* and *Barwon–Darling Long Term Water Plan*. Note: This option will be informed by connectivity options arising from the Western Regional Water Strategy and the Western Weirs Program.
Objective	

Option 25: Review urban water restriction policy

Source: Department of Planning, Industry and Environment—Water

Description	Development of a comprehensive policy on water use standards and appropriate temporary water restriction triggers and levels for regional towns. The investigation could complement the *Gwydir Incident Response Guide* and assist councils and local water utilities to revise drought management plans.
Intent	• 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. • 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 state-wide inconsistencies in: – water restriction definitions and gradings – triggers for introducing and lifting of urban water restrictions – the delegated authority for imposing and lifting urban water restrictions (such as Mayor, General Manager). • 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. • This option could be complemented by the development of community water efficiency campaigns.
Challenges addressed	Increased climate variability poses new risks to towns and communities in the Gwydir.
Potential combinations	This could be combined with other demand and supply options for regional towns.
Considerations	• The level of water restrictions has a direct impact on economic outputs, productivity and employment in the region. • Joint organisations could play a facilitation role as part of this option.
Objective	

Option 26: Addressing inefficient delivery system management

Source: Department of Planning, Industry and Environment—Water

Description	Under this option, water entitlement holders would be encouraged to trade to more efficient areas of the Gwydir system by introducing incentives to permanently or temporarily trade water out from river reaches with high transmission losses.
Intent	• A percentage of water is often lost as it is transmitted from water storages to users. These losses occur due to evaporation and seepage into the ground and are often exacerbated by the long distances water may have to travel through a system. In some areas, these transmission losses can account for 30% of water allocations. • The aim of this option is to decrease delivery losses and increase allocation reliability through the use of market mechanisms.
Challenges addressed	More efficient delivery of water.
Potential combinations	This option could be combined with water efficiency and policy options (such as *Review of surface water accounting and allocation process*).
Considerations	• This option requires greater consideration of environmental implications, especially around changes to water availability and flow delivery. • This option may not be permissible under *Commonwealth Water Act 2007* trading rules and would involve extensive negotiation with affected landholders. There may also be impacts on the delivery of environmental water and basic landholder rights. • Any trade of water would be governed by the access licence dealing rules detailed in the water sharing plans and the *Water Management Act 2000.* • The option would require a review of water sharing plan rules and alignment with the requirements of the Murray-Darling Basin Plan. Note: This option will be informed by connectivity options arising from the Western Regional Water Strategy and the Western Weirs Program.
Objective	


OVERSIZE

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 risk.

Option 27: New drought operational rules (Gwydir River)

Source: Department of Planning, Industry and Environment—Water

Description	The *Gwydir Incident Response Guide* outlines the framework for managing extreme events in the Gwydir 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. Applying the new climate data and updated modelling undertaken for the regional water strategies, this option would review the effectiveness of the *Gwydir Incident Response Guide*, including assessing the merit of changing the current system operation rules (for example, limiting the delivery of water to different sections of the regulated river) to minimise delivery losses during extreme events.
Intent	Improve water delivery and maintain effective reserves for high priority needs (regional towns, stock and domestic users and high-security entitlement holders) during extreme events.
Challenges addressed	• Ensuring healthy water sources to support the region's environment, which—in turn—supports liveable communities and thriving industries. • Increased climate variability poses new risks to towns and communities in the Gwydir.
Potential combinations	This option could be combined with existing government commitments, town water options and water efficiency and policy options.
Considerations	This option requires: • assessment of the potential water security risk to regional towns and stock and domestic users in the lower Gwydir • assessment of potential environmental impacts (such as impacts on threatened species and ecological communities) and demand on environmental water to reduce risks to native fish from restarting the river in hot conditions • consideration of possible (environmental) offsets needed to meet Basin Plan requirements • consideration of whether amendments to the current water sharing plan for the Gwydir regulated river are required • assessment of the impacts on water licence holders in the lower Gwydir • consideration of whether the impact would trigger compensation requirements under the *Water Management Act 2000*. A review of the effectiveness of the incident response guide may require changes to the *Gwydir Surface Water Resource Plan*, which would likely trigger the review and amendment requirements in the Basin Plan 2012. 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.
Objective	
Further information	**Extreme events and incident response guide:** www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/extreme-events

