NSW GOVERNMENT

Natural Resources Commission

Final report

Review of the Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources 2011

June 2022

Acknowledgement of Country

The Natural Resources Commission acknowledges and pays respect to traditional owners and Aboriginal peoples. The Commission recognises and acknowledges that Aboriginal peoples 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 the north western area, the Commission pays its respects to the Karenggapa, Wongkumara, Malyangapa, Wiljali and Barkandji peoples who are the Traditional Owners past, present and future, as well as other Aboriginal peoples for whom these waterways are significant.

Enquiries

Enquiries about this report should be directed to:

Phone	(02) 9228 4844
Fax	(02) 9228 4970
E-Mail	nrc@nrc.nsw.gov.au
Postal address	GPO Box 5341, Sydney NSW 2001

Document No. D22/1442

ISBN: 978-1-925204-82-7

Acronyms and units of measurement

Act	the *Water Management Act 2000* (NSW)
Commission	the Natural Resources Commission
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DPIE*	Department of Planning, Industry and Environment
DPI-Fisheries	Department of Primary Industries – Fisheries
DPE-E&H	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
GAB	Great Artesian Basin
GAB Plan	*Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources 2020*
GAB Shallow Plan	*Water Sharing Plan for the NSW Great Artesian Basin Shallow Groundwater Sources Order 2020*
GDE	Groundwater dependent ecosystem
HEVAE	High Ecological Values Aquatic Ecosystems
LALC	Local Aboriginal Land Council
LTAAEL	Long-term annual average extraction limit
MER	Monitoring, evaluation and reporting
ML	Megalitre (unit of volume equivalent to one million (1×10^6) litres
NARCliM	NSW and ACT Regional Climate Modelling Project
NPWS	National Parks and Wildlife Service
NRAR	The Natural Resources Access Regulator
NSW	New South Wales
Plan	The *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources 2011*
R/ SA	Recommendation/ suggested action
SMART	Specific, measurable, achievable, relevant and time-bound

***Note regarding DPIE / DPE**: During this review, DPIE was restructured and renamed to DPE. The water related functions of DPIE were transferred to DPE.

Table of contents

Executive summary

The Natural Resources Commission (the Commission) has reviewed the *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources 2011* (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. This assessment found that there are changes needed that warrant extending and remaking the Plan.

The Plan area's landscapes, ecology, land use and policy frameworks are unlike those elsewhere in NSW and present a unique set of challenges for water management. The Plan area contains less than 0.01 percent of NSW's population, but supports a $90 million pastoral industry, tourism destinations and could become an important mining and gas development region. It has significant environmental assets, including Ramsar-listed and Ramsar-nominated wetlands and one of NSW's newest national parks. The Plan area has a rich Aboriginal cultural history and state-significant Aboriginal cultural values, including NSW's first Aboriginal-owned national park, containing some of the most significant sacred places in far-west NSW.

The Plan area's arid environmental assets are adapted to a boom-and-bust cycle of water availability and the physical availability of water is a key limiting factor to outcomes. The priorities of the Act require the Plan to provide for environmental water requirements, sharing remaining water equitably between stakeholders, with basic landholder rights and town water supplies having priority.

The Plan area has a unique extraction profile, with minimal licensed extraction, and high long term average annual extraction limits relative to current licenced volume. The surface water extraction limit does not include harvestable rights despite this representing a significant proportion of water use in the Plan area. Further, surface and groundwater extraction limits are not based on best available evidence of sustainable extraction.

The surface water extraction limit for licences, domestic and stock rights, and native title rights is based on 10 percent of rainfall runoff. This is in addition to the harvestable rights allowance of 100 percent of rainfall runoff able to be captured through dams in minor streams. This risks outcomes and limits the Plan's ability to manage extraction equitably or sustainably. The Commission heard that harvestable rights extraction has increased over the last ten years, affecting downstream landholder's access to water for basic needs. It is unclear if the unique allowance for harvestable rights in the Western Division is delivering intended outcomes and providing for equitable water sharing. All landholders should have reasonable access to their basic landholder rights and all extraction should be accounted for under the Plan's limits.

The small and remote communities are vulnerable to water stress and only Tibooburra and Silverton have licences for their town water supply, with Silverton being supplied from a water source outside the Plan area. Water availability issues across the area may increase due to the potential for increased extraction from harvestable rights, growing tourism and mining industries, and climate change. This may affect environmental, social and economic outcomes. This review identified several issues that limit the Plan's ability to manage these risks.

The Commission understands that the Department of Planning and Environment – Water (DPE-Water) does not intend to prioritise this Plan for improvements, as it only covers seven licences and there are limited resources for water sharing plan remakes. While this may be understandable considering the very low number of licences, the region's fragile and high priority environmental and cultural assets, vulnerable communities and valuable industries warrant basic improvements to protect the region's very limited water resources. While extraction is a small volume compared to other water sharing plans, it may be a high proportion of available water in the Plan area. There is also the potential for significant economic disruptors such as gas development, mining or large-

scale solar that may seek significant water resources over the next Plan period, further entrenching issues.

To address these risks while recognising DPE-Water's resourcing constraints, the Commission has targeted actions to soundly structure the Plan in line with the Act's requirements to protect the Plan's unique water sources and maintain equitable sharing. The region's fragile and high priority environmental and cultural assets, vulnerable communities and valuable industries warrant basic improvements to protect the region's very limited water resources.

In particular, the Commission strongly recommends that DPE-Water carries out fundamental monitoring and evaluation in the short to medium term. This is justified considering the potential for growth in extraction from mining and gas production, the observed impacts of growth in extraction in the last ten years and the potential impacts on social and environmental outcomes. Further controlled allocations from the Plan's water sources should be suspended until analysis is complete.

Replacing the Plan and addressing the issues in this review (summarised in **Figure 1**) by implementing the recommendations in **Table 1** will improve equity in water sharing, and support environmental, social and economic outcomes in the far west.

Figure 1: Key areas to improve Plan performance

Overall finding on Plan extension and replacement

The Commission has identified risks to Plan outcomes and opportunities to improve outcomes that justify Plan replacement. The Commission recommends the Plan is extended for up to two years to allow time for analysis, consultation and the development of amended provisions (see **Table 1**).

Establishing sustainable extraction

Structural elements of the Plan, including water source boundaries, definitions, and consideration of connectivity, do not support sustainable management and reduce clarity around where Plan provisions apply.

Current long term average annual extraction limits (LTAAELs) are not based on best available evidence. The surface water LTAAEL is not based on an adequate assessment of sustainability, excludes harvestable rights, and there are considerable volumes available for licensing despite stakeholder advice that water sources are under pressure with current extraction levels. Having a single surface water source will not allow for extraction management at the appropriate scale if necessary. While groundwater LTAAELs were developed based on a risk assessment, this was underpinned by limited data. Groundwater source boundaries also create confusion as they overlap significantly with the Great Artesian Basin (GAB) water sharing plans.

There are potentially significant risks associated with the increasing capture of rainfall runoff under harvestable rights. In the Western Division, landholders can capture all rainfall runoff in dams on ephemeral first or second order streams. This capture is not licensed, monitored or assessed under the LTAAEL and stakeholders expressed concern about impacts on the environment and downstream users. Other interception activities, including rangeland rehabilitation works and road maintenance, may also impact on water flows and availability. The limited licencing and no gauging in the Plan area, make it difficult to implement and monitor the effectiveness of cease to pump provisions.

Supporting socioeconomic outcomes

The physical availability of water continues to be a key limiting factor for socioeconomic outcomes in the Plan area. The Plan does not include entitlements for town water for the four villages in the area and the outcomes for town water under the Plan are unclear. Pastoral properties rely on harvestable rights and domestic and stock rights for sheep and cattle production. Tourism and events are important industries in the Plan area and are likely to continue to grow, requiring access to water from an already-limited supply. There are also ongoing issues around the availability of water to support amenity values in the region.

The region's unique institutional arrangements for water management rely on volunteer committees supported by DPE-Water (Utilities – West) and Regional Development Australia – Far West. The volunteer committees have been under-resourced and not adequately engaged in decisions affecting town water supply.

Mining and gas production may have significant growth in the Plan area, further drawing on the region's water resources. It will become increasingly important that the Plan provisions adequately protect high value water sources and ecosystems as extraction demand grows.

The draft *Western Regional Water Strategy* recognises Essential Water's intent to repurpose Umberumberka Reservoir near Silverton for recreation, which is supported by Silverton Village Committee and Regional Development Australia – Far West. However, the reservoir currently does not have a water supply works approval or water access licence under the Plan.

Restoring Aboriginal water rights, values and uses

There was limited engagement and collaboration with Aboriginal stakeholders during Plan development. There is no water assigned for native title, Aboriginal uses, or cultural licences, despite the Plan area containing a native title determination, an Aboriginal-owned and managed national park, an Aboriginal area, a Local Aboriginal Land Council (LALC) reserve and multiple areas of cultural significance.

The complexity and limitations on Aboriginal specific water licences inhibit any meaningful uses by Aboriginal people. Aboriginal water values and assets are not adequately identified and protected despite an amendment provision allowing for rules to protect cultural values, and watering needs are not provided for.

Critical state-wide barriers to native title, Aboriginal water rights, and the protection of cultural values remain. While some of these can be addressed in the Plan remake, many are systemic and institutional and must be addressed through state-wide legislative, policy and practice change and significant increases in Aboriginal staff and resourcing.

Protecting groundwater dependent ecosystems

Groundwater-dependent ecosystems (GDEs) play a critical role in the Plan's arid environments. The Plan contains provisions to protect GDEs, primarily through setback distances for groundwater bores established nearby. However, these only apply to GDEs that are listed in the Plan and high priority GDEs may not be listed in the Plan or overlapping GAB water sharing plans. The Plan also does not list wetlands of international or national significance or protect them from water resource development.

While the Plan includes provisions to protect culturally significant GDEs, it does not list any. Given the importance of these features to Aboriginal peoples in the region, it is likely that some GDEs are culturally significant. Setback distances for culturally significant GDEs are also significantly less than those used to protect other high priorities GDEs, with no justification provided for this decision.

Table 1: Recommendations (R) and suggested actions (SA)

Overall recommendation	
R 1	The Plan should be: a) extended for up to two years until 30 June 2024, to allow time to complete data collection and analysis b) replaced by 1 July 2024, supported by the completion of these recommendations.
Establishing sustainable extraction	
R 2	To adequately protect surface and groundwater sources and their dependent ecosystems, DPE-Water should: a) revise the North Western Water Source into four surface water sources in the remade Plan, aligned with the four drainage basins and calculate individual LTAAELs for each water source (including a minimal LTAAEL for the Cooper Creek Water Source) b) in the next five years, assess existing available information and collaborate with DPE - Environment & Heritage (DPE-E&H) and the National Parks and Wildlife Service (NPWS) to complete targeted research (including gauging) into the Plan area's hydrology, environmental water requirements, hydrogeology, recharge rates and connectivity c) update groundwater source boundaries (including the definition of the Bancannia Trough) in the remade Plan based on contemporary evidence, and distinguish the Plan area from the GAB and GAB Shallow Plan areas d) identify and describe connectivity between water sources (including surface and groundwater, and interstate) and include common objectives for maintaining connectivity within the Plan, and between the Plan and the GAB and GAB Shallow plans.
R 3	To improve LTAAEL assessment and compliance, DPE-Water should: a) estimate all forms of extraction and interception (including harvestable rights) in the Plan area in the next five years using best available techniques b) include amendment provisions in the remade Plan stating that the surface water and groundwater LTAAELs should be revised at Year 5 (using evidence from **R 3(a)**) c) use the estimates from **R 3(a)** to assess LTAAEL compliance on a defined schedule from Year 5 d) include a provision in the remade Plan requiring the Minister to consider using the precautionary approach and excluding the Plan's surface and groundwater sources from controlled allocation orders until further research has been completed (under **R 2**) and used to refine LTAAELs (in **R 3(c)**), and water has been provided for Aboriginal rights and access (in **R 5**).
SA A	DPE-Water should prioritise engagement with stakeholders to determine if the harvestable rights provisions in the Western Division are serving their intended purpose without compromising downstream stakeholders' basic landholder rights and water dependent values.
SA B	DPE-Water should support Local Land Services to seek funding for monitoring impacts of rangeland rehabilitation on catchment scale water movement. Results should be used to assess changes in water availability assumed under the Plan in **R 2(b)**.

