NSW GOVERNMENT

Natural Resources Commission

Final report

Review of the Water Sharing Plan for the Namoi and Peel Unregulated River Water Sources 2012

June 2023

Enquiries

Enquiries about this report should be directed to:

Phone	(02) 9228 4844
E-Mail	nrc@nrc.nsw.gov.au
Postal address	GPO Box 5341, Sydney NSW 2001

Acknowledgement of Country

The Natural Resources Commission acknowledges and pays respect to Traditional Owners and Aboriginal peoples. The Commission recognises and acknowledges that traditional owners have a deep cultural, social, environmental, spiritual and economic connection to their lands and waters. We value and respect their knowledge in natural resource management and the contributions of many generations, including Elders, to this understanding and connection.

In relation to the area subject to this review, the Commission pays its respects to the Gomeroi, Kamilaroi and Gamilaraay nations past, present and future, as well as other Aboriginal peoples for whom these waterways are significant.

Cover image: Flooded Namoi River between Narrabri and Wee Waa, October 2022. Annabelle Guest, Northwest Helicopters

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List of acronyms

Act	the *Water Management Act 2000* (NSW)
AWD	Available water determination
Basin Plan	*Murray-Darling Basin Plan 2012*
BDL	Baseline diversion limit
Commission	the Natural Resources Commission
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DPI-Fisheries	Department of Primary Industries – Fisheries
DPE-EHG	Department of Planning and Environment – Environment and Heritage (the former Office of Environment and Heritage, subsequently Energy, Environment and Science)
DPE-Water	Department of Planning and Environment – Water
DPI	Department of Primary Industries
DPIE	Former Department of Planning, Industry and Environment
EEC	Endangered ecological community
GDE	Groundwater-dependent ecosystem
HEVAE	High Ecological Value Aquatic Ecosystems
LALC	Local Aboriginal Land Council
LGA	Local government area
LTAAEL	Long term annual average extraction limit
MER	Monitoring, evaluation and reporting
MDBA	Murray-Darling Basin Authority
ML	Megalitre (unit of volume equivalent to one million (1×10^6) litres
NSW	New South Wales
The Plan	The *Water Sharing Plan for the Namoi and Peel Unregulated River Water Sources 2012*
R	Recommendation
SDL	Sustainable diversion limit

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Executive summary

The Natural Resources Commission (the Commission) has reviewed the Water Sharing Plan for the *Namoi and Peel Unregulated River Water Sources 2012* (the Plan) as required under Section 43A of the *Water Management Act 2000* (the Act).

The Commission has assessed the extent to which Plan provisions have contributed to achieving environmental, social, cultural, and economic outcomes, and identified where changes to provisions are warranted. There is a material risk that the Plan is not adequately contributing to the achievement of these outcomes and indeed, in some areas, appears to be working against these outcomes. The Commission considers that the extent of changes needed warrant extending the Plan for up to two years and then replacing it.

A catchment-wide approach to water planning is needed to manage interactions between the different water sharing plans in the Namoi catchment and address cumulative impacts of extraction. The Namoi catchment is one of the most groundwater reliant regions in the Murray-Darling Basin. It also has the highest ratio of unregulated entitlement to overall entitlement of any Murray-Darling catchment. Regulated floodplain harvesting activities occur in the same area covered by the Plan and the cumulative impact of floodplain harvesting across plans is not currently understood.

The Plan does not manage access at the most appropriate scale. Extraction management units are not logically aligned to facilitate management of risks. The approach of grouping water sources by sub-catchments adopted by the Trade Review into the Namoi unregulated rivers should be expanded to other aspects of the Plan.

The Commission reiterates the need to urgently develop and comply with sustainable, numeric extraction limits for the Plan that incorporate all forms of extraction and are set at the appropriate scale. In the absence of Long-Term Annual Average Extraction Limit (LTAAEL) compliance, available water determinations (AWDs) have been set at 100 percent for all licensees. There is a significant risk that extraction exceeds the LTAAEL in the Plan area. The Plan's carryover rules and account limits allow for considerable accumulation in licensees' accounts that can result in users extracting greater volumes in drier years, increasing impacts on critical low flows.

The Plan does not currently provide for town water supply to consistently have priority over other licences as required by the Act. In the recent drought the town of Walgett had no surface water and other towns were at risk. While Walgett is supplied by the Namoi Regulated River Plan, the access and account rules in the Plan affect outcomes in the regulated river, including for Walgett. The Plan does not adequately manage climate variability or proactively address risks during drought.

The catchment includes significant environmental values, including important wetlands and lagoons that provide critical habitat. Current rules, including the extensive use of "no visible flow" rules do not sufficiently protect the water sources and their ecosystems.

The Commission continues to identify critical state-wide issues in water sharing plans relating to Aboriginal water rights and the protection of cultural water. The Commission does not see evidence that the Plan adequately protected or provided for Aboriginal water values and uses or provided for tangible access to water (including via controlled allocations). Of particular concern is the release of controlled allocations in the Baradine Creek Water Source, which has high cultural values, without apparent consideration of protection of those values.

Although these issues are significant, considerable work is being undertaken in the Plan area to understand environmental and town water needs and risks. This information can be drawn upon to quantify sustainable extraction and strengthen rules in a replacement Plan. A summary of key areas to improve the Plan are outlined in **Figure 1** below. To ensure clarity, the Commission has developed a detailed set of 19 recommendations.

Figure 1: Key areas to improve Plan performance

Overall finding on Plan extension and replacement

The Commission has identified several opportunities to improve outcomes that justify replacing the Plan. The Commission recommends an extension of up to two years to the existing Plan to allow time to undertake required data collection and analysis, consultation, and development of amended provisions (see recommendations).

Integrated catchment planning needed

The water sources managed by the Namoi's water sharing plans are highly interconnected. The rules in one plan can have significant potential implications in another. Current water accounting rules allow town water usage in the Plan to be offset in a different plan area at a different time. This reduces the ability to adequately manage outcomes. The Plan needs to be amended to ensure that water is accounted for at the location it is extracted, at the time it is extracted.

The Plan has not been amended to include provisions for floodplain harvesting. The potential impacts of unregulated floodplain harvesting are unknown but likely significant.

The cumulative impact of floodplain harvesting across the unregulated and regulated plans, as well as downstream, has not been assessed. Daily access rules (specifically, cease to pump thresholds) are not commensurate with risks from take via floodplain harvesting. Daily access rules also need to align between the unregulated and regulated plans.

Improving management at different scales

The Plan needs to be better managed at different spatial scales. The Trade Review, commissioned by DPE-Water, recognised the need to manage trade by grouping water sources at a sub-catchment scale. This approach needs to be applied to other aspects of the Plan. Sustainable limits are required at the sub-catchment scale to adequately and equitably manage risks.

Trading zones that are smaller than water sources need to be changed to management zones so their extraction volumes are transparent and access conditions can be targeted to outcomes.

The Plan accounting rules currently allow increases in Tamworth's water supply needs taken from the unregulated system to be offset in the regulated systems at a different point in time. This ignores the actual availability of water and any potential impacts of extraction on downstream users, including other towns.

Ensuring sustainable extraction

The Plan lacks a numeric LTAAEL that is based on an assessment of sustainability. The Plan currently has a single LTAAEL corresponding to its one extraction management unit. This reduces the ability to manage the different risks from extraction within the sub-catchments. Establishing multiple extraction management units based on sub-catchments would allow for targeted extraction management.

Current water use is not assessed and there has been no assessment of compliance with the Plan's limit. In the absence of LTAAEL compliance, AWDs have been set at 100 percent for all licensees. There is a significant risk that extraction exceeds the LTAAEL in the Plan area, meaning that environmental water and basic landholder rights are not protected as intended.

Climate change and variability are likely to impact water availability in the future. Plan provisions, including LTAAELs and AWDs, do not address climate variability, limiting the Plan's ability to support resilient water sources.

Protecting and securing town water supply and basic rights

Town water supply access conditions are not explicit in the Plan, reducing transparency. The Plan does not consistently prioritise local water utility licences over other licences, as required by the *Water Management Act 2000*.

The Plan's access rules and carryover provisions do not adequately protect town water supplies downstream. Further, access rules for towns are stricter than for other water users with environmental releases from Dungowan Dam able to be extracted immediately downstream.

Town water supplies require a mechanism in the Plan to increase reliability and allow for growth within a sustainable limit.

Estimates of basic landholder rights' volumes have increased since the Plan was made. The replacement Plan should reflect the latest figures.

Improving consideration of connectivity

The Namoi's unregulated water sources are highly connected to the regulated river water sources and to alluvial groundwater. The scale of extraction can risk local and cumulative impacts in high use water sources and downstream, with groundwater levels continuing to decline in the Upper and Lower Namoi.

The Commission found there was inadequate consideration of the relationships between plans and risks to connectivity; the impacts of surface water extraction are likely being exacerbated by groundwater extraction. While linked access rules have been introduced for some water sources, they should also be applied in other connected water sources where extraction risks are significant.

Protecting key environmental assets

It is likely that the protection of low flows afforded by current access rules is not sufficient for key ecological functions in a number of water sources. Only a small percentage of the Plan's water sources have flow based access rules. The rest have access rules that either specify visible flow at a point in the water source or generic visible flow rules. In addition, access rules do not currently account for recent climatic conditions and where they can protect drought refugia.

Provisions to protect significant wetlands and important lagoons in the mid to lower catchment also need to be improved to ensure they are adequately protective of environmental values. In particular, the rules for Lake Goran are likely inadequate.

Supporting equitable water sharing

The Plan does not have clear equity objectives. Trading rules allow for different access conditions to be placed on the same type of licence within the same water source, raising issues of equity.

The Plan does not effectively protect replenishment flows from the regulated river for their intended purpose, allowing releases that are protected under the regulated plan to be extracted by any unregulated licensee. Replenishment flows should be based on the requirements of the receiving watercourse.

There are also inequities associated with account management provisions and relative AWD reductions between unregulated access licences and the proposed unregulated floodplain harvesting licences, as well as between unregulated and regulated floodplain harvesting licences. DPE-Water are aware of these issues and have indicated they are exploring options for more equitable outcomes.

Restoring Aboriginal water rights, values and uses

The Commission has identified key issues from available information that will likely require further engagement during DPE-Water's replacement Plan process.

Many of these are state-wide issues in water sharing plans identified across all water sharing plan reviews in the 2020-22 period and in other major reviews. In particular, the Plan does not proactively consider water requirements for registered Native Title claims and other Aboriginal land ownership; there is limited meaningful water access and uses; and Aboriginal water-dependent cultural assets are not adequately identified and protected.

Table: Recommendations (R)

Overall recommendation	
R 1	The Plan should be: a) extended for up to two years until 30 June 2025, to allow time to complete data collection and analysis b) replaced by 1 July 2025, supported by the completion of these recommendations.
Interaction between plans needs to be considered	
R 2	To ensure that water sharing plans are adequately accounting for water usage, DPE-Water should: a) ensure that water sharing plan provisions account for water at the location it is extracted, at the time it is extracted b) review the cross-plan accounting rules to ensure the priorities of the Act are maintained across all plans.
R 3	As part of the replacement Plan, to improve the management of cumulative impact from floodplain harvesting, DPE-Water should: a) quantify total extraction in water sources and management zones, and develop access rules to manage the cumulative risks b) assess the cumulative impacts of all unregulated floodplain harvesting extraction across the Namoi catchment and revise accounts to manage the cumulative risk c) review the impact of the Plan's carryover provision on the risk of exceeding LTAAEL(s) and risk to outcomes.
R 4	To inform the replacement Plans by 1 July 2024, DPE-Water should develop a comprehensive water balance, using an overarching modelling framework for the entire Namoi catchment. The modelling framework should inform revised provisions and assess their ability to achieve outcomes and requires functionality to differentiate the extraction and water accounts for each major water source and all sub-catchments. The model needs to link where the risks are generated to where the risks are experienced.
Improving management at sub-catchment scale	
R 5	To ensure that extraction is managed at the appropriate scale, DPE-Water should: a) remake the trading zones as management zones, making the extraction volumes transparent and allowing for access conditions to be set at an appropriate scale b) separate out Pian Creek and Lake Goran as additional sub-catchments c) establish the proposed sub-catchments as extraction management units and develop LTAAELs for each extraction management unit. d) ensure provisions such as access rules and carryover rules are appropriately tailored to each sub-catchment and consistent with the priorities of the Act.

Ensuring sustainable extraction	
R 6	As a matter of priority, to support sustainable extraction and improve transparency, DPE-Water should: a) establish accurate numeric LTAAELs to provide clarity around the amount of water that can be extracted or diverted under the water sharing plans and enable compliance assessment b) undertake LTAAEL compliance assessment based on the best available information beginning with extraction management units at high risk for LTAAEL exceedance. This assessment should not be delayed until better information is available, rather it should be done immediately based on information available and continually improved over time c) include a provision in the Plan requiring DPE-Water to determine the sustainable level of extraction by Year 5 based on best available ecological requirements, hydrological and climate information, and that these levels are used to define and amend the Plan's LTAAELs for each extraction management unit.
R 7	As part of the replacement Plan, DPE-Water should: a) review the Plan's entitlement and estimated basic landholder rights volume and update these figures b) continue to update these figures whenever the Plan is being reviewed or amended c) undertake a risk assessment if the entitlement and basic landholder rights estimate changes by more than 5 percent in any water source to determine whether Plan provisions remain adequate to protect the water source, the environment and basic landholder rights.
R 8	DPE-Water should ensure the replacement Plan includes requirements (i.e., new Plan provisions) for: a) AWDs to be set conservatively if DPE-Water does not annually make and publish an estimate using best available information of extraction and assess compliance with the LTAAEL(s) b) proactive AWDs to support sustainable numeric LTAAEL(s) and revision to account for management rules (carryover and account limits) to support any AWD changes. These proactive AWDs should be developed in consultation with stakeholders by Year 5 of the replacement Plan.
Securing town water supply to meet future needs	
R 9	To better protect and prioritise town water supplies, DPE-Water should in the next two years: a) for transparency include all access rules for town water supplies in the Plan b) review additional town water demands from industry and population pressures and the adequacy of existing rules c) review the risks to town water supplies (including the latest climate change data) within the Plan and the regulated river, and ensure provisions provide adequate protections for towns d) provide a mechanism within the Plan for towns to increase their water security within sustainable limits and review whether there is a need to split

	industrial usage from domestic water supply to ensure appropriate prioritisation e) review and consolidate existing access licence conditions and water supply work approval conditions including Appendix 4 to ensure they protect town water supplies and basic rights f) consider whether specific access rules are required in Pian Creek in order to protect replenishment flows and potential water quality benefits of Pian Creek flows for Walgett's water supply water.
Improving consideration of connectivity	
R 10	To improve the management of connectivity in the replacement Plan, DPE-Water should: a) strengthen the definition of connectivity including clarifying that ephemeral streams are highly connected b) further assess risks to highly connected water sources c) improve Plan objectives by recognising that the Plan should contribute to maintaining and where possible enhancing surface water-groundwater connectivity and the recovery of water levels through groundwater recharge d) investigate relationships between ephemeral streams in the Plan area and their connected groundwater sources and ensure that water sharing rules mitigate the impacts of extraction, particularly during periods of low/no flow e) use hotspot maps of groundwater decline and observed changes in stream flows to target connected water sources that require linked access rules and ensure surface water access rules protect base flows. f) Use the results of the above to revise the Plan rules to ensure connectivity is adequately addressed in the Plan and consider what changes may be necessary to the Water Sharing Plan for the Namoi Alluvial Groundwater Sources 2020.
R 11	As part of Plan replacement, to improve connectivity with the Barwon-Darling River: determine the contribution of flows from the unregulated river water sources of the Namoi valley to Barwon-Darling flow targets; include relevant targets in the replacement Plan; and clarify how Plan rules would be implemented to support these targets.
Protecting key environmental assets	
R 12	As part of Plan replacement, to address the inadequacy of the environmental protection provided by current access rules, DPE-Water should: a) review the current hydrometric network to identify where the Plan can reference operational gauges for establishing flow classes and flow-based access rules for water sources that currently have a 'no visible' flow rule b) ensure all high environmental value water sources at medium to high risk from extraction have flow-based access rules that support connectivity and adequately protect water sources and their dependent ecosystems c) review if conditions attached to current water access licences and works approvals are appropriate to protect high priority needs and ensure any changes to access rules from (a) and (b) are reflected in water access licence/works approval conditions.

R 13	To improve the provision of replenishment flows and associated environmental and social outcomes in unregulated river water sources, DPE-Water should review the definition of replenishment flows and ensure Plan rules provide protection from access to replenishment flows, except for domestic and stock purposes.
R 14	To inform Plan replacement, DPE-Water should investigate the adequacy of current Plan provisions for protecting the environmental values associated with Lake Goran, the impacts of climate change on the lake and its ability to support irrigation, and update Plan provisions to better protect these values where necessary.
R 15	To ensure that regionally significant wetlands are protected in the replacement Plan, DPE-Water should: a) carry out investigations to determine if drawdown provisions for Wee Waa and Gulligal lagoons are adequately protective of environmental and cultural values b) remove schedule 1A of the Plan and update drawdown provisions based on the outcomes of the investigations undertaken as per R 15(a) c) install hydrometric equipment to monitor water levels.
R 16	As part of Plan replacement, include appropriate mechanisms to protect held environmental water that may be used for watering environmental assets in unregulated river water sources.
Supporting equitable water sharing	
R 17	As part of the replacement Plan, to ensure access is equitable within the Plan area and downstream of the Plan, DPE-Water should: a) include appropriate minimum cease to pump thresholds in the Plan for application to all licences in that water source or management zone, and specify that daily access conditions are mandatory conditions on access licences b) implement AWD provisions which require reduction for the licence category which causes LTAAEL exceedance, except for Local Water Utilities and Domestic and Stock licences consistent with the rules in the Namoi Regulated Water Sharing c) ensure the Plan recognises floodplain harvesting can occur on properties that cover multiple water sources and ensure water extraction is accounted for at the location it is extracted. d) prioritise and equally protect all town domestic supplies e) include explicit equity objectives, strategies and performance indicators.
Restoring Aboriginal water rights, values and uses	
R 18	As part of the replacement Plan, to deliver better outcomes for Aboriginal peoples through water management, DPE-Water should: a) undertake culturally appropriate engagement with Traditional Owners and knowledge holders

	b) include registered Native Title claims and identify and include water-dependent cultural values and uses in the Plan c) co-design Plan objectives and rules to protect and support Aboriginal values and uses of water d) ensure that the Plan's definition of 'cultural practice' recognises and includes trade as a cultural practice (based on a long history of trade between Aboriginal nations) and does not restrict cultural access licences to 10 ML per application e) ensure Plan objectives and corresponding provisions are consistent with the NSW Water Strategy and Closing the Gap targets f) when making controlled allocations ensure Aboriginal rights and access including Native Title are prioritised g) improve reporting on key performance indicators that increase Aboriginal benefit including external influences (including regulatory action outcomes).
Monitoring, evaluation and reporting (MER)	
R 19	In order to improve monitoring, evaluation and reporting, DPE-Water should: a) ensure the replacement Plan specifies timely reporting requirements of the results of MER activities to support transparency and adaptive management. This should include but is not limited to reporting on: ▪ outcomes for key environmental assets ▪ water management during extreme events that occur in the Plan areas ▪ benefits for Aboriginal people arising from the Plan provisions. b) work with other agencies to: ▪ identify and address critical knowledge gaps ▪ specify what MER activities will be undertaken to address critical knowledge gaps, support transparency and adaptive management of the Plan in line with the NSW Water Sharing Plan Evaluation Framework and Prioritisation Tool (prioritise MER activities based on value and risk). ▪ strengthen stakeholder engagement in the lead up to and during the Plan replacement process. c) undertake a study or commence ongoing monitoring to better understand the impact of unregulated flows and unregulated access in Pian Creek on the quantity and quality of water supply of Walgett via the regulated river d) undertake a study of Lake Goran, its hydrological regime, values, extraction risks from entitlement levels and carryover, and the impacts of climate change, and consider the implications of the results for access rules in accordance with the water management principles.

1 Review background

1.1 Water sharing plans and the Commission's role

Water sharing plans are statutory instruments under the Act. They prescribe how water is managed to support sustainable environmental, social, cultural and economic outcomes. They intend to provide certainty for water users regarding how available water will be shared over the life of the water sharing plan, which is typically 10 years, unless extended.

The Plan commenced on 4th of October 2012. In 2016 the Mooki unregulated water sources were added. In 2020 the:

- unregulated river surface water sources were removed from the *Water Sharing Plan for the Peel Valley Regulated, Unregulated, Alluvium and Fractured Rock Water Sources 2010* and combined into this Plan
- the alluvial water sources were removed from the Plan and included in a single water sharing plan for all alluvial water sources in the Namoi and Peel valleys (*the Water Sharing Plan for the Namoi Alluvial Groundwater Sources 2020*).

The Plan is due for extension or replacement on 1 July 2023.

The Commission has a role under Section 43A of the Act to review water sharing plans within five years of expiry and report to the Minister on:

- the extent that a plan's water sharing provisions have materially contributed to the achievement of, or failure to achieve, environmental, social and economic outcomes
- if changes to plan provisions are warranted.

The Commission may recommend extending or replacing plans depending on its review findings. Section 43A(3A) of the Act requires the Commission to consider potential compensation requirements resulting from recommended changes to a plan.[1] Under the Act, compensation is payable by the state to access licence holders only in certain circumstances[2] where water allocations under a water sharing plan are reduced.

The Commission must also consider the water management principles,[3] including the water sharing principles, when reviewing plans. The Act is clear that water sharing is not about balancing uses and values – it is about first providing for the environment and second recognising basic landholder rights above other uses. It specifies that the:

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1 If a Commission report recommends changes to a plan that will reduce water allocations in relation to which compensation might be payable under Section 87AA of the Act, the Commission is to state in the report if the purpose of the proposed changes is: (a) to restore water to the environment because of natural reductions in inflow to the relevant water source, including changes from climate change or drought or (b) to provide additional water to the environment because of more accurate scientific knowledge demonstrating the amount previously allocated to the environment is inadequate.

2 As set out in sections 87 and 87AA of the Act. Section 87 states that compensation applies for certain reductions in water allocations arising during the initial (10-year) period of a water sharing plan, only where amendments are not already contemplated in that plan. Section 87AA makes clear that compensation applies to amendments to the plan after its 10-year term. In addition, the Minister has an overriding discretion under Section 87 (but not under Section 87AA) to determine if compensation should be paid and, if so, the amount of any such compensation and the manner and timing of any payments.

3 Section 5 of the Act sets out the water management principles while Section 9 of the Act establishes a duty of persons exercising functions under the Act.

a) sharing of water from a water source must protect the water source and its dependent ecosystems, and
b) sharing of water from a water source must protect basic landholder rights, and
c) sharing or extraction of water under any other right must not prejudice the principles set out in paragraphs (a) and (b).[4]

Further, the water management principles should be prioritised in the order that they are set out above.[5] Water sharing plans must be evidence-based to achieve these outcomes.

1.2 Review approach

The Commission's review approach for water sharing plans is outlined on its website.[6] The Commission's review was informed by a range of evidence, including:

- **Consultation** – targeted engagement with government agencies, community, Aboriginal and industry organisations.[7]
- **Document review** – the Commission reviewed the Plan and background documents as well as public reports and unpublished information from water management agencies, including DPE-Water. As required, the Commission considered other relevant state-wide and regional government policies and agreements. The Commission was provided with several research papers relevant to the Plan area, which were considered as appropriate.
- **Technical advice** – consultants provided peer review.
- **Submissions** – the Commission called for and considered public submissions via letters and calls to key stakeholders and advertising on the Commission's website. Stakeholders were asked to respond to the following questions:
  - To what extent do you feel the Plan has contributed to social outcomes?
  - To what extent do you feel the Plan has contributed to environmental outcomes?
  - To what extent do you feel the Plan has contributed to economic outcomes?
  - To what extent do you feel the Plan has contributed to meeting its objectives?
  - What changes do you feel are needed to the Plan to improve outcomes?

The Commission received twelve submissions, which are published on the Commission's website.

The Commission used this evidence to evaluate the Plan's performance against its stated objectives, strategies and performance indicators. These were linked to environmental, social, cultural and economic outcomes as required for this review.

The Commission would like to thank the community members from the Plan area who gave up their valuable time to provide input to this review. We suggest DPE-Water engage with depth and intent to further understand issues facing communities, particularly Aboriginal peoples, in the Plan area.

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4 Section 5(3) of the Act.
5 Section 9(1) of the Act.
6 Natural Resources Commission (2022) *WSP Reviews - Review approach*
7 Interviews carried out as part of targeted consultation were documented but not recorded and transcribed, hence quotes are reported as 'indirect' rather than "direct" quotes.

1.2.1 Relevant regional plans, policies and agreements

In reviewing the Namoi and Peel Plan, the project team considered the following in accordance with clause 43A(4)(b) of the Act:

- Aboriginal Water Strategy – under development
- NSW Water Strategy – priority areas under the strategy that are relevant to the Namoi and Peel
- Draft Namoi Regional Water Strategy (including long list of options)
- Namoi Long-Term Water Plan (Parts A and B)
- Namoi Water for the Future Report.[8]

1.3 History of mergers, transfers and amendments

The Plan is an amalgamation of several previous plans (or portions of plans) starting in 2003:

- **2003** - Gazettal of *Water Sharing Plan for the Phillips Creek, Mooki River, Quirindi Creek and Warrah Creek Water Sources 2003*, which focused on rules for the Mooki River and commenced in 2004.
- **2010** - Gazettal of *Water Sharing Plan for the Peel Valley Regulated, Unregulated, Alluvium and Fractured Rock Water Sources 2010,* which covered five of the current Plan's unregulated water sources. The Peel Valley was originally managed under a single plan that had as its first objective to:
    - "*Manage the Peel Valley in a single water sharing plan that recognises the interaction between these water sources*".
- **2012** - Gazettal of *Water Sharing Plan for the Namoi Unregulated and Alluvial Water Sources 2012*, which covered 27 unregulated water sources and included four alluvial groundwater sources.
- **2016** - the *Water Sharing Plan for the Phillips Creek, Mooki River, Quirindi Creek and Warrah Creek Water Sources 2003* was merged into the Plan.
- **2020** - all alluvial groundwater sources were removed from the 2016 Plan, and the Peel unregulated water sources were included.

Over the life of the Plan the above plans have been amended, merged and divided. There have been numerous changes to access rules, objectives, and performance indicators, all of which could affect the outcomes from the Plan.

The Commission reviewed the *Water Sharing Plan for the Peel Valley Regulated, Unregulated, Alluvium and Fractured Rock Water Sources 2010* in 2020, prior to the merger of the unregulated elements with this Plan.[9] While the flow classes in the Peel Valley Plan remain the same, the exemptions changed significantly. This review will not re-review the Peel but focus only on the 2020 changes. The Commission's key Peel review findings that are relevant to this review include:

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8 Namoi Unlimited (2019) *Namoi Water for the Future*
9 NSW Natural Resources Commission (n.d.) *Water sharing plan reviews*

- the Peel Plan spreads the risk of increased extraction in the Peel Unregulated River and Alluvium water sources, and the waterways providing utility water supply to Tamworth, across other stakeholders in the Peel and Namoi valleys. These issues create uncertainty around future water availability for businesses and local water utilities and erode confidence in water management in the Peel Valley.
- the Peel Plan has a high level of entitlement and cannot adequately respond to risks such as those from prolonged drought, changes in water user behaviour, population growth or climate change. It does not proactively secure access to water for users in line with the priorities of the Act.

The Department's response to the Commission's recommendations is tabled on their website.[10]

The NSW Department of Planning, Industry and Environment adopted a policy of minimal change for unregulated river water sharing plans within their initial ten-year period when making changes to meet the requirements of the water resource plans. Changes to the plans were only proposed:

- if the current rules are inconsistent with the *Basin Plan 2012*
- where a rule is not implementable
- where a rule has had unforeseen consequences on the environment or water users.[11]

On 30 June 2020 the Murray Darling Basin Authority (MDBA) received all NSW proposed surface water resource plans (WRP). These 20 WRPs were assessed as inconsistent with the requirements of Chapter 10 of the Basin Plan and subsequently withdrawn by NSW. The re-submitted proposed NSW WRPs will incorporate specific clauses from NSW water sharing plans; some of which have been amended or re-made for the purpose of Basin Plan consistency. This means that the Commission's program of scheduled reviews of current NSW Murray-Darling Basin water sharing plans is examining water sharing arrangements that may be intended to be amended.

The multiple changes and sequencing of the water sharing plans has been highlighted by stakeholders[12] who had not seen the version submitted to the MDBA at the time of interviews. Some stakeholders have expressed frustration and confusion and are uncertain of the intended outcomes.

1.4 Parallel processes

The Commission notes that, in parallel with its water sharing plan reviews, DPE-Water is working towards accreditation of the *Namoi Surface Water Resource Plan* to the Murray-Darling Basin Authority (MDBA).[13] Findings from the Commission's review may have implications for the water resource plan when the replacement water sharing plans are developed.[14]

[10] ..... DPE (2022) *Department response to the NRC Review of the Water Sharing Plan for the Peel Valley Regulated, Unregulated, Alluvium and Fractured Rock Water Sources 2010*
[11] ..... DPIE (2019) *Namoi Surface Water Resources Plan – Fact Sheet*
[12] ..... Interview: Tamworth Regional Council, 5 December 2022.
[13] ..... The Commission notes that DPE-Water has submitted additional amendments to the catchment's water sharing plans which have not been considered for this review.
[14] ..... NSW Natural Resources Commission (2022) *Review approach*

2 The Plan area

2.1 Plan area and history

The Namoi catchment covers more than 43,000 square kilometres, stretching over 350 kilometres from the Great Dividing Range near Tamworth west to the low-lying alluvial floodplains that connect to the Barwon-Darling River near Walgett. The catchment represents about 4 percent of the Murray-Darling Basin.[15] Located in the elevated eastern portion of the catchment is the Peel Valley, an important sub-catchment of the Namoi catchment that covers 4,700 square kilometres.[16]

The Traditional Owners of the Plan area include several Aboriginal nations, the Gomeroi Native Title claimants and 15 Local Aboriginal Land Councils (LALCs). They have longstanding and continuing ties to Country and hold the rivers, wetlands, waterways including its many billabongs in this catchment in high regard. Many important sites and artefacts exist across the Namoi catchment, representing an historic and continuing connection to Country and culture and life sustained by it.[17]

Water is essential to Aboriginal people's identity:

'The Gomeroi value water for the connection it provides to history and their ancestors. From the beginning until now, they have engaged in cultural practices that shape their identity as people. Cultural life happens around water. Evidence of cultural practice and cultural sites such as scar trees, burial grounds, grinding stones, campsites, middens, men's and women's sites are situated around rivers, streams and springs.'[18]

Figure 2 shows the 14 LALCs across the area and one active Native Title claim submitted by the Gomeroi People (filed in December 2012).[19]

Examples of known culturally significant areas and features in the Plan area include:

- a water-dependent feature at downstream end of Baradine Creek identified as being culturally significant[20]
- Eulah Creek is classified as an area of high Aboriginal Cultural significance[21]
- Community Conservation Areas (Zone 2) Boonalla Aboriginal Area was created in December 2005. It covers an area of 2,310ha[22]
- Willala Aboriginal Area in the Coxs Creek sub-catchment.[23]

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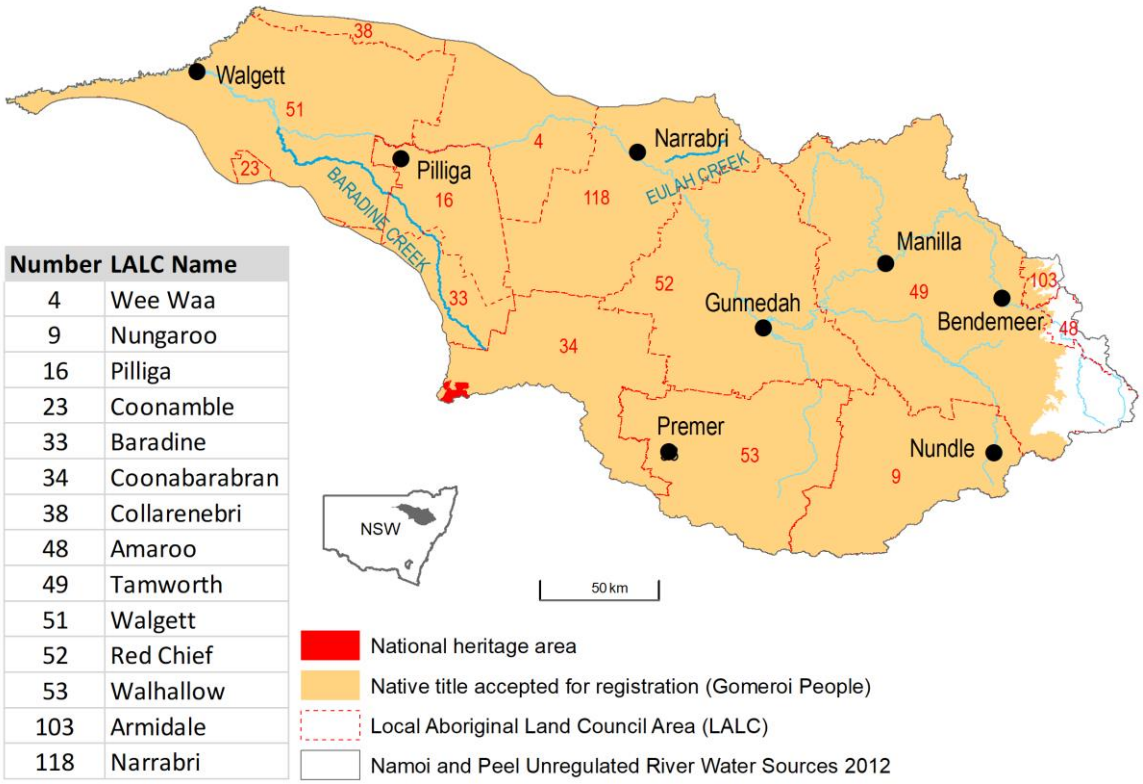
15 DCCEEW (n.d.) *Namoi catchment*
16 ..... DPI-Water (2016) *Water Sharing Plan for the Namoi Unregulated and Alluvial Water Sources 2012 - Background document*
17 ..... DPIE (2020) *Namoi Long-Term Water Plan*
18 ..... Dhirranggal Solutions (2018) *Report on culturally appropriate First Nations consultation with Gomeroi Nation*. Report prepared for NSW Department of Primary Industries, p.21.
19 ..... National Native Title Tribunal (2019) *Register of Native Title claims details - Gomeroi People (NC2011/006)*
20 ..... DPIE (2020) *Namoi Long Term Water Plan Part B: Namoi catchment*
21 ..... *Ibid.*
22 ..... NSW National Parks and Wildlife Service (n.d.) *Boonalla Aboriginal Area*
23 ..... NSW National Parks and Wildlife Service (2012) *Willala Aboriginal Area: Plan of Management*



Number	LALC Name
4	Wee Waa
9	Nungaroo
16	Pilliga
23	Coonamble
33	Baradine
34	Coonabarabran
38	Collarenebri
48	Amaroo
49	Tamworth
51	Walgett
52	Red Chief
53	Walhallow
103	Armidale
118	Narrabri

Figure 2: Local Aboriginal land Councils and active Native Title claims

Water is a significant feature of the region's landscape and environment with interconnected systems of rivers, creeks, wetlands, floodplain watercourses and riparian forests. The landscape across the Plan area transitions from tablelands to central slopes and western floodplains. The Plan covers a mixture of highly productive farmlands and less developed forests.