Option 28: Review of surface water accounting and allocation process

Source: Department of Planning, Industry and Environment—Water

Description	The option would review several settings of the current surface water accounting and water allocation process in the Gwydir regulated system, including: • reviewing the water allocation process • the effects of updating the 'worse inflow sequence' reference in the water sharing plan for the Gwydir regulated river (for example, to incorporate climate change considerations) and what this means for allocating water to different users • investigating changes to the volume of water stored in Copeton Dam for regional towns and stock and domestic water users (and applying different water delivery mechanisms) • investigating how conveyance 'losses' are accounted for • investigating the inclusion of provisions for cultural flows.
Intent	More effectively meet basic landholder rights, stock and domestic water users, Aboriginal cultural needs and high priority users in the Gwydir (with an additional buffer to support town water security).
Challenges addressed	• Increased climate variability poses new risks to towns and communities in the Gwydir. • Increased climate variability poses additional risks to water supply reliability for industry. • Changing water needs, both within the agriculture industry and through strategic growth of regional centres. • Increased climate variability will place increased pressure on surface and groundwater resources and the ecosystems they support.
Potential combinations	This option could be combined with water efficiency and policy options (such as *Review urban water restriction policy*).
Considerations	• The review would need to take account of previous work that was completed as part of the *Gwydir Surface Water Resource Plan*. • Consideration would need to be given to the 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.
Objective	
Further information	www.industry.nsw.gov.au/water/allocations-availability/allocations/how-water-is-allocated

Option 29: Investigation of licence conversions

Source: Department of Planning, Industry and Environment—Water

Description	This option would consider the potential benefits from voluntary conversion of general security licences to high security licences.
Intent	• Investigate the level of water security achievable in the Gwydir region. • Give water users more flexibility in production, including long-term transition to higher value enterprises that require high security water.
Challenges addressed	• Increased climate variability poses new risks to towns and communities in the Gwydir. • Increased climate variability poses additional risks to water supply reliability for industry. • Changing water needs, both within the agriculture industry and through strategic growth of regional centres. • Increased climate variability will place increased pressure on surface and groundwater resources and the ecosystems they support.
Potential combinations	This option could be combined with water efficiency and policy options (such as *Review of surface water accounting and allocation process)*.
Considerations	This option requires: • detailed consideration of current policy, regulatory, water management constraints and risks to other water licence holders • consideration of environmental implications, especially changes to water availability and flow delivery • 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 Copeton Dam?) • feedback on public acceptance of the option. 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.
Objective	

Option 30: Improved data collection and storage

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

Description	Opportunities to improve data collection around water use by industry, the environment and towns in the Gwydir region. This would generate better information to inform future water planning and management decisions in the region. 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. It would also investigate ways to harness water data collected by industries (for example, in Environmental Impact Statements and annual compliance reports). The option would review the water monitoring programs that utilise the monitoring infrastructure and prepare a unified state-wide monitoring program strategy. Finally, the option would consider how best to publicly share data, and what information products are needed for different types of water users.
Intent	Inform future water management in the Gwydir region (such as the operation of water sharing plans and water resource plans).
Challenges addressed	• Healthy water sources support the region's environment, which—in turn—supports liveable communities and thriving industries. • Increased climate variability may pose new risks to towns and communities in the Gwydir.
Potential combinations	This option could be combined with options around sustainable groundwater access (such as *Reliable access to groundwater by towns* and *Improved clarity in managing groundwater resources sustainably*).
Considerations	Work by the Water Renewal Taskforce (such as new metering regulation) will assist in improving data collection on water use. This option will consider the recent announcement by the Australian Government to build a web-based, real time water information platform.
Objective	

Option 31: Training and information sharing programs:
– new climate data/modelling
– managing groundwater resources sustainably

Source: Department of Planning, Industry and Environment —Water

Description	Training and information sessions on the new regional water strategy climate data and modelling to build confidence in the new approach and identify opportunities for wider use of the new datasets. Providing training and information about groundwater resources and how they are managed.
Intent	• Assist councils and other water users to make informed decisions about their water supply security (including groundwater). • Provide greater transparency around water management and water modelling. • Inform councils in the development of their own integrated water cycle management strategies and Regional Town Water Strategies.
Challenges addressed	Increased climate variability poses new risks to towns and communities in the Gwydir.
Potential combinations	This option could be linked to other options designed to strengthen community preparedness for climate extremes, maintain and diversify water supplies, and protect and enhance natural systems.
Objective	