SA C	DPE-Water should work with road authorities in the Plan area to ensure that water extraction exempt from licensing under the Plan is consistent with Plan objectives.
Supporting socioeconomic outcomes	
R 4	To support socioeconomic outcomes while ensuring the priorities of the Act are maintained, DPE-Water should: a) work with volunteer village committees during the Plan remake to define town water supply needs b) licence all villages' town water requirements identified in **R 4(a)** in the next two years and include these entitlements in the remade Plan c) consider all water-dependent activities when assessing economic benefits in the Plan area during the Plan remake, including tourism and amenity value d) retain trade rules in the remade Plan to protect high value water sources and ecosystems and support socioeconomic outcomes.
SA D	DPE-Water should liaise with Essential Water and Silverton Village Community Committee regarding Umberumberka Reservoir's licence requirements in the next two years. The appropriate water supply works approval and licence should then be assigned and included in the remade Plan (see **R 4(b)**).
SA E	DPE-Water should clearly describe town water arrangements in the remade Plan's supporting documents, recognising village committees' local water management responsibilities, all town water sources and entitlements to improve transparency for all parties.
SA F	The NSW Government should provide adequate funding and technical support through DPE-Water (Utilities) to resource the management of town water in remote villages and achieve the Plan's social objectives.
Restoring Aboriginal water rights, values and uses	
R 5	To better achieve the Plan's Aboriginal water objectives, DPE-Water should continue its current related work and: a) recognise in the remade Plan the native title rights of the Barkandji Traditional Owners in the Plan area, consistent with their native title determination b) consult with Traditional Owners, native title claimants, and other Aboriginal groups and knowledge holders to quarantine water allocations for future native title determinations or other cultural water access rights before releasing additional controlled allocations c) protect high value water dependent cultural assets in the remade Plan, by: i) undertaking detailed engagement with Traditional Owners, native title claimants and other Aboriginal groups and knowledge holders to identify high value water dependent cultural assets in the Plan area and provisions to protect and support these assets ii) reviewing existing provisions such as setback distances to consider if they provide appropriate protection, and revise if appropriate d) include provisions in the remade Plan to protect assets identified in **R 5(c)(i)**, consistent with the existing amendment provision.

Protecting groundwater dependent ecosystems	
R 6	To protect GDEs and associated values, DPE-Water should revise the list of high value water-dependent ecosystems and GDEs in the remade Plan using best available information, including: a) including internationally (Ramsar) and nationally listed wetlands b) reviewing the categorisation of the two listed karst environments and if required, amending access rules to align with other high value GDEs c) ensuring the Plan, GAB Plan and GAB Shallow Plan list all high value GDEs and high value water dependent ecosystems in the appropriate plan, and that definitions are consistent across plans d) investigating the groundwater dependency of significant wetlands in the Plan area to determine if setback distances in the Plan and GAB Shallow Plan are adequate to maintain and support their environmental values.
Governance and implementation	
R 7	DPE-Water should develop the Plan-specific MER plan by June 2024, publish it in conjunction with the remade Plan, and include a provision in the Plan requiring the MER plan to be implemented. The MER plan should identify feasible and appropriate resourcing to support ongoing MER activities in line with the *NSW Water Strategy* and should clearly articulate areas of priority for further research.
SA H	DPE-Water should engage with native title holders, village committees, pastoral representatives, Aboriginal groups, NPWS, Local Land Services, Regional Development Australia, Lake Eyre Basin Community Advisory Committee, South Australia and Queensland governments, and other relevant local stakeholders to inform the Plan remake and facilitate ongoing communication. This should be tailored to the engagement needs of the remote area.

1 Review background

1.1 Water sharing plans and the Commission's role

Water sharing plans are statutory instruments under the *Water Management Act 2000* (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 it is extended. The *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources 2011* (the Plan) commenced on 1 October 2011 and is due for extension or replacement on 1 July 2022.

Figure 2 summarises the roles of the various NSW water management agencies. 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 the 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.

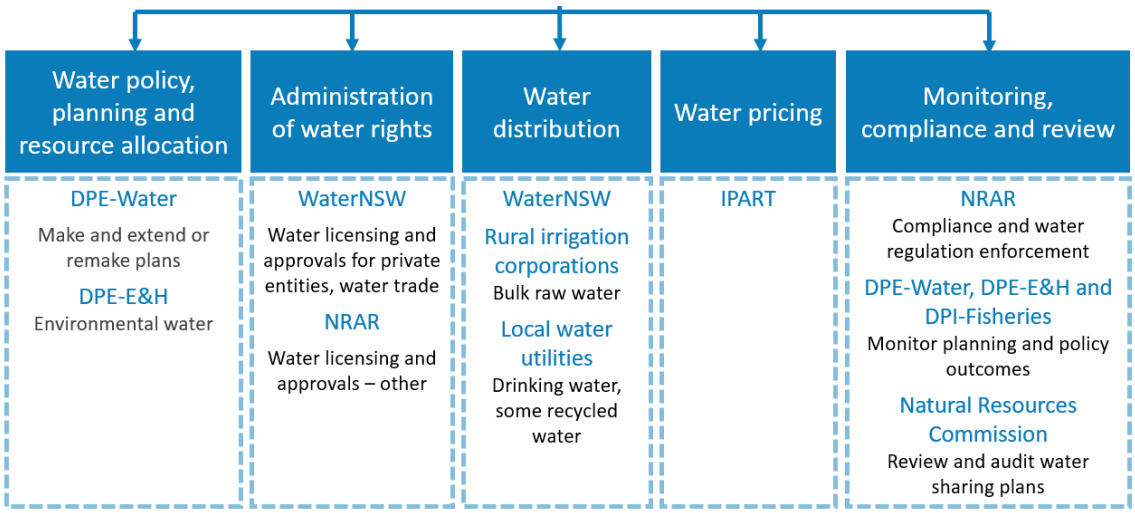

Figure 2: Roles and responsibilities in NSW water management[1]

The Commission may recommend extending or replacing plans depending on its review findings. The Commission's review must consider the water management principles,[2] 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:

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).[3]

Further, the water management principles should be prioritised in the order that they are set out above.[4] Water sharing plans must be based on evidence to achieve these outcomes.

1 Revised from Department of Industry (DoI)-Water (2019) *NSW Regional Water Statement*
2 Section 5 of the Act.
3 Section 5(3) of the Act.
4 Section 9(1) of the Act.

1.2 Review approach

The Commission has largely relied on a desktop review, agency interviews and submissions to gather evidence for this review. Stakeholder engagement was targeted and limited in scope due to an increase in COVID-19 cases across NSW at the time of consultation. The Commission would particularly like to note the input of community members who volunteer on village committees in the Plan area and gave their time to provide input to this review.

The Commission's review was informed by a range of evidence, including:

- **Consultation** – targeted engagement with government agencies, community, Aboriginal and industry organisations.[5]
- **Document review** – the Commission reviewed the Plan, its background document, public reports and unpublished information from water management agencies, and other relevant government policies.
- **Technical advice** – consultants provided peer review.
- **Submissions** – the Commission called for public submissions. Stakeholders were asked to comment on the extent to which they felt the Plan contributed to social, environmental and economic outcomes, and to meeting its objectives, as well as any changes they felt were needed to the Plan to improve outcomes. The Commission received four submissions, including one confidential submission. The three non-confidential submissions are published on the Commission's website.[6]

The Commission evaluated the Plan's performance against its stated objectives, strategies, and performance indicators. These were linked to environmental, social, cultural, and economic outcomes for this review (provided in **Appendix A**).

As found in the Plan's Section 44 implementation audit,[7] its vision, objectives, strategies, and performance indicators were not being given effect.[8] The lack of clearly linked objectives, strategies and indicators, and limited MER made it difficult to determine the Plan's performance. This report presents the Commission's findings using the best available evidence.

5 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.
6 Natural Resources Commission (n.d.) *Water sharing plan reviews*
7 Section 44 of the Act requires auditing within five years of the making of a plan to ascertain whether the plan has been given effect.
8 Alluvium and Vista Advisory (2019) *Audit of the Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources 2011*

2 Plan context

This chapter gives an overview of the Plan area and its water-dependent environmental, social, and economic values.

2.1 Plan area and water sources

The *North Western Unregulated and Fractured Rock Water Sharing Plan* (the Plan) area (**Figure 3**) covers the arid north-west corner of NSW, from the South Australian border just north of Broken Hill, north-east to White Cliffs and to the Queensland border. The Plan area is bounded by the Murray-Darling Basin to the south-east.

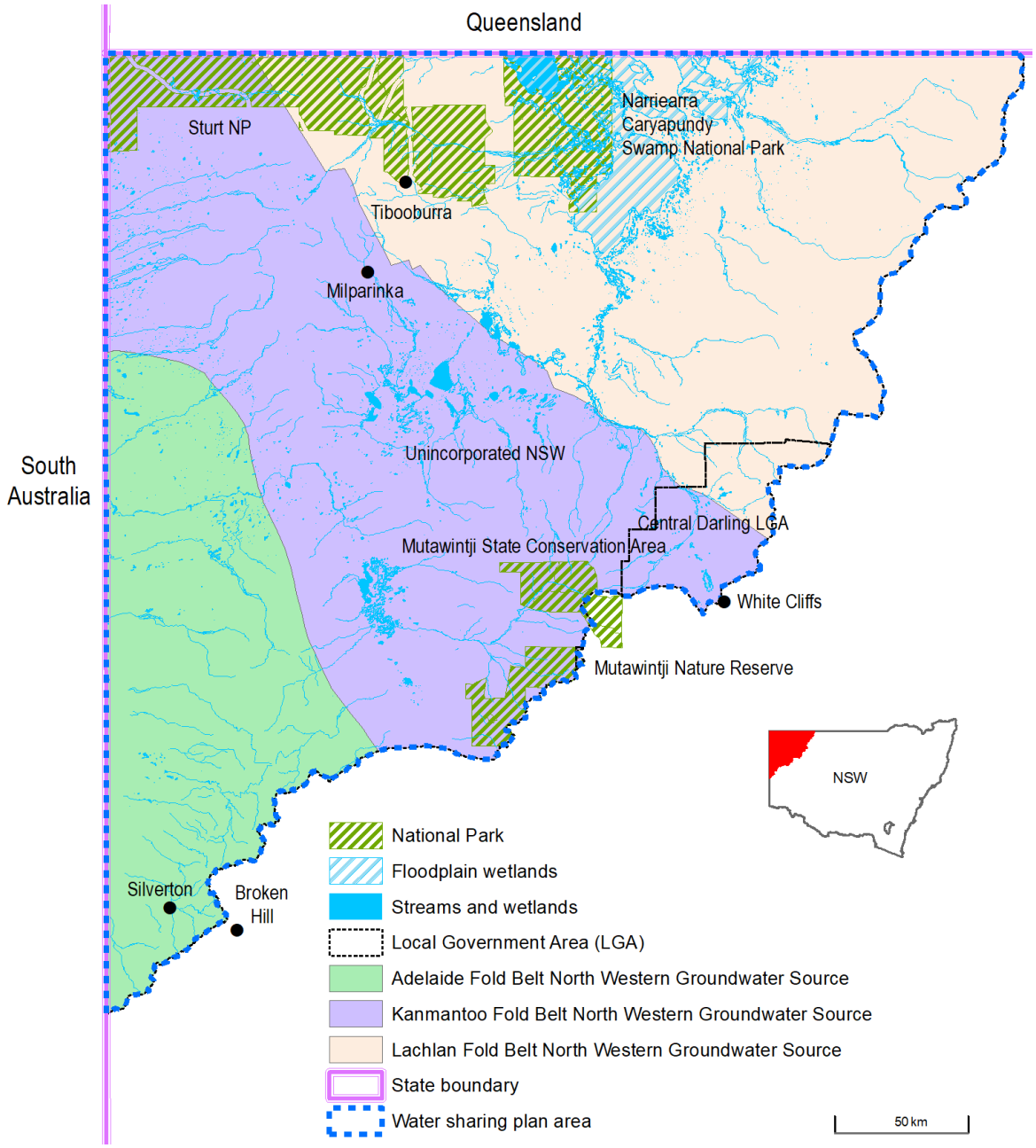

Figure 3: Plan area showing water sources, local government areas (LGAs) and national parks[9]

[9] Map developed by the Commission from publicly available NSW and Australian government data.