The Namoi River rises on the western slopes of the Moonbi Range and Great Dividing Range (near Niangala), at the convergence of the Macdonald River and Boundary Creek. It flows generally west and is joined by twenty-seven tributaries including the Peel (Calga), Manilla and Mooki rivers, before reaching its confluence with the Barwon River, near Walgett. Other tributaries include Bohena, Coghill, Baradine, Etoo and Tullaba creeks, which deliver substantial volumes of water from the Pilliga into the Namoi River.

The Plan includes all surface water that is not gazetted as regulated water (**Figure 3**). The regulated water that is covered under the *Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016,* and therefore not included in this review is:

- the Upper Namoi Regulated River Water Source - that between the banks of all rivers, from Split Rock Dam water storage downstream to Keepit Dam water storage

- the Lower Namoi Regulated River Water Source - that between the banks of all rivers, from Keepit Dam water storage downstream to the junction of the Namoi River with the Barwon River.[24]

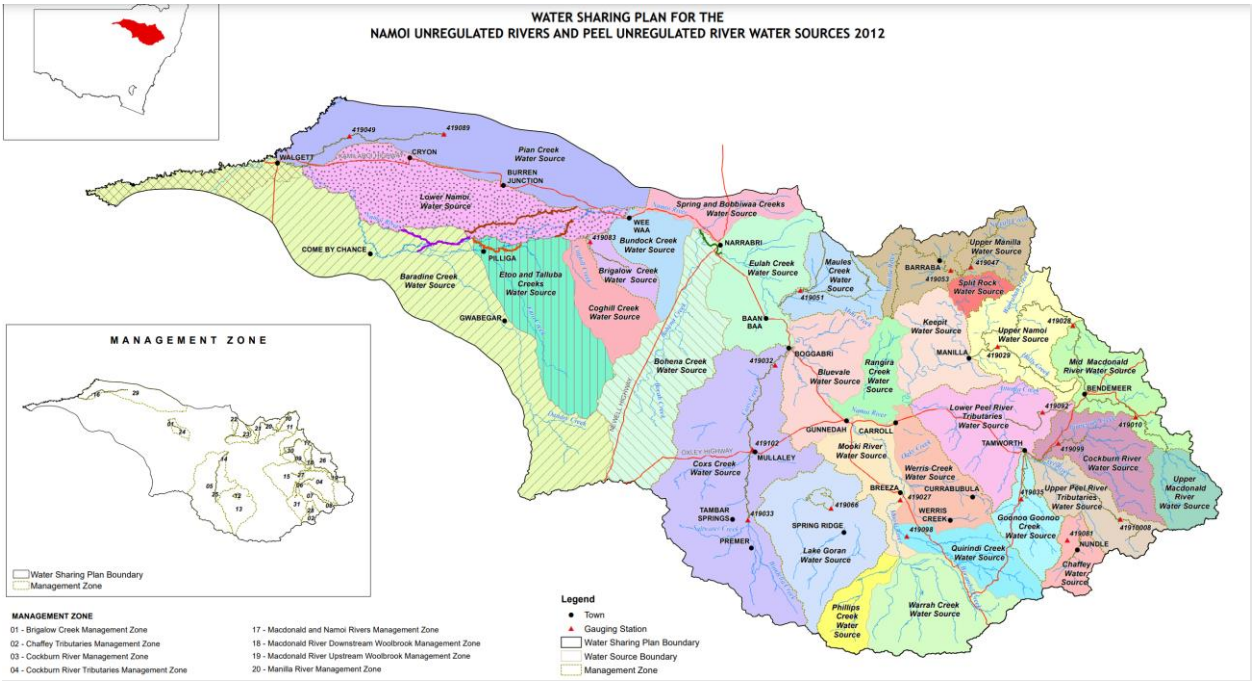


Figure 3: The Plan area and water sources

Other important water sources in the region include water sourced from floodplain harvesting, recycled and wastewater generated by local water utilities, and surface water runoff from rainfall captured in farm dams.[25] As part of the 2020 amendments the alluvial groundwater sources, which are highly connected to the surface water were removed from the Plan (See **Section 7.2**).

2.2 Climate

The Namoi region has always had a highly variable climate. Over the last 125 years, the region has cycled between wet and dry periods. The first half of last century was dominated by extended dry periods with intermittent wet periods. The second half of last century, especially in the 1950s, was wetter but had shorter, more severe dry periods. From 2012 to 2022, the period of the Plan, the region experienced widespread below average rainfall culminating in drought conditions, recording its lowest one year, two-year and three-year rainfall totals on record. There has been above average rainfall for the last two years, leading to higher flows including floods.

Figure 4 shows rainfall at Wee Waa over the period of the Plan since the late 1950s. Where the graph is rising there is above average rainfall, where it is falling there is below average rainfall. The longer the fall, the drier the catchment becomes.

[24] ..... Clause 4 (2) and (3) *Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016*
[25] ..... DPIE (2021) *Draft Regional Water Strategy - Namoi Strategy*

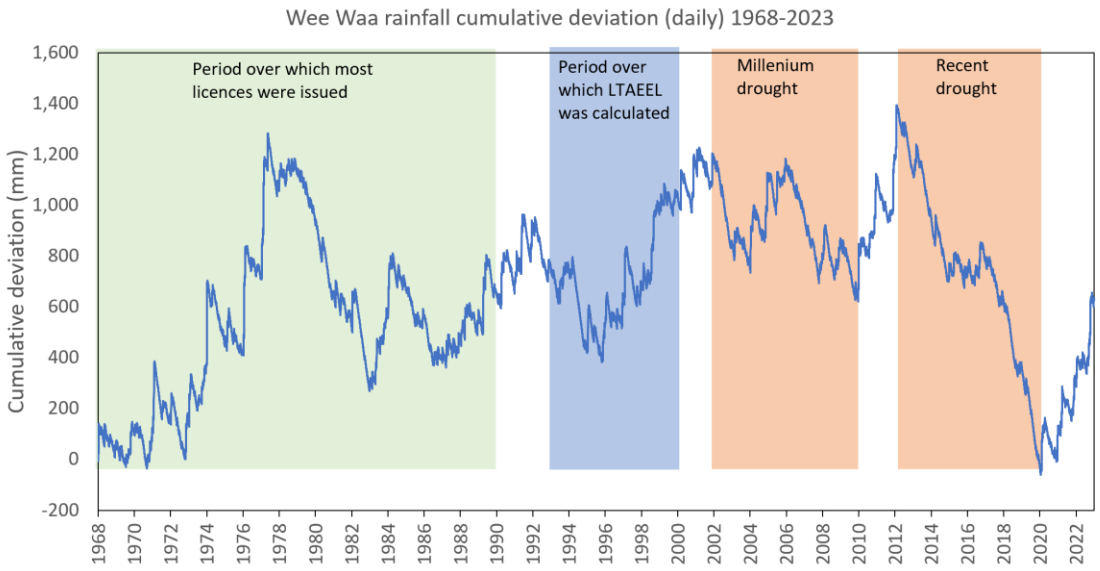


Figure 4: Wee Waa rainfall cumulative deviation

The period from the 1970s up until the 1990s, in which most of the unregulated licences were issued, saw an extensive wet period through the 1970s. The 1993-1999 period, in which the extraction limit was set, was mostly wet following a short drought in 1994. The period of the Plan by contrast was all below average rainfall except for 2016 and the period since 2020. The implications of setting an extraction limit over a period that is not representative of possible climate conditions are discussed further in **Chapter 5**.

2.3 Environment

The Plan area supports a diverse range of significant ecosystems that depend on the region's water and flow conditions. Nine of the 26 unregulated surface water sources covered by the Plan were identified as having high instream values.[26] Lake Goran, a wetland of national significance located on the Liverpool Plains, is the terminus of a large internal drainage basin with a catchment of over 1,700 km^2. When full it has a surface area of over 50 km^2. It is recognised as an important habitat for water birds, particularly migratory birds protected under international migratory bird agreements.

Parts of the Namoi catchment form part of the Lowland Darling River Aquatic Ecological Community (EEC).[27] The Plan area also supports various billabongs, lagoons and floodplains. Wetlands and important river anabranches throughout the catchment provide drought refuge and breeding grounds for a range of aquatic and terrestrial flora and fauna.

Important native species include the vulnerable Silver perch (*Bidyanus bidyanus*), Murray cod (*Maccullochella peelii*) and Bell's turtle (*Myuchelys bellii*); the endangered Eel tailed catfish (*Tandanus tandanus*), Booroolong frog (*Ranoidea booroolongensis*), western population of Olive perchlet (*Ambassis agassizii*) and Southern purple spotted gudgeon (*Mogurnda adspersa*); and the critically endangered Flathead galaxias (*Galaxias rostratus*)

[26] ..... DPIE (2020) *Namoi Long-Term Water Plan – Part A: Namoi catchment*
[27] *Ibid.*

and Sloane's froglet (*Crinia sloanei*), as well as several threatened water birds including the Australasian bittern (*Botaurus poiciloptilus*) and Brolga (*Grus rubicunda*).[28]

2.4 Urban water requirements

The total population of the Plan area is 92,078. Tamworth is the region's major service centre with about 62,769 residents in the Tamworth Regional Local Government Area (LGA).[29] Gunnedah Shire Council has the second highest population with 12,691. Other towns in the Plan area include Barraba, Manilla, Narrabri, Nundle, Quirindi, Caroona, Breeza, Tambar Springs, Walgett, Wee Waa and Werris Creek. The population in the Plan area is expected to grow in Tamworth and Gunnedah but decline in all other LGAs. Not all towns rely on surface water with Gunnedah and Narrabri relying on groundwater.

In 2021, Aboriginal and Torres Strait Islander peoples comprised 21 percent of the total population in Walgett Shire, 16 percent in Gunnedah Shire, 15 percent in Liverpool Plains Shire, 13 percent in Tamworth Regional Shire and 7 percent in Walcha Shire.[30] This is significantly higher than the NSW average of 2.9 percent and of regional NSW at 3.7 percent.[31]

The Walgett LGA is classified as remote, and Walcha, Liverpool Plans and Gunnedah are classified as outer regional. Remote and outer regional areas are more likely to experience larger impacts from changes such as water reform or drought because the local economy is often more dependent on agriculture than is the case in inner regional areas or in major cities.[32]

Most licence entitlements in the Plan are unregulated river access licences. Only 5 percent of entitlement is for urban water supply. In addition to Tamworth, the Plan manages town water supplies for Werris Creek and Bendemeer. The town of Manilla relies on surface water from the unregulated Upper Namoi River, supplemented by supply from Split Rock Dam in dry years. The Plan includes unregulated entitlement for 'Local Water Utilities' for their urban centres but does not include their access conditions.

2.5 The Plan area's economic importance

In 2016, 39,027 people were employed in the Plan area, the majority (25,999) residing in the Tamworth LGA where healthcare and social assistance was the largest employer. In all other LGAs in the Plan, agriculture, forestry and fishing were the largest employers, with mining equal to agriculture in Gunnedah.[33]

In 2017/18, the region generated $6.36 billion, accounting for 3 percent of NSW's total economic output.[34] Mining contributed 10.5 percent to the region's economic output.

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[28] ..... *Ibid.*
[29] NSW Government (2023) *NSW Projections Explorer*
[30] ..... ABS (2023) *Data by region (map) by LGAs*
[31] ..... ABS (2021) *Regional Summaries by LGA*
[32] Schirmer, J. and Mylek, M. (2020) *Thriving, surviving, or declining communities: socioeconomic change in Murray-Darling Basin communities*. Report prepared for the Panel for the Independent Assessment of Social and Economic Conditions in the Murray-Darling Basin.
[33] ABS (2023) *Data by region (map) by LGAs*
[34] DPIE (2021) *Draft Regional Water Strategy - Namoi Strategy*

Gunnedah Coalfield is one of the five major coalfields in NSW.[35] Agriculture contributed 9.4 percent to the region's economic output.[36]

The Namoi region is home to some of the most productive land in NSW and has been one of the state's prime agricultural regions since the late 1820s. Around 75 percent of the region is used for agricultural purposes, with sheep and cattle grazing accounting for approximately 54 percent of the catchment area. Horticultural crops and dry land farming account for another 17 percent of the catchment and irrigation operations approximately 4 percent.[37]

Irrigated lands are located mainly on the low-lying alluvial plains, with over 70 percent being used for cotton production. Larger irrigators mainly grow cotton, in rotation with grain crops, oilseed and legumes. The Namoi region is the second largest cotton producer in Australia.[38]

The main crops in the Peel catchment are lucerne and grain. Other activities in the Peel Valley include the production of green feed for dairying and the production of summer and winter fodder crops. A large concentration of agricultural processing facilities, such as for meat, dairy, grain and oil seed, support agriculture in the region. Many of these facilities are located around Tamworth. Transport is another important support industry, distributing agricultural goods nationally and internationally.

Proximity to agricultural processing facilities and access to markets is supporting a rapid expansion in the intensive agriculture and food processing sectors in the region, including the poultry and broiler industry. There has also been a rapid growth of boutique agriculture ventures around Tamworth.

The Namoi region is a popular tourism destination, hosting several high-profile events including the annual Tamworth Country Music Festival. Tourism provides jobs for about 2,351 workers in the region, or about 6 percent of the region's total employment. In 2018, tourist expenditure amounted to about $458 million across the region's local economies.[39] The Namoi region's dams, waterways and lakes support a range of water-based recreation opportunities.

All of these industries rely on water. Agriculture uses up to 94 percent of the region's water resources while mining uses around 2 percent of the region's ground and surface water resources.[40] Expansion and diversification of industry such as pumped hydro and coal seam gas, in addition to the growth in hobby farms, will increase water demand. Tourism can also create significant additional demand on town water and sewerage services.

35 *Ibid.*
36 *Ibid.*
37 *Ibid.*
38 *Ibid.*
39 *Ibid.*
40 *Ibid.*

3 Interaction between plans needs to be considered

3.1 A catchment-wide approach is needed

In addition to the Plan, three other water sharing plans manage water in the broader Namoi catchment. These are the:

- *Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2020* (the Namoi Regulated River Plan)
- *Water Sharing Plan for the Peel Regulated River Water Source 2020* (the Peel Regulated River Plan)
- *Water Sharing Plan for the Namoi Alluvial Groundwater Sources Order 2020* (the Alluvial Groundwater Plan).

The water sources managed by these plans are highly connected and rules in one plan can have significant potential implications in another - both beneficial and detrimental. The relationships between the Namoi catchment plans are unique compared with other catchments in the Murray-Darling Basin, in particular:

- **the catchment has a large volume of unregulated extraction**: based on figures in the *Basin Plan 2012*, the Namoi catchment has the largest volume of unregulated river extraction relative to regulated river and total water extraction of the Murray-Darling Basin valleys.[41] This extraction occurs almost entirely above the regulated rivers.[42] The Plan also contains the highest estimated unregulated Baseline Diversion Limit (BDL) in the NSW Northern Basin.
- **groundwater extraction compounds the impacts of unregulated extraction**: surface and groundwater within the Namoi unregulated system are highly connected, with unregulated extraction reducing groundwater recharge. When unregulated surface water extraction is combined with increased groundwater extraction, particularly during drought, groundwater levels drop. This has occurred across the Namoi catchment, with declines of up to 10 metres observed in some locations (see **Chapter 7**). Groundwater extraction also reduces baseflow to rivers, creating a compounding cycle of impacts. The combination high level of unregulated river extraction and high levels of groundwater extraction can have a significant impact on the reliability of supply for downstream towns, licenced users, basic rights, regulated river reliability, and flow out of the Namoi catchment.
- **the catchment uses cross-plan accounting**: under cross-plan accounting rules, increased extraction in one plan can be offset by reductions in extraction in another plan, at a later time. For example, water extracted for Tamworth's town water supply from Dungowan Creek (a river in the Peel Valley sub-catchment, which is covered by the unregulated Plan), is offset by reductions in supplementary (high flow) water extraction from the Namoi Regulated River in subsequent years (see **Section 3.5**).

In 2020, the MDBA found that actual end of system flows in the Namoi catchment were significantly less than expected under modelling.[43] Its analysis also found the end of system flows for a given volume of inflows have decreased when comparing before and after 2012. While the northern Basin has been disproportionately impacted by adverse

[41] ..... Namoi 38 percent, Macquarie 24 percent, Gwydir 9.6 percent and Border Rivers 8.3 percent.
[42] ..... Only small sections of Pian Creek and Baradine Creek water source do not flow into the regulated rivers.
[43] MDBA (2020) *The 2020 Basin Plan Evaluation - Hydrological analysis evidence report*

climatic conditions since the beginning of the *Basin Plan* period, these do not entirely explain the reduced flow compared to modelling.[44]

The MDBA's report recommended further investigation into additional factors that may have caused reduced transmissions, including groundwater recharge rates, evapotranspiration, and changes in land and water use.[45]

The disparity between inflows and expected end of catchment flows has major consequences for both in-valley connectivity and system scale connectivity with the Barwon-Darling that have broader ecological, social and cultural implications. For example, the failure to supply water to priority users, including drinking water for Walgett.

There is strong evidence that the increasing frequency and length of cease to flow events are adversely impacting on socioeconomic, environmental and Aboriginal values.[46] The MDBA report recommended that water sharing plans are adapted based on data and learnings from the 2017-20 drought.

The Plan, and the way it interacts with other water sharing plans in the Namoi catchment, has the potential to contribute to lower than expected end of catchment flows. This chapter focusses on several key cross-plan issues that should be addressed concurrently with the Plan remake. These are largely related to entitlement and LTAAELs across all Namoi catchment plans, including that:

- total entitlement and basic landholder rights are greater than mean annual flow (**Section 3.2**)
- reductions are required to bring extraction below entitlement across all plans, noting that even with reductions, the sum of LTAAELs across the Namoi catchment will remain high relative to mean annual flow (**Section 3.3**)
- cross-plan water accounting shifts the risks of reductions across plans and does not account for the water at the time and place it is extracted (**Section 3.5**)
- the complexity of the Namoi catchment system and risks to water security in the region justify an integrated approach to managing extraction, which requires consistent modelling across the plans (**Section 3.7**).

3.2 The system is overallocated

The Commission finds that the catchment is heavily allocated, with entitlement and estimated interception nearly twice the mean annual flow (**Figure 5**). The total licensed entitlement for regulated, unregulated and alluvial water sources in the Namoi catchment's connected plans is 818,023 ML/year. In addition, there is:

- regulated river floodplain harvesting (62,700 ML/year in the LTAAEL)[47]
- water that is extracted through basic landholder rights, including harvestable rights. The Basin Plan estimate for farm dams adds another 160,000 ML/year[48]

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44 *Ibid.*

45 ..... While most of the analysis centred on regulated gauging stations at the bottom of the catchment, the Waminda gauge (419049) on the unregulated Pian Creek was also used.

46 MDBA (2020) *The 2020 Basin Plan Evaluation - Hydrological analysis evidence report*

47 ..... The 62,700 ML/year is comprised of 25,200 ML/year of overbank flow harvesting, 21,300 ML/year of non-exempt rainfall runoff harvesting, and 16,200 ML/year of exempt rainfall runoff harvesting.

48 MDBA (2022) *Murray-Darling Basin Baseline Diversion Limits, 2021-2022*

- unregulated floodplain harvesting.

In total, this takes total entitlement and allowable interception to at least 1,040,723 ML/year (excluding unregulated floodplain harvesting). This is 185 percent of the mean annual flow of 563,000 ML/year at Goangra (forty-six kilometres upstream of the end-of-system at Walgett).[49]

The Australian Government's Bioregional Assessment for the Namoi subregion found, that in the 33-year period up to the assessment in 2018, annual flows were above the mean annual flows on only six occasions.[50] The implication is that in most years the mean annual flow is not available. Overall, the Namoi catchment is heavily overallocated.

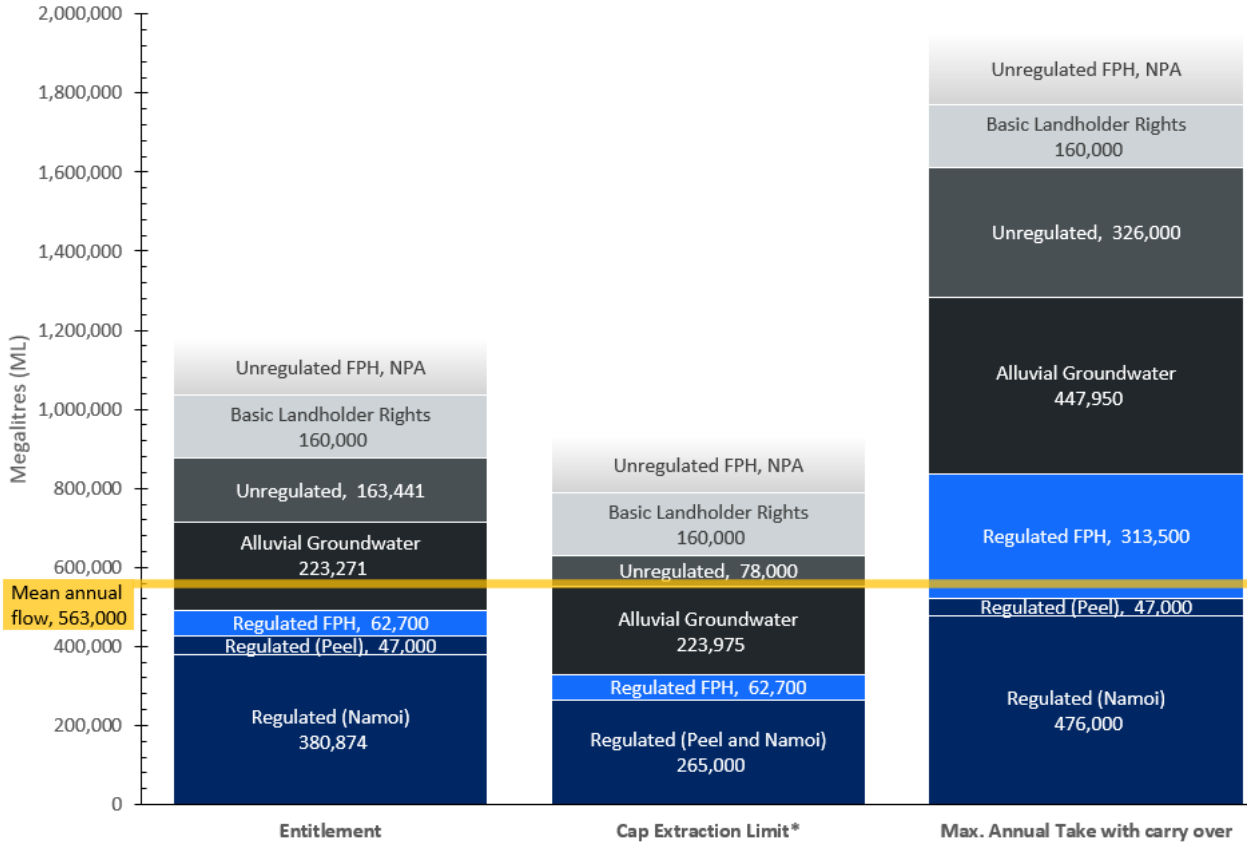


Figure 5: Comparison of entitlement, extraction limits and carryover to mean annual flow at Goangra (gauge 419026)

*** Used Extraction limit as entitlement figures unavailable**

[49] ..... Australian Government (n.d.) *Bioregional Assessment: Namoi subregion - Surface water*

[50] ..... Welsh W, Hodgkinson J, Strand J, Northey J, Aryal S, O'Grady A, Slatter E, Herron N, Pinetown K, Carey H, Yates G, Raisbeck-Brown N and Lewis S (2014) *Context statement for the Namoi subregion. Product 1.1 from the Northern Inland Catchments Bioregional Assessment.* Department of the Environment, Bureau of Meteorology, CSIRO and Geoscience Australia, Australia.

3.3 Reductions are required across plans to address high levels of entitlement

To manage the high levels of surface water entitlement across the Murray-Darling Basin, extraction is limited to historical levels of extraction. In 1995, the Murray-Darling Basin Ministerial Council introduced the Murray-Darling Basin Cap on Surface Water Diversions (the Cap) to help protect the riverine environment and protect water users' rights. NSW unregulated water sharing plans limit the level of allowable extraction to the LTAAEL, which was set equal to the Cap. The Commission's understanding is that these limits were intended an interim cap only, to prevent further growth in water usage to ensure that the health of water sources and their dependent ecosystems at least did not deteriorate further. The intention was that these interim limits would be assessed and revised over time as better information became available to assess their sustainability and adequacy for achieving intended outcomes. However, this assessment and revision has not yet been undertaken.

LTAAELs are set for extraction management units and normally fixed to the amount of extraction at a particular date. The total for all those extraction management units within the Namoi catchment (excluding the porous and fractured rock aquifers) is approximately 790,000 ML plus unregulated floodplain harvesting (see **Figure 5**). This is still significant compared with mean annual flow. Alluvial groundwater entitlement (223,271 ML) combined with unregulated entitlement (163,441 ML) equates to 386,712 ML at 100 percent allocation. This is close to the 427,876 ML of the combined Namoi (380,874 ML) and Peel (47,002 ML) regulated river entitlement.

For the regulated river, AWDs (the amount of a user's entitlement they are allowed to take) is based on the amount of water in storage and expected inflows, evaporation and transmission losses. If modelling shows users are taking more than the LTAAEL, an additional allocation reduction is applied. Allocations therefore consider both availability and demand. Similarly, groundwater allocations are based on maintaining extraction to a percentage of average groundwater recharge.

In contrast, for this Plan water allocations are only meant to allocate the percentage of entitlement required to maintain the historical extraction levels. This approach does not adequately consider climate variability and the capacity of rivers at any point in time to actually provide water. As shown **Figure 4** (**Chapter 2**), the historical extraction levels occurred over a wetter period. Further, for the period of the Plan, there has been no assessment of the unregulated LTAAEL and allocations of 100 percent have been issued continually.

Any exceedance of the LTAAEL within this Plan impacts the entire catchment, and in particular the availability of water in the downstream regulated rivers.

3.4 Carryover rules are inconsistent and increase risk

The Namoi catchment's water sharing plans introduced carryover rules to allow for variation in the availability of water for extraction across years. The total allowable carryover across all plans in the Namoi is shown in **Figure 5**. These rules do the opposite to the AWDs and allow extraction within the Plan in a particular year to exceed entitlement, as unused allocation from the previous year can be carried across up to the account limit. These carryover rules and account limits within the Plan allow for up to 343,595 ML

extraction within any year. This equates to 80 percent of regulated entitlement and 130 percent of the regulated river's extraction limit.

The regulated river plan limits the amount of water that can be taken in any one year, to 1.25 times the level of entitlement, and to 3 times during any three consecutive twelve-month periods. The rules in the alluvial groundwater plan vary the amount of carryover between water sources with carryover restricted in some water sources and on licence categories. Similar restrictions do not apply in this Plan, where blanket carryover rules apply to all water sources within it. Better alignment between plans, and consideration of the potential impacts of carryover rules is needed to prevent excessive extraction.

3.5 Cross-plan water accounting results in risks to town water supplies

There are currently cross-plan water accounting provisions within the Plan and associated regulated plans, where exceedance of extraction by a category of licence in one plan is offset by reductions in another category of licence in a different Plan. These provisions are intended to address the future growth of Tamworth's town water supply. The Commission is concerned that these provisions do not account for the necessary use of water at the location it is extracted, at the time it is extracted, resulting in poor outcomes. There is also an overall lack of clarity about how Tamworth Regional Council's unregulated water is accounted for.

Tamworth Regional Council holds a water licence for water extraction from Dungowan Dam of 5,600 ML/year. This dam is located on a river covered by the Plan, but the access licence for Dungowan Dam[51] is excluded from the Plan's unregulated LTAAEL. In addition to the licence associated with Dungowan Dam, Tamworth Regional Council holds other water licences in regulated water sources. The Commission has found a discrepancy in how growth in extraction by Tamworth City Council is accommodated in the Plan and the regulated river plans, meaning it is unclear how Tamworth Regional Council's unregulated water is accounted.

The result of the accounting rules is that any growth in Tamworth Regional Council's extraction is offset in the regulated rivers. Five percent of Tamworth Regional Council's growth in extraction is offset through reductions in the Peel Valley Regulated River Plan. The remaining 95 percent is being offset through reductions to supplementary water users on the Lower Namoi Regulated River.

Supplementary water, formerly known as off-allocation water is water that:

- is not needed to meet current water orders, commitments on the river or other operational requirements

[51] Clause 29 (d) the annual extraction of water averaged over the period from 1 July 1993 to 30 June 1999 under entitlements issued under Part 2 of the Water Act 1912 from the Chaffey Water Source, the Goonoo Goonoo Creek Water Source, the Upper Peel River Tributaries Water Source, the Lower Peel River Tributaries Water Source and the Cockburn River Water Source at the commencement of the Water Sharing Plan for the Peel Valley Regulated, Unregulated, Alluvium and Fractured Rock Water Sources 2010, excluding those licences nominating works that extract water from the Wallamoore Anabranch and local water utility access licences that nominate works that extract water from Dungowan Dam.

- cannot be captured, or 're-regulated' for future use into government owned storages such as Keepit Dam
- is made available to Supplementary Access licence holders at a given location during an announced access period.[52]

Critically, access to these flows is purely opportunistic and dependent on the amount and location of rainfall and ensuing streamflow, and the catchment conditions at the time.[53]

In effect, reductions in flows (low flows in particular) from the Dungowan Creek (which is an unregulated river) are offset by reductions in high flow opportunistic water extraction in Peel and Namoi regulated rivers. This offsetting occurs the following year after the actual impact, resulting in significant implications for related environmental, social and cultural outcomes.

The accounting rules are highly problematic as:

- increased extraction for Tamworth can occur during periods of low and medium flows in Dungowan Creek that would not have triggered supplementary events in Lower Namoi Regulated River
- there is a finite amount of water in the Peel Valley system, particularly during droughts, but these rules do not restrict take based on available water at the place and time it is taken
- there is potential for impact on high priority users dependent on low flows from the Peel catchment, such as the town water supplies in the regulated rivers and Basic Landholder Rights downstream of Dungowan Dam.

Growth in Tamworth's population would have a significant impact within the Peel Valley as it would reduce the availability of water and the frequency of spills from Dungowan Dam. There is a real risk that town water demands will exceed available flows, particularly during drought periods, and that current offset arrangements do not address the issue of growth within a sustainable limit (see **Section 6.5**).

In addition to Dungowan Dam, Tamworth Regional Council holds other water licences. The Namoi Regulated River and Peel Regulated River plans both define growth in extraction by Tamworth City Council as growth from all local water utility access licences or *Water Act 1912* licences in the Namoi catchment area under Cap baseline conditions.

To avoid perverse outcomes, water sharing plans should account for water at the location it is extracted, at the time it is extracted. DPE-Water should review the cross-plan accounting rules to ensure the priorities of the Act are maintained across all plans.

3.6 The cumulative impact of floodplain harvesting needs to be considered

Floodplain harvesting is a significant farm management practice in the Namoi catchment. The draft Regional Water Strategy indicates that approximately one quarter of all surface water used in the region comes from water diverted from the floodplain and intercepted

[52] ..... DPE (n.d.) *How water is allocated - Supplementary water*
[53] ..... *Ibid.*

before it enters rivers and creeks. If that figure is correct, unregulated floodplain harvesting would be of the same order of magnitude as the unregulated access licences.

The Plan does not include detailed provisions for floodplain harvesting licences. The volume of unregulated floodplain entitlement, and peak extraction levels proposed for access rules are not available. Only individual account management rules (carryover rules) have been publicly released.

Flows that spill out onto the floodplain are important for maintaining system scale connectivity, floodplain vegetation communities and floodplain wetlands, which provide critical habitat for a range of species and support the overall productivity of river floodplain systems.

The NSW Floodplain Harvesting Policy[54] allows for both regulated and unregulated floodplain access licences in the Plan area. The difference between these licences is administrative based on whether applicants had a regulated river licence or not.[55] Modelling results for the Regulated Namoi River were made available in November 2022. There are no publicly released figures on the extent of unregulated floodplain harvesting.

Surface water extraction in the floodplain will include:

- unregulated river access licences
- floodplain harvesting access licences (unregulated river) currently unspecified
- 25,200 ML/year on average of overbank flow harvesting (regulated river)
- 21,300 ML/year on average of non-exempt rainfall runoff harvesting (regulated river)
- 16,200 ML/year on average of exempt rainfall runoff harvesting (regulated river).

Under the Floodplain Harvesting Policy, outside of the designated floodplain,[56] overbank flow should be covered by an unregulated access licence. DPE-Water state that in the unregulated water sources (excluding the Barwon-Darling), the total volume of water available for floodplain harvesting is in most cases already accounted for within the existing access licence share and the LTAAELs. The reason is that when the *Water Act 1912* licences were volumetrically converted, the process was based on area planted and the water needed to meet authorised crop area under their Water Act Licences. This was intended to take into account all water that was used previously, whether from extraction from the river or from overland flow.

Without unregulated floodplain harvesting figures the outcomes attributable to floodplain harvesting over the period of the Plan cannot be determined. To manage the impacts of floodplain harvesting, DPE-Water should address the:

- cumulative impact of floodplain harvesting extraction across the unregulated and regulated plans on floodplains

54 DPE (n.d.) *NSW Floodplain Harvesting Policy*

55 Thoms, M., Quinn, G., Butcher, R., Phillips, B., Wilson, G., Brock, M. and Gawne, B. (2002) *Scoping study for the Narran Lakes and Lower Balonne floodplain management study*, Cooperative Research Centre for Freshwater Ecology, Canberra.