Option 32: Land use change impact on water resources

Source: Community consultation

Description	Investigation of the potential impacts on water resources due to land use changes and population growth in the Gwydir region.
Intent	• Provide important information to the NSW Government to help in its decision making process regarding future land use applications in the region. • Examine the feasibility of land use planning controls.
Challenges addressed	Increased climate variability may pose new risks to towns and communities in the Gwydir.
Potential combinations	This option could be combined with options designed to protect and enhance natural systems (such as environmental restoration/rehabilitation works, pump screening, environmental water management and other measures) or improving Aboriginal people's access to water and cultural rights.
Considerations	The option requires: • detailed assessment of existing planning controls • improved understanding of impacts on water resources from land use changes. Note: This option will require close collaboration with other government agencies.
Objective	

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.

Option 33: Culturally appropriate water knowledge program	
Source: Department of Planning, Industry and Environment—Water, Aboriginal consultation	
Description	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 Gwydir region. This option would develop a culturally appropriate water knowledge program that would aim to increase the capacity of Aboriginal people across the Gwydir 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.
Intent	• Improve the ability of Aboriginal community to understand the complexities of water management in NSW. • Improve water knowledge and participating across all ages and communities.
Challenges addressed	• Lack of culturally appropriate information about how governments manage water. • 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.
Potential combinations	This could be combined with the *Water-dependent cultural practices and site identification project* and options designed to protect and enhance natural systems such as the *River Ranger Program*.
Considerations	Ensure program training is created and delivered in a culturally appropriate manner. This may include: • building skills and accreditations/qualifications for key community members who can take this back to the broader community • hosting training in the community or in appropriate settings • ensuring Aboriginal people have a chance to assist in the development and delivery of training programs • hosting training with school aged children at important sites to improve knowledge and appreciation. Note: Two-way knowledge sharing between Aboriginal people and for local, State and Federal governments to promote improved Aboriginal cultural awareness. This option will be considered at a state level through a state-wide Aboriginal water policy.
Objective	

Option 34: Water-dependent cultural practices and site identification project

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

Description	Options for Aboriginal people to classify and map water-dependent cultural sites throughout the Gwydir region. This would include the identification and mapping of cultural sites, places of spiritual significance and places used by Aboriginal people for traditional hunting, recreation and cultural purposes. One mapping option could be the culturally significant Gwydir Wetlands. Intellectual property and cultural knowledge would be protected and retained by Aboriginal people.
Intent	• Develop a resource for Aboriginal people to help with planning of cultural and environmental water and possible impacts of other management and development decisions. • Enable Aboriginal people to educate the wider community to develop a greater understanding of cultural values and connections to rivers and wetlands across the Gwydir region.
Challenges addressed	• 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. • Aboriginal people have limited access to water allocations to use for cultural and economic purposes. • Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.
Potential combinations	This could be combined with other options linked with improving recognition of Aboriginal people's water rights, interests and access to water, as well as options designed to protect and enhance natural systems such as the *River Ranger Program*.
Considerations	We heard from Aboriginal people in the Gwydir that: • Aboriginal people should retain ownership of information they share • this option should empower the broader Aboriginal community to share knowledge and improve the protection and outcomes of cultural sites and values that are important to them. Note: • Mapping of different aspects of Aboriginal cultural values has previously been undertaken in the Gwydir by various agencies and organisations. These resources can assist with the implementation of this option. • The *Aboriginal Waterways Assessment* tool has been piloted by the Murray Lower Darling Rivers Indigenous Nations, Northern Basin Gomeroi Nations and the Murray-Darling Basin Authority and is currently being used across the Basin. • This option could be considered at a state level through a state-wide Aboriginal Water Policy.
Objective	
Further information	**The Aboriginal Waterways Assessment program:** **www.mdba.gov.au/discover-basin/water/cultural-flows**

Option 35: Shared benefit project (environment and cultural outcomes)