The region's landscapes, ecology, land use and policy frameworks are unique. There is little research into its hydrology, environmental flow requirements, hydrogeology, or the connectedness of surface and groundwater. The area is largely unincorporated land (areas with no local council), with services for its small population managed by volunteer village committees (see **Section 2.3**).

The Plan manages one surface water source (North Western) and three groundwater sources (Adelaide Fold Belt North Western, Kanmantoo Fold Belt North Western and Lachlan Fold Belt North Western) (**Table 2** and **Figure 1**). There are two groundwater sources associated with the GAB in the Plan area but managed by the *Water Sharing Plan for the NSW Great Artesian Basin Shallow Groundwater Sources 2020* (GAB Shallow Plan) and the *Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources 2020* (GAB Plan) (**Table 2**). There is known connectivity between these water sources (see **Chapter 4.5**).

Over the Plan period, most extraction has been for domestic and stock purposes covered by basic landholder rights.[10] Basic landholder rights are prioritised under the Act and do not require water licences. They include:[11]

- **Harvestable rights – dams** – in the Western Division, landholders can capture all rainwater runoff[12] by means of a dam or dams located on minor streams[13]
- **Domestic and stock rights** – owners or occupiers of land overlaying an aquifer or with river, estuary or lake frontage can take water without a licence for domestic use or to water stock
- **Native title rights** – individuals holding native title[14] can take and use water for a range of personal, domestic and non-commercial purposes.

Table 2 and **Figure 4** show current entitlements. There is 786 megalitres (ML) of domestic and stock rights and licensed entitlement from surface water, and 5,027 ML from groundwater under the Plan. Licensed entitlement under the Plan is only 190 ML (through three surface water and four aquifer access licences). The volume of harvestable rights extraction is unknown but is expected to be high relative to other entitlement as landholders are permitted to capture all rainfall runoff in dams on ephemeral first or second order streams. Landholders in the northern portion of the Plan area also extract groundwater managed under the GAB Plan and GAB Shallow Plan, with an estimated 5,240 ML of rights and entitlement under those plans but within the Plan area.

10 NSW Office of Water (2011) *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources – Background document*
11 Sections 52-55 of the Act.
12 Except for land on or within 3 kilometres of a Ramsar Wetland of International Importance, which could be adversely impacted by exercise of the harvestable right. As per Clause 1 and Schedule 1 in NSW Government (2006) *NSW Government Gazette 40 - 31 March 2006*, (pp. 1628-1631).
13 NSW Government (2006) *NSW Government Gazette 40 - 31 March 2006*, (pp. 1628-1631).
14 As determined under the Commonwealth *Native Title Act 1993*.

Table 2: Summary of water sources, entitlement and LTAAELs in the Plan area (and relevant water sources from the GAB plans)

Water source	North Western	Adelaide Fold Belt North Western Groundwater	Kanmantoo Fold Belt North Western Groundwater	Lachlan Fold Belt North Western Groundwater	GAB Shallow Plan – Central Shallow (North Western) Groundwater *These are not part of the Plan but are in the same spatial area (see **Section 3.1.3**)*	GAB Plan – Central Groundwater
Approximate surface area in the Plan area where water source rules apply (km²)[15]	*62,375*	*6,533*	*6,123*	*0*	*51,332*	*51,332*
Domestic and stock basic landholder rights under the Plan (estimated current) (ML)[16]	809 (679)	2,396 (1,863)	2,182 (3,081)	0 (0)	Not applicable (918)[17]	Not applicable (3,800)[18]
Local water utility licence entitlement (ML)	52 (a domestic and stock licence, subcategory town water supply)	0	0	0	0	25 (1 licence)
Domestic and stock (stock) licence entitlement (ML)	15 (1 licence)	0	0	0	0	0
Unregulated river licence entitlement (ML)	40 (1 licence)	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Aquifer access licence entitlement (ML)[19]	N/A	64 (3 licences)	19 (1 licence)	0 ML	454 units (2 licences)	43 units (10 licences)
LTAAEL (ML)	**2,807**	**50,635**	**46,550**	**0**	**33,220**[20]	**5,193 + 'X'**[21]

15 Office of Water (2011) *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources – Background document*
16 Estimates provided by DPE-Water.
17 Clause 18(a) of the GAB Shallow Plan.
18 Clause 18(a) of the GAB Plan.
19 WaterNSW (n.d.) *Water Register*, accessed 3 March 2022.
20 Clause 23(1) of the GAB Shallow Plan.
21 The LTAAEL is 5,913 ML plus the volume of water lost through inefficient systems when exercising domestic and stock rights, plus 30 percent of the water savings made under cap and pipe projects after 2020, as per Clause 24(1) of the GAB Plan.

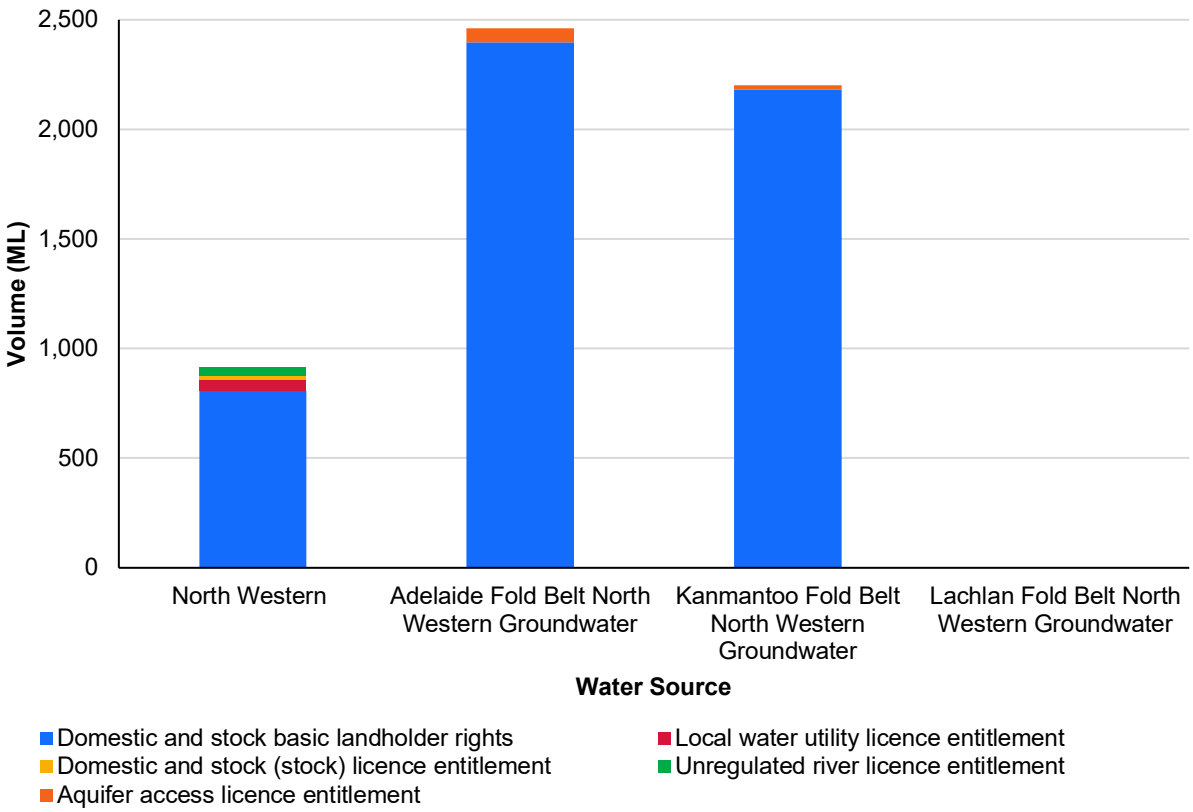

Figure 4: Licensed entitlement and domestic and stock rights in the Plan's water sources

2.1.1 Surface water

The Plan area is characterised by gibber plains, sand dunes and stony ranges across four drainage basins (**Figure 5**):

- **Cooper Creek** – part of the Lake Eyre Basin north-west of Tibooburra. Water flows north to Cooper Creek in Queensland. Less than 1 percent of the catchment is in NSW, all of which is in National Park.[22] The Plan prevents approval or amendment of water supply works, and therefore licensed extraction, in the Cooper Creek catchment.[23]
- **Bulloo Overflow** – a large area of floodplain and wetlands north of Tibooburra fed by the Bulloo River, which flows into NSW from Queensland. Around 27 percent of the catchment is in NSW.
- **Lake Bancannia** – a catchment south-east of Tibooburra, with ephemeral (intermittent) streams flowing into fresh and saline lakes, including Yantara, Ulenia, Salt Lake, Bullea, and Bancannia.
- **Lake Frome** – north of Broken Hill along the NSW-South Australia border. Around 10 percent of the Lake Frome catchment lies in NSW. Part of the Lake Eyre Basin, it largely contains ephemeral streams that flow west towards ephemeral lakes and swamps in South Australia, although most terminate in the shallow lakes and floodouts of the Strzelecki Desert.

The Plan excludes water taken under a floodplain harvesting access licence that does not specify the North Western Water Source.[24] As the Plan area does not include a designated floodplain, there are no floodplain licences.