56 ..... For purposes of the Floodplain Harvesting Policy, 'floodplain' means any area of land designated as a floodplain under the WM Act or the *Water Act 1912*. The policy applies to floodplain harvesting activities on properties where all or part of that property lies within the designated floodplain.

- adequacy of daily access rules (specifically cease to pump thresholds). These need to be commensurate with cumulative risks from all extraction including floodplain harvesting
- risk of LTAAEL exceedance on other water users
- overbank flow captured under unregulated water access licences.

3.6.1 There are extensive floodplains associated with the unregulated rivers

The Namoi floodplain is extensive but can be divided into two parts: the Upper Namoi floodplain and the Lower Namoi floodplain. Floodplain harvesting does not occur within the Peel, or upstream of Keepit Dam based on the definition adopted by DPE-Water as this is not a designated floodplain.

Figure 6 shows the designated Upper Namoi Floodplain relative to the Lower Namoi Regulated River and the unregulated water sources. The floodplain covers most of the Coxs Creek, Lake Goran and Mooki water sources. The Lower Namoi regulated river passes through the top end of this floodplain.

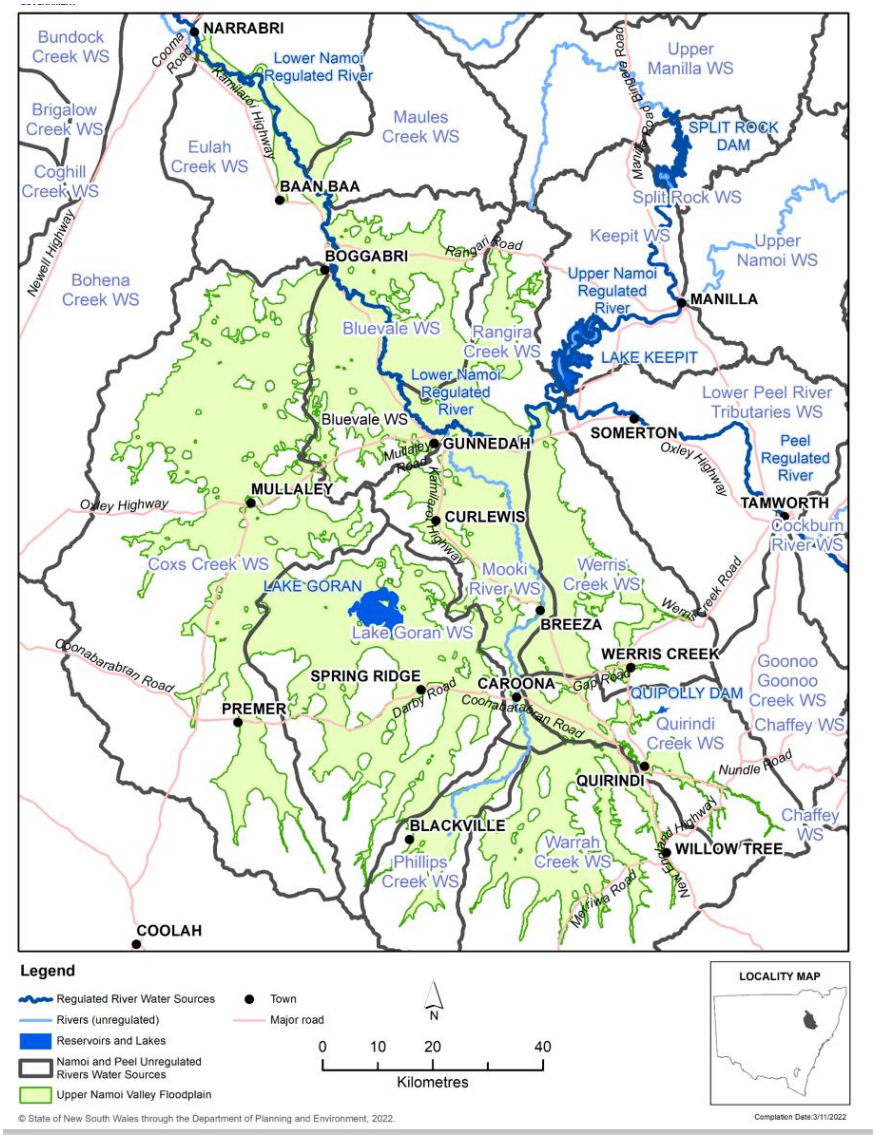


Figure 6: Upper Namoi Floodplain

Figure 7 shows the designated Lower Namoi Floodplain. This has a greater level of interaction with the Lower Namoi regulated river. Unregulated floodplain harvesting is concentrated in the Baradine Creek and Pian Creek water sources.

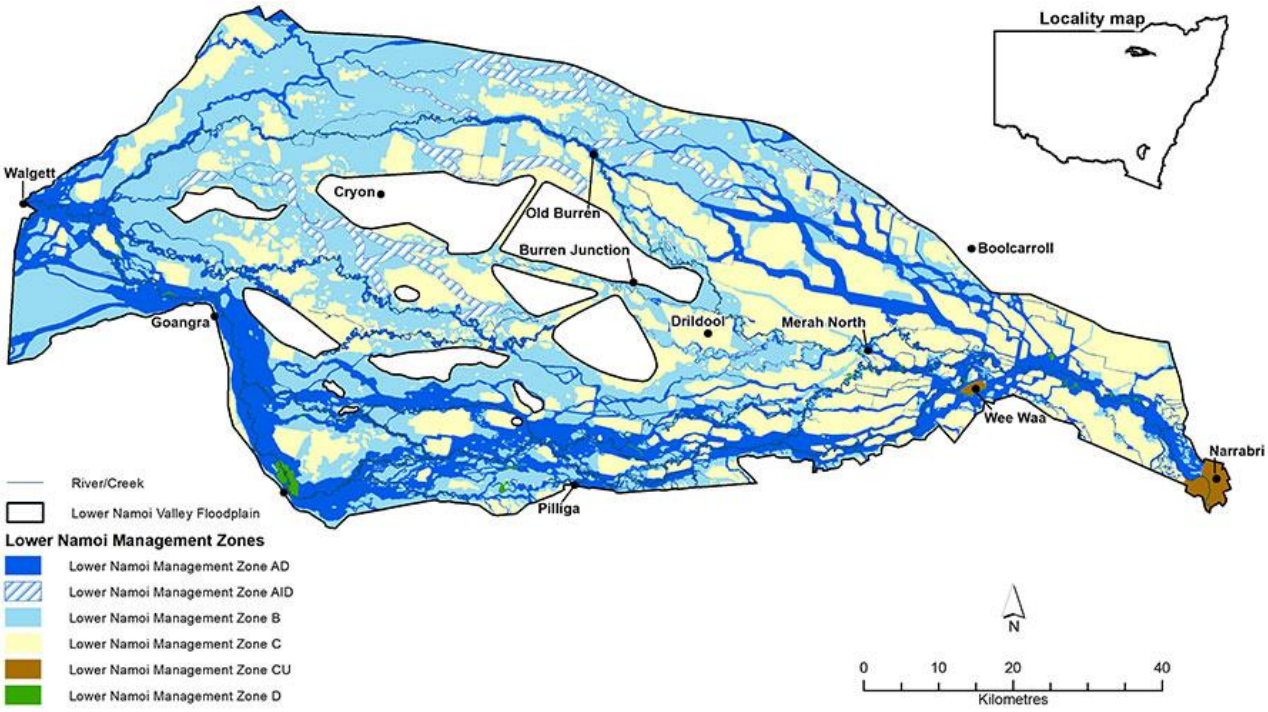


Figure 7: Lower Namoi Floodplain

3.6.2 Cumulative risk of floodplain harvesting should be addressed

The Plan's trade limits and risk assessments to inform the Plan did not include floodplain harvesting. In 2018, DPE published a risk assessment to inform the development of the Namoi Surface Water Resource Plan. Assessment of the impacts associated with floodplain harvesting was not part of this risk assessment.

Understanding the risks of extraction in each flow class, including overbank flows, on water sources, management zones and downstream outcomes is important when defining daily access provisions. The Act's principles require the consideration and minimisation of the cumulative impacts of water management licences and approvals and other activities on water sources and their dependent ecosystems.[57]

Floodplain harvesting (regulated river) entitlement is extracted from the same floodplain as covered by the Plan. The risk of this entitlement to unregulated river water sources is not clearly articulated in published reports but is likely significant. Modelling for regulated rivers also does not address the risk to unregulated rivers.

In preparing the remade Plan, DPE-Water should ensure the impact of floodplain harvesting on the unregulated and regulated plan users and water sources is adequately assessed

[57] Section 5(2)(d) of the Act.

and that provisions, such as carryover and daily access rules, once in the Plan, are adequate to ensure consistency with the principles of the Act.

3.7 Integrated catchment-wide modelling and accounting is required

The complexity of the Namoi catchment and risks to water security in the region justify an integrated catchment-wide approach to managing extraction. The Namoi catchment faces increasing risks to its water supplies as population and demand grow, extraction patterns are altered, and flows to major water storages are reduced in droughts. To ensure overall extraction does not deplete increasingly stretched water resources, it is essential to understand the overall water balance of the entire catchment, while also having the data to manage growth in extraction through water accounts that recognise the location of where the risks are generated.

An integrated modelling and accounting framework covering the entire catchment is required. This should be used to develop and assess the capacity of Plan rules to deliver outcomes and assess the risks to water users and the environment from extraction and future water availability. To achieve this requires a single model covering water extraction in both regulated rivers and at least the major unregulated water sources. The model needs functionality to differentiate extraction and model water accounts, including carryover, at each of the major water sources and all sub-catchments. The model needs to link where the risks are generated to where the risks are experienced.

3.8 Recommendations

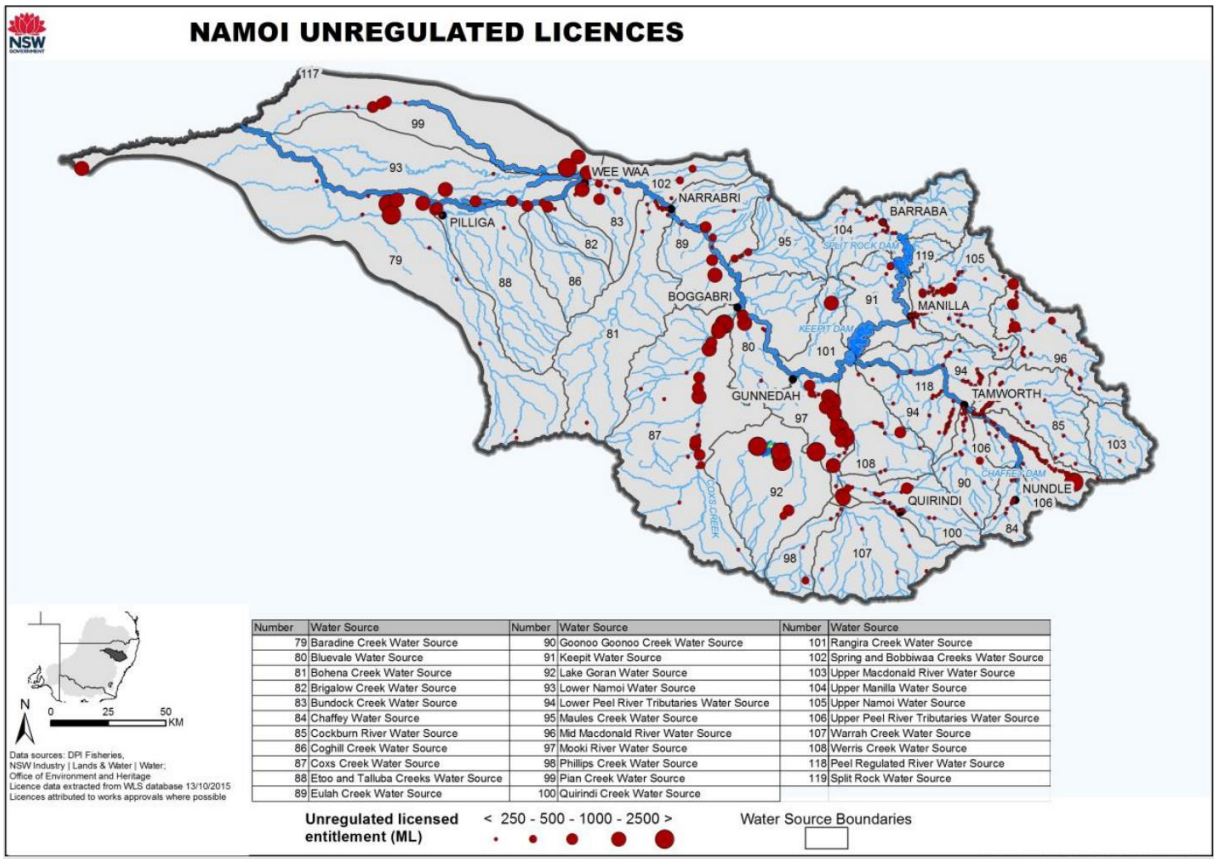
R 2	To ensure that water sharing plans are adequately accounting for water usage, DPE-Water should: a) ensure that water sharing plan provisions account for water at the location it is extracted, at the time it is extracted b) review the cross-plan accounting rules to ensure the priorities of the Act are maintained across all plans.
R 3	As part of the replacement Plan, to improve the management of cumulative impact from floodplain harvesting, DPE-Water should: a) quantify total extraction in water sources and management zones, and develop access rules to manage the cumulative risks b) assess the cumulative impacts of all unregulated floodplain harvesting extraction across the Namoi catchment and revise accounts to manage the cumulative risk c) review the impact of the Plan's carryover provision on the risk of exceeding LTAAEL(s) and risk to outcomes.
R 4	To inform the replacement Plans, by 1 July 2024, DPE-Water should develop a comprehensive water balance, using an overarching modelling framework for the entire Namoi catchment. The modelling framework should inform revised provisions and assess their ability to achieve outcomes and requires functionality to differentiate the extraction and water accounts for each major water source and all sub-catchments. The model needs to link where the risks are generated to where the risks are experienced.

4 Improving management at different scales is required

The Namoi catchment has some unique characteristics that need to be addressed through better management at different scales. While the annual limits show a significant cumulative risk across the catchment (see **Chapter 3**), to understand the impact of that risk and properly manage it requires consideration of water extraction at the sub-catchment, water source, management zone and trading zone scale. The recent Unregulated River Trade Review identified that the system is already heavily allocated. As such, trade is unlikely to provide a solution to improved outcomes. Development and adjustment of access rules at the appropriate scale will be necessary instead.

4.1 Most extraction is concentrated in eight sources

Currently there are 726 unregulated licences, unevenly distributed across the catchment (**Figure 8**).



Number	Water Source	Number	Water Source	Number	Water Source
79	Baradine Creek Water Source	90	Goonoo Goonoo Creek Water Source	101	Rangira Creek Water Source
80	Bluevale Water Source	91	Keepit Water Source	102	Spring and Bobbiwaa Creeks Water Source
81	Bohena Creek Water Source	92	Lake Goran Water Source	103	Upper Macdonald River Water Source
82	Brigalow Creek Water Source	93	Lower Namoi Water Source	104	Upper Manilla Water Source
83	Bundock Creek Water Source	94	Lower Peel River Tributaries Water Source	105	Upper Namoi Water Source
84	Chaffey Water Source	95	Maules Creek Water Source	106	Upper Peel River Tributaries Water Source
85	Cockburn River Water Source	96	Mid Macdonald River Water Source	107	Warrah Creek Water Source
86	Coghill Creek Water Source	97	Mooki River Water Source	108	Werris Creek Water Source
87	Coxs Creek Water Source	98	Phillips Creek Water Source	118	Peel Regulated River Water Source
88	Etoo and Talluba Creeks Water Source	99	Pian Creek Water Source	119	Split Rock Water Source
89	Eulah Creek Water Source	100	Quirindi Creek Water Source		

Figure 8: Distribution of unregulated licences

Seventy-three percent of entitlement (119,721 ML at 100 percent allocation) is concentrated in the following seven water sources:

Lake Goran	33,190 ML/year
Mooki River	30,287 ML/year
Baradine Creek	19,409 ML/year
Coxs Creek	18,171 ML/year
Pian Creek	13,146 ML/year
Upper Namoi	9,773 ML/year

Upper Peel Tributaries	9,238 ML/year

The largest single access licence, with 10,851 unit shares, is in the Baradine Creek Water Source. This licence is larger than the total of all licences in all but five of the Plan's thirty-one water sources. As such, risks across the water sources vary greatly.

Table (see Appendix A) shows a comparison of the Plan to the NSW Water Register. This demonstrates that there has been a considerable increase in entitlement across the Plan since its inception. The total increase in entitlement is 17,746 unit shares, or a 10 percent increase. There has been significant growth in entitlement within some water sources, in particular, a 645 percent increase in Pian Creek.[58] This growth occurred two weeks after the Plan commenced in 2012. Subsequent amendments to the Plan have not included an update to entitlement figures.

For this review, the Commission has used the NSW Water Register's entitlement figures, as they are the most up to date. The Commission continues to recommend that entitlement figures should be updated whenever a plan is updated or amended so that the plan reflects latest available information and risks are transparent to users.

Regulated and unregulated floodplain harvesting also occurs in most of these water sources, but is concentrated in the Coxs Creek, Lake Goran, Baradine Creek, Mooki River and Pian Creek. Unregulated floodplain harvesting entitlement is not currently listed in the Plan so the full extent of extraction in each water source cannot be determined. These variations in extraction type and extent across the Plan area require appropriate management at the sub-catchment scale.

4.2 Groupings of water sources is required to improve outcomes

Two recent documents have used groupings of water sources to improve outcomes:

- the Trade Review[59] (see **Section 4.3**) and the 2020 amendments to the Plan recognised this, creating six sub-catchments for water trading purposes
- the Long-Term Watering Plan (LTWP) grouped the water sources into four management areas.

The Commission recommends additional sub-catchments be established in the Plan, with appropriate water sharing plan rules applied at the sub-catchment scale to achieve specific outcomes, such as sub-catchment sustainability. These sub-catchments should be established as EMUs to allow LTAAELs for each sub-catchment to be established. Appropriate access rules for each sub-catchment based on risks should also be established. The recommended sub-catchments are:

- the Peel
- the Upper Namoi
- the Lower Namoi unregulated excluding Pian Creek and Lake Goran
- Pian Creek
- Lake Goran.

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[58] Water NSW (n.d.) *NSW Water Register*, as at April 2023.
[59] ..... Trade Review - unpublished document, provided by DPE-Water.

In order to properly manage it, Pian Creek should be its own sub-catchment as flow is dependent on replenishment flows from the regulated river and inflows from the Gwydir catchment.

Similarly, Lake Goran is not connected to the rest of the Namoi catchment, except during very high flows and is therefore also considered separately.

Further logic for these groupings and their connection to the other water sharing plans are detailed below (see also **Figure 9**).

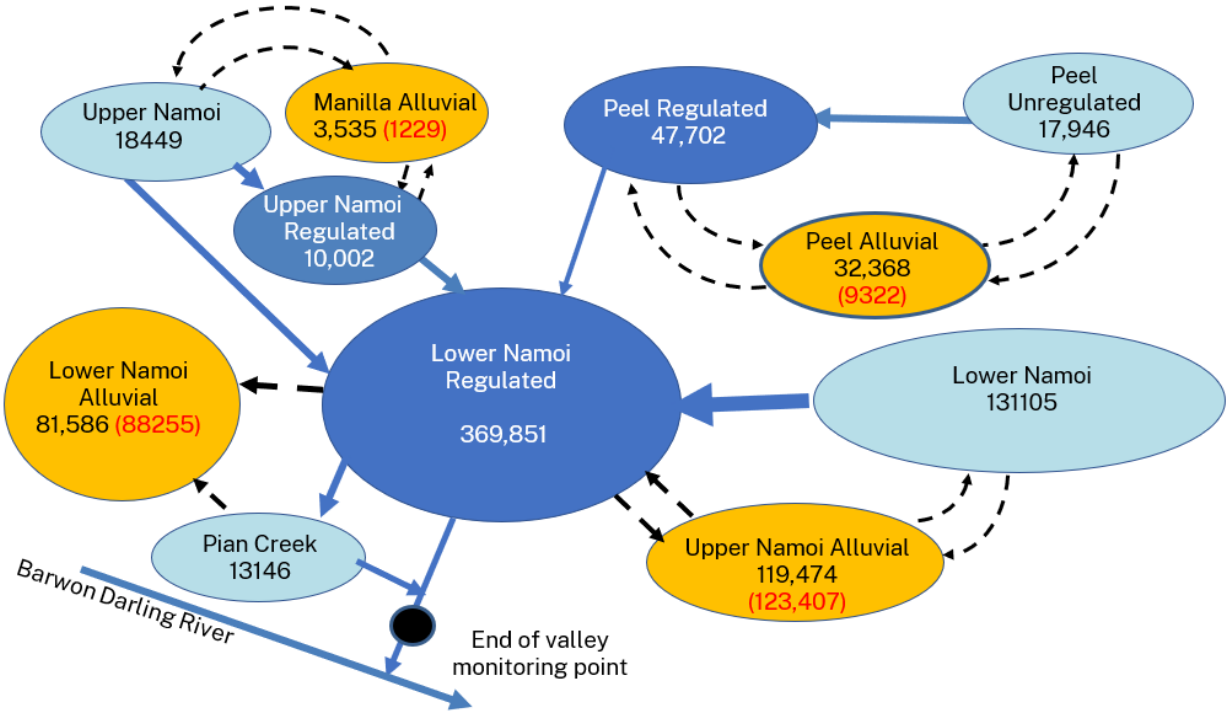

Figure 9: Spatial relationship of extraction

4.2.1 The recommended Peel sub-catchment

This recommended grouping is consistent with the LTWP and combines Chaffey and Peel sub-catchments to protect Tamworth's water security. Peel is a major sub-catchment of the Namoi, covering 4,700 square kilometres. The Peel River begins upstream from Nundle, at around 1,100 M elevation, and is regulated once it reaches Chaffey Dam. Below the dam, the Peel River runs through Tamworth and connects with the regulated Lower Namoi River near Carroll.

The unregulated rivers and their connected groundwater flow into the Peel Regulated River, which has significant implications for inflows to the regulated river system and therefore water security in Tamworth. Notably, in the Peel Valley the sum of unregulated and alluvial allocations is 50,314 ML, which is greater than the regulated river allocation of 47,702 ML. Extraction from the unregulated river and alluvial groundwater can therefore substantially reduce the inflows to the regulated river and reduce reliability of supply both in the Peel Regulated River and the Namoi Regulated River (see **Figure 9**).

The total water allocation for the Peel Valley is 98,024 ML at 100 percent unit shares divided as follows:

- regulated river is 47,702 ML at 100 percent allocation (48.6 percent)
- unregulated rivers are 17,946 ML at 100 percent allocation (18.3 percent)
- alluvial is 32,368 ML at 100 percent allocation (33.1 percent).

In this sub-catchment area, the unregulated system has not been subject to the same LTAAEL compliance measures as the regulated and alluvial systems. Water allocation for unregulated water users was 100 percent continually for the period of the Plan. However, the Regulated River has been managed to a LTAAEL of 15,100 ML/year and the alluvial groundwater to a LTAAEL of 9,322 ML/year. Without LTAAEL compliance the unregulated water users can extract 42 percent of all extraction despite only representing 18 percent of entitlement.

The Peel Regulated River has reduced allocations as low as zero for general security and therefore no carryover is allowed. In contrast, provisions in the Plan allow unregulated access licences at the same time to extract up to 200 percent (23,794 ML) within a single year. The Peel catchment needs to be managed to a sustainable limit with each plan's water accounts aligned to achieve the same outcomes.

4.2.2 Upper Namoi

This sub-catchment is consistent with the LTWP and combines the Split Rock and Keepit sub-catchments to ensure the protection of inflows into Keepit Dam, which is critical for water security for towns like Walgett. The major rivers in the Upper Namoi include the Manilla and Macdonald rivers. The Manilla River flows through the town of Barraba. Once it reaches Split Rock Dam the river becomes the Upper Namoi Regulated River. At Manilla the Namoi River and Manilla River join.

4.2.3 Lower Namoi tributaries

The Lower Namoi tributaries sub-catchment includes most of the Namoi River tributaries downstream of Keepit Dam. It includes major tributaries such as the Mooki River, Coxs Creek and Baradine Creek. These tributaries provide important contribution to downstream flows in the regulated system and contain most of the entitlement and proposed floodplain regulated and unregulated floodplain harvesting. In 2016, the Mooki River catchment was incorporated into the Plan.[60]

Many of these Lower Namoi tributary water sources are impacted significantly by groundwater extraction (see **Chapter 7**). The outflows from these rivers are the inflows to the regulated river. As stakeholders identified:

"*The protection of tributary flows in the unregulated system to maintain water quality during extreme dry periods is critically important for downstream requirements to meet critical human water needs for basic landholder rights during such time. Coordination of rules with the regulated WSP is important during these extreme events especially given the regulated WSP appears to lack strong rules to manage access licences during low flow periods which creates a risk to all Namoi water sources.*"[61]

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60 Prior to 2016, the Mooki River catchment was covered by the *Water Sharing Plan for the Phillips Creek, Mooki River, Quirindi Creek and Warrah Creek Water Sources 2003*

61 Submission: *Inland Rivers Network* (February 2022)

Management of the regulated rivers, including general security allocations, is based on historical inflows. No growth or changes in extraction patterns in the unregulated extraction is considered in the Regulated Namoi Plan. However, the Plan's account limits allow for twice the historical level of extraction within any given year. The impact of account rules from this group of water sources needs to be considered in the context of both regulated and unregulated river outcomes.

4.2.4 Pian Creek (excluding the regulated section)

This is a recommended additional sub-catchment to manage replenishment flows, inflows from the Gwydir catchment and water quality at Walgett.

Pian Creek leaves the Namoi River just upstream of Wee Waa and is the largest effluent of the Namoi River. Water is diverted into the system via Gunidgera Weir through Gunidgera Creek, and then into Pian Creek. When flows are sufficient, Pian Creek travels for over 200 km westward before it joins the Namoi River just 20 km upstream of its confluence with the Barwon River. Pian Creek receives local runoff from two small tributaries: The Sink Hole and Old Burren Creek.

Pian Creek has two sections, a regulated and an unregulated section. The unregulated section requires replenishment flows that have not been supplied through the Regulated River. The Regulated Namoi Plan specifies that sufficient volumes of water must be set aside from assured inflows into Split Rock Dam, Keepit Dam or other water storages to provide replenishment flows of up to a total volume of 14,000 ML in any water year to Pian Creek downstream of Dundee Weir.

'*The aim of these replenishments is to fill all the waterholes and billabongs down to the end of Pian Creek*.'[62]

However, rules also allow operator (WaterNSW since 2014) discretion and replenishment flows were not provided into unregulated water sources downstream of the regulated river at critical times (see **Chapter 8**). In addition, as highlighted above, unregulated extraction in the Upper Namoi can reduce the minimal inflow sequence and therefore the availability of water for Pian Creek.

The unregulated section of Pian Creek is divided into two zones - the creek itself (Lower Pian Creek Management Zone) and the Tributaries Management Zone where the increase in entitlement has occurred.

Walgett's town water supply is reliant on flows in Pian Creek as this creek flows into the Namoi Regulated River just upstream of Walgett. The protection of flushes through Pian Creek is therefore important for the quality and quantity of Walgett's water supply. The water quality for Walgett is often poor due to blue-green algae, and Walgett had insufficient supply for town water during the recent drought.

4.2.5 Lake Goran

This is a recommended additional sub-catchment to manage Lake Goran's conservation values and recognise that Lake Goran is not connected to the rest of the Namoi catchment, except during very high flows.[63] It therefore needs to be considered separately. Lake Goran

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62 NSW Department of Infrastructure, Planning and Natural Resources (2005) *Namoi River Valley: IQQM Cap implementation summary report*, p.28.

63 ..... CSIRO (2007). *Water availability in the Namoi*. A report to the Australian Government from the CSIRO Murray-Darling Basin Sustainable Yields Project. CSIRO, Australia

is an ephemeral lake located on the Liverpool Plains 65 kilometres west of Tamworth and around 30 kilometres south of Gunnedah. When full, Lake Goran spans around 8,200 hectares. The lake is filled by local runoff and inflows from Yarraman, Hut Gully and Coomoo Coomoo creeks. During very high flows, Lake Goran drains into the Mooki River via Native Dog Gully Creek and can contribute to flows in the Namoi River. However, this only occurs during major floods.[64]

4.3 The Trade Review

A review of water trading rules within the Namoi and Peel unregulated areas found that, as a result of the high levels of entitlement, there are limited opportunities for trade.[65]

Table (see Appendix A) lists the Plan's entitlements in comparison to the entitlement held in the NSW Water Register and the trade limits. This shows:

- in the Peel Valley the trade limits are the same as the NSW Water Register (no trades are allowed into the Peel or between water sources within the Peel)
- in the Upper Namoi the trade limits are greater than the NSW Water Register values. (However, the Commission notes that a town water licence is currently not in the register and therefore the trade limit and current entitlement may be close to equal)
- there are some opportunities for trade in the Lower Namoi tributaries
- the Pian Creek trade limit matches the current entitlement in the NSW Water Register (this means no more trade can occur).

Trading is the only economic performance indicator included in the Plan. However, the outcomes of the Trade Review indicate that there should remain very limited opportunities for trade, as the system is heavily allocated. As such, issues created where specific sub-catchments are particularly overallocated will need to be managed through improved access and accounting rules.

Typically, a plan establishes trading rules at a sub-catchment scale, which incorporates one or more water sources. Water sources may also be further sub-divided into management zones. However, this Plan subdivides water sources into smaller trading zones. This makes it difficult for the Plan provisions to adequately address risks at the appropriate scale. The Plan should be reconfigured to establish appropriate groupings that align for the purposes of both management and trade.

In general, trade is an important tool for water licence holders, including primary producers, urban water suppliers, and environmental water managers to achieve economic, social and environmental outcomes. In addition, trade can be an important and cost-effective part of a suite of adaptation strategies for climate change. This is critical given climate change may cause a significant shift in the region's climate, potential long-term declines in water availability, and more frequent and intense extreme events. While the Commission recognises the outcomes of the Trade Review identified limited opportunity for trade except within a trading zone, DPE-Water should continue to seek to identify if there are opportunities to enhance trade in the future, such as trading between licence types to assist in managing climate change impacts.

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64 DPI (2016) *Water Sharing Plan for the Namoi Unregulated and Alluvial Water Sources 2012 - Background document*, p.37.

65 Trade review of unregulated water sources in the Namoi and Peel document provided by DPE-Water - unpublished.

4.4 Some water sources need to be sub-divided to achieve localised outcomes

Typically trading is specified at the sub-catchment scale, with multiple water sources included in the sub-catchment. However, this Plan subdivides some water sources into trading zones. For example, Baradine Creek is sub-divided into the following:

- Namoi Effluents and Barwon Trading Zone - 47 unit shares
- Turragulla and Gil Gil Creeks Trading Zone - 19,023 unit shares
- Baradine Creek and Tributaries Trading Zone - 1,326 unit shares.

Although Baradine Creek covers a large area, extraction is concentrated on Turragulla and Gil Gil Creeks.

In the Plan, management zones are used for both access and trading, whereas trading zones are used for trading purposes only. This creates inconsistencies. The current trading zones should be established as management zones in the Plan, with appropriate access rules applied to address the unique concerns within each zone.

Many of the trading zones are associated with streams that flow out of the regulated river and return downstream (i.e., anabranches). Extraction in these creeks should consider both local and regulated river outcomes.

Entitlement and trading limits also need to be transparent for each zone. For example, the Plan lists the current entitlement in Bohena Water Source as 995.5 unit shares and restricts the Bohena Namoi River Trading Zone to 695 unit shares. However, neither the Plan nor the NSW Water Register state what the current entitlement in the trading zone is. For transparency, the Plan needs to state the amount of entitlement within each zone so that users understand the extent to which trade is actually available.

4.5 Recommendations

R 5	To ensure that extraction is managed at the appropriate scale, DPE-Water should: a) remake the trading zones as management zones, making the extraction volumes transparent and allowing for access conditions to be set at an appropriate scale b) separate out Pian Creek and Lake Goran as additional sub-catchments c) establish the proposed sub-catchments as extraction management units and develop LTAAELs for each extraction management unit. d) ensure provisions such as access rules and carryover rules are appropriately tailored to each sub-catchment and consistent with the priorities of the Act.

5 Ensuring sustainable extraction

A fundamental role of a water sharing plan is to define how much water can be extracted by licensed users, while the remaining water must protect the water sources, their dependent ecosystems and basic landholder rights. Ensuring extraction remains within the LTAAEL is critical to protect environmental values. The Plan establishes rules to manage extraction at three scales:

- **Long term:** LTAAELs control the amount of water that can be extracted over the long term in each extraction management unit. Setting these limits is critical; a limit that is too high will reduce the amount of water remaining for the environment and downstream water users, while a limit that is too low reduces economic and social opportunities. LTAAEL assessment should include all extraction for consumptive (non-environmental) use, including basic landholder rights. The Plan also includes provisions referring to the Basin Plan for calculating the 'sustainable diversion limit' (SDL) and assessing SDL compliance in the Plan area (see **Box 1**).[66]
- **Medium term:** AWDs allocate the volume of water that can be extracted under access licences each year. The unregulated Plan rules currently require AWDs to be used retrospectively to reduce extraction if the LTAAEL is exceeded. To date, AWDs have not been used to reduce risks to the unregulated water sources but have been set to a default of 100 percent each year.
- **Short term:** daily access rules define when licensees can extract water. These include rules like cease to pump requirements and establishment of flow classes. They are intended to protect the needs of the environment, basic landholder rights and water utilities on a daily basis. Reactive Section 324 orders can also be used in extreme situations, such as drought, to protect flows, but as discussed in previous plan reviews, their use is sub-optimal, difficult for water users to predict and is not regulated by the Plan.

The Commission continues to identify significant issues around establishing and managing extraction and interception activities through LTAAELs.

[66] ..... Divisions 3, Part 6 of the Plan.

Box 1: Baseline diversion limits and long-term average annual extraction limits

The Basin Plan provides an additional framework that sets limits on the amount of all surface water and groundwater that can be sustainably taken from a particular area (for example, an SDL resource unit) within NSW's Murray-Darling Basin catchments. These limits are referred to as sustainable diversion limits (SDLs).[67] To establish the SDL in each SDL resource unit, authorities had to determine how much water was extracted and intercepted (on an average annual basis) from each water resource unit prior to the development of the Basin Plan.[68] This is referred to as the baseline diversion limit (BDL).[69] NSW interprets the BDL definition as being the long-term average annual extraction limit (LTAAEL) provided for in the water sharing plan in place as at 30 June 2009.