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

Description	Water for the environment plays a vital role in sustaining the health of rivers and wetlands, and supporting their ecological, cultural and economic values. This option would investigate opportunities for shared benefits from using water for the environment to also achieve cultural outcomes, recognising it does not replace the provision of cultural flows. For example, shared benefits could include achieving environmental and cultural outcomes in the Gwydir Wetlands. We have heard that this could include better engagement with communities and families along the Gwydir River and consideration of impacts on cultural sites when delivering environmental water.
Intent	• Use environmental water to help achieve cultural outcomes, where shared benefits exist. • Support, incorporate and implement traditional Aboriginal ecological knowledge into water management action plans for the environment. • Support the cultural connection of Aboriginal people to water-sustained environments.
Challenges addressed	• 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. • Aboriginal people have limited access to water allocations to use for cultural and economic purposes. • Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.
Potential combinations	This could be combined with other options linked with 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 such as the *River Ranger Program*.
Considerations	This option would need to consider: • development of capacity and resources within Aboriginal people to support their participation in environmental water planning • appropriate channels for Aboriginal community members to engage with environmental water holders to identify shared watering needs, including developing cultural annual watering plans • the need and frequency of watering at different times of the year to achieve cultural outcomes • how Aboriginal people can be involved in the decision making • how to ensure cultural values are considered. Note: • Environmental water holders are responsible for the use of environmental water. The primary consideration in using this water is the achievement of environmental outcomes. • Option 34. *Water-dependent cultural practices and site identification project* would provide more resources for Aboriginal people to work with environmental water holders. • This option could be considered at a state level through a state-wide Aboriginal water policy.
Objective	

Option 36: Regional Cultural Water Officer employment program

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

Description	Investigate models for establishing Cultural Water Officer roles that assist with engaging with Aboriginal people regarding water management in the Gwydir. Responsibilities of this role could include: • increasing the general knowledge of the broader Aboriginal community on water management matters and the water licencing framework in a culturally appropriate way • coordinating engagement with local Aboriginal people on water management matters, including through a digital platform • promoting and supporting self-determination and representation • channelling information between Aboriginal people and government bodies and key stakeholders.
Intent	• Improve the awareness and involvement of local Aboriginal people in the management of water resources across the Gwydir. • Enable local Aboriginal people to use their local knowledge and skills to assist in decisions about water use and management. • Enable more equitable and collaborative relationships with Aboriginal people and co-designed programs.
Challenges addressed	• 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. • Aboriginal people have limited access to water allocations to use for cultural and economic purposes. • Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate way.
Potential combinations	This could be combined with other options linked with improving recognition of Aboriginal people's water rights, interests and access to water, as well as options designed to protect and enhance natural systems such as the *River Ranger Program*. Note: This option could be considered at a state level through a state-wide Aboriginal water policy.
Considerations	This option would need to consider: • the operational and project budget required to support the program • the location of officers and whether they would sit within government or within an Aboriginal organisation.
Objective	

Option 37: Regional Aboriginal Water Advisory Committee

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

Description	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 Aboriginal people. The committee could also be responsible for: • guiding the purchase and management of water entitlements for the Aboriginal people to receive cultural flows • defining the water needs for Aboriginal people in the region • providing representation for the wider Aboriginal community, including those not part of a peak organisation or representative body.
Intent	• Improve the representation of Aboriginal people in decision-making. • Broadly represent Aboriginal people of the region who have cultural knowledge and can speak for their country. • Provide a point of contact for water managers to engage with the region's Traditional Owners.
Challenges addressed	• 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. • Aboriginal people have limited access to water allocations to use for cultural and economic purposes. • Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.
Potential combinations	This option could be combined with other options linked with improving the recognition of Aboriginal people's water rights, interest and access to water, as well as options designed to protect and enhance natural systems such as the *River Ranger Program*.
Considerations	We heard from Aboriginal people in the Gwydir that consideration should be given to: • having a suitable cross-section of representatives from the region's Aboriginal people • ongoing funding for the committee • giving the committee authority over certain decision-making processes • legislative backing for the committee • how water entitlements could be held on behalf of Aboriginal people • ensuring that Aboriginal people are involved in water decision-making outside of this committee. Note: • 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. • This option could be considered at a state level through a state-wide Aboriginal water policy.
Objective	

Option 38: Water portfolio project for Aboriginal communities

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

Description	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 Gwydir.
Intent	• Supporting Aboriginal people using water entitlements for economic and cultural purposes. • 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.
Challenges addressed	• 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. • Aboriginal people have limited access to water allocations to use for cultural and economic purposes. • Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.
Potential combinations	This could be combined with other options linked with improving recognition of Aboriginal people's water rights, interests and access to water.
Considerations	This option would need to consider: • the federal government has pledged $40 million in funds to support the acquisition of water entitlements for cultural purposes across the Murray-Darling Basin • funding needs to be sufficient to meet ongoing Aboriginal needs. Investigation will need to be undertaken into the level of demand • feedback from consultation in the region recommends that funding should be able to be used to buy infrastructure to support entitlements • consider learnings from the Murray-Darling Basin Authority Water Efficiency Measures program in supporting the purchase of water entitlements for cultural flows. Note: This option could be considered at a state level through a state-wide Aboriginal water policy.
Objective	
Further information	**National Cultural Flows Research Project:** www.culturalflows.com.au/