22 DPIE-Water (n.d.) *Catchment snapshot – North-western NSW*
23 Clause 44(2) of the Plan.
24 Clause 4(5) of the Plan.

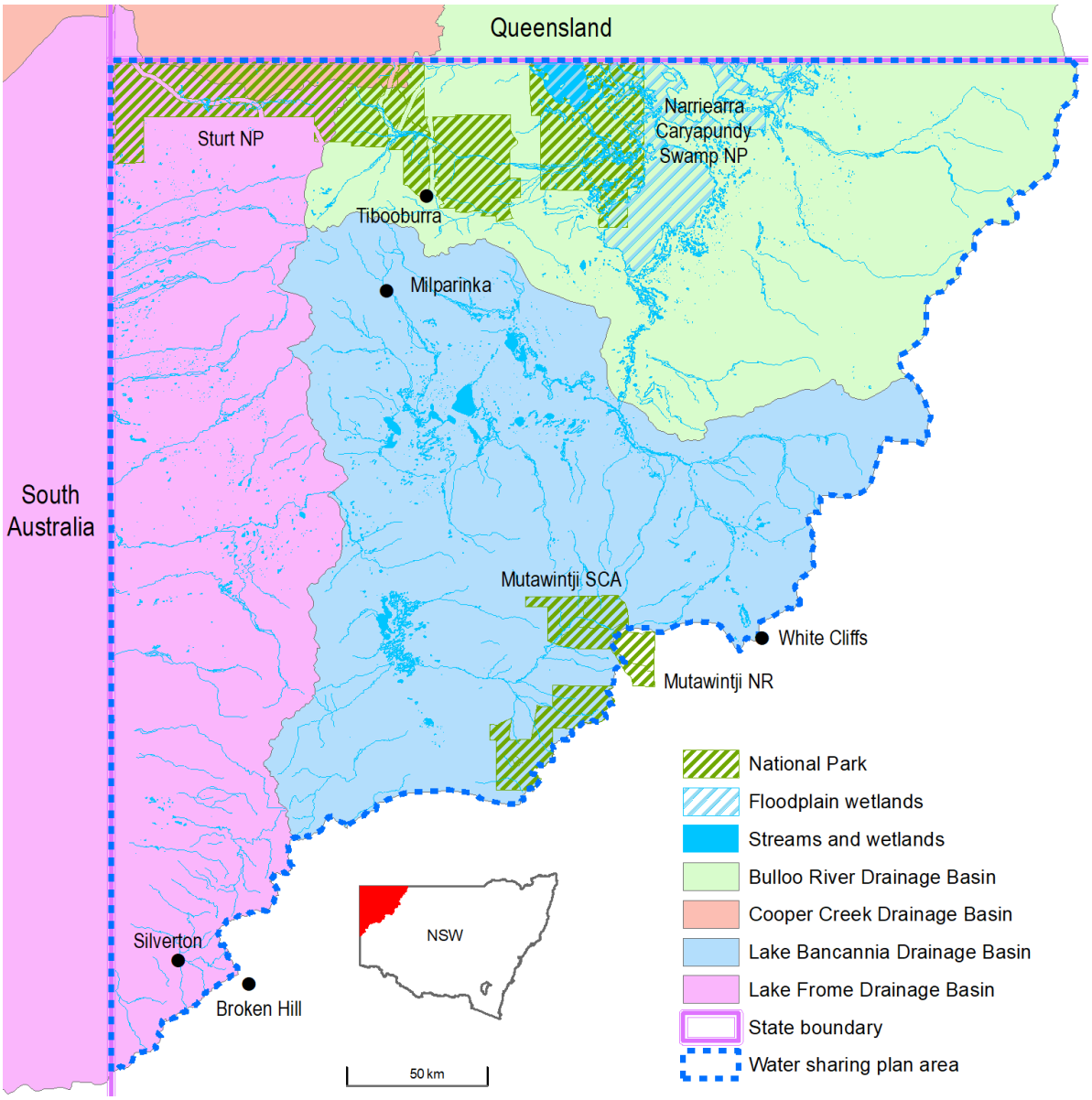

Figure 5: Drainage basins in the Plan area

2.1.2 Groundwater

The Plan's three groundwater sources cover all fractured rock and alluvial sediments in the southern portion of the Plan area, shown as dotted areas in **Figure 6**. In the northern portion of the Plan area, the Plan only applies to fractured rock water sources below the GAB water sources.[25] **Figure 7** shows how the Plan's groundwater sources underlay the GAB plans to varying depths. The grey hatched area in **Figure 6** intersects with the GAB plans:

- *GAB Shallow Plan*: the Central Shallow (North Western) Groundwater Source includes all groundwater to a depth of 60 metres below ground surface, and all alluvial sediments at any depth.[26]
- *GAB Plan*: the Central Groundwater Source includes all water in all rocks of Cretaceous and Jurassic age below 60 metres below ground level.[27]

25 Clauses 4 and 5 of the Plan.
26 Clause 4(3) of the GAB Shallow Plan.
27 Clause 4 of the GAB Plan.

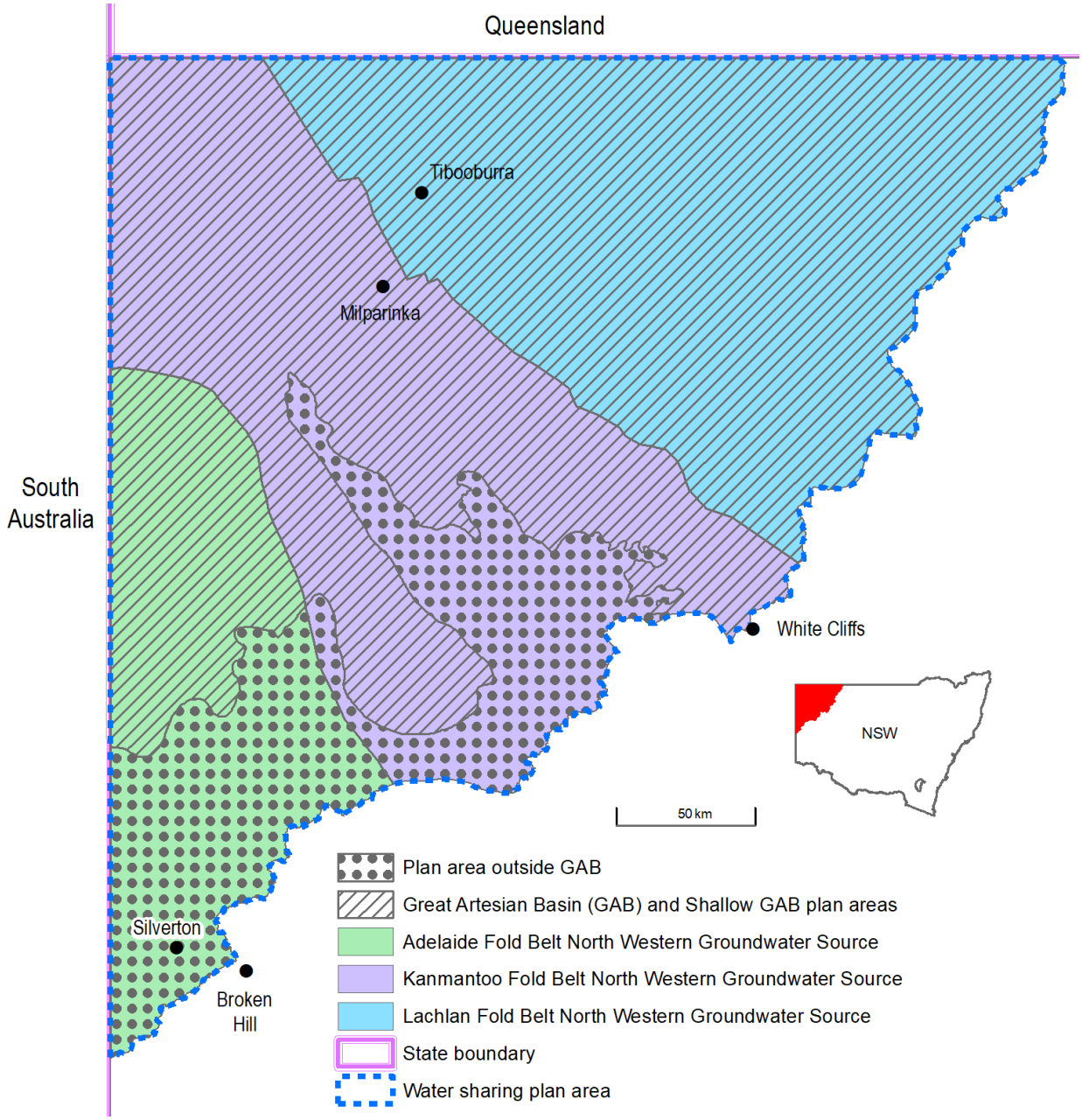

Figure 6: Groundwater sources in the Plan area, see Figure 7 for a cross section of the Shallow GAB and GAB plan areas

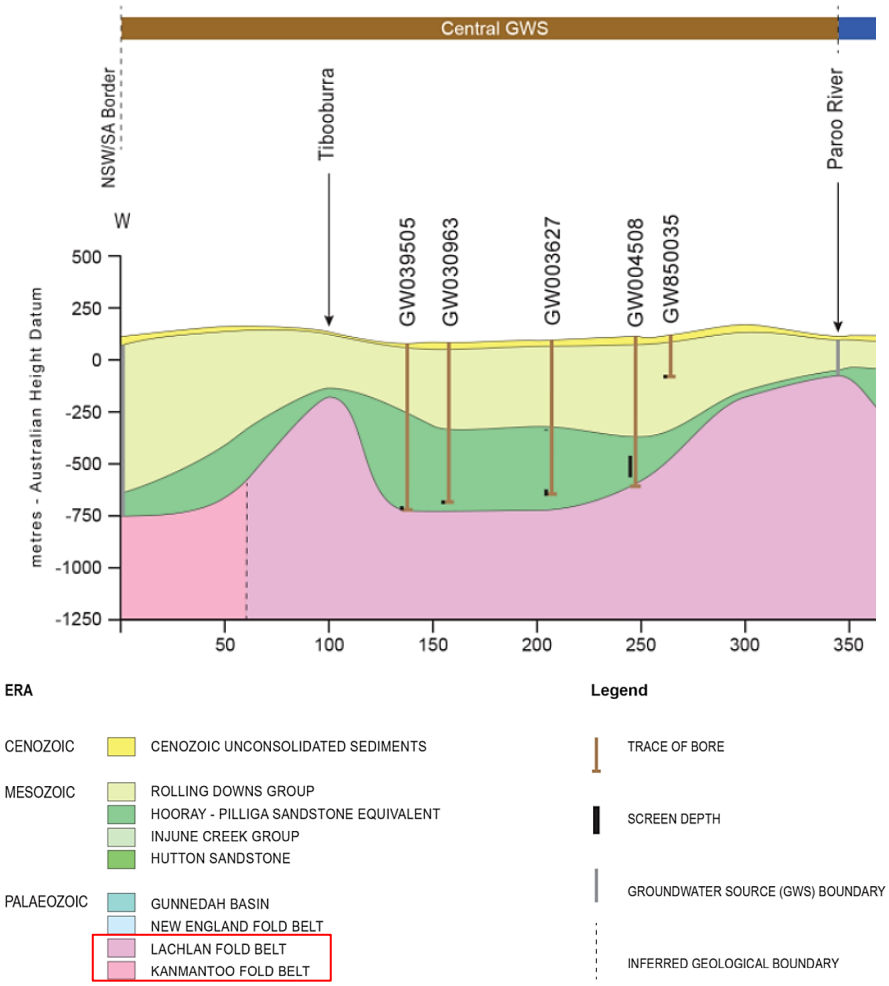

Figure 7: Cross section of the NSW Great Artesian Basin Groundwater Source in the northern portion of the Plan area, showing the underlying Lachlan and Kanmantoo Fold Belt North Western Groundwater Sources[28]

The northern portion of the Plan area is mapped as having extensive, productive aquifers in the porous rocks of the GAB, managed under the GAB and Shallow GAB plans.[29] The southern portion of the Plan area has localised, generally low productivity aquifers. Groundwater movement is generally towards the south and west. Artesian flow (from the GAB) is only found in the area along the western boundary of the Plan and east of Tibooburra.[30] Although not covered by the Plan, the water associated with the GAB is of great importance to spring ecosystems and pastoral properties in the Plan area.

The Plan lists four high priority GDEs. Three are associated with the Adelaide Fold Belt Groundwater Source (Torrowangee, Tarrawingee Springs and Corona Springs) and one with the Kanmantoo Fold Belt North Western Groundwater Source (Mutawintji).[31] There are high priority GDEs in the area associated with the GAB water sources, such as mound springs and additional high value GDEs have been identified in the Plan area in recent years (see **Section 6.1**).