Since 2021, the Inspector General of Water Compliance is responsible for monitoring Basin states' compliance with SDLs.[70] Basin states, including NSW, are required to report on water take in SDL resource units within inland NSW areas in accordance with Section 71 of the *Water Act 2007*. The *Water Act 2007* and Basin Plan have not only added an additional layer of reporting, and assessment, but compliance with SDLs is based on a broader definition of all forms of water take and interception activities, including take from watercourses, run-off dams, floodplain harvesting, commercial plantation (net take) and basic landholder rights.

For the review, the above reference to the Water Act and Basin Plan requirements is relevant given that:

- the Plan references the SDL in Part 6, Division 3
- the definition of the Plan's LTAAEL and the definition of the Basin Plan's BDL is broadly equivalent[71]
- the MDBA has defined numerical estimates of BDLs for unregulated water sources in the Namoi catchment area.[72]

5.1 Common issues across inland unregulated water sharing plans

The Commission continues to identify significant issues related to the establishment and management of extraction through LTAAELs across its reviews of the inland unregulated water sharing plans. These recurring issues are discussed in detail, along with associated recommendations to address them, in issue briefs on the Commission's website:

- Issue brief 1 – The need to set numeric extraction limits and assess compliance
- Issue brief 2 – Ensuring LTAAELs are sustainable

In this Plan, the following common issues were identified:

- **The Plan lacks a numeric LTAAEL:** The Plan's LTAAEL is not expressed in numeric form, rather it is expressed descriptively as the sum of various types of historic water

[67] ..... MDBA (2022) *Current diversion limits for the Basin*
[68] ..... Under the *Water Act 2007* and *Basin Plan 2012*, the SDL applies to 'consumptive', non-environmental take only.
[69] ..... The SDL for a resource unit is the BDL minus the water recovery target. The recovery target has been set at 2,750,000 ML (or 2,750 gigalitres) for the entire basin, and the recovery target for each water resource unit, along with the BDL, is specified in Schedule 2 of the *Basin Plan 2012*
[70] ..... Clause 215C of the *Water Act 2007*
[71] ..... Schedule 2 of the *Basin Plan 2012* and Clause 32 of the Plan.
[72] ..... MDBA (n.d.) *Current Baseline and Sustainable Diversion Limits*

usage, over certain periods of time.[73] The associated numeric value (in other words a volumetric value in ML) of this LTAAEL definition is not included in the Plan. Based on data available in the Basin Plan, the Commission determined that unregulated river access licence entitlement is roughly twice the Namoi estimated unregulated BDL component, which should be roughly comparable to the LTAAEL. This creates a high risk that the current water extraction levels in the system is higher than the current extraction limits and that water that is meant to be reserved for the environment and basic landholder rights is being extracted.

- **LTAAEL compliance assessment has not been undertaken:** In the absence of numeric LTAAELs, DPE-Water has not assessed how much water is extracted from these sources each year, nor compared this actual usage to the extraction limits to assess compliance with the plans. A water sharing plan's ability to achieve its objectives is dependent upon compliance with its extraction limits. Therefore, these issues create a material risk that many of the inland unregulated water sharing plans are not achieving their intended outcomes.

- **The LTAAEL is not based on a sustainability assessment:** There is no evidence that the Plan's LTAAEL definition has been assessed for its sustainability. The Commission considers there is a high probability that the Plan's current LTAAEL is not sustainable. Specifically, it is not based on environmental water requirements, and it does not adequately consider climate variability or climate change. Since the Plan was implemented, there have been increases in the level of entitlement.

The Commission considers that these issues must be addressed as a matter of priority and recommends:

- DPE-Water establish accurate numeric LTAAELs to provide clarity around the amount of water that can be extracted or diverted under the water sharing plans and enable compliance assessment
- DPE-Water undertake LTAAEL compliance assessments based on the best available information beginning with extraction management units at high risk for LTAAEL exceedance. This assessment should not be delayed until better information is available, rather it should be done immediately based on information available and continually improved over time, consistent with the precautionary principle
- the Plan should include a provision requiring DPE-Water to determine the sustainable level of extraction for proposed extraction management units (based on sub-catchments) by Year 5 based on best available ecological requirements, hydrological, and climate information and that these levels are used to define and amend the Plan's LTAAELs for each extraction management unit.

5.2 AWDs should be set conservatively in the absence of LTAAEL assessment

Continuing to have water sharing plans that rely on an LTAAEL without adequately defining the LTAAEL or assessing compliance against it does not protect the Act's priorities of protecting the environment or basic landholder rights. As discussed in the previous sections, it is essential that DPE-Water rectifies these issues before remaking the Plan.

[73] ..... The LTAAEL is defined in Section 29 of the Plan and includes the sum of the annual extraction averaged over the period from 1 July 1993 to 30 June 1999 under entitlements issued under Part 2 of the *Water Act 1912*; for relevant water sources; the annual requirements for basic landholder rights for relevant water sources; and annual extraction under floodplain harvesting licences from relevant water sources.

As outlined in **Chapter 3,** there is a high risk of overextraction in the Namoi catchment. The Commission strongly recommends that DPE-Water undertakes LTAAEL assessments as required by the Plan as an immediate priority. Until this occurs, the Plan should require other mechanisms to provide accountability for protecting the environment, basic landholder, and town water requirements. Risks to the environment and other priority water users are exacerbated by the presence of significant entitlements above the estimated historic extraction on which the LTAAEL is based. Water users can legally use all water allocated to them subject to licence conditions. Risks to water sources are further compounded by the Plan having access rules that only prohibit take when there is no visible flow in most water sources, no limits on daily take and generous account management rules. Combined, these issues mean there is inadequate protection of environmental water at the short, medium and long-term time frames.

The replacement Plan should include provisions for AWDs to be set conservatively until DPE-Water conducts appropriate LTAAEL compliance assessments. For water sources identified as high risk under the WRP risk assessment, using the precautionary principle, AWDs should be reduced to be equivalent to the ratio of the LTAAEL to unregulated river access entitlement. If that cannot be calculated, the AWD should be set at the ratio of the unregulated BDL to the unregulated river access entitlement.

This is not the Commission's preferred outcome, but in the absence of any other estimate of LTAAEL compliance it is necessary to provide accountability and assurance that the environmental water is protected as a priority consistent with the Act requirements. This would provide a tangible figure for stakeholders to highlight the risks of the current AWD approach to the Plan's water sources. It also provides an incentive to landholders to report their actual take and encourages DPE-Water to develop sustainable, numeric LTAAELs and conduct LTAAEL assessment in the Plan area.

Once LTAAEL assessments are completed, AWDs should be made flexibly and adaptively based on a range of considerations, including (but not limited to) historic and predicted climate conditions, risks to urban water supplies, and amount of carryover. In addition, this should be implemented alongside the 'sub-catchments' identified in **Chapter 4**, in order to focus such an AWD reduction to areas of likely growth in use and avoid penalising water users in areas of low risk of growth in use.

The Commission has estimated the ratio of the BDL component to unregulated river access entitlement to be 48 percent (i.e., BDL is 48 percent of total entitlement). The Commission expects that the ratio of LTAAEL to unregulated river access entitlement is of a similar scale. An AWD reduction of this scale would have a critical impact on unregulated river and floodplain harvesting access licensees. Such a ratio should only be used where DPE-Water does not take steps to make a reasonable estimate of extraction to undertake LTAAEL compliance and should not be required considering the data available from water users and implementation of metering reforms. Assessment of LTAAEL compliance does not require perfect information, but it will require resourcing. The Commission supports DPE-Water implementing a risk-based approach and using available data to estimate LTAAEL compliance until improved information, such as longer term metering data, is available.

In the meantime, the risk that AWDs may need to be significantly reduced to comply with the LTAAEL under the current Plan is not transparent to users given the lack of a numeric LTAAEL and failure to undertake LTAAEL compliance and adjust AWDs in the past. DPE-Water must engage with licensees as soon as possible to communicate the risks of exceeding the current LTAAEL, and potential future reductions in AWDs. Engaging with stakeholders would allow DPE-Water to better understand potential impacts on licensees, areas of risk and may help develop more nuanced AWD adjustments to adequately protect

the environment with the least impact on licensees. The conservative approach is only recommended as a Plan safeguard in case of DPE-Water's lack of LTAAEL assessment and should only apply if DPE-Water does not make a reasonable estimate of extraction and assess it against a numeric LTAAEL.

5.3 Future AWDs should be proactive

The Plan could be improved to ensure the efficient use of available water. The current process of providing large allocations relative to the LTAAEL then relying on temporary water restrictions under Section 324 of the Act is leading to poor outcomes across NSW. Managing to a numeric sustainable long-term limit should allow for AWDs to vary between years based on a range of issues. To improve outcomes from the Plan a shift is required to move to proactive AWDs and Plan provisions that enable quicker responses to changes in conditions.

AWDs for the regulated rivers are proactive and based on considerations such as water held in storage, carryover, and estimated drought inflow sequences. The Plan's LTAAEL is based on the historical extraction between July 1993 and June 1999. This historical data is no longer current, sufficient or appropriate. This level of extraction was affected by both the level of activation and climate during that time. The LTAAEL and AWDs need to be able to accommodate different climatic conditions and levels of activation to address risk and achieve good outcomes.

At the start of each water year the following should be considered as part of the AWD announcements:

- **The level of activation:** Water can only be extracted from an access licence if it is attached to a water supply work approval (work approval).[74] DPE-Water should consider the level of activation in the Plan area when determining short-term water management decisions, including annual AWD announcements to manage the hydrologic stress to the Plan's unregulated water sources during droughts. However, this consideration should take into account the risk of additional activation, such as any pending work approvals.
- **The amount of carryover:** The regulated river AWDs consider carryover before allocating additional water. The current unregulated carryover rules have been applied across all NSW unregulated plans without consideration of climate variability and seasonality or risks and outcomes.

  Having large amounts of carryover reduces LTAAEL compliance effectiveness as it can take many years for water held in accounts to be reduced before extraction drops to that required to meet the LTAAEL. Responses to exceedances above the average can occur years after the exceedance, often at times when climatic conditions are such that no reductions are required.
- **Historical and predicted climatic conditions:** The Plan requires the same volume is allocated irrespective of climatic conditions. The Plan states it recognises the effects of climate variability by having provisions that limit water availability on a long-term average basis.[75] Using a long-term average, which is a fixed number, does not recognise or adjust for climate variability between years. Having AWDs that are based on the actual volume of water available would seem logical and should be a goal of the Plan. The Plan also notes that other statutory tools are available to manage for climatic variability within a water source, for example, temporary water restrictions

[74] ..... While it is recognised that there are other types of work approvals, for brevity our references here to 'work approval' refer only to water supply work approvals.
[75] ..... Clause 14(1) of the Plan.

under Section 324 of the Act. The use of Section 324s and turning off the Plan's provisions to manage water scarcity is sub-optimal, does not provide a predictable approach for the market (i.e., for licence holders) and is not transparent.

Comparing current and predicted climatic conditions to those experienced between 1993 and 1999 should highlight the duration and intensity of droughts that may occur and the Plan's ability to manage those droughts. Past climate and future climate change both indicate the likelihood of drier periods having higher frequency, duration and scale. The paleoclimate work for the regional water strategies has shown the climate has greater extremes, with longer periods of drought than recent recorded history. Climate change is projected to cause changes in monthly rainfall patterns and lower average annual rainfall in most NSW inland catchments, higher temperatures, and lower evapotranspiration leading to lower runoff and inflows. This magnifies the risks that the Plan cannot meet the Act's water management and water sharing principles.

- **Risk to urban water supplies:** AWDs continued to be allocated at 100 percent while downstream towns such as Walgett were on Level 6 water restrictions, which is not in accordance with the priorities of the Act. While Section 324 orders can be made to restrict usage to protect town water supplies if necessary, the Plan should include appropriate rules to adequately protect town water supplies during a range of conditions.

DPE-Water should develop and implement a proactive AWD approach to address climate variability. Having a risk-based AWD process can be used to better manage climatic variability. The current practice of allowing large carryovers to manage variability only considers extraction during wetter years and does not reflect the risk in drier years. Any such proactive AWD approach should be clear and transparent in the Plan rules and should provide licensees adequate certainty to assess their inter-annual risks but be responsive to annual weather systems.

By Year 5 of the Plan, DPE-Water should, in consultation with stakeholders, develop and implement the use of proactive AWDs and revise account management rules (carryover and account limits) to support any AWD changes.

5.4 The LTAAEL does not consider climate change risks

The Plan's LTAAEL is fixed at a level of extraction during the 1990s. As highlighted in **Section 2.2**, the 1993 to 2000 period reflects a relatively wet period in the historical rainfall record. Using this period to define the LTAAEL is inadequate as it does not consider the full climate record or climate change projections of streamflow decreases in the next ten years and beyond.[76]

Defining a sustainable LTAAEL must factor in the full suite of climate scenarios and recognise that the future climate is uncertain and further work is required to accommodate change. This should be part of adaptive management. The Plan maintains the water above the LTAAEL for the environment and basic landholder rights, but if the LTAAEL is based on extraction from a period with greater water availability than is likely in the future, there is a risk that less water will be available for the environment and basic landholder rights.

[76] ..... Australian Government (2019) *Bioregional Assessments – Namoi Subregion – Climate*; DPIE (March 2021) *Draft Regional Water Strategy: Namoi Strategy*

Over the last few years DPE-Water has significantly expanded its understanding of the area's climate – both historically via the paleoclimate dataset, and with respect to climate change.

The new climate data and updated hydrological modelling developed for the Regional Water Strategy suggest:

'..climate conditions, combined with the way we currently manage and share water, are placing the Namoi region's water resource under pressure and creating challenges for the towns, communities, industries and ecosystems that rely on them. Relying on observed historical records to make water management decisions is no longer the best course of action. We need to have plans in place to be prepared and resilient if there are future changes in the climate.'[77]

The impacts of drought will be exacerbated by climate change. The Namoi region could experience:

- changing rainfall patterns with less winter and spring rainfall and more summer and autumn rainfall on average
- increased evaporation
- a much higher probability of prolonged 10-year dry periods, as well as the potential for more frequent short, sharp droughts, similar to the most recent drought to affect the Namoi catchment (2017-2020)
- higher water security risks for major towns that rely primarily on surface water
- a higher probability of cease-to-flow events
- less frequent, but higher magnitude large flow events.[78]

These estimates indicate that for the period of the next water sharing plan there is a notable potential impact on rainfall, water availability and runoff. This would be compounded by increased demand for extraction due to higher temperatures and evapotranspiration. If the Plan were to be managed to the current LTAAEL, the volume of water available to fulfill environmental and instream needs would therefore decrease over time.

Adaptive management will require that the plans are able to be adjusted to ensure the impacts of climate change can be addressed without the need to switch off the Plan.

Without a mechanism to adjust for likely climate change trends, the Plan does not fulfil its requirements of prioritising the sharing of water to protect the water source and its dependent ecosystems, or adequately recognising variability.[79] The Plan must therefore address and be adaptable to the risk of reduction in water availability for the environment and water users and planned environmental water over the next ten years and beyond.

It is critical that DPE-Water determines sustainable level of extractions for each sub-catchment that considers historic variability and risks from climate change and use this as the replacement Plan's LTAAEL(s) for each extraction management unit (see **Chapter 4**). DPE-Water's work on climate change and variability, as part of the draft *Namoi Regional Water Strategy*, should be incorporated into the Plan review.

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77 DPIE (March 2021) *Draft Regional Water Strategy: Namoi Strategy*
78 ..... *Ibid.*
79 ..... Section 5(3) of the Act.

The Minister currently has the ability under Section 324 of the Act to implement temporary water restrictions to cope with water shortages in unregulated rivers. While this is one option to manage water during periods of drought, DPE-Water should expand rules for setting AWDs, allowing for more certainty and proactive management of water shortages based on best available evidence.

Existing Plan provisions, while not designed specifically to manage climate variability, may partially fulfil this function. For example, cease to pump thresholds restrict extraction and protect pools when flows stop. However, this may cause equity issues between water users, where upstream extractors are less affected by cease to pump rules than those downstream. The Plan originally included an objective to 'manage these water sources to ensure equitable sharing between users'.[80] Reducing AWDs would share the reduced entitlements more equitably across all users, regardless of their relative position in each water source.

The Plan should also prevent carryover provisions intended to allow greater extraction in wetter years from allowing greater extraction during drier years.

5.5 Estimated entitlements need to be updated regularly in both plans

The entitlement shares and basic landholder rights volumes in the water sharing plan areas have changed since the plans were first made. Although there are several possible reasons for the difference between actual and estimated shares, the Commission continues to hold the view that DPE-Water should update all water sharing plans' estimated entitlement shares and basic landholder rights whenever Plan provisions are reviewed and updated.

Updating these figures is important to:

- provide transparency and clarity to licence holders, including information as to the potential risk of future water allocation reductions once DPE-Water has established a numeric LTAAEL (or LTAAELs) for the plans and undertakes appropriate LTAAEL compliance assessment
- indicate if there are emerging risks in a water source that need to be reviewed and assessed
- provide a trigger that could be used by DPE-Water to initiate a review of the adequacy of the Plan provisions necessary to manage risk in the Plan area.

As highlighted in previous water sharing plan reviews, the discrepancies between actual and estimated entitlement shares and basic landholder rights volumes in the Plan could impact the Plan's water sources, the environment and water users. This is because the adequacy of current Plan provisions, including daily access rules, are based on an understanding of hydrological stress, which is closely linked to the level of entitlements. In addition, changes in entitlement shares and basic landholder rights could impact on the connectivity between the unregulated and regulated river systems.

If actual entitlement shares and basic landholder rights volumes are higher than the plans' estimates, there is greater risk that access rules and other Plan provisions may not be adequate to protect the ecological needs of these water sources, their water-dependent ecosystems and basic landholder rights' needs and also impacts downstream water users.

[80] ..... Clause 10(d) of the *Water Sharing Plan for the Namoi Unregulated and Alluvial Water Sources 2012*. Historical version for 4 October 2012.

The Commission recommends that DPE-Water reviews and updates the plans' estimated entitlement shares and basic landholder rights volume based on best available information and continues to update these figures whenever the plans are amended or at a minimum every 5 years. In addition, DPE-Water should undertake a risk assessment if the entitlement shares and basic landholder rights volume changes by more than 5 percent in any water source to determine whether the current provisions of the plans remain adequate to protect the water source, the environment and basic landholder rights.

5.6 Cultural flows should be considered in sustainable extraction limits

Cultural water entitlements and cultural flows are expected to become an increasingly important component in water planning and management.[81] This is evident by DPE-Water's commitments to develop an Aboriginal Water Strategy and Cultural Watering Plans (CWP) which seek to inform the department's review of existing policy frameworks to identify opportunities for greater Aboriginal access and ownership of water.[82] As this work progresses, it is likely that water entitlements beneficially owned by First Nations will be established (or acquired) as well as cultural flows implemented in particular Plan areas.

To meet the spiritual, cultural, environmental, social and economic needs of First Nations, entitlements and flows may have variable consumptive and non-consumptive components. In this context, DPE-Water should consider how to support First Nations holding these entitlements and to account for cultural flows.[83]

DPE-Water should make provisions in the replacement Plan to account for these water entitlements beneficially owned by First Nations, as well as for cultural flows. It will be important to explicitly integrate reporting of cultural flows into water accounting. This would include the development of a conceptual framework to correctly account for cultural flows, which will be used for consumptive and non-consumptive purposes. The establishment of sustainable LTAAELs should also consider these new and emerging issues to ensure future LTAAELs and their compliance can account for cultural water uses.

In addition, Australia's Native Title laws recognise the traditional rights and interests to land and water for Aboriginal people. The *Native Title Act 1993* specifically recognises Native Title water rights, stating that 'a Native Title holder is entitled, without the need for an access licence, water supply works approval or water use approval, to take and use water in the exercise of Native Title rights' (Section 55(1)).

Anyone holding Native Title rights with respect to water can take and use water in accordance with the laws and customs by which the title is held.[84] There are several Native Title applications in the Plan area[85] and it will be important that the development of a

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81 ... Cultural flows are defined as 'water entitlements that are legally and beneficially owned by the (First) Nations and are of a sufficient and adequate quantity and quality to improve the spiritual, cultural, environmental, social and economic conditions of those Nations'.

82 ..... DPE Water (n.d.) *About Cultural Watering Plans*

83 MDBA (2020) *Sustainable diversion limit (SDL) accounting improvements strategy 2020 – 2025*

84 As stated in Section 211(2) of the *Native Title Act 1993* '*... the law does not prohibit or restrict the Native Title holders from carrying on the class of activity, or from gaining access to the land or waters for the purpose of carrying on the class of activity, where they do so for a) the purpose of satisfying their personal, domestic or non-commercial communal needs; and b) in exercise or enjoyment of their native title rights and interest*'.

85 National Native Title Tribunal (2022) *Search Application and Determinations*

sustainable LTAAEL accounts for any future Native Title rights in the Plan area. It will also be important that DPE-Water engages with Native Title holders or registered claimants in remaking the Plan and developing sustainable LTAAELs.

5.7 Recommendations

R 6	As a matter of priority, to support sustainable extraction and improve transparency, DPE-Water should: a) establish accurate numeric LTAAELs to provide clarity around the amount of water that can be extracted or diverted under the water sharing plans and enable compliance assessment b) undertake LTAAEL compliance assessment based on the best available information beginning with extraction management units at high risk for LTAAEL exceedance. This assessment should not be delayed until better information is available, rather it should be done immediately based on information available and continually improved over time c) include a provision in the Plan requiring DPE-Water to determine the sustainable level of extraction by Year 5 based on best available ecological requirements, hydrological and climate information, and that these levels are used to define and amend the Plan's LTAAELs for each extraction management unit.
R 7	As part of the replacement Plan, DPE-Water should: a) review the Plan's entitlement and estimated basic landholder rights volume and update these figures b) continue to update these figures whenever the Plan is being reviewed or amended c) undertake a risk assessment if the entitlement and basic landholder rights estimate changes by more than 5 percent in any water source to determine whether Plan provisions remain adequate to protect the water source, the environment and basic landholder rights.
R 8	DPE-Water should ensure the replacement Plan includes requirements (i.e., new Plan provisions) for: a) AWDs to be set conservatively if DPE-Water does not annually make and publish an estimate using best available information of extraction and assess compliance with the LTAAEL(s) b) proactive AWDs to support sustainable numeric LTAAEL(s) and revision to account for management rules (carryover and account limits) to support any AWD changes. These proactive AWDs should be developed in consultation with stakeholders by Year 5 of the replacement Plan.

6 Securing town water supply to meet future needs

The Plan and its predecessors include a performance indicator to measure the extent to which local water utility requirements have been met.[86] This chapter outlines how in the recent drought the towns' requirements were not met. Emergency measures were taken to ensure the water supply for Tamworth, Kootingal, Walgett and Manilla town water supplies. The Commission considers the Plan did not perform well against this performance indicator.

In 2020, the Plan's objectives were changed to include the social and cultural objectives to maintain, and where possible improve:[87]

- access to water for town water supply and licensed domestic and stock purposes
- water quality within target ranges for basic landholder rights, town water supply, domestic and stock purposes.

No changes were made to the Plan's provisions to achieve these objectives. The Plan's strategy for reaching the targeted social and cultural objectives was to provide access to water for basic landholder rights, town water supply, and for licensed domestic and stock purposes. The Plan needs to go beyond just providing access for town water and ensure that the Plan's provisions appropriately protect and prioritise towns' access to water.

Most town water needs in the Plan area are at very high risk.[88] The Commission identified provisions in the Plan such as carryover and inadequate cease to pump rules that do not address and, in some cases, increase this risk. Town water supplies are important to the economy as local communities and many industries are dependent on town water. Town entitlements outside the Plan in the regulated rivers are also impacted by rules from this Plan.

DPE-Water needs to ensure impacts from changes in extraction patterns in the unregulated rivers set by the Plan are also appropriately considered in the regulated rivers (**Section 6.6**).

Further, the current Plan is not transparent in relation to town water supply security because most of the access rules for town water supplies are not included in the Plan provisions. It is important that local water utility access licences (referred to in this report as town water supply licences) are fully recognised in the Plan and their access conditions (currently on water supply works approvals (work approvals)) are included in the Plan provisions. Inconsistencies between the Plan and the current conditions on works approvals should be resolved in the remake of the Plan.

Town water supply licences have priority over other licences consistent with Section 58(1)(a)[89] of the Act. The Commission has reviewed the Plan with that intent.

To ensure that towns have priority, the Plan needs to be amended to:

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[86] ..... See Clause 12(A)(ii) of the Plan.
[87] ..... See Clause 12 of the Plan.
[88] ..... DPIE (2021) *Draft Regional Water Strategy Namoi Strategy*
[89] ..... Section 58(1)(a) Priorities between different categories of licence.
..... (1) For the purposes of this Act, the following priorities are to be observed in relation to access licences—
..... (a) local water utility access licences, major utility access licences and domestic and stock access licences have priority over all other access licences.

- recognise the economic and social importance of towns and their dependence on town water (**Section 6.1**)
- recognise the risk to water security (**Section 6.2**)
- recognise that the water security risks could increase for towns (**Section 6.3**)
- ensure growth in town water supply occurs within sustainable limits and provide a mechanism to allow towns to increase their water security within these limits (**Section 6.4**)
- ensure access rules protect towns within the Plan (**Section 6.5**)
- protect flows that are critical for towns supplied in the regulated river and downstream (**Section 6.5** and **Section 6.6**)
- protect basic rights, and domestic and stock rights (**Section 6.7**).

6.1 Town water supplies are economically and socially important

'The economic value of town water supply, water-related tourism and recreational fishing and community well-being must be included in consideration of economic outcomes.'[90]

Namoi catchment's local water utilities are licensed to take up to 40,257 ML to supply their connected towns and villages from the unregulated, regulated and groundwater plans.[91] This equates to roughly 6 percent of all current licensed water entitlement. When interception by basic rights and floodplain harvesting is included, this is 4 percent of extraction from the Namoi catchment. However, towns provide much greater than 4 percent of the region's economic output.

Town water entitlement is 5 percent of all licenced unregulated entitlement. The Plan states there is a total 8,333 ML/year for town water supplies.[92] Industries that rely on town water contribute significant economic prosperity to the region and their access to reliable town water is essential. This is not recognised in the Plan's economic objectives.

There is a large concentration of agricultural processing facilities that draw on town water supplies. Non-residential water requirements just exceed the residential daily water requirements. For example, up to half of Tamworth's non-residential town water is used by the top four major users (4.2 ML/day) in the meat processing industry.[93]

Since 2015/16, food product manufacturing experienced significant growth. In 2021, manufacturing was the second largest employer in Tamworth employing 12 percent of the population and generated $369 million in 2020/21.[94]

The Namoi region is also a popular tourism destination offering many recreational and cultural activities and hosts high-profile events including the Tamworth Country Music Festival and Gunnedah AgQuip agricultural field day, which create additional demand on

[90] ..... Submission: Inland Rivers Network, 21 February 2022.
[91] ..... Note this entitlement goes across five Plans: 8,333 in the Plan, 16,400 ML in the Peel Regulated River, 515 ML/year in the Upper Namoi Regulated River Water Source, 2,271 ML/year in the Lower Namoi Regulated River Water Source, 11,347 in the Namoi Alluvial plus non alluvial groundwater.
[92] ..... See Clause 23 of the Plan.
[93] ..... Hunter H2O (2020)*Tamworth Emergency Water Supply Plan*
[94] ..... Economy Id (2023) *Tamworth Regional Council: Economic Profile*

town water needs. The annual Tamworth Country Music Festival attracts up to 300,000 visitors and AgQuip field day attracts 100,000 visitors.[95] These large events play a key role in the region's economy, delivering a significant boost to businesses.

Given the growth in industry and recreation and tourism demands, DPE-Water should consider these needs and the pressure they place on town water in the replacement Plan.

6.2 Towns have very high water security and social risks

It is not the responsibility of this review to determine the appropriate level of security for town water supplies. However, it is necessary to determine if the Plan's provisions are increasing or decreasing risks to those supplies, and if they are providing adequate protection of those supplies. Many of the towns have very high security risks,[96] which means town water supply is under significant pressure, particularly during droughts.

DPE-Water recognises the importance of assessing risks to town water supply and continues to engage and work collaboratively with local water utilities in the development of strategic plans to address water security requirements. The Safe and Secure Water Program (S&SP) is the government's key infrastructure program targeted at addressing priority town water security, water quality and environment (sewerage) risks in regional NSW.

While the Plan is not responsible for investments for securing town water supplies, it is required to prioritise towns by protecting water supplies within Plan provisions. The Plan is also required to ensure protection of basic rights and domestic and stock rights in accordance with the priorities of the Act.[97] The Commission acknowledges that under the Act the Plan can provide for different priority for licences.[98] However, the Plan does not explicitly state that it sets any licence priorities different to the Act. Therefore, the priorities in the Act stand.

The recent drought exposed the vulnerability of town water supplies. Towns in the Namoi region faced some of the most severe water security risks across NSW.[99] Outlined below are:

- the specific risks to each water supply system
- the impact of the recent drought on those supplies
- the implications to the Plan from changes to water supply.

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[95] ..... DPIE (2021) *Draft Regional Water Strategy Namoi Strategy*
[96] ..... *Ibid.*
[97] ..... See Clause 58 Priorities between different categories of licence.
..... (1) For the purposes of this Act, the following priorities are to be observed in relation to access licences—
..... (a) local water utility access licences, major utility access licences and domestic and stock access licences have priority over all other access licences.
[98] ..... (3) In relation to the water management area or water source to which it applies, a management plan may provide for different rules of priority to those established by subsection (1).
..... (4) If a management plan so provides for different rules of priority, those different rules are taken to have been established by this section.
[99] ..... DPIE (2021) *Draft Regional Water Strategy Namoi Strategy*

Tamworth, Moonbi, and Kootingal

Tamworth is an important regional centre located in the Peel sub-catchment. It is the largest regional town in the state's northwest and provides an employment and services hub for communities throughout the Namoi and surrounding catchments.

Tamworth, Moonbi, and Kootingal are supplied by a scheme that includes:

- Chaffey Dam - 16,400 ML of local water utility entitlement in the Peel Regulated River
- Dungowan Dam - 5,600 ML of entitlement in the unregulated Upper Peel River Tributaries Water Source
- the Paradise Drift Wells (emergency only).

Extraction from these sources depends on the relative water levels of the dams. On average 60 percent of Tamworth's water use comes from Chaffey Dam (regulated water) and the remaining 40 percent (unregulated water) from Dungowan Dam.

In 2016, WaterNSW completed the Chaffey Dam Augmentation and Safety Upgrade Project. This increased the permanent storage capacity from 62,000 ML to 100,000 ML. The dam filled to full capacity in October 2016. Despite this increase in storage capacity, in June 2019, the NSW Government announced emergency short-term measures to extend supply to the Tamworth, Moonbi, and Kootingal town water supply system.[100] By February 2020, Chaffey Dam declined to less than 15 percent capacity and Tamworth Regional Council had its yearly town water supply allocation reduced to 70 percent of its entitlement in 2019/20. Council had to implement Level 5 water restrictions.

Dungowan Dam was full in early 2017 and fell to less than 20 percent by January 2020. The access conditions for Dungowan Dam (which are not included in the Plan) impact on Tamworth's water security.

Walgett

Walgett water supply services both the town of Walgett and the Namoi and Gingie villages. In 2021, the town had a population of 1,824.[101] The population of Walgett Shire was 5,747. Twenty-one percent were Aboriginal and Torres Strait Islander peoples.[102] Population is expected to decline over the next decade. Many stakeholders including the Dharriwaa Elders Group raised a range of water quality and water security issues during this review (see **Chapter 10**).[103]

Walgett Shire Council should be able to rely on the regulated river entitlement. However, access to safe drinking water continues to be a challenge for residents in Walgett, creating an ongoing health risk.

During successive droughts Walgett has not been able to extract surface water. The way that both the regulated Namoi River and unregulated river water sources are managed (particularly Pian Creek), has significant implications for Walgett's water supply. The Namoi regulated river water sharing plan will be reviewed by the Commission in 2024. However, as

[100] ..... WaterNSW (2019) *Operational update: Peel valley emergency drought works, December 2019*
[101] ..... ABS (2023) *Walgett Quick Stats Suburbs and Localities*
[102] .... ABS (2023) *Data by region (map) by LGAs)*
[103] ..... Dharriwaa Elders Group (2023) *Yuwaya Ngarra-li Briefing Paper: Walgett's Drinking Water*

highlighted through this report the regulated and unregulated rivers are highly interconnected.

Unregulated river extraction can impact the downstream regulated rivers' ability to supply water to towns in drought. The unregulated rivers also provide additional flow for flushing that improves water quality in the regulated river.

In December 2018, releases from the Keepit Dam, which supplies Walgett, were stopped. The Namoi River at Gunnedah stopped flowing between 1 January 2019 and 10 February 2020, except for seven days in April 2019 in response to a rainfall event.[104] When regulated river water is unavailable, Walgett supplements surface water with groundwater from the Great Artesian Basin as this is their only alternative. The high concentration of sodium in the groundwater presents a health risk. A temporary reverse osmosis plant was established in Walgett to resolve drinking water quality requirements but was closed four months later due to waste management issues.[105] It has only recently been switched back on.[106]

The water requirements for Walgett go beyond just drinking water. There are also significant impacts on locals' wellbeing and amenity in droughts:

'Water for parks and gardens, and other amenity is not available in the drought. Water for amenity is wellbeing for the town – in hot summers it can go up to 50 degrees, so it's hard. People fish and swim. It's the only form of amenity they have.'[107]

Manilla

Manilla historically extracted water from the Upper Namoi unregulated river. However, the limited protection of this water in the Plan meant that Manilla is now required to extract water from the regulated river supplied from Split Rock Dam.

To improve the security of the town's water, a supply pipeline was constructed in December 2019 from the Manilla River (regulated river) to the Namoi Weir (on the unregulated Upper Namoi Water Source). When the regulated water enters the weir, it becomes unregulated water. This water is then pumped to the water treatment plant. The implication for the Plan and access requirements are set out in **Section 6.3**.

As a result of Manilla shifting to supply from the regulated river, water was not delivered to regulated water licence holders in the Upper Namoi Regulated River between Split Rock Dam and Lake Keepit.[108] This will be discussed in the Commission's review of the *Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016*.