Option 39: Co-management investigation of Travelling Stock Reserves

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

Description	Travelling Stock Reserves 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 these sites and are not resourced to be involved in management decisions about these culturally significant sites. This option would investigate opportunities to improve the involvement of Aboriginal people in the co-management of Travelling Stock Reserves that connect communities to waterways and water-dependent sites of cultural importance.
Intent	• Improve access to waterways and other water-dependent sites of cultural importance. • Support Aboriginal people's involvement in the management of TSRs that connect Aboriginal people to waterways. • Support Aboriginal people to have more input on decisions that affect them and their cultural values.
Challenges addressed	• 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. • Aboriginal people have limited access to water allocations to use for cultural and economic purposes. • Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.
Potential combinations	This option could be combined with other options linked with improving recognition of Aboriginal people's water rights, interests and access to water, as well as options designed to protect and enhance natural systems such as the *River Ranger Program*.
Considerations	This option would need to consider Local Land Services' state-wide plan for managing the delivery of better Travelling Stock Reserves services for the community. Note: This option could be considered at a state level through a state-wide Aboriginal water policy.
Objective	

Option 40: Aboriginal cultural water access licence review

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

Description	Water access licences allow licence holders to take water from rivers, lakes or aquifers for certain uses. The includes a category of specific purpose water access licences (Aboriginal cultural) that can only be held by Aboriginal people to access water for drinking, food preparation, washing and watering domestic gardens, as well as for Aboriginal cultural uses.[1] The utilisation of these categories of licences 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.
Intent	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.
Challenges addressed	• 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. • Aboriginal people have limited access to water allocations to use for cultural and economic purposes. • Aboriginal knowledge and science are not effectively integrated into water management in culturally appropriate ways.
Potential combinations	This could be combined with other options linked with 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 such as the *River Ranger Program*.
Considerations	This option will need to consider: • reviewing other Aboriginal water licences (community development, environmental, commercial) including conditions of existing licences • policy and legislative options for improving licences, the application and decision-making processes and recognising Aboriginal water allocations • how the licences fit with the extraction and allocation limits within the valley • supporting services, including education and knowledge sharing about water markets and licences. Note: This option could be considered at a state level through a state-wide Aboriginal water policy.
Objective	

1. See Part 7, Section 37 (3) www.legislation.nsw.gov.au/#/view/regulation/2012/355/full Similar rules are proposed in the draft Water Sharing Plan for the Gwydir Regulated River Water Sources 2020.

Options not progressed

Thirteen options that were considered by the Gwydir Valley Priority Catchment Study are not included in the long list of options. WaterNSW has carefully considered the potential benefits and impacts of these options before recommending that they are not included in the Draft Gwydir Regional Water Strategy.

Option	Description	Reason for not progressing
Horton Dam on the Horton River	Construction of a new 350 GL water storage on the Horton River (which enters the Gwydir River near Gravesend and is a major contributor of unregulated flows to the Gwydir region)	WaterNSW is not recommending this option proceed further as the dam would have relatively low inflows. Modelling undertaken by Department of Planning, Industry and Environment—Water also showed that a new dam on the Horton is not significantly more efficient than the existing on-farm storages. Modelling also suggested there would be a number of significant environmental impacts, primarily a reduction in long term inflows to wetlands. The option also has potential for impacts on native fish populations, as well as the creation of cold water pollution.
Bingara Dam on the Gwydir River	Construction of a new 700 GL water storage on the Gwydir River approximately 30 km downstream of Copeton Dam	This option is not preferred due to the proximity of the proposed dam site to Copeton Dam, the lack of a catchment area for inflows and the assessment that it would not improve drought security. The option also has potential for impacts on native fish populations, as well as the creation of cold water pollution.
Access Copeton Dam dead storage volumes	Upgrade to Copeton Dam to increase access to high security water (or equivalent entitlement) at the bottom of the dam during times of extreme water scarcity using floating pumps	This option could put the town water supply for Inverell at high risk. It would also have significant impacts on a multi-million dollar recreational fishery that would take 10+ years to recover and on native fish populations (with potential mass fish deaths adversely impacting water quality).
Rebuild Carole Creek flow regulator	Rebuild the regulator to provide a deeper storage facility and reduce evaporative losses	After further analysis following the Preliminary Business Case, this option is not preferred on the basis that it would not significantly improve water efficiency and would cause the system to exceed its sustainable diversion limit. Re-regulating would also have impacts on native fish populations and water quality.
Water supply efficiency scheme for Thalaba Creek	Piping Thalaba Creek from the end of Moomin Creek	After further analysis following the Preliminary Business Case, this option is not preferred as it would have a marginal impact on drought security, but potentially significant detrimental environmental impacts.
Improvements to on-farm storage effectiveness	Reconfiguration of on-farm storages to have smaller surface areas as part of on-farm maintenance programs	Further modelling following the Preliminary Business Case indicated small gains from reduced evaporation.