28 DPIE-Water (2020) *NSW Great Artesian Basin Groundwater Resource Description Report*
29 Jacobson, G. and Lau, J.E. (compilers) (1987) *Hydrogeology of Australia* (1:5,000,000 scale map). Bureau of Mineral Resources, Canberra.
30 *Ibid*.
31 Office of Water (2011) *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources – Background document*

2.1.3 Climate

> '*In a few words, the meteorological history of our Western Division shows it to be essentially a country of almost invariably low rainfall and inevitably recurring drought*.'[32]

The Plan's climate is desert and grassland (both hot, persistently dry).[33] Mean annual minimum and maximum temperatures at Tibooburra are 15 to 28 degrees Celsius respectively, and are about 12 to 25 degrees Celsius at Broken Hill, immediately to the south of the Plan area.[34]

Long-term observations show that temperatures across the region have been increasing since around 1950.[35] In the last 30 years, there have been more hot days and more consecutive days above 42 degrees Celsius.[36] Recent climate change projections available through the NSW and ACT Climate Change Modelling (NARCliM) project indicate this trend is expected to continue in the coming decades along with changes to rainfall.[37]

Average annual rainfall varies from 251 millimetres at Broken Hill to 188 millimetres at Tibooburra.[38] In the south at Broken Hill, monthly average rainfalls are highest in summer and lowest in April and August.[39] In the north at Tibooburra, monthly average rainfalls are highest in March and November, and lowest in July and August.[40]

Over the life of the Plan, much of the region experienced either the lowest or significantly below average 12-month (2019), 24-month (2018-2019) and 36-month (2017-2019) rainfall periods on record.[41] With the return of La Nina, 2020 and 2021 had average to above average rainfall.[42]

2.2 Arid environment and waterways

The Plan area's internally-draining river basins and drainage networks create a landscape of ephemeral waterways, terminal wetlands, lakes, and swamps. The waterways in the Plan area are characteristic of the arid zone's fluvial processes. Flow regimes are highly variable, waterways have relatively small channels that manage ordinary flow events, with larger flows accommodated by additional floodplain flow. Floodouts are common; these are unchanneled reaches where water spreads as sheet flow. Floodouts are fed from upstream channelled reaches, and sometimes a channel also exists downstream. Floodouts are a key feature of arid landscapes, with sedimentation and infiltration retaining runoff and supporting vegetation growth.[43] They are biologically productive areas and important drought refugia for terrestrial

---

32 Lunney, D. (1994) *Royal Commission of 1901 on the western lands of New South Wales - an ecologist's summary*. In 'Future of the Fauna of Western New South Wales', pp. 221-240.
33 Bureau of Meteorology (2001) *Map of Climate Zones of Australia*, accessed 19 January 2022.
34 Bureau of Meteorology (2022) *Climate statistics for Australian locations - Summary statistic Tibooburra Airport*, accessed 19 January 2022; and Bureau of Meteorology (2022) *Climate statistics for Australian locations - Summary statistics Broken Hill Airport AWS*, accessed 19 January 2022.
35 Office of Environment and Heritage (2014) *Far West climate change snapshot*
36 Bureau of Meteorology and the CSIRO (2019) *Regional weather and climate guide: Western NSW*
37 Office of Environment and Heritage (2014) *Far West climate change snapshot*
38 Over the period 1991 to 2021, Bureau of Meteorology (2022) *Climate statistics for Australian locations - Summary statistics Broken Hill (Stephens Creek Reservoir)*; and over the period 1997 to 2021; Bureau of Meteorology (2022) *Climate statistics for Australian locations - Summary statistic Tibooburra Airport*, accessed 19 January 2022.
39 Bureau of Meteorology (2022) *Climate statistics for Australian locations - Summary statistics Broken Hill (Stephens Creek Reservoir)*, accessed 19 January 2022.
40 Bureau of Meteorology (2022) *Climate statistics for Australian locations - Summary statistic Tibooburra Airport*, accessed 19 January 2022.
41 Bureau of Meteorology (2021) *Recent and historical rainfall maps*, accessed 10 January 2022.
42 *Ibid*.
43 Wakelin-King, G. and Webb, J.A. (2007) Threshold dominated fluvial styles in an arid zone mud aggregate river; the uplands of Fowlers Creek, Australia, *Geomorphology*, 85: 114-127.

ecosystems. Their reliable vegetation and groundwater is important to pastoralists for grazing and to locate dams to capture runoff for watering stock.[44]

The area has undergone dramatic change over the last two hundred years, with the introduction of pastoralism in the 1800s, a mining boom in the mid- to late-1800s and a decline in grazing during the Federation Drought and rabbit population boom. The 1901 Royal Commission of the Western Lands highlighted a crisis brought about in the Plan area by overstocking, rabbit populations, drought, and erosion.[45] Almost all vegetation had been grazed by sheep and rabbits, exposing soils, and causing erosion and dust storms.[46] Rabbits caused continual degradation until the 1950s, when population control began to have effect and vegetation began to recover, but in an altered ecosystem state.[47]

There is limited up-to-date information on the condition of the ephemeral aquatic ecosystems in the Plan area. A pre-2009 River Condition Index assessment showed the Plan's catchments were in moderate/good to very good condition.[48] However, the Plan area has not been assessed since this time.[49] More recent work on aquatic ecosystems in the Lake Eyre Basin in South Australia[50] and the environmental values of the Queensland portion of the Bulloo River Basin mapped them as slightly to moderately disturbed.[51] The High Ecological Value Aquatic Ecosystem (HEVAE) Framework has not been applied to the Plan area. DPE-Water is currently developing an ecological assets and issues report for the area.

The importance and condition of waterways is often measured in terms of aquatic ecosystems and water quality. These metrics are a poor fit to non-perennial systems, which usually lack standing water or aquatic biota. In this way the value of ephemeral waterways has not been well captured, despite their importance to terrestrial ecosystems in the Plan area.

The Plan's catchments support over 274,300 hectares of wetlands, which provide nationally and internationally significant waterbird habitats.[52] These include large saline lakes, such as the nationally-significant Salt Lake south of Tibooburra,[53] and freshwater lakes such as the Bulloo River Overflow,[54] which can hold water for extended periods acting as refuges for waterbirds in dry periods.[55]

There are several national parks and conservation areas designed to protect the Plan area's environmentally and culturally important landscapes. The NSW Government has invested significantly over the life of the Plan to establish new reserves, including Narriearra Caryapundy Swamp National Park in 2021, the largest acquisition of private land for a national park in the history of NSW.[56] The NSW Government purchased the pastoral properties 'Nuntherungie' (to be managed as part of Mutawintji State Conservation Area) and 'Narriearra' and 'Avenel' for the Narriearra-Caryapundy Swamp National Park during the Plan period.

---

44 Wakelin-King, G. and Webb, J.A. (2007) Threshold dominated fluvial styles in an arid zone mud aggregate river; the uplands of Fowlers Creek, Australia, *Geomorphology*, 85: 114-127.

45 Lunney (1994) Royal Commission of 1901 on the western lands of New South Wales - an ecologist's summary. In 'Future of the Fauna of Western New South Wales' (pg: 221-240).

46 Oxley, R. E. (1987) 'Analysis of historical records of a grazing property in south-western Queensland. 2. Vegetation changes', *The Australian Rangeland Journal,* 9(1): 30-38.

47 *Ibid*.

48 DoI Water (2018) *River Condition Index in NSW EPA (2018) State of the environment – River health 2018*

49 DECCW (2010) *State of the catchments 2010: Riverine ecosystems Western Region*

50 Department of Environment, Water and Natural Resources (2015) *South Australian Lake Eyre Basin aquatic ecosystem mapping and classification*

51 Queensland Government (2020) *WQ0111 - Bulloo River Basin: Queensland Murray-Darling and Bulloo Basins Environmental Values and Water Quality Objectives scheduling document*

52 For example, NPWS (2019) *Statement of Management Intent: Pindera Downs Aboriginal Area*

53 Department of Agriculture, Water and Environment (n.d.) *Directory of important wetlands in Australia – information sheet – The Salt Lake – NSW058*

54 DPIE-Water (n.d.) *Catchment snapshot – North-western NSW*

55 NPWS (n.d.) *Narriearra Caryapundy Swamp National Park*

56 NPWS (2021) *Statement of Management Intent - Narriearra Caryapundy Swamp National Park*

The NSW and Australian governments have nominated Caryapundy Swamp within Narriearra Caryapundy Swamp National Park as a Ramsar Wetland of International Importance.[57] The importance of maintaining natural flows in the Bulloo River has been recognised to conserve the ecological character of the proposed Ramsar site, due to the connectedness between the river, the floodplains and wetlands.[58] Upstream water resource development, increased water extraction and diversions present a substantial risk to the site.[59] Narriearra Caryapundy Swamp National Park protects around 24 percent of the Bulloo Overflow, including Caryapundy Swamp, which is in a relatively natural state compared to most inland river catchments in eastern Australia. The Bulloo Overflow is a key biodiversity area, providing a critical breeding area for migratory bird species and is an important refuge in drought years.[60]

Sturt National Park is the largest park in western NSW, protecting the desert landscapes of the Simpson-Strzelecki Dunefields and Channel Country bioregions. The park contains the Ramsar-listed Lake Pinaroo, which is the largest terminal basin in the NSW dunefields. Lake Pinaroo is an important migratory stopover for waders and provides drought refuge and key habitat for at least 40 waterbird species, including threatened species.[61] Known threats to the wetland include changes to its hydrology and ecology due to climate change.[62]

The Mutawintji Lands, including Mutawintji National Park (which incorporates the Mutawintji State Conservation Area) and Mutawintji Nature Reserve are characterised by rocky outcrops, outwash areas and alluvial plains, with mulga and saltbush shrublands, arid woodlands and riparian river red gum woodlands.[63] The reserves are important for native animal species due to the relative reliability of water supplies compared with the surrounding sandplains, providing drought refuge and supporting migratory waterbirds.[64]

2.3 Population

2.3.1 Villages

The Plan area is largely in Unincorporated NSW, with a very small overlap with Central Darling Shire Council, which includes no population centres. The Plan area has just over 1,000 residents – about 0.01 percent of the NSW population – spread across approximately 8 percent of NSW's area.[65] In 2016, residents were spread over 331 houses and six 'other dwellings' in the towns of Tibooburra (134 residents), Packsaddle (87), Milparinka (77), Silverton (50) and about 260 pastoral properties.[66]

Tibooburra is a former gold mining town, surrounded by granite tors and located near the Sturt National Park. Silverton was established around 1880 and had a population peak of 2,000-3,000 people in 1885, after which it declined in favour of Broken Hill. Milparinka is another gold rush town, named after the Wangkumara description of a waterhole in Evelyn Creek meaning 'water may be found here'.[67] The town is now described as a 'ghost town', with a pub that has traded since 1882, and heritage trail of local ruins including a historic underground water tank.[68]

---

57 NPWS (2021) *Statement of Management Intent - Narriearra Caryapundy Swamp National Park*
58 An unpublished draft ecological character description for Caryapundy Swamp was shared with the Commission to inform this review.
59 *Ibid*.
60 NPWS (2019) *Statement of Management Intent - Pindera Downs Aboriginal Area*
61 NPWS (2021) *Sturt National Park – Learn more*; NPWS (2018) *Plan of Management – Sturt National Park*
62 NPWS (2018) *Plan of Management – Sturt National Park*
63 Mutawintji Board of Management and NPWS (2013) *Mutawintji Lands Plan of Management*
64 *Ibid*.
65 There are 1,026 estimated residents in Unincorporated NSW (Australian Bureau of Statistics (2021) *Data by Region - LGA*)
66 ABS (2016) *2016 Census QuickStats - Unincorporated NSW*; Interview: Pastoralists' Association of West Darling, 22 December 2021.
67 Aussie Towns (2022) *Milparinka*
68 Aussie Towns (2022) *Milparinka*; Australian Explorer (2022) *Milparinka*