Barraba

In 2010, Barraba township was being supplied by an emergency bore because the primary water source, the Manilla River, had virtually dried up.[109] In 2013, after the Plan commenced,

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[104] ..... DPIE (2021) *Draft Regional Water Strategy - Namoi Strategy*
[105] ..... Interview: Walgett Shire Council, 17 November 2022.
[106] ..... Ministerial media release (28 April 2023) *Minister Jackson vows to fix Walgett water*; Ministerial media release (3 May 2023) *Walgett successfully switches to river water*
[107] ..... Interview: Walgett Shire Council, 17 November 2022.
[108] ..... Legislative Council (2019) Questions & Answers Paper No. 161
[109] ..... ABC Local (2010) *Barraba's water supply critical*

Tamworth Regional Council built a 28-kilometre pipeline with pumping station from Split Rock Dam to Barraba to ensure residents have access to a quality water supply.[110] The implications of shifting water from the regulated river will be discussed in the Regulated River Review.

Bendemeer

The small town of Bendemeer extracts water from the Macdonald River. The town also has a bore in the fractured rock groundwater that was "*handy in 2020 drought.*'[111] During the recent drought the town relied solely on the bore.

Werris Creek, Quirindi and Willow Tree

Werris Creek's water supply comes from the surface water source at Quipolly Dam. The dam has a capacity of 8,100 ML and lies 9.5 km south-east of the town. Liverpool Plains Shire Council owns and operates the dam and has an annual extraction allocation of 1,000 ML. Water is treated at the Werris Creek Water Treatment Plant before distribution to Werris Creek consumers.[112]

Quirindi's water supply comes from the Upper Namoi Zone 1 Borambil Creek Ground Water Source. This water source is an alluvial aquifer with a high degree of connectivity to the Borambil Creek. Water is extracted via a bore field with bores up to 30 metres deep located at Borambil, 3.7km west of the town. Council holds an annual extraction allocation of 1,150 ML from the aquifer. Water is disinfected before distribution to Quirindi consumers.[113]

The Quipolly Water Project, currently under construction, will secure the Werris Creek water supply and provide options for the management of Quirindi water supply by constructing a state-of-the-art water treatment plant near Quipolly Dam and a pipeline to Werris Creek and Quirindi.[114]

Walcha

Walcha Shire Council relies on 379 ML of surface water entitlement from the Macdonald River, which is stored in an off-river storage. Whilst town water entitlement was adequate, security of supply has been at risk over the life of the Plan. In 2019, Walcha faced lengthy water restrictions because its 80 ML off-creek water storage was not big enough to service the town's 3,092 residents. A new 300 ML off-stream storage dam, being built on a small tributary of the MacDonald River, will provide greater water security and reliability for residents and businesses and help drought-proof the town's water supply. Major construction is due to be finished by mid-2023.[115]

As outlined above, town water supply for many of the towns in the Plan area remains at high risk. While infrastructure projects can provide additional storage, and/or access to additional supplies, they will not alone resolve risks for towns. The Commission has

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[110] ..... Pump Industry Magazine (2013) *Construction about to begin on Tamworth water supply project*
[111] ..... Interview: Tamworth Regional Council, 5 December 2022.
[112] ..... Liverpool Plains Shire Council (2023) *Water and sewer services*
[113] ..... *Ibid.*
[114] ..... Liverpool Plains Shire Council (2023) *LPSC Water Quipolly Water Project*
[115] ..... Ministerial media release (31 August 2022) *Walcha one step closer to improved water security*

identified several ways in which the Plan can be revised to better ensure town water has priority and that supplies are protected as much as possible.

6.3 Access rules do not protect all town water supplies within the Plan

In general, local water utility access licences include an extraction component that specifies the timing, circumstances, and rates at which town water can be taken. These conditions should be consistent with the priorities, principles, and objects in the Act, as well as the Plan objectives, including around social, cultural, and economic outcomes.

The rules in Part 8, Division 2 of the Plan apply to the taking of water under an access licence with a share component that specifies the water sources listed in Table B of the Plan.[116] The Plan also states rules do not apply to the taking of water under access licences of the subcategory 'town water supply' or domestic and stock (subcategory 'domestic').[117]

The various towns, their entitlement, and access conditions for those towns within the Plan and other water users are listed in **Table 2** below. A search of Local Water Utility water supply work approvals on the WaterNSW water register (as well as a search of still unconverted *Water Act 1912* licences) shows water supply work approval conditions have stricter access conditions than those in **Table 2**. This means that the Plan rules and the approval conditions on the licences are inconsistent – with the Plan being less strict. This creates confusion for users and means that it is not clear how the water is meant to be managed. The following water sources provide examples of where town water supply is not adequately prioritised due to these stricter conditions.

Upper Peel River Tributaries Water Source

Dungowan Dam has an entitlement of 5,600 ML/year. Release requirements for the dam are not specified in the Plan. The works approval for the dam (90AL819030) requires that when flows entering are above 10 ML/day Tamworth Regional Council is required to maintain a flow in Dungowan Creek downstream of the dam of not less than 10 ML/day, for the downstream river health. When flows are less than 10 ML/day, the inflow into the dam is required to be released. This rule means up to 3,650 ML/year is not available for Tamworth, which impacts its water security.

The Plan requires downstream licences to stop pumping when there is no visible flow at Thortons Road Bridge. The environmental water released by Tamworth Regional Council is not protected from other uses and is available for extraction immediately downstream of the dam. This not only poses a risk to environmental outcomes but prioritises unregulated access licence holders downstream of Dungowan Dam over town requirements and the environment, which does not give effect to the principles and priorities of the Act.

The Plan needs to assess the environmental requirements of Dungowan Creek and set appropriate rules that are then applied consistently to both Dungowan Dam and other water users that recognise the priority of the Act.

[116] ..... See Clause 46 Table B of the Plan.
[117] ..... See Clause 18 (b) & (e) of the Plan.

Upper Namoi Water Source

The Plan lists 564 ML/year of local water utility in the Upper Namoi Water Source. This licence is not listed in the Water NSW water register. The Commission understands this is because the *Water Act 1912* licence (for Manilla) has not been converted. The Commission understands that the existing Water Act licence requires up to 4 ML/day to be released downstream. However, the Plan does not include this requirement and only requires 'no visible flow over the crest of the Manilla Weir.' This rule is less stringent than the town water supply rule and therefore is not in line with the priority order in the Act.

The Plan needs to protect the town water supply and address the cross-plan water supply for Manilla to ensure that water pumped from the regulated river is protected and not required to then be released under the unregulated river access rules.

The rule for unregulated access licences should not be less stringent than the town water supply if the principles and priorities of the Act are to be given effect.

Table 2: Town water supplies within the Plan

Council and population in 2021[118]	Entitlement (ML/year)	Water source /zone	Water supply	Entitlement in NSW Water Register	Town water supply access rules	Unregulated Access licence rule specified in Plan
Walcha Shire (3,046)	463	Mid Macdonald River	Walcha	379	Not specified in Plan or Water Register	Very Low Flow Class less than or equal to 10 ML/day Macdonald River at Woolbrook gauge (419010)
Tamworth Regional (62,769)	84	Mid Macdonald River	Bendemeer	84 ML	No conditions attached to Water Access Licence 32510 or Works Approval 90AL828819	Very Low Flow Class less than or equal to 10 ML/day Macdonald River at Woolbrook gauge (419010)
	564	Upper Namoi	Manilla	564	Not specified in Plan 4 ML/day*	Very low flow is equal to no visible flow over the crest of the Manilla Weir
	421	Upper Manilla	Barraba	421	Not specified in Plan or water register	Very low flow is less than or equal to 3 ML/day at Manilla River at Black Springs gauge (419053)
	5,600	Dungowan Creek Management Zone	Tamworth	5,600	Not specified in Plan Specified on works approval 90CA 819031 See ** below	Very low flow is equal to no visible flow at Thortons Road Bridge
Liverpool Plains Shire (7,825)	1,000	Quirindi Creek	Werris Creek	1,000	Not specified in Plan or water register	Less than or equal to 2 ML/day

[118] NSW Government (2023) *NSW Projections Explorer*

* Interview: Tamworth Council, 5 December 2022.

* * When flows are entering the storage of Dungowan Dam from all sources including the Dungowan and Lever Creek catchments, the approval holder must operate the return pipes to Dungowan Creek so as to maintain a flow in Dungowan Creek downstream of the dam of not less than 10 ML/day (as measured by the automatic recording gauge) provided that when the total inflow into the storage of the dam is less than 10 ML/day, than that flow which is entering the storage of the dam for the time being must be released downstream of the dam into Dungowan Creek.

Mid Macdonald River Water Source

The Mid Macdonald water source contains two town water access licences (Bendemeer and Walcha) totalling 463 ML/year. Access licences are required to cease to pump when river levels reach the Very Low Flow Class that is less than or equal to 10 ML/day at the Macdonald River at Woolbrook gauge (419010).

This Woolbrook gauge is upstream of Bendemeer and most of the licenced use is for irrigation. Stopping extraction at 10 ML/day at the top of the system does not protect water all the way to the bottom of the water source. For example, at 11 ML/day all the 11 ML/day can be extracted. This is well within the peak daily demand of the 4,818 unit shares of unregulated access licences in the Mid Macdonald River Water Source.

Protection of town water would best be served by setting the cease to pump rule for this water source at the downstream end of the water source at the Macdonald River Retreat gauging station (419028).

The ability of Bendemeer to use an alternative groundwater source reduces the need to extract the very low flows in some years.

DPE-Water need to review the location reference for cease to pump rules to ensure town water supplies are protected.

6.4 Water security risks could increase for towns

For towns and Aboriginal communities, the potential for more frequent and severe dry periods will need to be addressed. Data analysis and modelling undertaken to date indicate that the Namoi catchment is vulnerable to climate change. New modelling for the *Draft Namoi Regional Water Strategy* found that surface water availability for Tamworth could be significantly less secure than what we have seen in the last 130 years.[119]

Under DPE-Water's adopted dry climate change scenario:

- median minimum inflows into Chaffey and Dungowan dams could be 50 percent lower than the observed historical levels over a 36-month period
- existing dams could sit at lower levels for longer than average. Annual water supplied to Tamworth Council from regulated river sources could decline by approximately 20 percent when compared to the long-term historical forecasts.

Towns reliant on unregulated rivers and heavily dependent on surface water may be exposed to even greater water security risks. The draft *Namoi Regional Water Strategy* highlights that towns reliant on the unregulated surface water system are classified at very high water security risk, in light of climate change projections. These towns are Tamworth, Manilla, Kootingal/Moonbi, Werris Creek, Quirindi and Willow Tree.[120]

Even without modelling, the risk to towns is clear from historical rainfall records. **Figure 10** shows the deviation from average rainfall for a longer period than the graph in **Figure 4**, **Chapter 2**. It shows the recent drought in comparison to previous droughts. While the

[119] ..... DPIE (2021) *Draft Regional Water Strategy - Namoi Strategy*
[120] ..... *Ibid.*

recent drought was the culmination of eight years of below average rainfall this is dwarfed by the twenty-six-year period from 1922 to 1948 that culminated in the World War II drought. Managing to averages without the ability to reduce AWD based on availability increases the risks to towns. These risks need to be better addressed by the replacement Plan.

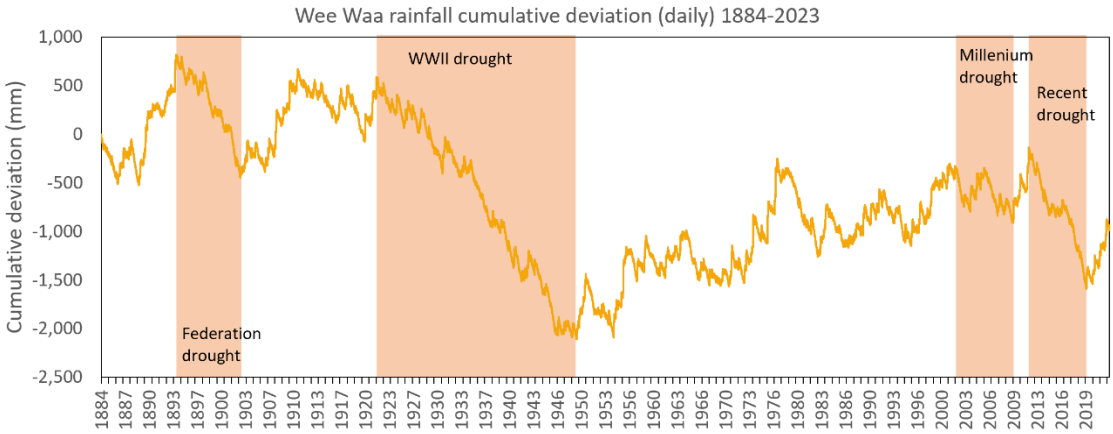

Figure 10: Cumulative deviation from average rainfall

To better identify when NSW rivers are moving into drought (or flood) WaterNSW is developing a framework for measuring risk.[121] This framework will use a variety of indicators such as rainfall deficit, soil moisture and streamflow conditions to provide an early warning of drought or flood to enable the community to be better prepared. This framework needs to be extended to include the unregulated rivers.

Given the significant risks that climate change poses to water availability in the Namoi catchment, the replacement Plan must consider the latest climate data and modelling to ensure that these risks are considered and managed under the replacement Plan.

6.5 Growth in town water supply needs to occur with sustainable limits

Many councils are planning for significant growth in town water use due to increased population and industry demand. Tamworth Regional Council uses on average 9,000 ML/year, which is half of their total entitlement.[122] Tamworth Regional Council aspires to significant growth in population, services and industry over the next twenty years. The NSW Government population projections estimate that Tamworth's population is likely to grow by over 14 percent to reach 71,956 by 2041.[123] For the period of the replacement Plan, it is unlikely that Tamworth Regional Council would seek an increase in entitlement under Section 66 (3) of the Act.[124]

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[121] ..... DPIE (2021) *Peel Valley snapshot 2017 2020 Drought*
[122] ..... Namoi Unlimited (2019) *Namoi Water for the Future*
[123] ..... NSW Government (2023) *NSW Projections Explorer*
[124] ..... Clause 66 (3) At the end of each 5-year period, the Minister is to vary each local water utility licence so as to reflect any variation in population, together with any variation in associated commercial activities, that has occurred during that period in the area in which domestic water is supplied under the licence.

In 2020, the Productivity Commission Inquiry[125] found Australia's water policy was not up to the challenge of climate change and population growth. They also found that non-infrastructure options to improve Tamworth's water security were explicitly excluded from the analysis for Dungowan Dam's business case. Moreover, as the proposed project is within a fully allocated water system, it would result in an implicit (and expensive) transfer of water.

Tamworth's town water supply security is complex and determined by both their infrastructure and provisions across multiple water sharing plans. Tamworth can grow within their existing entitlement. However, since the water available is limited, this growth comes from a mix of:

- a reduction of security to Tamworth's overall supply
- a reduction to other users from less water available in the Peel Valley
- a reduction to other users outside the Peel Valley through LTAAEL rules in the regulated and unregulated plans.

Having greater entitlement does not guarantee security. Trades can improve security if the water is purchased strategically, for example above Chaffey Dam or as an offset for environmental releases. Currently the Plan does not facilitate or protect water purchased for towns. The Plan should address the Productivity Commission's recommendation.

The Commission recognises that town water supplies also provide for local industries, particularly in places like Tamworth. The trade-offs between domestic and non-domestic industries reliant on town water supply and other industries should be explicit and based on clear equity objectives.

If growth in extraction was to exceed the entitlement due to growth from commercial activities not listed in Clause 66 (3) – which allows the Minister to grant additional entitlement for specific town water supply needs, entitlement would be required through an explicit transfer of water through trade.

..... Clause (3A) In subsection (3), associated commercial activities means activities within the following categories recognised in the Australian and New Zealand Standard Industry Classification (ANZSIC), 1993 edition (Australian Bureau of Statistics publication, Catalogue No 1292.0) —
..... (a) construction (category E),
..... (b) wholesale trade (category F),
..... (c) retail trade (category G),
..... (d) accommodation, cafes and restaurants (category H),
..... (e) communication services (category J),
..... (f) finance and insurance (category K),
..... (g) property and business services (category L),
..... (h) government administration and defence (category M),
..... (i) education (category N),
..... (j) health and community services (category O),
..... (k) cultural and recreational services (category P),
..... (l) personal and other services (category Q).

[125] ..... Australian Government Productivity Commission (2021) *National Water Reform 2020, Inquiry Report no. 96*, Canberra.

For the replacement Plan, DPE-Water should develop explicit opportunities for towns to grow within sustainable limits and consider if industrial town water usage should be licenced separately from domestic town water to enable appropriate prioritisation.

6.6 Plan rules impact town water in the regulated river and downstream

The Trade Review (see **Section 4.3**) recognised the significance of unregulated extraction on towns not directly supplied by the unregulated Plan. However, other aspects of the Plan such as the access and accounting rules also do not protect towns. These include towns supplied by the regulated rivers. The Trade Review recommended restricting trade into the catchments of the Chaffey, Split Rock, and Keepit Dams.

Table 3 sets out the towns supplied by the regulated river and how rules in the unregulated rivers affect their security of supply. It details the regulated dam from which it is supplied, the water sources immediately upstream of the dam, the contributing tributaries downstream of the dam and the unregulated rivers.

For example, security to towns, such as Walgett, and other essential services supplied by the Namoi Regulated River are reliant on minimum inflow sequence. Clause 55(1) of the Upper and Lower Namoi Regulated River Water Sharing Plan requires the operator to operate the water supply system to be able to meet Basic Landholder Rights and 100 percent of local water utility, domestic and stock licences and high security licences through the period of lowest accumulated inflows as per information prior to 1 July 2004.This includes the amount of water assumed to flow into Keepit Dam and Split Rock Dam during the worst drought on record before 2004. The current Namoi Regulated River Water Allocation Methodology[126] uses a modelled minimum inflow volume of 67,800 ML for the 24-month period from June 1918 to May 1920. During the recent drought the observed inflows for the 24-month period were just 5,000 ML. Reduced minimal inflows contributed to the failure to provide water to Walgett during that drought.

This also raises the question of whether the system operation rules should be amended in light of recent data. Replacing the 67,800 ML previous minimum with the 5,000 ML may not be viable as it would require retention of a significant amount of dam volume for possibly a once-in-a-century event and would have significant economic impacts on irrigation and other water holders. However, not changing anything is arguably inconsistent with priorities in the Act and inequitable for the people of Walgett. Adequate selection and protection of a minimum inflow sequence to ensure surface water flow at Walgett is therefore both an unregulated and regulated plan issue and can only be resolved with an integrated catchment planning approach.

[126] ..... DPIE (2021) *Water Allocation Methodology - Namoi Regulated River Water Sources*

Table 3: Regulated town water supplies impacted by the Plan

Towns	Extraction Point	Dam and contribution tributaries	Unregulated water sources immediately upstream	Access rules in water upstream water source	Entitlement	Extraction Limit	Minimum two-year inflow requirement for regulated plan
Barraba	Split Rock Dam	Split Rock Dam	Split Rock Upper Manilla	Less than or equal to 3 ML/day	17,335-unit shares of unregulated access licences and 1,448 ML of local water utility licences	Up to 300 % of unregulated entitlement within any 2-year period*. 56,349 ML	67,800 ML for a 24-month period
Manilla	Manilla River at Manilla	Split Rock Dam	Split Rock	Visible flow			
Walgett	Namoi River at Walgett	Keepit Dam	Keepit Dam* Upper Namoi	No visible flow over the crest of the Manilla Weir			
		All water sources below Keepit Dam	Pian Creek	Less than or equal to 43 ML/day at Dempseys Bridge gauge or less than or equal to 5 ML/day at Waminda gauge	13146	Up to 300 % of unregulated entitlement and 400 % of unregulated floodplain harvesting**	Specified as part of total losses in regulated river AWD
			Baradine Creek	Visible flow	19739		
Tamworth	Chaffey Dam	Chaffey Dam	Chaffey Dam	2 ML/day or less	Restricted trade from below to above Chaffey Dam	Up to 300 % of unregulated entitlement within any 2-year period*.	4,000 ML for 12 months[127]

* 200% in first year and 100% in second year
** 300% in first year and 100% in second year

[127] DPIE (2019) *Water Allocation Statement – Peel Valley*, Figure 1.

The total unregulated entitlement above the Keepit Dam is 17,335 unit shares of unregulated access licences and 1,448 ML of local water utility licences. With a 100 percent allocation AWD and an account limit of 2 ML per unit share, up to 52,005 ML is allowed to be extracted within any two-year period. This is 77 percent of the assumed inflows. The daily access rules protect some inflows into Split Rock Dam (3 ML/day). The visible flow rules for the bulk of the catchment of the Keepit Dam's catchment do not protect any inflows.

The Namoi Regulated River Water Allocation Methodology[128] also relies on inflow from tributaries below the dams. As the methodology lumps inflow and losses together the assumed inflows for these rivers cannot be determined. Major tributaries, such as Baradine Creek, also have visible flow as the access rule, meaning users can pump water as long as there is visible flow. The Plan needs to align with the regulated river plan to protect town water supplies. This requires a separate LTAAEL for the catchment above the regulated river dams and access rules that can protect the minimal inflow sequence.

Walgett's town water supply is also reliant on flows in Pian Creek as this creek flows into the Namoi Regulated River just upstream of Walgett. The protection of flushes through Pian Creek is therefore important for the quality and quantity of Walgett's water supply. The water quality for Walgett is often poor due to blue-green algae.

The Plan protects flows in the Lower Pian Creek Management Zone when they are less than or equal to 43 ML/day at Dempseys Bridge gauge (419098) or less than or equal to 5 ML/day at Waminda gauge. There is no requirement to protect replenishment flows. Outside of the Lower Pian Creek Management Zone the rules currently only require that water must only be taken if there is visible flow in the water source at the location where water is to be taken. The extent to which Pian Creek historically contributed to Walgett water security (in terms of quantity and quality) needs be considered in the Plan.

6.7 Not all access rules protect basic rights and domestic and stock rights

The Plan estimates 2,480.2 ML/year for basic rights.[129] DPE-Water provided updated estimates of 4,894 ML/year.[130] It is not clear if this is a result of a different method of estimation or actual growth. This increase has occurred in water sources critical to water supply such as the Mid Macdonald.

Excluding domestic and stock rights from cease to pump rules[131] does not protect those rights. The standard default access rule of 'no visible flow' does not effectively protect flows during periods of low flow and are difficult to enforce. Visible flow at the pump site does not ensure water reaches downstream basic rights and stock and domestic rights users.

Rules carried forward from previous water access licence conditions that were established under the *Water Act 1912* are listed separately in Appendix 4 (Section 47(7) of the Plan).

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[128] ..... DPIE (2021) *Water Allocation Methodology - Namoi Regulated River Water Sources*
[129] ..... See Clause 19 of the Plan.
[130] ..... DPE-Water (2022) *Basic Landholder Rights Summary Gwydir, Namoi, Murrumbidgee* internal document.
[131] ..... See Clause 18(b) of the Plan.

These should form the basis for more effective access rules. DPE-Water should consolidate and review existing unregulated water access licence conditions and works approval conditions. These conditions should be reflected in the Plan provisions, instead of the schedule and appendices. The Commission understands that DPE-Water is currently undertaking a review of Appendix 4 of the Plan.

6.8 Recommendations

R 9	To better protect and prioritise town water supplies, DPE-Water should in the next two years: a) for transparency include all access rules for town water supplies in the Plan b) review additional town water demands from industry and population pressures and the adequacy of existing rules c) review the risks to town water supplies (including the latest climate change data) within the Plan and the regulated river, and ensure provisions provide adequate protections for towns d) provide a mechanism within the Plan for towns to increase their water security within sustainable limits and review whether there is a need to split industrial usage from domestic water supply to ensure appropriate prioritisation e) review and consolidate existing access licence conditions and water supply work approval conditions including Appendix 4 to ensure they protect town water supplies and basic rights f) consider whether specific access rules are required in Pian Creek in order to protect replenishment flows and potential water quality benefits of Pian Creek flows for Walgett's water supply water.

7 Improving consideration of connectivity

The Namoi catchment is one of the most groundwater reliant regions in the Murray-Darling Basin. For the period 2012-13 to 2018-19, groundwater extraction from the Namoi alluvials accounted for on average 18 percent of metered groundwater take in the NSW groundwater resource units of the Murray-Darling Basin.[132] Groundwater is an important water source for towns, stock and domestic use, industry and water-dependent ecosystems of the Namoi valley. Reliance on groundwater for irrigation during the term of the Plan has been significant,[133] particularly during drought periods (see **Figure 11**).

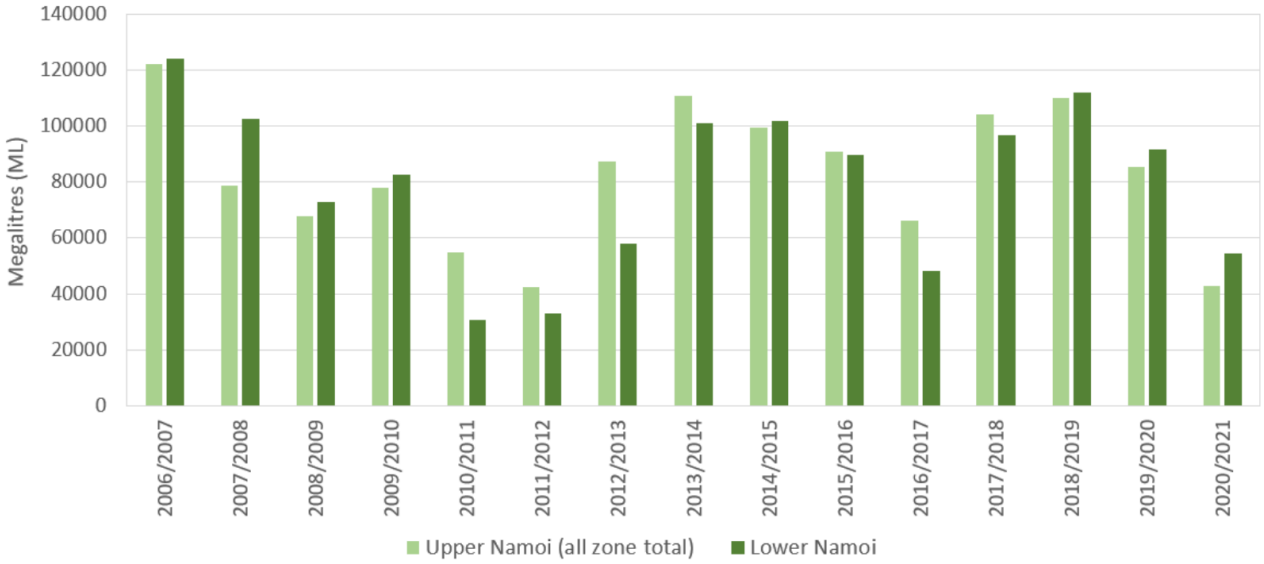

Figure 11: Annual metered usage for the Lower Namoi Groundwater Source and the Upper Namoi groundwater sources combined

While this Plan review focuses on the unregulated surface water sources of the Namoi valley, the combined extraction of surface and groundwater can impact water availability and surface and groundwater flow, particularly where water sources are highly connected. Therefore, surface and alluvial water sharing plans cannot be considered in isolation.

The scale of extraction can risk local and cumulative impacts in high use water sources but also downstream. Potential impacts include loss of aquifer integrity, degradation of water-dependent ecosystems, water quality issues and changes in water source connectivity. These impacts are already being observed in the Namoi valley where groundwater levels continue to decline in parts of the Lower Namoi and Upper Namoi.[134]

In 2020, during the development of Namoi surface water resource plan as part of the Basin Plan process, the alluvial water sources were removed from the Plan into a dedicated groundwater sharing plan. This was undertaken to align water sources with surface and

[132] ..... Fu, G., Rojas, R. and Gonzalez, D. (2022) *Trends in groundwater levels of the alluvial aquifers of the Murray-Darling Basin and their attributions*, *Water 2022*, 14, 1808.
[133] ..... DPE (2021) *Upper and Lower Namoi Groundwater Sources: 2021 groundwater level review*
[134] ..... *Ibid.*

groundwater resource plan areas of the Basin Plan. The new *Water Sharing Plan for the Namoi Alluvial Groundwater Sources 2020* (the Alluvial Groundwater Plan) is not due to expire until 2030, meaning it will be in place nearly another decade before it is reviewed by the Commission. Some of the recommendations from this current Plan review will have implications for this groundwater plan and may warrant amendments before the plan is due to expire to better manage connected water sources.

This chapter does not solely focus on surface water-groundwater connectivity. It also identifies where there can be greater focus on lateral and longitudinal connectivity within and between water sources. This is consistent with the Plan's objective to protect and contribute to the enhancement of 'the longitudinal and lateral connectivity within and between water sources to support target ecological processes.'[135] However, the adequacy and appropriateness of Plan rules for achieving this objective requires further assessment and should be a focus of Plan replacement to ensure Plan provisions support connectivity given it is *'fundamental to supporting many of the priority ecosystem functions in the Namoi.'*[136]

Key issues covered in this chapter include:

- inadequate consideration of relationships and risks to connectivity (**Section 7.1**)
- impacts of surface water extraction are exacerbated by groundwater extraction (**Section 7.2**)
- while linked access rules have been introduced for some water sources, they are lacking for other connected water sources (**Section 7.3**)
- the Plan does not consider how unregulated river water sources contribute towards downstream flows (**Section 7.4**).

7.1 Inadequate consideration of connectivity relationships and risks

Several water sharing plans apply to the water sources of the Namoi valley.[137] Many water sources that these plans apply to are considered to be connected, albeit to varying degrees (ranging from highly connected, less connected to disconnected). However, the way in which connectivity is defined and considered in the Plan and corresponding Alluvial Groundwater Plan[138] does not adequately recognise or manage risks to connected water sources.

The Plan and the Alluvial Groundwater Plan do not adequately consider two key aspects of connectivity:

1. they do not adequately recognise the role of streamflow in groundwater recharge i.e., reserving a portion of surface flows is not just important for maintaining longitudinal connectivity, it is also important for groundwater recharge, the maintenance of

[135] ..... Clause 10(2)(b) of the Plan.
[136] ..... DPIE (2020) *Namoi Long Term Water Plan – Part A: Namoi catchment*, p.25.
[137] ..... *Water Sharing Plan for the Unregulated Namoi and Peel Water Sources 2012*
..... *Water Sharing Plan for the Namoi Alluvial Groundwater Sources 2020*
Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016
Water Sharing Plan for the NSW Murray-Darling Basin Fractured Rock Water Sources 2020
[138] ..... *Water Sharing Plan for the Namoi Alluvial Groundwater Sources 2020*

groundwater-dependent ecosystems (GDEs) and the productive base of consumptive groundwater users.

2. they do not adequately recognise the highly connected but ephemeral streams where groundwater discharge plays an important role in supporting water-dependent ecosystems during periods of no or low flow.

The Plan and corresponding alluvial water sharing plan need to address these gaps to provide a foundation for better managing connectivity, particularly given the alluvial aquifers of the Upper Namoi are highly connected to the river system and highly dependent on recharge from surface water flows.[139]

Recognising these interactions and addressing these gaps in water sharing plans would be consistent with commitments made under the NSW Groundwater Strategy to better integrate groundwater management with other land and water management processes.[140] Specifically, Action 1.5.1 of the strategy which outlines commitments to manage groundwater and surface water together to:

- improve our understanding of surface water and groundwater connectivity processes - including the role of baseflows in supporting riverine environments and stream discharges to groundwater sources, flooding and groundwater recharge
- achieve better integration of our river system models and groundwater models by improving the underlying assumptions about the physical surface water and groundwater interactions
- develop a robust approach to manage surface water-groundwater connectivity and access in water sharing plans
- ensure that surface water and groundwater management plans complement and integrate with each other where feasible.

As a minimum, the replacement Plan should include objectives for managing surface-groundwater connectivity in an integrated way and include strategies and provisions to support this.

7.1.1 Role of surface water flows in groundwater recharge

DPE-Water risk assessments developed as part of the Namoi surface and alluvial Water Resource Plans discuss surface water-groundwater connectivity and associated risks from groundwater extraction, including lowering of the water table impacting on stream flow. However, risks to groundwater recharge from surface water extraction in the unregulated river water sources were not assessed.

The Commission acknowledges there is some consideration of connectivity by DPE-Water in water sharing plan rules, where a component of groundwater recharge is derived from the regulated river system. For example, AWDs for aquifer access licences in the Peel River Alluvium are linked to those for regulated river (general security) access licences in the Peel Regulated River Water Source, while the AWD for the Manilla Alluvial Water Source is linked to those derived for the regulated river (general security) access licences in the Upper Namoi Regulated River Water Source.

[139] ..... DPIE (2020) *Namoi Long Term Water Plan: Part A*, p.26.
[140] ..... DPE (2022) *NSW Groundwater Strategy*

However, there needs to be further consideration of the contribution of unregulated rivers to groundwater recharge, particularly in the context of climate change. As part of the replacement Plan, DPE-Water should consider this relationship when revising Plan objectives and strategies, and assess the risks associated with surface water extraction in connected unregulated river water sources on groundwater recharge.

This would be consistent with the Sinclair Knight Merz definition of connectivity which recognises that:[141]

- abstraction from the groundwater system can affect the quantity (and quality) and reliability/accessibility of abstraction from the surface water system
- abstraction from the surface water system can affect the quantity (and quality) and reliability/accessibility of abstraction from the groundwater system
- abstraction of water from either can affect water supply to ecosystems that rely on both surface and groundwater, for example, low flows in rivers and certain wetlands.

7.1.2 Highly connected ephemeral streams

Five highly-connected groundwater sources in the Namoi valley were identified as part of the macro water planning process.[142] They include the Manilla Alluvium, Peel Alluvium, Currabubula Alluvium, Werris Creek Alluvium, Quipolly Creek Alluvium and Quirindi Creek Alluvium. Most of these groundwater sources underlie or partially underlie unregulated river water sources or streams that are part of these broader water source areas.[143]

Groundwater access rules that link to surface water rules were established for highly connected perennial streams and regulated rivers, while bore setback distances ('groundwater only' rules) were established for more ephemeral streams. This is likely due to inadequate stream flow gauges to enable linked flow-based access rules for alluvial access licence holders in ephemeral stream sub-catchments.

The Risk Assessment for the Namoi Alluvial Water Resource Plan Area states that 'as rules were introduced to manage potential impacts in highly connected areas, the risks are considered to be adequately managed within acceptable impacts on surface water sources'.[144] That is, the risks to connected water sources are considered tolerable by DPE-Water. However, the risks to intermittently flowing streams such as Currabubula Creek, Quipolly Creek and Quirindi Creek are not adequately understood and may not be effectively managed given the lack of stream flow data.