Option	Description	Reason for not progressing
Modifying the extent of the Gwydir regulated river system	Providing regulated water supply to all four arms of the Gwydir River system below Moree creates transmission losses. This option would limit the extent of the regulated system	WaterNSW's Preliminary Business Case considered that this option would be unlikely to be permitted under the Murray-Darling Basin Plan rules and would involve extensive consultation, negotiation and compensation to affected landholders (with a significant risk of devaluation and inequity for riparian properties that are in current regulated areas). Potential impacts on the ability to deliver water to key environmental assets in the lower end of the system have also been identified.
Biniguy underground dam	Construction of a cut-off wall built into the alluvium layer of the Gwydir River 23 km upstream of Tareelaroi Weir at Biniguy. Water would be extracted via vertical shafts located within the Gwydir River sediment in which submersible pumps are installed	WaterNSW has not recommended this option due to significant ecological issues, the excessive costs required to investigate its feasibility, the high construction costs relative to the benefit and the uncertainty of the benefit.
Inland diversion of water from the Clarence River catchment	Increase inflows into Copeton Dam by diverting water from the Clarence River catchment on the eastern side of the Great Dividing Range	WaterNSW eliminated this option at the 'fatal flaw' analysis stage of the Preliminary Business Case as it was considered excessively expensive for marginal benefit, with the added complexity of negotiating agreement with Clarence River residents and water users. There are also potentially significant environmental implications, including impacts on threatened species and biosecurity in both the Gwydir and Clarence valleys.
Gwydir River channel enlargement	Enlarge the Lower Gwydir River channel by 5-20 metres bottom width to provide capacity to satisfy larger demands in the Lower Gwydir from Tyreel regulator to Brageen Station	WaterNSW eliminated this option at the 'fatal flaw' analysis stage of the Preliminary Business Case as the benefits would occur infrequently and not for sustained periods. There are also potentially significant environmental implications, especially the interaction of the river channel with the floodplain and tributaries, and risks to waterway stability and geomorphology that could affect aquatic and riparian vegetation.
Use available on-farm storages for operation as re-regulating storages	Use on-farm storages close to regulators as supporting regulators or to enhance current regulators' efficiency, rather than building new structures	WaterNSW eliminated this option at the 'fatal flaw' analysis stage of the Preliminary Business Case because it was considered to be high risk in terms of landholder negotiations, the returning water quality and low pump rates. Potential environmental impacts have also been identified, including impacts from the re-regulating structures on native fish and water quality.

Option	Description	Reason for not progressing
Enhanced water distribution network to major river and creek systems	Use channel enlargements and pipelines to deliver bulk water distribution systems	WaterNSW has not recommended this option for inclusion in the draft strategy as it did not meet all the 'must have' criteria by which options were assessed for the Preliminary Business Case. These criteria covered value for money, achieving drought security water availability requirements, achieving delivery efficiency and free of excessive risk—constructability, approvals, environmental and social. The changed flow regime associated with this option would result in potentially significant environmental impacts, with threatened species populations existing in this part of the valley.
Pipeline from Copeton Dam to Biniguy	Pipeline from Copeton Dam to Biniguy to provide a high security water supply for permanent planting production in the Biniguy area	WaterNSW has not recommended this option for inclusion in the draft strategy because very few transmission losses occur before Biniguy and this option does not make economic sense given the number of high security licence holders in the area that a pipeline would service. The changed flow regime from piping would have significant environmental implications, with threatened species populations existing in this part of the valley.

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