These towns are classified as very remote communities with less amenity and vulnerable to shocks in the face of changes. Very remote areas are more likely to experience larger impacts from changes such as water reform, drought, or agriculture.[69] People in the Plan area have lower overall wellbeing scores and access to poorer physical amenity compared to regional averages.[70] Fourteen percent of residents did not have internet access, with a further 5 percent having unknown access.[71]

2.3.2 Town water supply and water storages

Town water supplies in Unincorporated NSW are managed and operated by volunteer village committees. The Plan does not list any local water utility entitlement for any of its four towns and there were no utility licences held when the Plan commenced.[72] The Plan's background document notes that towns have a higher priority access than for commercial uses but does not specify which towns rely on the Plan's water sources for their water supply.[73]

Tibooburra

Tibooburra village holds a 52 unit share domestic and stock licence, sub-category 'town water supply'[74] from the North Western Water Source.[75] Tibooburra Water, operated by a volunteer committee, manages town water for the community.[76] Surface water is stored in Alpress Tank and Thomsons Creek Dam before it is treated and supplied to residents. The average annual town water use was around 40 ML per year over the last five years.[77] The current infrastructure provides about two years of supply, and the water treatment plant can receive carted water in an emergency.[78] Catchment improvement works to improve water quality and supply are being considered, pending funding availability.[79]

Silverton

When the Plan commenced, Essential Water supplied Silverton's bulk town water from the Umberumberka Reservoir (inside the Plan area)[80] and Stephens Creek Reservoir (outside the Plan area). Stephens Creek Reservoir was topped up[81] with water from the Lower Murray-Darling Unregulated Water Source in the *Water Sharing Plan for the Lower Murray-Darling Unregulated River Water Source 2011*.[82] There is no licence linked to Umberumberka Reservoir.

Silverton's town water has been supplied from the Wentworth to Broken Hill Pipeline since 2019[83] under Essential Water's 8,694 ML of entitlement from the Murray Water Source under

69 Schirmer, L. and Mylek, M. (2020) *Thriving, surviving, or declining communities: socio-economic change in Murray-Darling Basin communities*, p. 13. A report prepared for the Panel for the Independent Assessment of Social and Economic Conditions in the Murray-Darling Basin, University of Canberra.
70 *Ibid*.
71 ABS (2016) *2016 Census QuickStats - Unincorporated NSW*
72 See Division 3 Clause 21 of the Plan.
73 NSW Office of water (2011) *Water Sharing Plan North Western Unregulated and Fractured Rock Water Sources Background document*
74 Note that this licence has the same priority as local water utility licences.
75 WaterNSW (n.d.) *Water Register - WAL 27190*, accessed November 2021.
76 Interview: Tibooburra Water, 31 January 2022.
77 Town water five-yearly water use. Information provided by Tibooburra Water via email, 7 February 2022.
78 Viridis (2018) *DWMS Review and Discussions - Tibooburra Water*. Provided by Tibooburra Water, 31 January 2022.
79 Interview: Tibooburra Water, 31 January 2022.
80 A 7,800 ML dam on Umberumberka Creek, south of the village.
81 Through Essential Water's 6,300 ML local water utility licence drawing from the Darling River and Menindee Lakes.
82 Clause 35 of the *Water Sharing Plan for the Lower Murray-Darling Unregulated River Water Source 2011* allows for Essential Energy to apply for a local water utility access licence for the purpose of supplying water to Broken Hill and Silverton. This licence was subsequently applied for and is currently held by Essential Water.
83 Essential Water (2022) *What we do*

the *Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016.*[84] Umberumberka Reservoir is no longer used for backup water supply due to operating and maintenance costs for the historic pumps.[85] The reservoir will not be decommissioned and will continue to be maintained by Essential Water.[86]

A chlorination plant near Silverton treats water before distribution to the township.[87] Silverton Village Committee advocate for improved water supply services and manage other local services for the community.[88]

Milparinka

DPE-Water advised that Milparinka's community water supply has two ground tanks for raw water; the Rodeo Ground Tank and Milparinka Tank (Government Tank). These are not licensed. The town's properties rely on rainwater tanks for drinking water. While Milparinka has no licence assigned against the Plan's water sources for its surface water extraction, there is a 25 ML local water utility licence in the Central Groundwater Source under the GAB Plan.[89] This groundwater source underlies the Plan area (see description in **Section 2.1.2**). Water is carted to Milparinka when required during drought.

Packsaddle

Packsaddle also has no licence under the Plan. Packsaddle's community water is supplied by a ground tank about 1.5 kilometres north east of the roadhouse.[90] This is in the North Western Water Source. Stakeholders advised that the Packsaddle community uses a mix of surface and groundwater to meet their needs, supplemented with water carting in drought and two steel water tanks owned by the SES.[91]

2.4 Aboriginal peoples of the North West

Aboriginal Nations in the Plan area include the:[92]

- Karenggapa people in the north-western corner around Sturt National Park
- Wongkumara/Wangkumara people around Tibooburra and to the north and east
- Malyangapa/Maliangapa/Malyangaba/Maljangapa people in the lakes area around Milparinka to Mutawintji
- Wiljali/Wiljakali/Wilyakali people in the southern area down to around Broken Hill
- Barkandji/Paakantyi/Barkindji people across to the Barwon-Darling River.

Aboriginal populations in the Plan area were decimated by the arrival of pastoralists in the mid-1800s, forced relocation to Brewarrina Aboriginal Mission and the 1919 influenza epidemic.[93] As

84 Essential Water (2018) *Drought Management Plan for the water supply business in the Broken Hill Region*; NSW Government (2020) *Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources Order 2020*
85 Interview: Essential Water, 11 April 2022.
86 Interview: Essential Water, 11 April 2022. Note that Stephens Creek Reservoir outside the Plan area will continue to be maintained as a contingency supply in case of failure of the Murray to Broken Hill pipeline.
87 Interview: Silverton Community Committee, 1 February 2022.
88 Interview: Regional Development Far West, 3 February 2022.
89 Clause 22(a) of the GAB Plan.
90 Interview: Regional Development Far West, 3 February 2022; DPE-Water advice, 31 March 2022.
91 Interview: Transport for NSW, 24 March 2022; DPE-Water advice, 31 March 2022.
92 NSW Office of Water (2011) *Water Sharing Plan – North Western Unregulated and Fractured Rock Water Sources – Background document;* Australian Institute of Aboriginal and Torres Strait Islander Studies (2022) *Map of Indigenous Australia*
93 NSW Office of Water (2011) *Water Sharing Plan – North Western Unregulated and Fractured Rock Water Sources – Background document*; Beckett, J. and Hercus, L. (2009) *The Two Rainbow Serpents Travelling: Mura track narratives from the 'Corner Country',* ANU Press, Canberra.

a result, there are few resident Aboriginal communities remaining. In 2016, about 3.4 percent of the total population in the Plan area identified as Aboriginal or Torres Strait Islander.[94] However, there are a greater number of Aboriginal people who have cultural association with the area or are descended from original inhabitants of the Plan area but now live elsewhere.[95]

The Plan area includes (**Figure 8**):

- four LALC areas: Tibooburra, Mutawintji, Broken Hill and Wanaaring LALCs
- two native title claims: for the Malyangapa People Part A, and Wongkumara People
- a native title determination: for the Barkandji People.

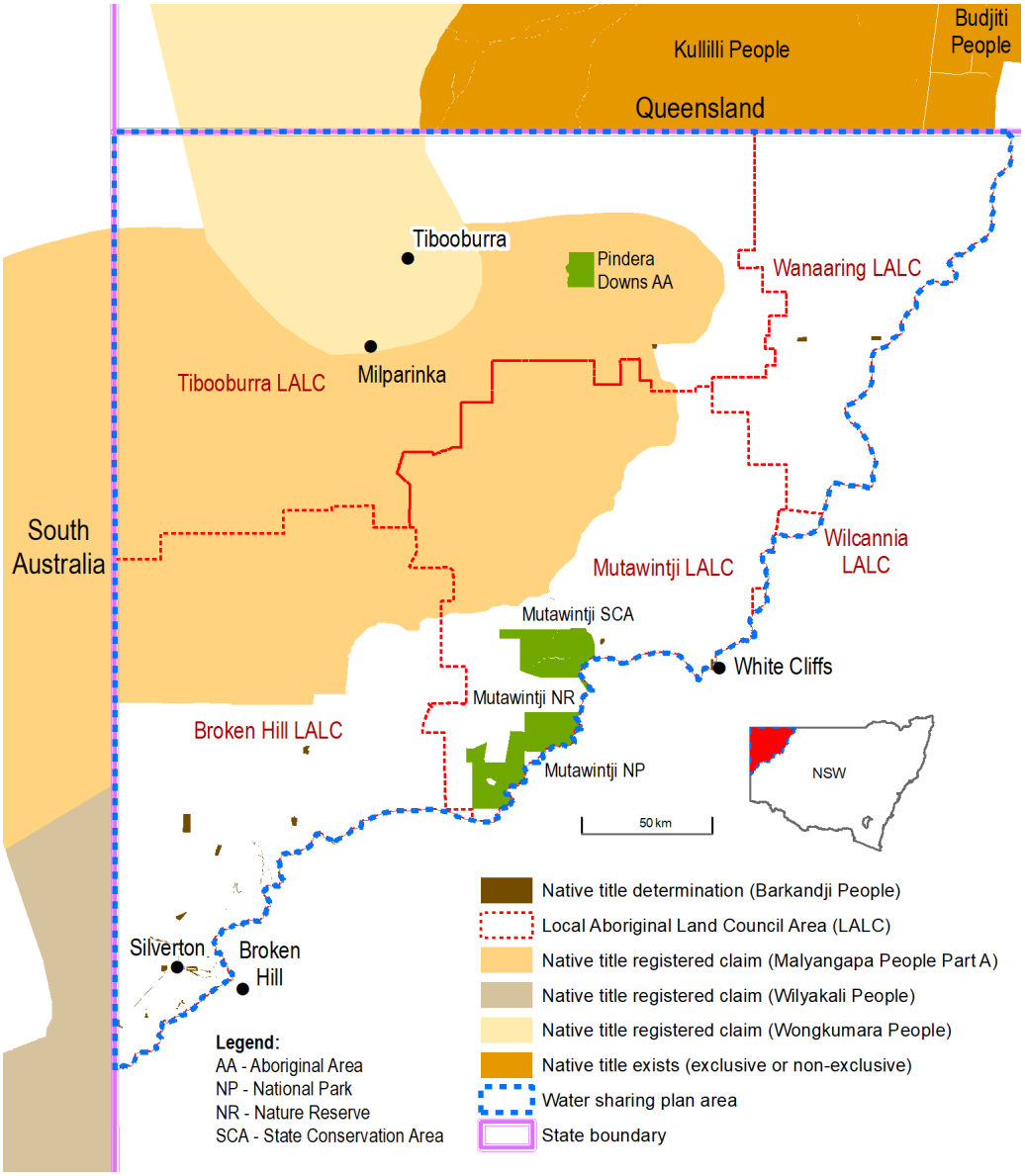

Figure 8: Plan area with native title and LALC boundaries[96]

94 With a further with 11.5 percent of respondents not responding or not stating a response to this question. Australian Bureau of Statistics (2016) *Table 02: Census counts of Aboriginal and Torres Strait Islander persons in local government areas, 2016*

95 Mutawintji Board of Management and NPWS (2013) *Mutawintji Lands Plan of Management*

96 Map developed by the Commission using LALC data provided by DPI and native title areas from the National Native Title Tribunal website.