Recharge is likely to be episodic and the extent to which groundwater pumping affects stream flow and pool persistence is unclear. These interactions require improved understanding to inform risk management and appropriate access rules for both surface and groundwater users. This would require a review of ephemeral streams and their

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[141] ..... Sinclair Knight Merz (2011) *National Framework for integrated management of connected groundwater and surface water systems*, Waterlines report, National Water Commission, Canberra

[142] ..... DPI-Water (2015) *Macro water sharing plans: an approach for groundwater*

[143] Boundaries of unregulated river water sources and connected groundwater sources do not match making it challenging to conjunctively manage connected water sources including risks to those water sources.

[144] ..... DPI (2019) *Risk Assessment for the Namoi Alluvium Water Resource Plan Area (GW14)*, p.44.

connected groundwater sources and may lead to changes in access rules, including in the groundwater sharing plan.

7.2 Impacts of surface water extraction are compounded by groundwater extraction

Groundwater extraction in the Namoi valley has been attributed to declining groundwater levels and changes in stream flows. In 2007, CSIRO reported that the 'LTAAEL for the Lower Namoi Alluvium Groundwater Management Unit exceeds total long-term groundwater recharge from all sources and exceeds annual recharge in most years'.[145] Extraction at this level, given the current spatial pattern of pumping bores, was not considered sustainable. They found the lower Namoi River has changed from a river that gained water from groundwater prior to development, to one that now loses considerable streamflow volumes to groundwater.[146]

Based on analysis undertaken on behalf of the Commission, historical extraction from alluvial groundwater systems has led to an estimated loss of 94 GL/year (~250 ML/day) of flow within the Namoi valley, with potentially another 24 GL/year (~65 ML/day) from further extraction from alluvial aquifers.[147] This cumulative impact represents an estimated 12 percent reduction in mean surface water availability. The reduction in streamflow in the Namoi catchment is significant, even more so when considered in the context of a more variable climate, with the potential for drier conditions and associated impacts on flows. Streamflow impacts for the Namoi also appear significant relative to other river valleys where estimated changes in mean surface water availability range from 0.9 percent (Gwydir valley) to 3.7 percent (Lachlan valley).

Increased groundwater demand, particularly during drought, is causing significant lowering of groundwater levels, with declines of more than 10 metres observed in some locations.[148] Water levels have continued to decrease for most of the life of the Plan, albeit with some recovery observed since 2020.

The draft Namoi Regional Water Strategy recognises the threat that continuing water level decline and climate change pose to the ongoing viability of water resources of the Namoi valley and indicates the need for further intervention:[149]

> *'[groundwater] levels have continued to decline across most of the Upper Namoi by around 2 m, with the Upper Namoi Groundwater Source Zone 12 (north-east of Gunnedah) and the area near Caroona (Upper Namoi Groundwater Source Zone 8) showing up to a 10 m decline. If these declines continue, restraints on water extraction are likely to be introduced in these areas to provide ongoing viability of the resource for all uses. If the climate becomes drier in the longer term, this problem will become worse'.*

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[145] ..... CSIRO (2007) *Water availability in the Namoi. A report to the Australian Government from the CSIRO Murray-Darling Basin Sustainable Yields Project*. CSIRO, Australia, p.ii.
[146] ..... *Ibid.* p.154.
[147] ..... Advice from University of Melbourne (connectivity paper, Table 4 p. 26). This is based on analysis of the alluvia as these (a) represent the major component of extraction; (b) represent almost all the increase in extraction in NSW for 2012-3 to 2018-9, (c) are adjacent to streams and (d) are more likely to have entitlements used.
[148] ..... DPE (2021) *Upper and Lower Namoi Groundwater Sources: 2021 groundwater level review*
[149] ..... DPE-Water (2022) *Draft Regional Water Strategy, Namoi: Shortlisted Actions – Consultation Paper*, p.39.

The impact of groundwater drawdown on streamflow depends on the connectivity of the streams and adjacent groundwater system. Disconnected areas are less sensitive to groundwater levels, while connected areas will increase losses to groundwater if water tables fall.

Groundwater-surface water connectivity in the Namoi valley has been the focus of several studies, including a baseline assessment of surface water-groundwater connectivity for 2012 as part of the Bioregional Assessment process.[150] When compared to previous assessments, including CSIRO's assessment, more widespread areas of disconnection were identified, but also areas of increased disconnection and transition to disconnection (see **Figure 12**).

Unregulated river water sources where changes were evident include:

- **Mooki River basin** (which corresponds with the Mooki Water Source): increases in disconnection were observed from Quirindi downstream to Caroona, and the river reach between Breeza and Gunnedah, while reaches classed as transition occur in the mid Mooki River basin downstream of Breeza
- **Coxs Creek basin (corresponds with Coxs Creek Water Source)**: transitional areas were observed upstream and downstream of the disconnected reach between Mullaley and Boggabri
- **other areas in the Upper Namoi:** showing disconnected and transition classes include reaches around Carroll, a small section upstream of Maules Creek.

There has also been a shift from net gaining to net losing streams for connected systems.[151] Further acceleration of losses can only be prevented if there are no further falls in water tables along connected reaches. This would require some form of water management. Ensuring compliance with groundwater extraction limits (including SDLs) is not considered sufficient to prevent further falls or impacts on stream flow. Other mechanisms are required such as linked access rules (see **Section 6.3**).

[150] ..... Aryal SK, Northey J, Slatter E, Ivkovic K, Crosbie R, Janardhanan S, Peña-Arancibia J and Bell J (2018) *Observations analysis, statistical analysis and interpolation for the Namoi subregion*. Product 2.1-2.2 for the Namoi subregion from the Northern Inland Catchments Bioregional Assessment. Department of the Environment and Energy, Bureau of Meteorology, CSIRO and Geoscience Australia, Australia.

[151] ..... *Ibid.*

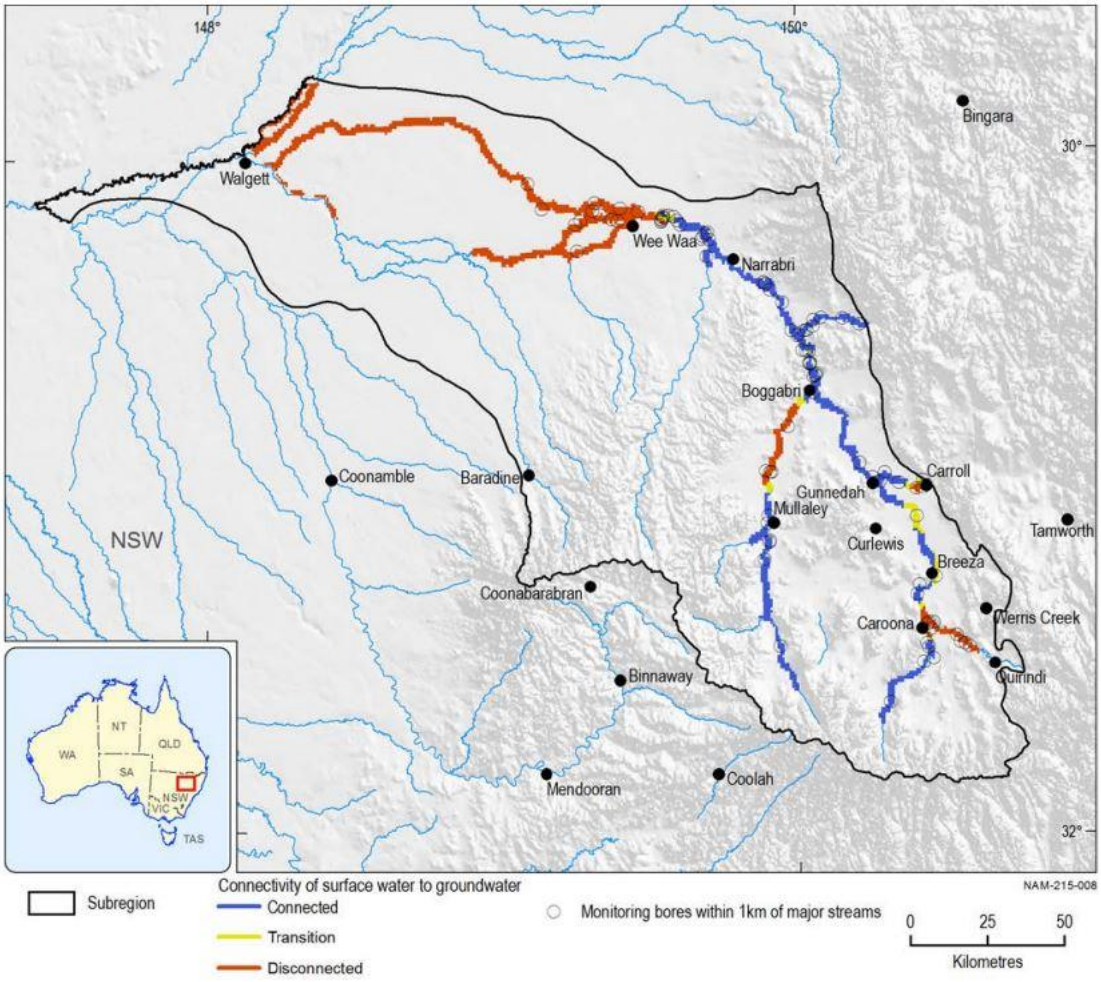

Figure 12: Inferred shallow alluvial aquifer - stream connectivity in the Namoi valley[152]

Connected surface water – groundwater reaches (< or = 10 m); transition reaches (>10 m to 12 m); disconnected reaches (>12 m) Dataset: Bioregional Assessment programme (Dataset 2)

[152] ..... Aryal S,K, Northey J, Slatter E, Ivkovic K, Crosbie R, Janardhanan S, Peña-Arancibia J and Bell J (2018) *Observations analysis, statistical analysis and interpolation for the Namoi subregion. Product 2.1-2.2 for the Namoi subregion from the Northern Inland Catchments Bioregional Assessment*. Department of the Environment and Energy, Bureau of Meteorology, CSIRO and Geoscience Australia, Australia, p.117.

7.3 Connected water sources lack linked access rules

Although some connected water sources in the Plan have linked access rules that reflect surface water management (see **Table 4** and **Box 2**), there are several that do not that may benefit from having them given groundwater extraction could result in streamflow depletion. They include:

- Werris Creek
- Cox's Creek (mid)
- Cox's Creek tributaries
- Upper Peel tributaries (Dungowan Creek)
- Upper Peel tributaries (Duncans Creek and other tributaries)
- Lower Peel River Tributaries
- Cockburn River
- Cockburn River tributaries.

Historically, alluvial access licences have had rules in place in the Cockburn River catchment.

Access rules for groundwater extraction from nominated pumps near the Cockburn River were linked to surface water cease to pump rules, with a 28-day delay from when the trigger is reached and applied to surface water users. The trigger corresponded to the 84th percentile of all daily flow and a discharge volume of 2.6 ML/day. These rules were intended to protect low flows and remnant pools during dry seasons but were not carried into the *Water Sharing Plan for* the *Namoi Alluvial Water Sources 2020*. Instead, this plan includes an amendment clause that allows for establishment of access rules in the Cockburn River Alluvium Management Zone (Peel Alluvium Groundwater Source) post 1 July 2022.[153] This is likely associated with the timing of hydrogeological investigations in the Cockburn sub-catchment.

Some of the challenges faced in establishing linked access rules include:

- a lack of reliable gauges in proximity to alluvial groundwater sources on which cease-to-pump rules can be based (for example, Currabubula, Quipolly and Quirindi creeks)
- for some streams, the extent to which groundwater pumping impacts on stream flow is unclear.

These issues need to be considered as part of the Plan replacement process, particularly where the risk of streamflow depletion is considered significant and will impact on water-dependent values.

Joint groundwater and surface water management will likely become more important as a mechanism for managing water resources under increasing climate variability and climate change. Changes in surface water availability is likely to contribute to increasing groundwater extraction during drier times and higher storage of surface water during wetter times. Currently, there is a lack of coordination in managing surface water-

[153] ..... Clause 68 of the *Water Sharing Plan for the Namoi Alluvial Groundwater Sources 2020*

groundwater connectivity in some areas due to trade and carryover provisions. Joint water management rules may be needed to protect baseflows affected by increased use of groundwater. Such rules may be more complex for less highly connected systems and greater knowledge would be required.

Box 2: Linked access rules for connected water sources: Maules Creek

Maules Creek has the attributes of a highly connected system but is not defined as highly connected (it coincides with the Upper Namoi Alluvium).[154] Research by the University of New South Wales shows that the unregulated Maules Creek changed from being gaining to losing at Elfin Crossing.

A series of near-perennial pools near Elfin Crossing are considered sensitive to groundwater pumping. There is a history of restrictions placed on some groundwater pumping during the years 2007-10 (in Zone 11); namely that when the surface flows in Maules Creek at Elfin Crossing were less than 1 ML/day, pumping was limited to 12 hours/day; and when the flows ceased in Maules Creek, pumping was restricted to 4 hours/day.

During the term of the Plan, Maules Creek ceased to flow in March 2018 at Avoca East Gauge (419051). This coincided with the lowest water levels on record at the groundwater observation bore (GW967137) near Elfin Crossing. Temporary water restrictions were put in place on groundwater access licence holders in the Upper Namoi Zone 11 Maules Creek groundwater source from 18 October 2019 – 30 June 2020.[155] This was intended to maintain perennial pools and groundwater levels.

Surface water access rules need to be reviewed in terms of their effectiveness in protecting base flows in Maules Creek, perennial pools near Elfin Crossing and associated values. The Long-Term Water Plan recommends reviewing the cease to pump rule at Avoca East Gauge (419051). Linked access rules for groundwater users have been established in the Water Sharing Plan for the Namoi Alluvial Water Sources 2020 since temporary water restrictions applied. DPE-Water created two management zones in the Upper Namoi Zone 11 groundwater source coinciding with Elfin Crossing. Clause 40(2) of the alluvial water sharing plan applies to the Upstream Elfin Crossing Management Zone and specifies that no take is to occur if there is no flow at the Maules Creek at Avoca East gauge (419051) for 14 consecutive days.

[154] ..... DPE-Water (2020) *Temporary water restrictions – expired or repealed temporary water restrictions – Maules Creek Groundwater Source, Upstream Elfin Crossing*
[155] ..... *Ibid.*

Table 4: Groundwater zones with linked surface water access rules

Unregulated river water source	Unregulated water source access rules	Groundwater zone	Groundwater zone access rules
Maules Creek Water Source - Maules and Horsearm Creeks Management Zone	More than 1 ML/day Maules Creek at Avoca East gauge (419051)	Upper Namoi Zone 11 (Upstream Elfin Crossing) Maules	Water must not be taken under an aquifer access licence with an extraction component if there is no flow at the Maules Creek at Avoca East gauge (419051) for 14 consecutive days
Upper Namoi Water Source - Macdonald and Namoi Rivers Management Zone	Visible flow over the crest of the Manilla Weir	Namoi Unregulated River Alluvial Management Zone in the Manilla Alluvial Groundwater Source	Water must not be taken under an aquifer access licence when flows have been in the Very Low Flow Class for 14 or more consecutive days
Halls Creek Management Zone in the Upper Namoi Water Source	More than 1 ML/day at Halls Creek Ukolan gauge (419029)	Halls Creek Alluvial Management Zone in the Manilla Alluvial Groundwater Source	Water must not be taken under an aquifer access licence when flows have been in the Very Low Flow Class for 14 or more consecutive days
Goonoo Goonoo Creek	Visible flow at upstream of Calala Lane Road Bridge and flow at Timbumburi gauge	Goonoo Goonoo Creek Alluvium Management Zone in the Peel Alluvium Groundwater Source	Water must not be taken under a domestic stock access licence, aquifer access licence or local water utility access licence if there is no flow at the Goonoo Goonoo Creek at Timbumburi gauge (419035) for 14 consecutive days

7.4 The Plan should specify how it will contribute to downstream flow targets

As part of its water reform package, the NSW Government released information on possible measures to help improve the management of environmental water and environmental outcomes. One of the measures is the '*use of downstream environmental requirements as a trigger to manage upstream access*'.[156] This is underpinned by the

[156] ..... DPI (2018) *NSW Water Reform Action Plan – Better management of environmental water consultation paper*

implementation of the *Interim Unregulated Flow Management Plan for the North West*[157] to improve the contribution of flows to the Barwon-Darling.

The Border Rivers Regulated Plan was replaced in 2021 and includes access rules that require consideration of Barwon-Darling flow targets in managing outflows from the regulated Border Rivers. *The Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Source 2016* also has provisions that refer to the Interim Unregulated Flow Management Plan.[158] However, the contribution of flows from unregulated rivers and interactions between regulated and unregulated rivers of the Namoi valley does not seem to have been adequately considered, including how flows through unregulated water sources can contribute to meeting downstream flow targets. The Namoi Long-Term Water Plan recognises that 'hydrological connectivity at a planning unit scale is required throughout the catchment to contribute to end of system flows.'[159]

The unregulated river water sources of the Namoi valley can, and should, contribute to valley and system scale connectivity including downstream flow targets. Their role in contributing to these targets needs to be recognised and reflected in the Plan. The *Namoi Long-Term Water Plan* considered that increasing the contribution of flows to the Barwon-Darling was relevant to all management areas of the Namoi valley i.e., Namoi regulated, Peel, Upper Namoi and Lower Namoi.[160]

The Commission is of the view that where water is released or access restricted to achieve specific downstream objectives, that water should be protected. To assist with meeting downstream flow targets, the unregulated plan should include access restrictions consistent with the regulated plan where unregulated (supplementary) flows in the regulated river system flow downstream and spill into the Plan's water sources. Access should also be restricted to held environmental water should it spill from the regulated river into unregulated river water sources to maximise environmental outcomes and be more consistent with the intent of these environmental flows.

157 The Interim Unregulated Flow Management Plan for the North West (the North-West Flow Plan) recognises the importance of inflows from tributaries of the Barwon-Darling (i.e. Border Rivers, Gwydir, Namoi and Macquarie) in maintaining sufficient water quality and quantity for the environment and communities of the Barwon-Darling River. It limits access to supplementary flows in these tributary valleys until targets in the Barwon-Darling River are met.

158 ..... Clauses 48(5) and 48(6) in Division 3, Part 9 of the *Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016*

159 ..... DPI (2020) *Namoi Long-Term Water Plan: Part A*, p.27.

160 ..... *Ibid*.

7.5 Recommendations

R 10	To improve the management of connectivity in the replacement Plan, DPE-Water should: a) strengthen the definition of connectivity including clarifying that ephemeral streams are highly connected b) further assess risks to highly connected water sources c) improve Plan objectives by recognising that the Plan should contribute to maintaining and where possible enhancing surface water – groundwater connectivity and the recovery of water levels through groundwater recharge d) investigate relationships between ephemeral streams in the Plan area and their connected groundwater sources and ensure that water sharing rules mitigate the impacts of extraction, particularly during periods of low/no flow e) use hotspot maps of groundwater decline and observed changes in stream flows to target connected water sources that require linked access rules and ensure surface water access rules protect base flows f) use the results of the above to revise the Plan rules to ensure is adequately addressed in the Plan and consider what changes may be necessary to the Water Sharing Plan for the Namoi Alluvial Groundwater Sources 2020.
R 11	As part of Plan replacement, to improve connectivity with the Barwon-Darling River, determine the contribution of flows from the unregulated river water sources of the Namoi valley to Barwon-Darling flow targets, include relevant targets in the replacement Plan, and clarify how Plan rules would be implemented to support these targets.

8 Protecting key environmental assets

Although parts of the Namoi catchment are highly developed, unregulated river water sources still have significant environmental values, including the nationally significant Lake Goran south of Gunnedah. Many of these values are affected by an altered flow regime.

Around one third of the Plan's unregulated river water sources have high instream values. Water sources in the lower Namoi, such as Pian Creek, comprise a series of anabranches and include an extensive network of billabongs and lagoons that provide habitat for a range of species including threatened species.

Fish community status is moderate overall for the Namoi valley, with few river reaches rated in good condition.[161] These include Wombat and Wanourie creeks situated in the lower Namoi catchment west of Wee Waa. However, in the lower Namoi catchment, fish community status is generally fair to poor.

There is a high degree of interaction between unregulated and regulated river water sources, but also groundwater in the Namoi catchment. In the lower catchment (see **Chapter 7**), tributary inflows from unregulated river water sources, particularly the Mooki River, Cox's Creek, Bohena Creek and Baradine Creek, contribute to the maintenance of environmental values in the regulated Namoi River and further downstream. Unregulated river water sources can also provide important drought refugia. Therefore, protection of flows in these tributary streams is important for the overall health of the Namoi catchment. The lower catchment also comprises a broad floodplain and complex network of distributary creeks (for example, Pian Creek) and anabranches. As a result of these interactions, the regulated and unregulated systems need to be managed as a whole to provide for connectivity within and between water sources, including with the Barwon River.

Amendments to the Plan in 2020, as part of the development of the Namoi Surface Water Resource Plan, resulted in changes to the Plan's environmental objective and the inclusion of targeted environmental objectives, including one for connectivity. However, further work is required to align strategies in the Plan with these objectives. Several opportunities identified during the development of the Namoi Surface Water Resource Plan are still to be addressed to improve environmental outcomes.[162]

In parallel with this water sharing plan review the Commonwealth government announced in February 2023 that it would focus on strategic water purchasing as part of the Bridging the Gap 2023 initiative.[163] This includes 9.5 GL of surface water in the Namoi catchment. But this is dependent on finalisation and accreditation of the Namoi Surface Water Resource Plan. This initiative may warrant changes to water sharing provisions to protect this water from extraction, specifically when it flows from the regulated river into unregulated river water sources in the Plan area. This has not been explored in detail as part of this review.

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[161] ..... DPI (2016) *Fish communities and threatened species distributions of NSW.* Report prepared for the Commonwealth Government. NSW Department of Primary Industries, Wollongbar.
[162] ..... NSW planning principles of minimal change for water sharing plans within their initial ten year period were adopted for the development of Water Resource Plans.
[163] ..... DCCEEW (2023) *Strategic water purchasing – Bridging the Gap 2023*

Key issues explored in this chapter include:

- in several water sources access rules do not adequately protect low flows and are not based on the latest information (**Section 0**)
- drawdown provisions for Lake Goran do not appear commensurate with the lake's national significance or adequately consider climate change (**Section 8.2**)
- drawdown provisions for regionally significant wetlands have not been reviewed in terms of their adequacy for protecting environmental values (**Section 8.3**).

8.1 Daily access rules do not adequately protect environmental values

There is limited data available to determine the adequacy of the Plan provisions for meeting environmental needs, particularly in periods of low flow. The key mechanisms to protect the environment on a daily basis are access rules (e.g., cease-to-pump and commence-to-pump rules) that afford a level of low flow protection. However, these are generally based on visual observations of flows and pool capacity as there are limited gauge stations in the Plan area's unregulated river water sources.

It is likely that the protection of low flows afforded by current access rules is not sufficient for key ecological functions in a number of water sources. Further, access rules do not currently account for recent climatic conditions. It is important to assess the impacts of current access rules on in-channel connectivity and habitat persistence, with modelling where possible. Given that recent years (2017-2020) have contained some of the driest on record in the Namoi catchment, any analysis must consider these more recent conditions where flows and habitat persistence and viability were very low. Modelling with information from this dry period, combined with improved understanding of environmental needs should be considered in refining daily access rules for the replacement Plan as this will help to set more relevant environmental protections, consistent with the Act's objects and principles, and the Plan's objectives.

The risk assessment undertaken as part of the development of the *NSW Namoi Surface Water Resource Plan* identifies several water sources with medium to high risks for different flow components. As part of the risk assessment, DPE-Water also determined High Ecological Value Aquatic Ecosystem (HEVAE) consequence scores based on an assessment of ecological values and functions, and extraction pressure in each water source. One third of water sources in the Plan area (9 out of 26) received a high to very high HEVAE consequence score.[164] These include Bohena Creek, Etoo Creek, Talluba Creek, Lower Namoi, Maules Creek, Pian Creek, Spring Creek, Bobbiwaa Creek and the Upper Namoi water sources. Some of these water sources include creeks with highly altered flow regimes, with increased cease to flow periods and low flows (e.g., Maules Creek and Pian Creek).

New strategies are needed to mitigate risks to key components of the flow regime for these water sources, particularly to low flows and increased periods of no flow, with a changing climate potentially contributing to accelerated drying (see **Section 5.4**).

[164] ..... DPIE (2019) *Risk assessment for the Namoi Surface Water Resource Plan Area (SW14)*

Action 3.1 of the *NSW Water Strategy* is to '*consider the NSW Long-Term Water Plans to protect and enhance ecological systems*'.[165] Long-Term Water Plans are intended to guide water planning by establishing the volume, timing, duration and frequency of flows for achieving environmental outcomes and are an important information source for improving access rules in the unregulated river water sources covered by the Plan.

The *Namoi Long-Term Water Plan* identifies several water sources where changes to access rules could improve environmental outcomes.[166] However, they are not just constrained to water sources with high to very high HEVAE consequence scores. For example, the *Long-Term Water Plan* and DPI-Fisheries' fish and flows analysis indicate that changes to access rules in the Mid MacDonald River Water Source, which received a medium HEVAE consequence score, are warranted. DPE-Water should as a minimum consider the *Namoi Long-Term Water Plan* and fish and flows analysis when revising access rules for medium and high risk water sources as part of Plan replacement.

8.1.1 MacDonald River Water Sources

The Macdonald River located in the upper Namoi catchment has high environmental values and is the highest yielding of the upper tributaries per catchment area. It contributes 2.5 times the daily flow of the Manilla River to the Upper Namoi Regulated River (upstream of Keepit Dam).[167] The catchment is separated into two water sources with two management zones in the Mid MacDonald River Water Source.[168] The Upper MacDonald River Water Source has 30 ML unregulated river entitlement whilst the Mid MacDonald River Water Source has 4,777 ML of entitlement (4,269 ML of unregulated river access licences, 463 ML for town water supply[169] and 44.5 ML of licenced domestic and stock entitlement).

Both trade rules and daily access rules are important for protecting environmental values. However, a recent trade review undertaken for the Namoi (**Section 4.3**) supported allowing an additional 40 ML of trade into the Upper MacDonald River (to a cap of 70 ML) and more than 1,000 ML of trade into the Mid MacDonald River Water Source (to a limit of 5,872 ML) from the Keepit sub-catchment.[170] This advice appears to contradict the risk profile for the MacDonald River water sources, particularly the Mid MacDonald River where low and base flows are highly altered and cease to flow periods have increased**.**
Although there are reaches with low hydrologic disturbance in the Mid MacDonald River Water Source (e.g., Watson's Creek), the Namoi Surface Water Resource Plan risk assessment determined that the risks associated with the highly altered low and baseflows of the Mid MacDonald River and increased cease to flow periods are not tolerable.[171] DPI-Fisheries' fish and flows analysis indicates that these hydrological changes pose risks to refuge habitat and all functional fish groups (e.g., generalists, flow pulse specialists and

[165] ..... NSW Government (2021) *The NSW Water Strategy*
[166] ..... DPIE (2020) *Namoi Long-Term Water Plan: Part B*
[167] ..... Green D., Petrovic, J., Moss, P. and Burrell, M, (2011) *Water Resources and Management Overview: Namoi Catchment* NSW Office of Water, Sydney.
[168] ..... The two management zones of the Mid MacDonald River Water Source include:
- MacDonald River Upstream Woolbrook Management Zone
- MacDonald River Downstream Woolbrook Management Zone.

[169] ..... This licence services the town of Walcha.
[170] ..... The Keepit sub-catchment includes four water sources in the Plan area: Keepit Water Source, Upper MacDonald River Water Source, Mid MacDonald River Water Sources and Upper Namoi Water Source.
[171] ..... DPIE (2019) *Namoi Surface Water Resource Plan Risk Assessment*.

river specialists).[172] Surveys of the Bells' River turtle in the MacDonald River catchment also highlight the importance of refuge pools with Bendemeer providing critical habitat during the recent drought, whereas the smaller tributary of Watson's Creek experienced a decline in recorded numbers during the drought.[173]

As current access rules do not appear adequate and with potential risks associated with trade into the water source, there is a need to consider raising the cease to pump threshold for the management zones of the Mid MacDonald River Water Source. Access rules in both management zones are based on flow classes (very low flow and A class) and have a 10ML/day threshold (10ML/day or below for very low flow class and more than 10 ML/day for A class).[174] The *Namoi Long Term Water Plan* recommends raising the cease to pump threshold to 40 ML/day at MacDonald River at Retreat gauge (419028).[175] This gauge is at the bottom of the water source (see **Section 6.3**). The Commission acknowledges this is a significant increase and could have implications for water users but supports further investigation into the benefits and need for raising the cease to pump threshold.

8.1.2 Maules Creek Water Source

Maules Creek is the most significant of the three tributaries (Maules, Bullawa and Spring creeks) to the north of the regulated Namoi River between Boggabri and Wee Waa.[176] It has 1,102 ML of unregulated access licence entitlement, largely located on Maules Creek itself.

There is an open cut coal mine in the catchment (in the Back Creek sub-catchment, which is located in the Maules Creek Tributaries Management Zone) that has been operating since 2015. The mine has 30 ML of unregulated river access entitlement, and 3,000 ML of Lower Namoi regulated river entitlement.[177] The conditions on the unregulated river access licence require that water only be taken where there is a visible flow at the point of take. This mine was convicted of illegal water extraction that occurred between 1 July 2016 and 30 June 2019.[178] This would have no doubt impacted on the flow regime of Back Creek and likely Maules Creek.

The Namoi Surface Water Resource Plan risk assessment indicates that there is a high risk to no flow and low flow periods in Maules Creek. Cease to flow periods have significantly increased and low flows are highly altered. This risk was not considered tolerable given the "high potential for extraction to impact ecological values".[179] While Maules Creek has an existing cease to pump rule of 1 ML/day at Avoca East gauge (419051), which is approximately the 85th percentile, the risk assessment results indicate that this rule is not currently adequate for protecting low flows. Impacts from take by Maules Creek mine are likely to have also contributed to an altered flow regime.

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[172] ..... DPI-Fisheries (unpublished). *Fish and Flows in the Northern Basin Stage II – Namoi Valley*. Unpublished Client Report to the Murray Darling Basin Authority.
[173] ..... Spark, P. (2020) *Summary of Bell's Turtle monitoring surveys in the MacDonald River November 2019 to March 2020*. Unpublished report prepared by North West Ecological Services.
[174] ..... Table B, Division 2 of Part 8 of the Plan.
[175] ..... DPIE (2020) *Namoi Long-Term Water Plan: Part B*
[176] Green D., Petrovic, J., Moss, P. and Burrell, M, (2011) *Water Resources and Management Overview: Namoi Catchment* NSW Office of Water, Sydney.
[177] ..... Whitehaven Coal and Boggabri Coal Operations Pty Limited (2019) *Boggabri – Tarrawonga - Maules Creek Complex: Water Management Strategy*
[178] *Natural Resources Access Regulator v Maules Creek Coal Pty Ltd [2021] NSWLEC 135*
[179] ..... DPIE (2019) *Risk assessment for the Namoi Surface Water Resource Plan Area (SW14)*

The *Namoi Long-Term Water Plan* recommended reviewing the cease-to-pump threshold but also installation of new hydrometric equipment to better monitor and manage flows. The Commission supports these recommendations but also notes that the analysis undertaken to inform the risk assessment occurred prior to some of the lowest flows on record. Any change in access rules should consider this period, as well as the impacts of extraction by the mine.

Furthermore, Maules Creek is considered to be highly connected to the alluvial aquifer (see **Box 2** in **Section 7.3**). Subject to further investigation, DPE-Water should adopt linked access rules based on groundwater level monitoring of Maules Creek Alluvial Water Source.

8.1.3 Pian Creek Water Source

Pian Creek, whilst part of the unregulated Plan area is influenced by flows from the regulated Namoi River. Upstream of Dundee Weir, Pian Creek is regulated. The unregulated reach of Pian Creek re-joins the Namoi River near Walgett. The unregulated reach only receives water via uncontrolled events and provision of replenishment flows of up to 14,000 ML/year in accordance with Clause 59 of the *Water Sharing Plan for the Upper and Lower Namoi Regulated River Water Source 2016*. '*The aim of these replenishments is to fill all the waterholes and billabongs down to the end of Pian Creek*.'[180]

Delivery of water to the unregulated reaches of Pian Creek does not appear to consider the environmental values associated with the water source and its floodplain, water quality issues or how it contributes flows to the Barwon-Darling River (where it re-joins the Namoi near Walgett). Cease to flow and low and baseflows are highly altered, with operating constraints and efficiency influencing delivery of water to the unregulated reach of Pian Creek.

The Plan protects flows in the Lower Pian Creek Management Zone when they are less than or equal to 43 ML/day at Dempseys Bridge gauge (419089) or less than or equal to 5 ML/day at Waminda gauge (419049). Outside of the Lower Pian Creek Management Zone (Pian Creek Tributaries Management Zone), the Plan rules currently only require that water must only be taken if there is visible flow in the water source at the location where water is to be taken.

Rules allow for operator discretion (currently WaterNSW) in the delivery of replenishment flows. The Commission's audit of the *Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Source 2016* also found that replenishment flows are not always provided into unregulated water sources downstream of the regulated river at critical times.[181] In addition, unregulated extraction in the Upper Namoi can reduce the minimal inflow sequence and therefore the availability of water for replenishment flow for Pian Creek.

The replacement Plan process provides an opportunity to review the delivery of water for environmental needs in accordance with the priorities of the Act. This would involve

[180] ..... DIPNR (2005) *Namoi River Valley: IQQM Cap Implementation Summary Report (Final)*, p.28.
[181] ..... NSW Natural Resources Commission (2022) *Audit of the implementation of the Namoi, Gwydir and Macquarie regulated water sharing plans*, August 2022.

reviewing existing cease to pump rules for Pian Creek Water Source. However, these rules cannot be considered in isolation of the operating arrangements of the regulated reach of Pian Creek and the delivery of replenishment flows. Ideally, WaterNSW would work with environmental water managers to determine how best to deliver replenishment flows to provide for domestic and stock needs as well as environmental needs and the definition of replenishment flows would be clarified to state that it serves environmental needs and domestic and stock purposes. In addition, the extent to which Pian Creek historically contributed to Walgett's water security (in terms of quantity and quality) needs be considered in the replacement Plan.

8.1.4 Baradine Creek (Baradine Creek and tributaries trading zone)

Although it has a low HEVAE consequence score and is not listed as having high instream environmental values, Baradine Creek is an important tributary of the regulated Namoi River and its environmental values. For example, inflows from Baradine Creek appear to be important for reducing the duration of cease to flow events in the Namoi River at Goangra.[182] However, Baradine Creek does not currently have a flow-based access rule, except one licence in Appendix 4 which requires the authorised works shall not be used for the purpose of irrigation unless there is a visible flow in Baradine Creek at its confluence with the Namoi River.

In 2011 a new gauge was installed on Baradine Creek at Gwabegar gauge (419105). Insufficient data was available at the time the Plan was developed to reference this gauge. The Plan replacement process provides an opportunity to consider this gauge in developing flow-based access rules for licences upstream of the gauge that help to protect low flows and provide for connectivity with the regulated Namoi River.

8.1.5 Baradine Creek (Turragulla and Gil Creeks Trading Zone)

The Turragulla and Gil Creeks Trading Zone in the Baradine Creek Water Source is directly affected by outflow from the Namoi River. It has a volumetric limit of 19,023. The Plan does not specify if this is ML or unit shares. Trading is not allowed into this zone under clause 62(1)(n) of the Plan.

Appendix 4 lists four access licences in the Baradine Water Source. Two licences refer to Turragulla Creek. These have the following conditions:

- when there is a flow in Turragulla Creek the subject works shall not be used for the purpose of irrigation unless there is a visible flow in Turrugulla Creek at its confluence with the Namoi River
- the authorised works shall not be used during periods of inflow into the storage of the weir on Turragulla Creek unless there is a visible flow in the said creek at the bridge on the Epping Road.

Both conditions allow for most water entering the zone to be extracted within the zone. This is inconsistent with rules in the regulated river plan for supplementary flows and floodplain harvesting which are trying to maintain connectivity. As per **Chapter 4**, the Commission recommends this trading zone is remade as a management zone and

[182] ..... DPI-Fisheries (n.d.) *Namoi Fish and Flows report* (unpublished).

appropriate access rules are implemented to ensure environmental and connectivity objectives can be achieved.

8.2 Lake Goran's environmental values likely at risk from drawdown

Lake Goran is an ephemeral lake located on the Liverpool Plains 65 kilometres west of Tamworth and around 30 kilometres south of Gunnedah. When full Lake Goran spans around 8,200 hectares. The lake is filled by local runoff and inflows from Yarraman Creek, Hut Gully and Coomoo creeks. Depending on water levels Lake Goran drains into the Mooki River via Native Dog Gully Creek and can contribute to flows in the Namoi River. However, this only occurs during major floods and therefore under most conditions, the lake catchment is an internal, isolated drainage basin.[183]

The lake is recognised as providing important habitat for waterbirds, particularly migratory species protected under international migratory bird agreements and is listed as nationally significant under the Directory of Important Wetlands in Australia.[184] The *Namoi Long-Term Water Plan* indicates that 48 water-dependent bird species have been recorded at Lake Goran.[185]

Despite its national significance, the high conservation value aquatic ecosystem assessment (HEVAE) undertaken for Lake Goran Water Source, as part of the development of the Namoi Surface Water Resource, reported a low HEVAE consequence score.

The Commission understands that there were limitations in the risk assessment undertaken for Lake Goran water source as part of water resource plan development given it was not included in hydrological modelling and relied on expert opinion. This risk assessment does not appear to consider the significant increase in unregulated river access licence entitlement for Lake Goran during the term of the Plan (around 1,000 ML).[186] As at the 2022/23 water year, Lake Goran has 33,190 ML of unregulated river access licence entitlement and 88 ML of domestic and stock entitlement. This equates to around 27 percent of the lake's full containment volume.[187]

While the risk to Lake Goran from extraction was considered low at the time of the water resource plan risk assessment, it is unclear if the current level of extraction and current access rules are sustainable, particularly given the increase in entitlement and climate change. Based on climate projections from the development of the Namoi Regional Water Strategy, the Namoi region could experience increased rates of evaporation, reduced rainfall and increased cease to flow events,[188] which could have significant implications for the ephemeral Lake Goran, its environmental values and ability to support irrigation.

The Plan splits Lake Goran Water Source into two management zones (Lake Goran and Lake Goran Tributaries) and includes daily access rule and trade rules for each:

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[183] ..... DCCEEW (2019) *Directory of Important Wetlands in Australia information sheet: Goran Lake - NSW005*
[184] ..... *Ibid.*
[185] ..... DPIE (2020) *Namoi Long-Term Water Plan: Part B*
[186] ..... Based on comparison on entitlement data from 2021/22 and 2022/23 water years in the *NSW Water Register*
[187] ..... Based on a full containment volume of 123,000 ML.
[188] ..... DPIE (2021) *Draft Regional Water Strategy - Namoi Strategy*

- **Daily access rules:** the Plan establishes a very low flow class and A class for the Lake Goran management zone with access rules referencing the Hokey Pokey height gauge (419066). According to a note in the Plan[189] the cease to pump for the Lake Goran Management Zone at the Hokey Pokey height gauge (419066) of 294.7 metres ADH corresponds to approximately 13,500 ML or 11 percent of the nominal full containment volume of 123,000 ML.
- **Trade rules:** the Plan restricts trade from the Lake Goran Tributaries Management Zone to the Lake Goran Management Zone and any trades to or from an access licence with a share component that specifies Lake Goran Water Source.[190]

Clause 43 (5) of the Plan also allows for water to be carried over (up to 200 percent in accounts). Therefore theoretically, within the constraints of current Plan provisions, the lake could be drawn down significantly to the 11 percent drawdown threshold within a single water year. The risks to environmental values under this scenario are likely significant and require further assessment as part of the Plan replacement process.

The Plan's background document indicates that access rules for extraction from Lake Goran were carried across to the current Plan from conditions that were already on licences (i.e., the licences created under the Water Act 1912).[191] Therefore, there was no review of the existing access conditions during preparation of the Plan to determine if they are adequately protective of Lake Goran's environmental values or consideration of its national significance.

A hydrological study from 1995 examined a range of factors that influence water levels in the lake.[192] These include catchment land use, rainfall trends, evaporation and interaction with groundwater. However, it did not consider the role of the ephemeral lake as drought refugia and what this might look like under increased climate variability and climate change.

Given the national and regional significance of Lake Goran, DPE-Water should revisit the current drawdown rules and carryover provisions to determine if they are appropriate for protecting the nationally significant wetland from extraction and how the lake and its water-dependent values may be affected by climate change. Rules should be revised based on the outcomes of this investigation where necessary to ensure environmental values are protected consistent with the *Water Management Act 2000*.

8.3 Significant lagoons require greater protection

The Namoi catchment has a number of important lagoons in the mid to lower catchment. Many of which interact with the regulated Namoi River and are regionally significant. For example:

- **Gulligal Lagoon**: located in the Bluevale Water Source between Gunnedah and Narrabri has significant environmental and cultural values and is part of the Namoi

[189] ..... Clause 46 Note 7 in Division 2 of Part 7 of the Plan.
[190] ..... Clause 62(i) of Part 10 of the Plan.
[191] ..... DPI (2016) *Water Sharing Plan for the Namoi Unregulated and Alluvial Water Sources 2012 - Background document*, p.37.
[192] ..... Bewsher Consulting Pty Ltd (1995) *Hydrological study of Lake Goran*, prepared for Gunnedah Shire Council.

River Demonstration Reach.[193] The site is of cultural significance to the Gomeroi people. It has also been recognised as a site for receiving environmental water deliveries from the regulated Namoi River.

- **Wee Waa Lagoon:** situated in Bundock Creek Water Source has significant environmental values and receives inflows from the Pilliga Forest.

The Plan includes provisions to restrict the take of water from in-river and off-river pools when the volume is less than full capacity.[194] These rules do not apply to Gulligal Lagoon or Wee Waa Lagoon where 20 percent drawdown is permitted.[195] They also do not apply to access licences listed in schedule 1A of the Plan. However, there are currently no licences listed in this schedule. It should therefore be removed to prevent the risk of licences being included.

The drawdown provisions that apply to Gulligal and Wee Waa lagoons are based on the access arrangements of licence holders that existed prior to the development of the Plan. There is no evidence to indicate that these rules were reviewed for the adequacy in protecting the environmental and cultural values associated with these lagoons when they were included into the Plan. Therefore , these rules may not be consistent with the principles of the Act and objectives of the Plan.

The Commission understands that these lagoons have in the past been the focus of environmental water delivery. Clause 47(6) of the Plan would protect this water if it stayed below the cease to pump threshold of 80 percent of full capacity. However, if an environmental water delivery resulted in the water level exceeding this threshold, this water could be legally extracted under the Plan without other intervention.

The Plan includes a note that the Minister may make an order under section 324 of the *Water Management Act 2000* to temporarily restrict or prohibit this water being taken from these lagoons, but the Commission is of the view that it would be more effective to have such arrangements for the protection of environmental water embedded in the Plan.

The Commission recommends that unless there is evidence that drawdown does not pose an unacceptable risk to the environment, drawdown of Gulligal and Wee Waa lagoons should not be allowed. If drawdown is not removed from the replacement Plan, then at a minimum DPE-Water should install and reference gauge height similar to the arrangements in place for Lake Goran. This would reduce ambiguity over what constitutes 80 percent capacity.

[193] ..... The Namoi River Demonstration Reach was set up to showcase techniques for restoring habitat for native fish and other aquatic biota. It was funded by the Murray-Darling Basin Authority.
[194] ..... Clauses 47(3) to 47(4) of the Plan.
[195] ..... Clause 46(6) of the Plan applies to Gulligal and Wee Waa lagoons.

8.4 Recommendations

R 12	As part of Plan replacement, to address the inadequacy of the environmental protection provided by current access rules, DPE-Water should: a) review the current hydrometric network to identify where the Plan can reference operational gauges for establishing flow classes and flow-based access rules for water sources that currently have a 'no visible' flow rule b) ensure all high environmental value water sources at medium to high risk from extraction have flow-based access rules that support connectivity and adequately protect water sources and their dependent ecosystems c) review if conditions attached to current water access licences and works approvals are appropriate to protect high priority needs and ensure any changes to access rules from (a) and (b) are reflected in water access licence/works approval conditions.
R 13	To improve the provision of replenishment flows and associated environmental and social outcomes in unregulated river water sources, DPE-Water should review the definition of replenishment flows and ensure Plan rules provide protection from access to replenishment flows, except for domestic and stock purposes.
R 14	To inform Plan replacement, DPE-Water should investigate the adequacy of current Plan provisions for protecting the environmental values associated with Lake Goran, the impacts of climate change on the lake and its ability to support irrigation, and update Plan provisions to better protect these values where necessary.
R 15	To ensure that regionally significant wetlands are protected in the replacement Plan, DPE Water should: a) carry out investigations to determine if drawdown provisions for Wee Waa and Gulligal lagoons are adequately protective of environmental values b) remove schedule 1A of the Plan and update drawdown provisions based on the outcomes of the investigations undertaken as per R 15(a) c) install hydrometric equipment to monitor water levels.
R 16	As part of Plan replacement, include appropriate mechanisms to protect held environmental water that may be used for watering environmental assets in unregulated river water sources.

9 Supporting equitable water sharing

9.1 Summary

Equitable sharing of water is required by the Act.[196] Equitable sharing is a critical component of water sharing plans to support community trust and cohesion, effective water market operation and the fair distribution of benefits and costs from water sharing rules. Equitable sharing does not mean equal amounts of water supplied for all uses, rather:

- a fair distribution of available water consistent with the priorities under the Act
- consistent application of access rules for licences within the same licence category in the same water source or management zone
- fair and transparent consideration of relative reductions to meet extraction limits.

The Commission has identified significant issues with the extent to which the Plan supports these elements. Broadly these relate to:

- inconsistent application of access rules between and within licence types, management units and plans (**Section 9.2**)
- differences in carryover and account limits, and the inequitable application in relative reductions (**Section 9.3**).

Addressing these issues is critical to achieve environmental, economic and social outcomes within and downstream of the Plan area. In addition, the Plan does not include foundational elements reflecting the importance of equity, including clear equity objectives, strategies and performance indicators to transparently outline how it manages equitable sharing of water between and within licence categories (**Section 9.2.3**).

9.2 Access rules are inconsistently applied

Water access licences include an extraction component that specifies the times, circumstances, and rates at which water can be taken.[197] These conditions should be consistent with the priorities, principles, and objects in the Act, as well as the Plan objectives, including around social, cultural, and economic outcomes.

There are several issues related to the inconsistent application of access rules, including:

- access conditions for when water can be extracted are not equitable within the same category of licence within the same water source or management zone (**Section 9.2.1**)
- risks from placement of access conditions on licences or works approvals rather than provisions in the Plan may be compounded with trade (**Section 9.2.2**)
- the Plan does not protect replenishment flows from the regulated river for their intended uses (**Section 9.2.3**).

[196] ..... *Water Management Act 2000, Section 3(e).*
[197] ..... WaterNSW (n.d.) *Water access licences*

9.2.1 Access conditions for when water can be extracted are not equitable

The placement of cease to pump conditions on licences and works approvals rather than in the Plan has resulted in different access conditions for licensees in the same water sources or management zones. This is inequitable. The Plan should establish flow classes that provide for consistent cease to pump conditions to be applied as mandatory conditions for access licences of the same type within the same water source based on environmental risk and basic landholder needs.

To extract water, a licensee requires both an access licence (specifying times, circumstances, and rates at which water can be taken) and a water supply works approval (allowing for the installation and operation of a pump, dam, bore or flood works).[198] When *Water Act 1912* licences were converted to licences under the current Act, they were divided into access licences works and water supply work approvals. In most water sharing plans, licensees of the same category and water source receive the same general access conditions (with the addition of location specific conditions where required). Higher priority categories – such as local water utility access licences – may then receive greater access in terms of when they can extract through less restrictive cease to pump rules in the context of that water source.

Uniform application of conditions within a licence category is important for equity, trade, and the protection of the environment and basic rights. Access conditions should reflect the environmental, social, and economic dependency in a particular water source or management zone. The Plan should specify cease to pump thresholds for all licensed users within a licence category and water source or management zone to equitably share water.[199]

The Plan does not specify adequate cease to pump thresholds for most of the water sources in the Plan, instead relying on conditions on licences and works approvals. This results in a range of different cease to pump rules within the same water sources, creating inequity, an inefficient water market and ecological and economic risks. Further, it lacks transparency as these differences are not clear in the Plan and may create perverse outcomes of reduced environmental protection with some trades.

The Commission analysed cease to pump thresholds on a selection of licences across the Plan and found there is considerable variation in access licence and work approval conditions for the same licence category in the same water source or management zone.

Of the 31 water sources, 13 are further sub-divided into 33 management zones. In total, there are 51 units that require a daily access condition to be specified by the plan. Of those 51, only 15 have flow classes based on river flow. The remaining 36 management zones or water sources either specify visible flow at a point in the water source or the generic visible flow at the pump site. Rules that allow all flowing water to be pumped do not reserve a portion of flow. In addition, visible flow can be an ambiguous trigger for access rules and compliance is difficult to enforce. Visible flow for 36 of the 51 water sources or management zones does not reflect current knowledge regarding environmental water requirements, historical arrangements or the need to effectively manage risk.

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[198] ..... *Ibid*.

[199] ..... There may be certain circumstances where individual licensees have additional conditions to account for site specific issues - these are not the focus of this concern.

Appendix 4 lists 13 water sources in which 41 licences, that were established under the *Water Act 1912*, had pre-Plan conditions more stringent than the no visible flow rules or the rules specified in Table B of the Plan. In these 13 water sources, this has resulted in two groups of licences with different cease to pump thresholds:

- licences (and associated works approvals) with the Plan's default no visible flow threshold[200]
- former *Water Act 1912* licences that were required to have their conditions carried into Appendix 4 of the Plan.

There is also potential for another group of licences with conditions permitting pumping from pools below full capacity.[201] This gives them more access than the default rule that requires extraction to stop when the pool is below full capacity.[202] The Commission notes there are currently no licences with these conditions listed but the Plan can be amended[203] to add or remove access licences to this schedule. The Commission considers that licences should not be permitted to extract from pools from below full capacity. The replacement Plan should not include rules that potentially exempt users from extraction below full pool capacity.

Cease to pump thresholds should be based on a consistent assessment of environmental and basic landholder rights requirements in each water source or management zone. As part of cease to pump revisions, DPE-Water should include the appropriate flow classes in the Plan and apply them to all licensees within each water source or management zone. In this way all licensees in a licence category would be subject to the same minimum thresholds. WaterNSW could apply additional site-specific conditions where necessary in addition to the minimum requirements.

The Commission understands that DPE-Water is currently reviewing the Appendices. For some water sources and management zones, the cease to pump rules that predate the water sharing plan (under the *Water Act 1912*) are more appropriate and should be the basis for rules where they address the identified risk. The risk assessment found there was insufficient information to assess zero flows, low flows and freshes in lower Baradine Creek management zone. Baradine Creek has the third largest level of entitlement. Changing the trading zone to a management zone would allow targeted and equitable access rules.

9.2.2 Risks from placement of access conditions may be compounded with trade

The placement of cease to pump conditions on licences and works approvals rather than in the Plan has resulted in different access conditions for licensees in the same water sources or management zones. Some licensees have more stringent rules to protect environmental and social values, while others have the Plan's default 'no visible flow' rules.

[200] ..... Clause 44(2) of the Plan, which states that 'water must not be taken under an access licence when there is no visible flow in the water source at the location at which water is proposed to be taken'.
[201] ..... These licences must be listed in Schedule 1A of the Plan.
[202] ..... Clause 43(5) of the Plan, which also refers to Schedule 1A.
[203] ..... Under Clause 76(1A) and (1B).

When licences are traded, cease to pump conditions on works approvals or licences are not carried across to the new licence if there is a permanent trade.[204] Water sharing plans are intended to be the instrument that ensures equity and adequate protection of the environment and basic landholder needs. The Plan's current approach relinquishes the Plan's authority for cease to pump conditions to licences and works approvals. This is not common practice and adds complexity when assessing access conditions and protecting values. It reduces transparency around the risks and impacts of extraction on flows and creates confusion for stakeholders as conditions vary within water sources. There are also environmental and social impacts if there is trade as protections may be reduced.

The Commission supports the freeing up of trade restrictions, in line with stakeholder submissions, the National Water Initiative, and good practice. However, before trade barriers can be removed, it is critical that robust, consistent flow classes are included in the Plan. Further access conditions should be mandatory conditions on all licences that have access licence conditions less than the flow class. This would be transparent for anyone considering trades, will maintain equity, and apply even if a licence is traded.

9.2.3 The Plan does not protect replenishment flows from the regulated river

Replenishment flows are flows provided '*to refill pools and water holes in effluent river systems downstream of the [regulated] water source and provide water for household and town use and stock*'.[205] The Namoi Regulated Plan includes provisions allowing for replenishment flows for Pian Creek.[206]

The Plan does not recognise or protect replenishment flows released under the Namoi Regulated Plan, once they reach the unregulated waterways to allow them to reach their intended purpose, except through pre-existing conditions listed in Appendix 4. This creates inequities between licensees in different plans as unregulated licensees are allowed to extract until there is less than or equal to 43 ML/day at Dempseys Bridge gauge or less than or equal to 5 ML/day at Waminda gauge, whereas regulated water users upstream are restricted.

Other unregulated water sharing plans – such as the *Water Sharing Plan for the Macquarie Bogan Unregulated Rivers Water Sources 2012* – protect replenishment flows and require that water must not be taken under an access licence other than a domestic and stock access licence.[207] DPE-Water should include provisions in the replacement Plan preventing extraction of replenishment flows by an access licence other than for its intended purpose.

Further, to improve transparency and certainty of when replenishment flows should occur, replenishment flows should be made based on conditions in the receiving watercourses, noting these conditions may vary under projected climate change. The Commission will review the benefit of such provisions as part of the Namoi Regulated Plan review. The

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204 Under Plan Clause 43(7) (7), the cease to take condition are transferred after section 71S or 71W dealings.

205 ..... As defined in the dictionary (Schedule 1) to the Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016

206 ..... Clause 59 of the Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016

207 ..... For example, Clause 26 of the *Water Sharing Plan for the Macquarie Bogan Unregulated Rivers Water Sources 2012*

adequacy of the volumes allowed for under the replenishment flows also falls within the scope of the Namoi Regulated Plan review, rather than this review.

9.3 Account management and AWD reduction rules create inequities

Water sharing plan provisions must support equitable water sharing, particularly where the level of entitlement exceeds the LTAAEL. The Plan requires that if the LTAAEL or long-term average sustainable diversion limit are exceeded, the Minister is to make AWDs of less than 1 ML per unit share for unregulated river access licences and floodplain harvesting (unregulated river) access licences.[208] The Commission identified three key issues related to the Plan's account management provisions (introduced in **Chapter 5**) and relative AWD reductions between licence categories:

- unregulated access licences and proposed unregulated floodplain harvesting licences have different carryover, account limits, and patterns of extraction, which means that users in the same water source can accumulate water in their accounts and potentially contribute to LTAAEL exceedance at different rates. However, there is no consideration of these differences when applying reductions to ensure LTAAEL compliance, meaning growth within one category may be offset by an inequitable reduction in the other category
- there are differences between the regulated and unregulated floodplain harvesting account management rules, which may create inequalities
- within the same licence category, while carryover and account limits are the same, these provisions have different impacts and benefits for different users. These differences are also not considered when applying reductions, meaning an opportunistic extraction pattern by one industry can result in reductions to another.

9.3.1 Inequities between licence categories

Under the proposed rules, floodplain harvesting licensees can accumulate water in their account at a higher rate compared to unregulated river access licensees. Floodplain harvesters could be opportunistically extracting during periods of higher flow and storing water for later use, while unregulated river access licensees may require regular extraction (such as for permanent plantings or feedlots) and may not have the infrastructure to store large volumes of water. This inequity has been highlighted by stakeholders and DPE-Water have indicated they are investigating ways to address the issue.

Due to these behaviours and generous accounting rules, some licensees can have a greater contribution to LTAAEL exceedance in wetter periods, which may result in compliance action in drier periods that disproportionately impacts other licensees that have had a less significant contribution to the exceedance.

Combining unregulated river access licences and floodplain harvesting (unregulated river) licences together to reduce total extraction below the LTAAEL disadvantages those users who have less advantageous carryover rules and require greater long-term consistency of access. The impact of this provision and the relative effects on unregulated river and floodplain harvesting (unregulated river) access licences cannot be quantified without a

[208] ..... Clauses 35 and 31B of the Plan.

numeric LTAAEL and modelling. However, it is likely that it will cause inequity between categories of licence. DPE-Water have indicated that stakeholders have raised concerns over this inequity.

In other water sharing plan reviews, the Commission has acknowledged that AWD reductions for different licences categories are separated. For example, in the Gwydir Regulated River Plan, the regulated river (general security) and floodplain harvesting (regulated river) access licences AWD reductions are separated out if the LTAAEL is exceeded.[209] This is consistent with the NSW Floodplain Harvesting Policy. This approach of separating AWD reductions for each licence category should be adopted for the replacement Namoi Plan to enable targeted compliance action if the LTAAEL is exceeded.

9.3.2 Inconsistencies between the regulated and unregulated provisions may create inequalities

Both the regulated and unregulated plans allow for amendments to include rules for the management of floodplain harvesting. The proposed rules for floodplain harvesting access licences to be included in Namoi water sharing plans were released for comment through public consultation which ran from 1 December 2022 to 29 January (regulated river) and 28 February 2023 (unregulated river) respectively. However, these were not specific. For the purposes of assessing potential impacts of floodplain harvesting on the Plan, the Commission has assumed that provisions consistent with the Gwydir water sharing plans, which have been finalised, would be adopted. **Table 5** shows the accounting rules and maximum annual extraction that would be allowed under accounting provisions consistent with the Gwydir water sharing plans.

[209] ..... Clause 34(1) of the Water Sharing Plan for the Gwydir Regulated River Water Source Amendment Order 2022

Table 5: Accounting rules and maximum annual extraction

Accounting Rule	Unregulated Access	Unregulated Floodplain (assuming consistent with Gwydir)	Regulated Floodplain (assuming consistent with Gwydir)
Carryover	1 ML per unit share of access licence share component[210]	Water allocations remaining in a water allocation account for a floodplain harvesting (unregulated river) access licence must be carried over from one water year to the next water year[211]	Water allocations remaining in a water allocation account must be carried over from one water year to the next water year[212]
Account Limit	2 ML per unit share[213]	3 ML per unit share[214]	5 ML per unit share[215]
Available Water Determination	Unless the Minister otherwise determines, at the commencement of each water year, an available water determination of 1 ML per unit share	Unless the Minister otherwise determines, at the commencement of each water year, an available water determination of 1 ML per unit share	At the commencement of each water year, the Minister is to make an available water determination for floodplain harvesting (regulated river) access licences of 1 ML per unit share
Entitlement	154,115 unit shares	Unspecified	Unspecified – not provided
Maximum extraction within any year	308,230 ML	Unspecified entitlement (potentially times 3 depending on account limits)	Not provided with modelling report
LTAAEL ML/year	Unspecified	Unspecified	25,200 overbank flow harvesting 21,300 non-exempt rainfall runoff harvesting 16,200 exempt rainfall runoff harvesting
Compliance period	3 years	Unspecified	5 years[216]

[210] ..... Clause 46(5) of the Plan
[211] ..... 39 (6) of the *Water Sharing Plan for the Gwydir Unregulated River Water Sources 2012*
[212] ..... 45 (3) b of the *Water Sharing Plan for the Gwydir Regulated River Water Sources 2016*
[213] ..... 39 (4) b of the Plan - 1 ML per unit share of access licence share component plus allocation
[214] ..... DPI (n.d.) *Floodplain harvesting licence rules in the water sharing plan for the Namoi valley*
[215] ..... 45 (d) of the *Water Sharing Plan for the Gwydir Regulated River Water Source Amendment Order 2022*
[216] ..... DPI (n.d.) *Floodplain harvesting licence rules in the water sharing plan for the Namoi valley*

DPE-Water need to assess the cumulative impact of all extraction when setting account rules for a particular licence category and ensure that they are equitable. The Commission also notes that the AWD requirement for regulated floodplain harvesting removes the Minister's discretion to set an AWD as it requires the AWD to be set at 1ML per unit share. This is inconsistent with other provisions and creates inequities. The Commission will review this further in the review of the regulated plan.

9.4 Inequities within licence categories

There is only one LTAAEL for the entire Plan area. This means that any adjustments to AWDs to manage LTAAEL exceedance are shared equally across all users. This can create inequities between users of the same category with different water usage profiles. Carryover provisions were intended to allow users flexibility to access their long-term average extractions in systems that tend to be 'boom or bust'.

Use of significant carryover in wetter years may create inequities. Given that the Plan's entitlement is greater than the LTAAEL, there is a material risk of exceedance and AWD reduction action even without use of carryover. The relatively generous account management rules further increase the risk of LTAAEL exceedance in wetter periods when more water can be extracted.

Carryover provisions can create inequities between licence holders of the same type with different extraction needs. While the intent of carryover provisions was to provide more flexibility for users to manage extraction under variable wet and dry periods, the usefulness of these provisions varies depending on the extraction profile of the industry using the water. For example, these provisions are more beneficial to industries that can pump and store water, and those that opportunistically use water and are not reliant on consistent volumes year to year. Conversely, there are some industries that require greater consistency of access and may not have the infrastructure to take advantage of carryover provisions.

These differences mean that there is potential for some licensees to have a greater contribution to any LTAAEL exceedance through use of carryover. Despite this, if there is an LTAAEL exceedance, all unregulated access licences are reduced through an AWD in subsequent years. Pooling of all unregulated access licences across the Plan area together to reduce total extraction below the LTAAEL disadvantages those users who may not have driven LTAAEL exceedance, as well as those users who require greater consistency of access and are therefore less reliant on carryover provisions. This could be largely resolved by implementation of LTAAELs and subsequently AWDs at the sub-catchment scale, as described in **Chapter 5**.

The impact of LTAAEL exceedance and reductions in AWD would be disproportionately borne by those licensees that require ongoing access to water, and those who do not have large onsite storage as they are not likely to have caused the exceedance. If LTAAEL exceedance is significant, or due to the five-year assessment period is not acted upon swiftly, impacts will also be felt by the environment, domestic and stock users, and downstream systems due to extraction above the LTAAEL.

9.4.1 Licencing of farm dams if AWD is reduced

WaterNSW's licensing staff also highlighted the impact of the current Plan's trade restrictions on the water market's ability to accommodate farm dams that exceed harvestable rights. If AWDs were to be reduced, licensed farm dams must currently downsize their capacity or acquire additional entitlement through the trading market. This has not been an issue under the life of the Plan as 100 percent AWDs have been allocated each year. This is a state-wide issue and DPE-Water should consider mechanisms to address this concern before AWDs have to be reduced in unregulated systems.

9.5 Equity between towns

There are multiple towns within the system and downstream that need water in droughts (see **Chapter 6**). This creates a need to determine how water can equitably be shared amongst the towns. In the recent drought DPE-Water prioritised upstream access. The result was that towns closest to the regulated river dams, such as Manilla, received greater access than towns that would have incurred greater conveyance losses like Walgett. Regulated water was directed to Manilla partly because of the lack of protection of water in the unregulated rivers. Section 324 orders, which sit outside the Plan, were later used to stop extraction in the unregulated rivers to provide flows to Walgett and the Barwon-Darling. If the town water supply access conditions were inside the Plan, equity between town water supplies would be transparent.

These equity considerations will increase as towns in the upper Namoi continue to grow. The Plans allow carryover for towns within the Peel sub-catchment but not for other areas within the Plan.[217] The Commission considers that the Plans should provide that all towns are given equal access to domestic supplies.

9.6 Extraction via overbank flow creates potential compliance issues

Unregulated water licence holders catch overbank flow as part of their allocation. Currently the licences assume all water is pumped from a river in a single water source. However, in some cases licence holders may take overland flow under their unregulated licence that is in a different water source from where their pump is located. This creates a potential compliance issue for licence holders, even though it may be a continuation of historical practice, which has not been appropriately captured on their licence.

The Plan needs to recognise that, for some properties, the historical capture of floodplain harvesting can occur in water sources that are not where their current pump (and consequently works approval) is located. DPE-Water are aware of this issue and have indicated they are examining options to address it.

[217] ..... Clauses 43(6) and 44(3) of the Plan.

9.7 The Plan does not have clear equity objectives

The Act creates a clear expectation that water sharing plans should '*provide for the orderly, efficient and equitable sharing of water*' and seek to minimise cumulative impacts on water sources.[218] The Peel Plan had in its vision to:

> *'provide for equitable water sharing among users in these water sources'*.

The Namoi Unregulated Plan had as an objective to:

> *'manage these water sources to ensure equitable sharing between users'.*

The 2020 amendments removed reference to equity. The replacement Plan should include explicit equity objectives, strategies and performance indicators to transparently outline how it manages equitable sharing of water between and within licence categories. Without these, the Plan's effectiveness and alignment with the Act cannot be assessed and the Plan's treatment of different users is not transparent.

9.8 Recommendations

R 17	As part of the replacement Plan, to ensure access is equitable within the Plan area and downstream of the Plan, DPE-Water should: a) include appropriate minimum cease to pump thresholds in the Plan for application to all licences in that water source or management zone, and specify that daily access conditions are mandatory conditions on access licences b) implement AWD provisions which require reduction for the licence category which causes LTAAEL exceedance, except for Local Water Utilities and Domestic and Stock licences consistent with the rules in the Namoi Regulated Water Sharing c) ensure the Plan recognises floodplain harvesting can occur on properties that cover multiple water sources and ensure water extraction is accounted for at the location it is extracted. d) prioritise and equally protect all town domestic supplies e) include explicit equity objectives, strategies and performance indicators.

[218] ..... Section 3(e) and Clause 2(d) of Section 5 of the Act.

10 Restoring Aboriginal water rights, values and uses

The purpose of this section is to understand the extent that the Plan benefits Aboriginal people, and their spiritual, social, customary and economic values and use of water. The Commission notes this Plan has been in place for nearly 10 years and is intended to provide benefit to Aboriginal people, with several amendments over its term.

The Commission acknowledges the Gomeroi/Kamilaroi/Gamilaraay have an intrinsic connection with the lands and water of the Plan area. The landscape and its waters provide First Nations people with important links to their history and help them maintain and practice their traditional culture and lifestyle. The Namoi River is also an important source of water for the Aboriginal community of Walgett.

The Commission acknowledges that extensive flooding in the Plan area has limited engagement with Aboriginal people for this review. The Commission recognises the importance of engaging with Native Title claimants and Aboriginal people for the Plan review to better understand the impacts of the Plan and benefits to Aboriginal people.

The Commission supports DPE-Water undertaking further detailed engagement with Aboriginal communities as part of any plan replacement process to better inform Aboriginal cultural content and improve planning around water sharing and water use opportunities that benefit the Aboriginal people in relation to their spiritual, social, customary and economic use of land and water.

Aboriginal stakeholders have made submissions as part of this review and other processes[219] that are also relevant to this Plan review, which provide important insights regarding cultural values, rights and access to water, and where changes to the Plan may be warranted.

The Commission continues to identify critical state-wide issues in water sharing plans relating to Native Title, Aboriginal water rights, and the protection of cultural values. This review highlights several specific issues in the Plan area, including:

- there is limited recognition of Native Title in the Plan area (**Section 10.1**)
- the Plan does not effectively protect Aboriginal water values and uses or provide for tangible access to water (**Section 10.210.2**)
- there are inconsistencies with the NSW Water Strategy (**Section 10.3**) and the Aboriginal Water Strategy remains in development
- additional shares have been offered under controlled allocations in culturally significant water sources without evidence that Aboriginal water rights were considered before this took place (**Section 10.4**)
- access to town water is critical for Aboriginal communities (**Section 10.5**)
- cultural flows are not currently considered in extraction limits (**Section 5.6**).

219 Dharriwaa Elders Group (2023) *Yuwaya Ngarra-li Briefing Paper: Walgett's Drinking Water*

10.1 The Plan's recognition of Native Title rights

In line with other updated inland water sharing plans, the Plan includes a requirement to provide water to satisfy Native Title rights where a determination or ILUA is made.[220] The Plan also includes relevant objectives, strategies and performance indicators to monitor the extent to which Native Title requirements have been met and a provision to support amendments where Native Title rights may change under the Commonwealth *Native Title Act 1993*.[221] The amended Plan includes a targeted objective to '*provide access to water in the exercise of Native Title rights*.'[222]

There was a Native Title claim but no determinations when the Plan commenced (see **Section 2.1**). The active Native Title claim was submitted by the Gomeroi people and covers a significant part of the Plan area which also has a large and strongly connected Aboriginal population.[223] The current Plan has zero allocation for Native Title.

A submission from the Dharriwaa Elders group to this review highlighted the importance of its consideration:

'No Native Title claims have been determined yet for Walgett, but when they are, the relevant Water Sharing Plans must respond and incorporate their requirements, which will include surface and groundwater entitlements. Similarly, lands granted under NSW Aboriginal Land Rights Act, or managed under Indigenous Land Use Agreements, must be accommodated by the relevant Water Sharing Plans.'[224]

The Commission recommends that any Native Title claimants are engaged as a priority to identify water-dependent cultural values and how Plan provisions can better support and protect these values as part of the Plan replacement and ongoing Plan improvement.