Water is essential to Aboriginal peoples' identity and waterways are required to be protected and respected under traditional laws and customs. Before non-Indigenous contact, archaeological evidence indicates there were significant populations of Aboriginal people in the Plan area, spanning at least 30,000 years.[97] In the Plan area, movements of Aboriginal populations were strongly associated with ephemeral and permanent water sources:

> *'The Lands' resources, especially the deep waterholes, also drew Aboriginal people to the area as a refuge … Large gatherings could only happen when the rock holes were full of water and there was an abundance of food due to good rainfall.*'[98]
>
> '*In the dry interior everything relating to water was vital, and so stories and ritual concerning waterbirds and the legendary Water-snakes were particularly important*'.[99]

The cultural significance of the Plan area and its watersources can be seen in an example of a *mura* (or dreaming track) of two Ngatyi linking the Uladara waterhole at Paroo to Birndiwalpi spring[100] then westwards to the Flinders Ranges.[101]

There are several protected areas recognising the region's significant Aboriginal cultural values in the Plan area, including:

- **Mutawintji Lands**[102] and **Mutawintji State Conservation Area** – the first Aboriginal-owned national park in NSW.[103] The Mutawintji Board of Management and NPWS jointly manage the park, Mutawintji Historic Site and Mutawintji Nature Reserve. The State Conservation Area is immediately north of the Mutawintji Nature Reserve and was created in 2019. It is considered an '*essential part of the Darling (Barka) River dreaming story and its protection is considered integral to protection of culture'*.[104] The area contains some of the most significant sacred places in far-west NSW, acting as a place for meeting, ceremonies, and trade when rock holes filled with water after good rainfall. Culturally important places and landscapes are associated with creation stories associated with the broader region. Examples of *mura* (creators and their tracks) in the Lands include Kurlawirra (an important creator), Wirtuwirtulinya (seven sisters) and Ngatji (two rainbow serpents).[105]
- **Sturt National Park** – the park is on the traditional lands of the Wongkumara people. It contains state-significant Aboriginal cultural values and sites reflecting shared pastoral history and recorded oral history of Aboriginal people and relations between Aboriginal and non-Aboriginal communities.[106]
- **Narriearra Carypundy Swamp National Park** – on the traditional Country of the Karenggapa People, the Wongkumara and Malyangapa peoples also have traditional ties to the region. Within the park, the Bulloo Lake system, Bulloo Overflow, 12 Mile and Thompsons Creek are nominated places of high Aboriginal cultural value.[107] This is reflected in a song about Lake Bulloo after rains, sung by the most senior Tibooburra man

97 NSW Archaeology Pty Ltd (2008) *Silverton Wind Farm NSW Stage 1 - Aboriginal Heritage and Non Indigenous Heritage Assessment Volume 1*
98 Mutawintji Board of Management and NPWS (2013) *Mutawintji Lands Plan of Management*
99 Beckett, J. and Hercus, L. (2009) *The Two Rainbow Serpents Travelling: Mura track narratives from the 'Corner Country',* ANU Press, Canberra.
100 On the Yancannia property, which was one of the most important areas for Aboriginal peoples in the area as identified in Beckett, J. and Hercus, L. (2009) *The Two Rainbow Serpents Travelling: Mura track narratives from the 'Corner Country',* ANU Press, Canberra.
101 *Ibid*.
102 The Mutawintji Lands includes Mutawintji National Park, the Mutawintji Historic Site and the Mutawintji Nature Reserve.
103 Volkofsky, A. and Tomevska, S. (2019) 'Aboriginal-owned Mutawintji State Conservation Area doubles in size, adding to NSW national parks', *ABC News*, 6 September.
104 *Ibid*.
105 Mutawintji Board of Management and NPWS (2013) *Mutawintji Lands Plan of Management*
106 NPWS (2021) *Sturt National Park – Learn more*; NPWS (2018) Plan of Management – Sturt National Park
107 NPWS (2021) *Statement of Management Intent - Narriearra Caryapundy Swamp National Park*

and recorded in 1958: *'Weedy water, Water lapping, Wave come back, Leaping up, striking the bank, Water shaking, Come and carry the weeds away, Bulloo Lake, water, Looking at it, he (a mythical Ancestor) came there.'*[108] Caryapundy Swamp has been nominated as a wetland of international importance, including for significant cultural values.[109]

- **Pindera Downs Aboriginal Area** – reserved in 1986, the area is an important part of the cultural landscape for the Wongkumara Aboriginal people. Aboriginal sites include stone arrangements and artefact scatters.[110]
- **White Lady Rock Aboriginal Place** – the area contains a giant white-quartz boulder – the body of the White Lady who was the 'queen' of the local Aboriginal people – surrounded by smaller rocks. Her head was hidden underground in a nearby creek in the 1800s to protect it from white prospectors. White Lady Rock was known as a healing place and is important to Aboriginal communities across western NSW.[111]
- **Barkandji Traditional Owners #8 Part A Native Title determination** – this determination includes the right to use the water of the non-exclusive areas for personal, domestic and communal purposes. This includes cultural purposes and watering native animals, cattle and other stock, and watering gardens less than two hectares. It does not extend to a right to control the use and flow of the water in any rivers or lakes through or past the land.[112]

There are no State Heritage items with specific Aboriginal significance listed in the State Heritage Inventory, or Indigenous Protected Areas in the Plan area.

2.5 Industries and employment

2.5.1 Pastoralism

Most of the Plan area is used for agriculture, with livestock production being the main activity. Most of the land is Crown land administered under the *Crown Land Management Act 2016* by DPE-Lands for pastoral lease holdings under the *Western Lands Act 1901*. There are about 260 pastoral properties in the area; the average size is 35,000 hectares and the largest is 271,000 hectares.[113] The size of properties increases to the north as the climate becomes more arid.[114] Landholders rely more on surface water in the southern portion on the Plan area which is hilly rising country, while there is a greater reliance on bores in the flat, sandier country.[115]

Forty percent of residents in the Plan area were employed in agriculture in 2016; 20 percent in sheep farming, 12 percent in sheep-beef cattle farming and 8 percent in beef cattle farming.[116] At that time, the value of agricultural production in Unincorporated NSW was $91 million ($35 million for wool, $29 million for sheep and lambs, and $27 for million beef).[117] Production value varies with rainfall and availability of water and feed. Enterprises are responsive to variability and changes in production value, linked to rainfall, soil moisture and native vegetation.[118]

---

108 Beckett, J. and Hercus, L. (2009) *The Two Rainbow Serpents Travelling: Mura track narratives from the 'Corner Country',* ANU Press, Canberra.
109 The Hon Sussan Ley MP (Minister for the Environment) and Matt Kean MP (NSW Treasurer and then Minister for Energy and Environment) (2021) *Caryapundy Swamp to be listed as a wetland of international importance* [joint press release], 19 December.
110 Office of Environment and Heritage (2018) *Statement of Management Intent: Pindara Downs Aboriginal Area*
111 DPE-E&H (2022), White Lady Rock.
112 National Native Title Tribunal (n.d.) Barkandji #8 Part A determination
113 DPIE (2020) *Agriculture Industry Snapshot for Planning Far West Sub Region*
114 Interview: Pastoralists' Association of West Darling, 22 December 2021.
115 Interview: Pastoralists' Association of West Darling, 1 February 2022.
116 ABS (2016) *2016 Census QuickStats - Unincorporated NSW*
117 DPIE (2020) *Agriculture Industry Snapshot for Planning Far West Sub Region*
118 *Ibid*.

Wool and meat production on the rangelands relies on native grasslands and shrublands. In 2006, there were 598,000 sheep and lambs and 28,500 meat cattle in the area.[119] There has been a shift from wool to meat sheep and an increase in the number of cattle grazed.[120] There was a significant shift to goat production (both managed and mustering/trapping) during the drought due to increased value,[121] with goat production likely to continue given the animals' resilience and the development of goat meat processing and markets.[122]

2.5.2 Tourism and key visitation events

Accommodation is the second largest employer in Unincorporated NSW (after sheep farming), employing 14 percent of residents.[123] Tourism is important to the regional economy, with the NSW Government stating that '*protecting and managing water in the Far West is important to sustain and grow the economy and tourism opportunities*'.[124]

Figure 9 summarises tourism value and employment for the broader outback area of NSW, showing a gradual increase in both until 2020 and the impact of COVID-19. Most visitors to the region are from NSW (48 percent), with only 5 percent of visitors coming from overseas.[125] It is generally expected that tourism will bounce back as COVID-19 restrictions ease and domestic tourism increases.[126]

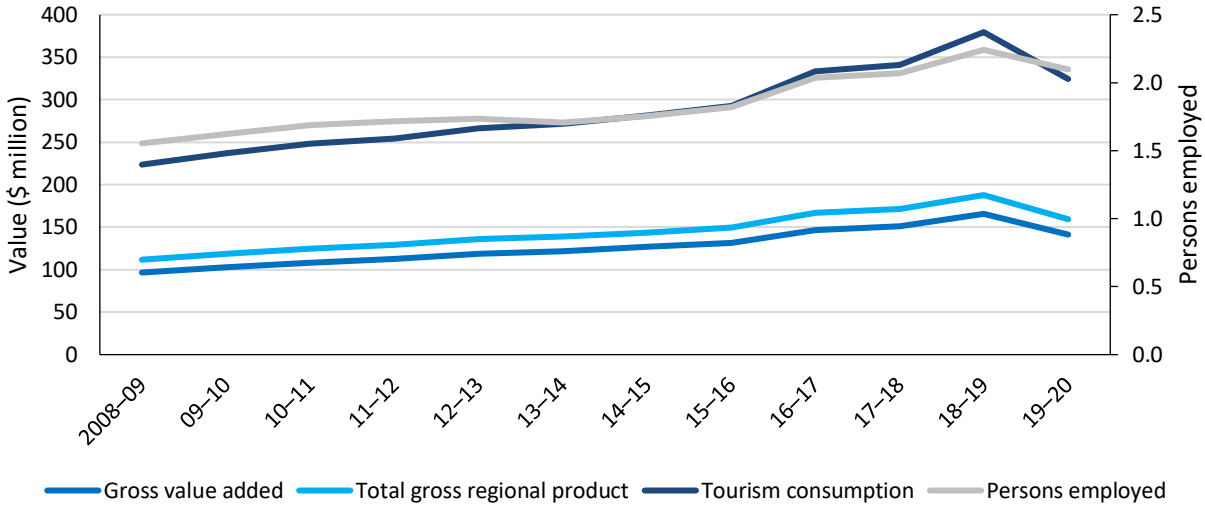

Figure 9: Total direct and indirect tourism value and employment in Outback NSW[127]

The NSW Government has invested $300 million in local tourism via the Regional Growth - Environment and Tourism Fund, focusing on tourism in the Far West, iconic tourism activation, nature-based tourism and Indigenous cultural tourism.[128] The NSW Government has recently sealed the 1,000-kilometre Sturts Steps touring route roads including the Silver City Highway through to Tibooburra, which has been accessible to 2WD since early 2022.[129] Tourism is focused on this route, and sealing the road may increase the transient population through the

119 Australian Bureau of Statistics (ABS) (2010) *National Regional Profile: Unincorporated NSW*
120 DPIE (2020) *Agriculture Industry Snapshot for Planning Far West Sub Region*
121 Interview: Local Land Services, 13 October 2021; Pastoralists' Association of West Darling, 22 December 2021.
122 Interview: Pastoralists' Association of West Darling, 22 December 2021; DPI (2022) *Goatmeat*
123 ABS (2016) *2016 Census QuickStats - Unincorporated NSW*
124 NSW Government (2021) *Far West – Region Overview*
125 Tourism Research Australia (2020) *Regional Tourism Satellite Account - Outback NSW*
126 Tourism Research Australia (2021) *Tourism businesses in Australia*
127 Note: this is broader than the Plan area, including Broken Hill City, Central Darling Shire, Bourke Shire and Cobar councils (Tourism Research Australia (2020) *Regional Tourism Satellite Account - Outback NSW*)
128 NSW Government (2021) *Regional Growth – Environment and Tourism Fund*
129 Transport for NSW (2022) *Cobb Highway and Silver City Highway sealing and upgrade program*

village and demand for town water. The remaining unsealed road on the north-south route from Victoria to Queensland will be complete by the end of 2022, increasing tourism and freight movement, and reducing ongoing maintenance.[130] Silverton, near Broken Hill and the start of the Sturts Steps route, receives an estimates 16,000 visitors a year.[131]