Under the claim registration test, registered Native Title claimants have proven their connection to Country (including connection to water dependant sites) to an extent where government departments must consult with them regarding development of land and water management plans.

The Commission continues to raise concerns regarding the limitations of the extent to which Native Title determinations and established ILUAs are reflected in water sharing plan provisions.

10.2 Existing provisions had limited Aboriginal benefits

The Plan includes an 'Aboriginal cultural' licence category to provide access to water but it can only be used for traditional cultural purposes (not commercial or trading activities)[225]

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[220] ..... Clause 20 of the Plan.
[221] ..... Clause 12 of the Plan.
[222] ..... Clause 12(2)(A) of the Plan.
[223] ..... National Native Title Tribunal (2019) *Register of Native Title claims details - Gomeroi People (NC2011/006)*
[224] Dharriwaa Elders Group (2019) *Dharriwaa Elders Group submission Namoi Water Resource Plan*
[225] ..... Clause 41 of the Plan states that '*An access licence of the subcategory "Aboriginal cultural" may only be granted for the taking of water by an Aboriginal person or Aboriginal community for any personal, domestic or communal purpose, including drinking, food preparation, washing, manufacturing traditional artefacts, watering domestic gardens, cultural teaching, hunting, fishing, gathering and for recreational, cultural and ceremonial purposes.*'

and allocations are capped at up to 10 ML per licence per year.[226] DPE-Water advised that *'the ability to apply for Aboriginal cultural water access licences in water sources throughout NSW has been embedded in water sharing plans for 20 years since the first plan was released in 2002. Yet in that time only seven cultural access licences have ever been issued, with only one remaining in use today.'*[227]

There is no water assigned for Native Title, and no Aboriginal cultural licences have been issued under the Plan based on the WaterNSW Water licensing system.[228] There is no allowance for issuing 'Aboriginal community development' licences under this Plan.

There is a long history of trade and sharing of resources as a cultural practice, which saw Aboriginal people grow resources on their Country and often venture outside of their own Country for trade and ceremony.[229, 230] However, trade is not recognised in the purpose for which cultural access licences may be granted. A review process needs to consider how to better balance economic opportunity (including those provided under a basic landholder right - stock watering) with that of a cultural purpose.

The Commission has highlighted in previous reports[231] that the limitations associated with Aboriginal cultural licences are inequitable, including that they are highly restrictive, inherently limiting by excluding economic uses[232] and unable to be easily accessed and applied for. These concerns were reflected in stakeholder submissions to this review.

Clause 12 (2)(d) of the Plan requires that the Plan contribute to the maintenance of water quality within target ranges to ensure suitability of water for Aboriginal cultural uses. However, the Plan has no clear provisions to specifically protect water quality for this purpose. The Commission recognises that the Aboriginal Water Strategy may consider these issues. However, it remains unpublished with benefits for Aboriginal people delayed.

The Plan aligns with the updated inland plans to include common objectives, vision, strategies, and performance indicators to maintain and improve values and uses of water by Aboriginal people.[233] Aboriginal social and cultural objectives were updated in the 2020 Plan revisions, but it is unclear how Aboriginal representatives were included in the process to make these amendments.

The Plan provides very limited information on the water-dependent cultural values of the Gomeroi people. For example, the Plan does not recognise or protect known water-dependent Aboriginal cultural values or places, such as the lower reach of Baradine Creek or Eulah Creek. Appropriate recognition of water-dependant Aboriginal cultural sites needs to inform the replacement Plan to ensure they are considered and protected.

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226 ..... Clause 34(3) of the Plan.
227 ..... Personal communications: DPE-Water, 4 April 2023.
228 ..... Data provided by WaterNSW from its Water Licensing System, as at 31 March 2023.
229 Kerwin, D. (2010) Aboriginal dreaming paths and trade routes. Aboriginal. Sussex Academic Press, Eastbourne, U.K.
230 Robert S. Fuller, Michelle Trudgett, Ray P. Norris, Michael G. Anderson (2014) *Star Maps and Travelling to Ceremonies -- the Euahlayi People and Their Use of the Night Sky*
231 ..... See previous reports at Natural Resources Commission (n.d.) *Water Sharing Plan Reviews*
232 ..... Part 2, Section 12(1) of the Plan.
233 Clause 12 of the Plan.

Plan provisions do not effectively support Aboriginal cultural values. This was evident in a submission made by the Dharriwaa Elders Group to the draft Namoi Surface Water Resource Plan, which refers to the Namoi catchment water sharing plans.[234] In its submission the Dharriwaa Elders Group felt that the Namoi unregulated water sharing plan's vision and objectives were undermined, specifically:

> *"The Aboriginal values of the water sources have not been protected and have been seriously threatened."*

As part of Plan replacement, DPE-Water needs to co-design Plan provisions with Aboriginal people to protect cultural values and ensure that Plan objectives (including economic opportunities) and Closing the Gap targets are realised. Co-design will further ensure Plan objectives are aligned with current aspirations and needs (contemporary and traditional).

10.3 Commitments under the NSW Water Strategy must be met

The Commission's recent water sharing plan reviews have acknowledged DPE-Water's focus on improving stakeholder engagement with Aboriginal peoples and commitments made under the *NSW Water Strategy* to address inequity in Aboriginal water rights and access. Historically the outcomes of effective policy have been limited by their ability to be adopted within the plans.

The Commission notes that previous initiatives such as the Aboriginal Water Initiative and State Water Management Outcomes Plan were designed to progress towards improving Aboriginal water outcomes. The dissolution of the Aboriginal Water Initiative and move away from the *State Water Management Outcomes Plan* delayed the realisation of outcomes for Aboriginal people. The implementation of the *NSW Water Strategy* and Aboriginal Water Strategy need to be seen through to their end for their full benefits to be realised.

Priority 2 of the *NSW Water Strategy* is to 'recognise First Nations / Aboriginal peoples' rights and values and increase access to, and ownership of, water for cultural and economic purposes' and includes the following actions:[235]

- strengthening the role of Aboriginal peoples in water planning and management
- developing a state-wide Aboriginal water strategy and a separate groundwater strategy
- providing Aboriginal ownership of and access to water for cultural and economic purposes
- working with Aboriginal peoples to improve shared water knowledge
- working with Aboriginal peoples to maintain and preserve water-related cultural sites and landscapes.

If implemented in a culturally appropriate manner, these commitments will lead to better outcomes for Aboriginal peoples, be consistent with commitments Australia has made as a

[234] ..... Dharriwaa Elders Group (2019) *A brief submission in response to the Draft Barwon-Darling Watercourse and Namoi Water Resource Plans: Submission to Department of Planning, Industry and Environment*
[235] ..... DPIE-Water (2021) *NSW State Water Strategy*

signatory to the United Nations Declaration on the Rights of Indigenous People,[236] and contribute to Closing the Gap targets. In its submission to the Plan review, the NSW Aboriginal Land Council emphasised the need for the NSW Government to contribute towards meeting these targets:[237]

> *'NSWALC seeks to ensure that the NSW Government meets its commitments outlined in the National Agreement on Closing the Gap (CtG). The CtG provides an important framework for governments to work in partnership with Aboriginal people to ensure we maintain distinctive cultural, spiritual, physical and economic relationships with water, and advance our rights and interests in water.'*[238]

However, as highlighted by the Productivity Commission inquiry on national water reform, there is still much work to do to secure Aboriginal peoples' interests in water.[239] Collaborations between agencies and First Nations to integrate cultural flows into contemporary water management or providing funding to help First Nations communities invest in water for cultural and economic activities are some of the steps required.[240] The challenge now is to embed these commitments and actions in the NSW water planning and water licensing framework so that Aboriginal rights and interest in water can be recognised, quantified and actioned in ways that support cultural and economic needs.

Key issues that need to be addressed include better alignment of the Plan and the *NSW Water Strategy* and the Aboriginal Water Strategy once it is finalised. The NSW Aboriginal Lands Council indicates that the Plan is not consistent with the *NSW Water Strategy*:

> *'The current Plan, at Part 2, 12 Aboriginal cultural objectives, attempts to reflect DPIE's commitment to work with Aboriginal communities however does not reflect DPIE's priority in the NSW Water Strategy to 'Recognise First Nations/Aboriginal People's rights and values and increase access to and ownership of water for cultural and economic purposes', particularly regarding ownership of water.'* [241]

The Commission notes that the Aboriginal Water Strategy has been in development during the implementation of this Plan. With no clear finalisation date, the Plan's ability to improve outcomes in water sharing for Aboriginal people is restricted to current processes, which have had limited positive success for Aboriginal people.

The Commission acknowledges that DPE-Water recently called for registrations of interest to develop Cultural Watering Plan pilots to inform their review of existing policy frameworks and identify opportunities for greater Aboriginal access and ownership of water.[242] This is a welcome initiative.

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[236] ..... See for example, '*Article 25 Indigenous peoples have the right to maintain and strengthen their distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources and to uphold their responsibilities to future generations in this regard.*' In: United Nations (2007) *United Nations Declaration on the Rights of Indigenous Peoples*

[237] ..... Submission: NSW Aboriginal Land Council, received 21 February 2022.

[238] ..... Submission: NSW Aboriginal Lands Council, 22 February 2022.

[239] ..... Productivity Commission (2021) *National Water Reform 2020, Productivity Commission Inquiry Report No. 96*

[240] ..... MDBA (2022) *Water for First Nations*

[241] ..... Submission: NSW Aboriginal Land Council, received 22 February 2022.

[242] ..... DPE-Water (n.d.) *About Cultural Watering Plans*

10.4 Aboriginal water rights should be prioritised when delivering controlled allocations

Controlled allocations can occur where a water source is not fully committed and there is unassigned water.243 The Commission understands that this can occur in circumstances where a licence holder surrenders their licence or entitlement shares to the Minister for Lands and Water, such as where they no longer intend to use the water for irrigation. The licence or entitlement may be cancelled or held by the Minister. Entitlement shares that are retained can be reissued to other licence holders via controlled allocation. However, before this occurs, risks associated with this action and a prioritisation of needs must be considered, consistent with the principles of the Act.244

In previous reviews, the Commission has recommended that DPE-Water considers Aboriginal water sharing and use opportunities before announcing controlled allocations.[245] However, in March 2022, the NSW Government published controlled allocations in one of the unregulated river water sources that forms part of the Plan area. This water source was Baradine Creek, which has significant Aboriginal cultural values.[246]

It is unclear if and how Aboriginal water rights and values were considered when making this controlled allocation order. The Minister is encouraged to codify this process and ensure there is greater transparency around what is considered as part of the risk assessment and assessment of high priority needs before making any future controlled allocations during the term of the replacement Plan.

The process of making controlled allocations needs to be bought into line with the *Water Management Act 2000* where Native Title is prioritised and the management principles must be given effect to.

10.5 Access to reliable town water of suitable quality is critical to Aboriginal communities

The Namoi is also an important source of water for the community of Walgett, which has a large and diverse Aboriginal and Torres Strait Islander population at 21 percent in 2021. This is much higher than the state average of 2.9 percent or rural areas of NSW at 3.7 percent.[247] Research has shown that Indigenous Australians experience much higher levels of disadvantage than non-Indigenous Australians.[248] Aboriginal communities in Walgett have experienced a range of challenges in accessing clean drinking water. The Dharriwaa Elders Group raised a range of water quality and water security issues experienced in Walgett, and the Namoi and Gingie villages:

> '*Access to safe drinking water continues to be a challenge for residents in Walgett, creating an ongoing health risk. The combination of climate change and systematic water mismanagement across the Murray-Darling Basin has threatened both the quality*

243 ..... DPE-Water (2022) *Controlled allocations*
244 ..... Section 5 of the Act.
245 ..... NSW Natural Resources Commission (2021) *Review of water sharing plans for the Bega and Brogo Rivers Area, Murrah-Wallaga Area, and Towamba River water sources*
246 ..... NSW Government (2022) *Government Gazette of the State of NSW, Number 83 - Electricity and Water*
247 ..... ABS (2021) *Estimated Resident Population by LGA 2001-2019*
248 ..... *National Agreement on Closing the Gap (2020)*

and quantity of Walgett's surface waters. While drought impacts overall flow, upstream industry threatens river quality and quantity through over-extraction and pollution. When the rivers run dry or are unsafe, the town switches its supply to bore water from the Great Artesian Basin (GAB) which has high sodium levels.' [249]

How the regulated Namoi River and unregulated river water sources are managed (particularly Pian Creek), can have implications for Walgett's water supply, including water quality. The Commission recognises there are a range of strategies that support the management of town water. It is critical to engage with local councils and Traditional Owners to ensure the replacement Plan adequately provides for town water supply needs (see **Chapter 6**).

10.6 Recommendations

R 18	As part of the replacement Plan, to deliver better outcomes for Aboriginal peoples through water management, DPE-Water should: a) undertake culturally appropriate engagement with Traditional Owners and knowledge holders b) include registered Native Title claims and identify and include water-dependent cultural values and uses in the Plan c) co-design Plan objectives and rules to protect and support Aboriginal values and uses of water d) ensure that the Plan's definition of 'cultural practice' recognises and includes trade as a cultural practice (based on a long history of trade between Aboriginal nations) and does not restrict cultural access licences to 10 ML per application e) ensure Plan objectives and corresponding provisions are consistent with the NSW Water Strategy and Closing the Gap targets f) when making controlled allocations ensure Aboriginal rights and access including Native Title are prioritised g) improve reporting on key performance indicators that increase Aboriginal benefit including external influences (including regulatory action outcomes).

[249] ..... Dharriwaa Elders Group (2023) *Yuwaya Ngarra-li Briefing Paper: Walgett's Drinking Water*

11 Monitoring, evaluation and reporting

A lack of coordinated MER is a consistent theme raised in the Commission's reviews of water sharing plans. This is largely due to a lack of plan-specific MER programs, as well as limited resources dedicated to MER.

This review has found a similar lack of plan-specific MER over the life of the Plan. However, the Commission recognises there are some existing or historical monitoring programs that support an understanding of the condition of water sources in the Plan area, and how environmental assets respond to changes in flow (**Section 11.1**). An environmental water requirement (EWR) tool developed by DPE-EHG may also provide insights regarding the contribution of Plan rules to meeting EWRs set out in the *Namoi Long-Term Water Plan*. However, this is dependent on adequate real-time hydrologic data, which is limited in unregulated river water sources. Also, the tool was at prototype stage at the time of this review.

The Commission acknowledges that DPE-Water is working to improve MER arrangements for water resource plans and water sharing plans (**Section 11.2**). It has prepared the *Namoi Surface Water Monitoring, Evaluation and Reporting Plan* as part of its work for the Namoi Surface Water Resource Plan. In addition, the Commission welcomes DPE-Water's work on a NSW Water Sharing Plan Evaluation Framework, including the development of the NSW Water Sharing Plan Evaluation Program and method statements to support its implementation. The Commission understands that DPE-Water will commence implementation of the program in 2023.

The *NSW Water Strategy* includes an action under Priority 3 to '*invest in long-term and effective monitoring, evaluation, reporting and research*.'[250] However, the Commission notes the lack of clarity around long-term future funding available for water sharing plan monitoring and evaluation actions.

The Commission considers it is critical that DPE-Water receives (or reallocates) adequate funding to undertake this function as a priority. Funding should be commensurate with the importance of MER for assessing water sharing plan effectiveness and will support adaptive management. The Commission understands that funding for water sharing plan MER activities is predominantly allocated from the Independent Pricing and Regulatory Tribunal NSW final determination of charges that the Water Administration Ministerial Corporation can levy on licence holders for its water management services over the period of 4 years. The current determination was handed down in 2021 and expires on 30 June 2025.

Section 11.3outlines key knowledge gaps that should be addressed.

11.1 Existing monitoring programs in the Plan area

Although there is a lack of monitoring and reporting against the Plan's performance indicators, there are other existing monitoring programs that provide some insight into environmental condition and outcomes being achieved in the Namoi catchment. However,

[250] ..... DPIE-Water (2021) *NSW Water Strategy*.

they cannot be directly attributed to the Plan provisions given they are largely associated with university research programs and the regulated river.

Much of the monitoring that has occurred to date has focused on the regulated Namoi River and surface-groundwater connectivity. This includes but is not limited to:

- fish community surveys
- aerial waterbird surveys (Split Rock Dam)
- Cockburn groundwater and surface water connectivity study,[251] which was underway when the Commission undertook its review of the *Water Sharing Plan for the Peel Regulated, Unregulated and Alluvial Water Sources 2010*.

There are also existing hydrologic and water quality monitoring sites in the catchment, including unregulated river water sources. As part of the development of the Namoi Surface Water Resource Plan, DPE-Water prepared a water quality technical report based on data from these sites.[252] In addition, DPE-Water completed a review of its stream, storage, groundwater and water quality monitoring network in 2021. This work has led to work being progressed to upgrade existing gauges and install new gauges in NSW, including in the Plan area.[253]

The Commission understands that DPE-Water will draw upon existing programs and link them back to Plan objectives and monitoring themes as part of its integrated MER plan.

11.2 Pathways towards improved MER

11.2.1 Water sharing plans

DPE-Water is taking steps to improve water sharing plan MER and support efficient and effective use of available resources. This includes:

- updating water sharing plan objectives as part of Plan amendments in 2020 to make them measurable and more meaningful
- establishing the Water Planning Implementation unit, including the Water Evaluation and Reporting Team that is focused on improving MER through the development of DPE-Water's *NSW Water Sharing Plan Evaluation Framework,* which intends to inform future water sharing plan reviews
- establishing a NSW Water Sharing Plan Implementation Program that will track and report on progress of implementation of water sharing plan MER activities
- investing in projects to strengthen MER and help target resources, including development and application of a framework for prioritising water sources for MER activities and a transferability model.

11.2.2 Water resource plans

In addition to strengthening water sharing plan MER, DPE-Water has also developed a Water Resource Plan MER Framework and customised environmental MER plans as part of

[251] ..... NSW DPIE (2021) *Cockburn River groundwater and surface water connectivity study*
[252] ..... NSW DPIE (2020) *Water quality technical report for the Namoi surface water resource plan area (SW14)*
[253] ..... NSW DPIE (2021) *Hydrometric improvement plan*

the development of water resource plans. These seek to integrate MER activities across agencies and map out monitoring efforts by research theme.

The Commission has considered the *Namoi Surface Water Resource Plan*'s MER plan, which was designed to meet Basin Plan reporting requirements.[254] The environmental MER plan is based on program logic developed for the water sharing plan objectives, but also objectives from the *Namoi Long-Term Water Plan* and Water Quality and Salinity Management Plan. The program logic is intended to guide monitoring activities, while risk assessments undertaken as part of the water resource planning process can inform areas for further research.[255] The MER plan also maps out existing monitoring programs by research theme.

11.2.3 Areas for improving MER

There is room for improvement of water sharing plan MER:

- while the amended Plan includes clearer, measurable objectives, important Plan provisions have not been updated to support the achievement of the revised objectives, meaning that in some respects, these objectives risk not being met
- the Plan lacks equity objectives and corresponding performance indicators – without these, the Plan's effectiveness and alignment with the Act with respect to how it manages equitable sharing of water between and within licence categories, and the Plan's treatment of different users lacks transparency and is difficult to assess
- improved real-time gauging and water level monitoring is required to support MER
- there do not appear to be clear roles and responsibilities or adequate resources for overseeing and implementing the MER plan, which generates risks to implementation
- methods manuals referred to in the MER plan do not appear to have been finalised.

Given limited resources, it will be critical for DPE-Water to continue to identify efficiencies, focus on the most critical water sharing plan MER needs and continue to work collaboratively with other government agencies and academic institutions to coordinate monitoring activities that support water sharing plan evaluation. MER activities should be prioritised based on value and risk. Water source prioritisation and transferability studies currently underway by DPE-Water will help to target MER effort and resourcing.

Public reporting of MER priorities, findings and how they were considered in Plan amendments is needed to improve transparency and public awareness around Plan outcomes. It is preferable that public reporting of available MER occur at regular intervals and in line with the NSW Water Sharing Plan Evaluation Framework, which is currently in development.

While MER may be limited by resources, public reporting of outcomes of MER that is available would be consistent with best practice and with various NSW commitments to increased transparency in water management. It would also be comparable with the MDBA and states' publication of reports and other matters required by the Basin Plan.

There is also a need to report on extreme events that occur during the term of a water sharing plan. These have already been observed during the term of the current Plan that is the focus of this water sharing plan review. Specifically, there should be greater visibility

[254] ..... DPIE (2019) *Namoi surface water resource plan: Namoi surface water monitoring, evaluation and reporting plan - Schedule J*
[255] ..... *Ibid.*

regarding water management arrangements during extreme events and how they influence Plan outcomes.

11.3 Knowledge gaps

As noted above, much of the focus for existing monitoring programs has been in the regulated Namoi River and surface-groundwater interactions. Further research of the unregulated river water sources is required to improve system knowledge and support adaptive management of the Plan and other water sharing plans that span the Namoi catchment. Greater focus on implementation issues is also warranted. This includes, but is not limited to:

a) quantifying the historic level of extraction to accurately determine the LTAAEL. Publish the method, data and assumptions used

b) quantifying the current levels of unregulated extraction and undertaking LTAAEL compliance assessments required by the Plan (**Chapter 5**)

c) undertaking risk assessments for water sources using the total extraction as the risk to Plan objectives (from unregulated access, unregulated floodplain harvesting, regulated floodplain harvesting and connected, groundwater)

d) determining water-dependent Aboriginal cultural values in the Plan area and their flow needs (noting that DPE-Water has recently commenced a project and called for expression of interest to develop Cultural Watering Plans)

e) assess connectivity between water sources and groundwater and determine long-term trends impacting water availability

f) upgrading the surface water model to include changes in extraction from unregulated water sources with high entitlement share levels

g) the importance of connectivity between water sources for carbon and nutrient pathways and options for Plan rules to reflect and protect connectivity,[256] in accordance with the water management principles of the Act and the objectives of the Plan

h) the impact of unregulated flows and unregulated access in Pian Creek on the quantity and quality of Walgett's water supply (via the regulated river)

i) undertake a study of Lake Goran, its hydrological regime, values, extraction risks from entitlement levels and carryover, and the impacts of climate change, and consider the implications of the results for access rules in accordance with the water management principles.

11.4 Recommendations

R 19	In order to improve monitoring, evaluation and reporting, DPE-Water should: a) ensure the replacement Plan specifies timely reporting requirements of the results of MER activities to support transparency and adaptive management. This should include but is not limited to reporting on: ▪ outcomes for key environmental assets

[256] ..... NSW DPI (2018) *Gwydir surface water resource plan: Gwydir surface water monitoring, evaluation and reporting plan - Schedule J*.

	▪ water management during extreme events that occur in the Plan areas ▪ benefits for Aboriginal people arising from the Plan provisions. b) work with other agencies to: ▪ identify and address critical knowledge gaps ▪ specify what MER activities will be undertaken to address critical knowledge gaps, support transparency and adaptive management of the Plan in line with the NSW Water Sharing Plan Evaluation Framework and Prioritisation Tool (prioritise MER activities based on value and risk). ▪ strengthen stakeholder engagement in the lead up to and during the Plan replacement process. c) undertake a study or commence ongoing monitoring to better understand the impact of unregulated flows and unregulated access in Pian Creek on the quantity and quality of water supply of Walgett via the regulated river d) undertake a study of Lake Goran, its hydrological regime, values, extraction risks from entitlement levels and carryover, and the impacts of climate change, and consider the implications of the results for access rules in accordance with the water management principles.

12 Compensation implications of recommendations

Under the Act, compensation may be payable by the NSW Government to access licence holders – only in some circumstances where water allocations under a water sharing plan are reduced. Section 43A(3A) of the Act requires the Commission to consider some potential compensation requirements resulting from recommended changes to water sharing plans.

Specifically, the Act states:

'(3A) If a report of the Natural Resources Commission under subsection (3) recommends changes to a management plan that will result in a reduction of water allocations in relation to which compensation might be payable under section 87AA, the Commission is to state in the report whether the purpose of the proposed change is:

> *(a) to restore water to the environment because of natural reductions in inflow to the relevant water source, including but not limited to changes resulting from climate change, drought or bushfires, or*
>
> *(b) to provide additional water to the environment because of more accurate scientific knowledge that demonstrates that the amount previously allocated to the environment is inadequate.'*

Many of the recommendations can be advanced without triggering compensation. The Commission notes that Section 87AA indicates for instance that compensation is not payable due to a reduction in water allocation if '*the reduction in water allocations is for the purpose of restoring water to the environment because of natural reductions in inflow to the water source, including but not limited to changes resulting from climate change, drought or bushfires*.' However, the Commission considers that compensation might be payable under Section 87AA in relation to some recommendations listed in **Table 6**.

Table 6: Recommendations that may trigger compensation

Interaction between plans needs to be considered	
R 2	To ensure that water sharing plans are adequately accounting for water usage DPE-Water should: a) ensure that water sharing plan provisions account for water at the location it is extracted, at the time it is extracted b) review the cross-plan accounting rules to ensure the priorities of the Act are maintained across all plans.
R 3	As part of the replacement Plan, to improve the management of cumulative impact from floodplain harvesting, DPE-Water should: a) quantify total extraction in water sources and management zones, and develop access rules to manage the cumulative risks b) assess the cumulative impacts of all unregulated floodplain harvesting extraction across the Namoi catchment and revise accounts to manage the cumulative risk

	c) review the impact of the Plan's carryover provision on the risk of exceeding LTAAEL(s) and risk to outcomes.
Ensuring sustainable extraction	
R 6	As a matter of priority, to support sustainable extraction and improve transparency DPE-Water should: c) include a provision in the Plan requiring DPE-Water to determine the sustainable level of extraction by Year 5 based on best available ecological requirements, hydrological and climate information, and that these levels are used to define and amend the Plan's LTAAELs for each extraction management unit.
Improving consideration of connectivity	
R 10	d) investigate relationships between ephemeral streams in the Plan area and their connected groundwater sources and ensure that water sharing rules mitigate the impacts of extraction, particularly during periods of low/no flow e) use hotspot maps of groundwater decline and observed changes in stream flows to target connected water sources that require linked access rules and ensure surface water access rules protect base flows. f) Use the results of the above to revise the Plan rules to ensure connectivity is adequately addressed in the Plan and consider what changes may be necessary to the Water Sharing Plan for the Namoi Alluvial Groundwater Sources 2020.
R 11	As part of Plan replacement, to improve connectivity with the Barwon-Darling River, determine the contribution of flows from the unregulated river water sources of the Namoi valley to Barwon-Darling flow targets; include relevant targets in the replacement Plan; and clarify how Plan rules would be implemented to support these targets.
Protecting key environmental assets	
R 12	As part of Plan replacement, to address the inadequacy of the environmental protection provided by current access rules, DPE-Water should: a) review the current hydrometric network to identify where the Plan can reference operational gauges for establishing flow classes and flow-based access rules for water sources that currently have a 'no visible' flow rule b) ensure all high environmental value water sources at medium to high risk from extraction have flow-based access rules that support connectivity and adequately protect water sources and their dependent ecosystems c) review if conditions attached to current water access licences and works approvals are appropriate to protect high priority needs and ensure any changes to access rules from (a) and (b) are reflected in water access licence/works approval conditions.
R 13	To improve the provision of replenishment flows and associated environmental and social outcomes in unregulated river water sources, DPE-Water should review the definition of replenishment flows and ensure Plan rules provide protection from access to replenishment flows, except for domestic and stock purposes.

R 14	To inform Plan replacement, DPE-Water should investigate the adequacy of current Plan provisions for protecting the environmental values associated with Lake Goran, the impacts of climate change on the lake and its ability to support irrigation, and update Plan provisions to better protect these values where necessary.
R 15	To ensure that regionally significant wetlands are protected in the replacement Plan, DPE-Water should: a) carry out investigations to determine if drawdown provisions for Wee Waa and Gulligal lagoons are adequately protective of environmental and cultural values b) remove schedule 1A of the Plan and update drawdown provisions based on the outcomes of the investigations undertaken as per R 15(a) c) install hydrometric equipment to monitor water levels.

Recommendation 6 could require compensation if the analysis determines that the current LTAAEL based on historic extraction is too high to adequately protect the water sources and their ecosystems. In this case the compensation may be due both because of new scientific information about ecological requirements as well as natural changes in climate, which may result in a lower availability of water into the future.

The other recommendations listed in **Table 6** may require compensation if access rules or other restrictions materially affect overall long-term allocation available to users. The Commission views that these changes are necessary to provide additional water to the environment because of more accurate knowledge that demonstrates that the amount currently allocated to the environment in the Plan is inadequate to achieve objectives, as well as because of anticipated changes in climate.

Recommendation 8 may well lead to a reduction to current AWDs. However, the Commission notes that the Act allows the Minister to set the AWD at their discretion. Further, this clause would only ensure that a precautionary approach is taken to setting the AWD to ensure the current LTAAEL is adhered to. As such the Commission does not anticipate that the compensation clause 87AA would be triggered. However, DPE-Water should seek their own legal advice on this matter.

Limitations on changes in the amendment provisions of the Plan, such as:

"*provided that the Minister is satisfied that the amendments maintain, to the extent feasible, the same level of access for licence holders in the affected water source or management zone as prior to the establishment of the new or amended water source or management zone*"[257]

need to be considered. It is unclear how 'maintain same level of access' is defined and whether this refers to long-term average or individual events. However, the Commission views this is unlikely to affect implementation of these recommendations.

The Commission acknowledges that there are other recommendations that may affect water allocations. However, these changes are allowed through amendment provisions

[257] ..... Clause 76 (1)a

provided for in the Plan. These include the ability in relation to the Namoi Unregulated Rivers Water Sources only, to add, remove or modify an extraction management unit.[258]

In considering these requirements, the Commission has not made any determination in relation to entitlements to or amount of compensation and does not provide legal advice in this report. DPE-Water should seek legal advice regarding any potential compensation implications of implementing the recommendations in this report.

[258] ..... any division of an extraction management unit into two or more extraction units may only be made following a review which is assessed as adequate by the Minister that investigates —
..... (i) the geographic distribution of actual or potential growth in extractions across the extraction management unit above the long-term average annual extraction limit or long-term average sustainable diversion limit for that extraction management unit, and
..... (ii) the potential for disproportionate growth in extractions in some water sources in the extraction management unit to cause an exceedance of the long-term average annual extraction limit for that extraction management unit, and

Appendix A

Table 1: Licensed Entitlements from NSW Water Register and Trading Limits

NRC Grouping	Water Source	NSW Water Register Entitlement 2023				Total Entitlement in WSP [1]	Entitlement not included in Plan	Water Source trading limits added in 2020 WSP*	Increase from Plan allowed through trade	Sub-catchment added in 2020 WSP*	Sub-catchment limit[2]
		D & S	**Unreg. R.**	**Local Water Utilities**	**Total**						
Peel Valley	Chaffey	4	0	388.5	388.5	384.5	0	389	0	Chaffey	389
	Cockburn River	67	4325	0	4392	4438	-46	4399	6	Peel River	17,565
	Goonoo Goonoo Crk	21.5	1033.5	0	1055	1061.5	-6.5	1055	0		
	Lower Peel R. Tribs.	58.5	2421	0	2479.5	2541	-62	2480	0		
	Upper Peel R. Tribs	25.0	4006	5600	9631	9266.5	365	9631	0		
	Total	**176**	**12,170**	**5600**	**17,946**	**17,695.5**	**250.5**				**17954**
Upper Namoi	Split Rock	0	0	0	0	0	0	300	300	Split Rock	2051
	Upper Manilla	435	1616	421	2472	2110.5	361.5	2051	0		
	Keepit	5	769	0	774	750	24	929	179	Keepit	15,315
	Upper Macdonald R.	0	30	0	30	30	0	70	40		
	Mid Macdonald R.	498.5	4269	463	5230.5	5332.5	-102	5872	539.5		
	Upper Namoi	42.5	9747	564	10,353.5	10684	-331	9790	0		
	Total	**981**	**16,431**	**1,448**	**18860**	**18,907**	**-47.5**				**17366**
Lake Goran	Lake Goran	88	33190	0	33,278	32171	1107	0	NA	Namoi	76208
Lower Namoi	Bluevale	12	2972	0	2984	1640	1344	3147	1507		
	Coxs Creek	107.5	18171.5	0	18279	17634	645	17627	0		
	Maules Creek	7	1102	0	1109	1413	-304	1,079	70		
	Eulah Creek	35	3859	0	3894	2069	1825	4704	2635		
	Bohena Creek	12	1161	0	1173	995.5	177.5	1453	457.5		

NRC Grouping	Water Source	NSW Water Register Entitlement 2023				Total Entitlement in WSP [1]	Entitlement not included in Plan	Water Source trading limits added in 2020 WSP*	Increase from Plan allowed through trade	Sub-catchment added in 2020 WSP*	Sub-catchment limit[2]
		D & S	**Unreg. R.**	**Local Water Utilities**	**Total**						
	Bundock Creek	20.5	5679	0	5699.5	5142.5	557	4160	-1539.5		
	Brigalow Creek	14	1243	0	1257	1257	0	1957	700		
	Coghill Creek	0	600	0	600	600	0	1390	790		
	Etoo-Tallaba Crks	7	2686	0	2693	1407	1286	1925	-768		
	Spring-Bobbiwaa Crks	5	1476	0	1481	748	733	1681	100		
	Lower Namoi	26	3375	0	3401	3412	-10	2668	-744		
	Baradine Creek	104	19635	0	19739	19409	330	20396	657		
	Phillips Creek	0	161	0	161	161	0	261	0	Mooki	67208
	Mooki River	100.5	30287.5	0	30388	30393	-5	30393	0		
	Quirindi Creek	40.5	1740	1000	2780.5	2785.5	-5	3156	370.5		
	Rangira Creek	21	1458	0	1479	1479	0	1479	0		
	Warrah Creek	6	259	0	265	265	0	435	170		
	Werris Creek	0	1344	0	1344	1340	4	1,704	364		
	Total	**606**	**130,399**	**1000**	**132005**	124315.5	7684.5	**NA**	**NA**		
Pian Creek	Pian Creek	32.5	13113	0	13146	2031	11115	13146	0	Included in Namoi Sub-catchment	
	Grand Totals	1795.5	**172,113**	**8,048**	**181956**	**162,953.5**	**19002.5**	**NA**	**NA**		

1 Unregulated access + urban water + domestic and stock - clauses 22-25 of 2020 amended WSP
2 Table C - Volumetric limits for dealings into sub-catchments