The high-value natural and cultural heritage assets in the Plan area (see **Section 2.4** and **2.2**) are tourism drawcards.[132] The new Narriearra-Caryapundy National Park is expected to open later this year and the NSW and Australian governments expect that the area's Ramsar listing '*will shine an international spotlight on the area driving economic opportunities, including tourism, for the local community*'.[133] The region includes many Aboriginal cultural sites, including one of the largest collections of Aboriginal rock art in NSW at Mutawintji Historic Site, as well as Tibooburra Aboriginal Keeping Place, which displays Aboriginal artefacts and other historical records.[134]

2.5.3 Mining, gas and energy generation

There is potential for mining and gas development in the Plan area, which could become the area's key water consumer. There are several leases, though none are currently in development or operation.[135] Stakeholders advised that the small gold mines near Tibooburra have recently closed.[136] The Plan area includes known copper, gold, ilmenite, rutile, and zircon deposits.[137] During stakeholder engagement there was some discussion around future mining for uranium. While uranium exploration is currently permitted in NSW, mining is not. There are no current exploration licences and the only significant known uranium deposit in NSW is at Toongi, near Dubbo.[138]

The Bancannia Trough is a sedimentary sub-basin in the Plan area consisting of porous rock (sandstone and siltstone) and unconsolidated sediments, stretching from between Broken Hill and Wilcannia, northwest to the South Australian border near Queensland (shown in **Figure 10**).[139] It is located in the Adelaide and the Kanmantoo Fold Belt North Western Groundwater Sources, as well as the GAB and GAB Shallow plans. It has been highlighted by the NSW Government as one of the more prospective potential sources of tight gas and conventional gas.[140] The NSW portion of the Bancannia Trough is near existing infrastructure, including the Moomba to Sydney gas pipeline and Barrier Highway. The Commission was advised that the Bancannia Trough has fresh to saline water in the upper 2,000 metres.[141] Its water is relied upon by landholders, with some pastoralists using desalination plants to treat domestic water before consumption.[142]

Sustainable energy generation and storage is an emerging industry in the area.[143] Energy generation may increase water extraction in the Plan area, with water required during

130 Transport for NSW (2022) *Cobb Highway and Silver City Highway sealing and upgrade program*
131 Interview: Silverton Village Committee, 1 February 2022.
132 Destination NSW (2022) *Depot Glen, Pooles Grave and Sturts Cairn*
133 The Hon Sussan Ley MP (then Minister for the Environment) and Matt Kean MP (NSW Treasurer and then Minister for Energy and Environment) (2021) *Caryapundy Swamp to be listed as a wetland of international importance* [joint press release], 19 December.
134 VisitNSW (2022) *Tibooburra Aboriginal Keeping Place*; NPWS (2022) *Mutawintji Historic Site*
135 NSW Government (2022) *Common Ground map*
136 Interview: Crown Lands, 14 December 2021.
137 Senior, A., Britt, A., Summerfield, D., Hughes, A., Hitchman, A., Cross, A., Champion, D., Huston, D., Bastrakov, E., Sexton, M., Moloney, J., Pheeney, J., Teh M, and Schofield, A. (2021) *Australia's Identified Mineral Resources 2020*
138 *Ibid*; NSW Parliamentary Research Service (2019) *Uranium mining and nuclear energy in New South Wales*
139 Geological Survey of NSW (2020) *Bancannia Trough Resource Assessment Report*
140 *Ibid*.
141 Interview: Nature Conservation Council, 2 March 2022
142 Interviews: Pastoralists' Association of West Darling, 1 February 2022; and Nature Conservation Council, 2 March 2022
143 DPIE (2020) *Agriculture Industry Snapshot for Planning Far West Sub Region*

construction, and, to a lesser extent, maintenance of sites. AGL's Silverton wind farm is one of Australia's largest wind farm development sites.[144] If fully developed, it would generate about 4.5 percent of NSW's power and contribute over $700 million to the regional economy.[145]

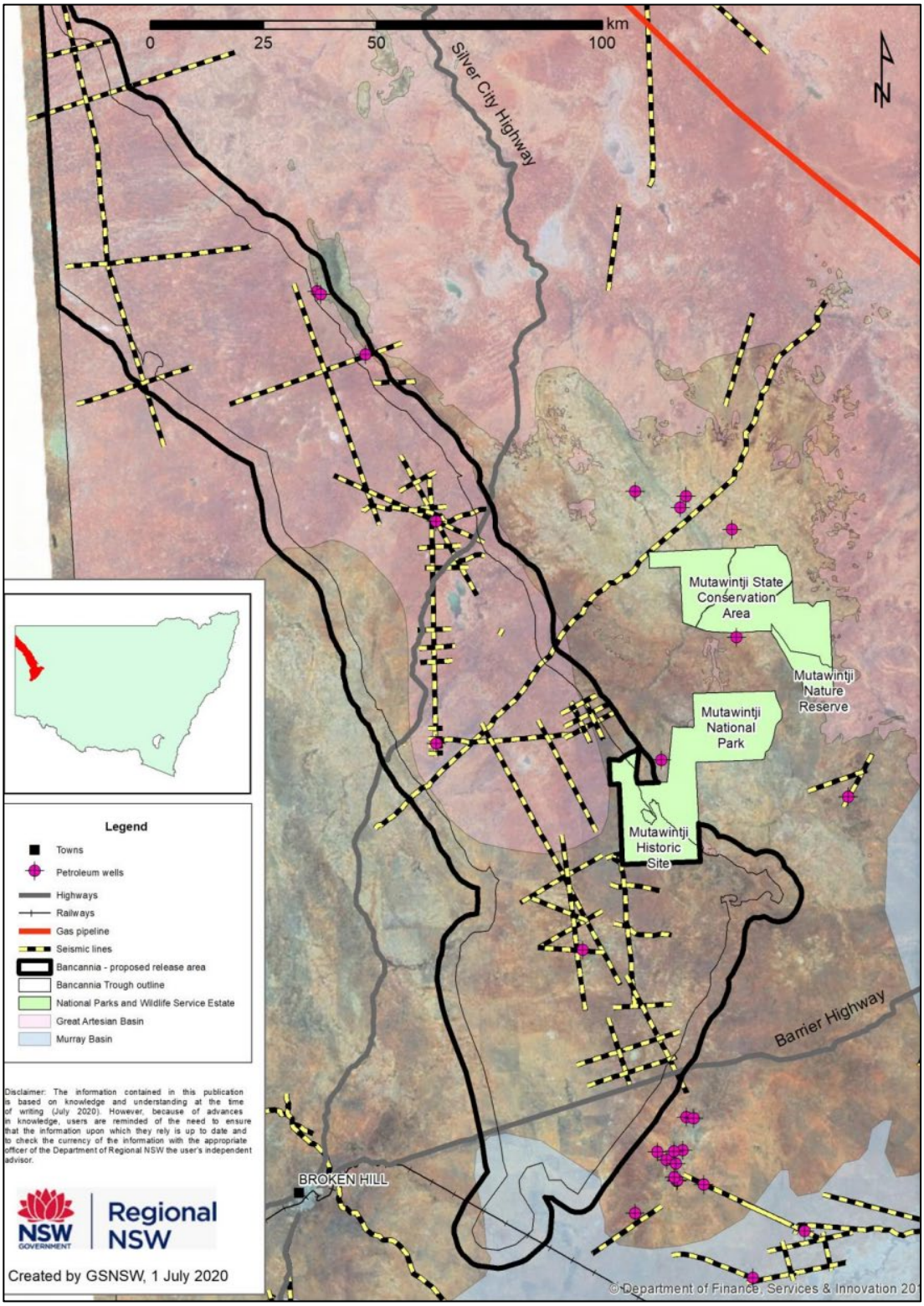

Figure 10: Bancannia Trough proposed release area[146]

144 The site has approval for 282 turbines and concept approval for an extra 316 turbines (Epuron (2022) *Silverton*).

145 Epuron (2022) *Silverton*

146 Geological Survey of NSW (2020) *Bancannia Trough Potential Strategic Release Area*.

3 Establishing sustainable extraction

The most fundamental role of a water sharing plan is to protect water for the environment by establishing the rules for extraction by licensed users and under basic rights. The regular assessment of compliance with the LTAAEL and response to any exceedance (non-compliance) is an important part of protecting the environment, basic rights and the distribution of water shares as intended by the Act and Plan. The Plan establishes rules to manage extraction at three scales:

- **Long term**: LTAAELs control the maximum amount of water that can be extracted over the long term in each water source.[147] 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 (see **Section 3.2**). LTAAELs should include all extraction for consumptive (non-environmental) use, including basic landholder rights. The Plan does not include harvestable rights extraction under the LTAAEL or as part of LTAAEL compliance.[148]
- **Medium term**: available water determinations allocate the volume of water that can be extracted under access licences each year. Available water determinations would not be effective in the Plan area in reducing extraction, as they can only limit licensed extraction and most extraction in the Plan area is for basic landholder rights. Available water determinations will therefore not be discussed in this review.
- **Short term**: daily access rules define when licensees can extract water day-to-day. They are intended to protect the needs of the environment, basic landholder rights and water utilities on a daily basis and enable equitable access to variable flow levels. The Plan includes cease to pump rules, which require licence holders to stop pumping when the river or pool falls below a specified level each day, to protect that portion of the flow regime and maintain aquatic refuges (see **Section 3.7**). The Plan does not have individual or total daily extraction limits, and these would be impractical considering the current extraction profile.

There are several issues related to the structural elements of the Plan that must be addressed before sustainable extraction can be refined for the Plan remake (such as through LTAAELs and cease to pump thresholds). These include resolution and clarification of Plan boundaries, water source definitions and links to neighbouring plans (**Section 3.1**). Once these foundational components are resolved, sustainable LTAAELs must be determined. This chapter outlines several issues that should be addressed to do this:

- LTAAELs should be revised based on an assessment of sustainability that considers the area's unique extraction profile, latest data, potential for increased extraction and future risks from climate variability and change (**Section 3.2**)
- risks associated with potentially significant and increasing harvestable rights extraction should be assessed and managed (**Section 3.3**)
- LTAAEL assessment is vital and should be commensurate with risk and resource availability. A reasonable estimate of extraction and capture should be made on a three- to five-yearly basis (**Section 3.4**)
- the impact on the water balance of increasing rehydration works in the Plan area should be assessed and considered as part of the Plan remake (**Section 3.5**)
- road maintenance water use should support Plan outcomes (**Section 3.6**)
- gauging should be installed to gather evidence and support future improvements to the Plan, such as improved cease to pump thresholds (**Section 3.7**).

147 Part 4 of the Plan.
148 Clauses 26 and 27 of the Plan.

3.1 Plan boundaries, definitions and links to other plans are not fit for purpose

The effectiveness of Plan rules is underpinned by its foundational elements, including Plan and water source boundaries, as well as Plan definitions, which delineate where provisions apply. There are several issues related to these elements that limit the effective management of sustainable extraction and may cause confusion around where Plan provisions apply. These issues are not resource intensive to rectify and should be addressed as a priority and include:

- the surface water around Silverton and Umberumberka Reservoir is not covered by a surface water source, affecting management in this area and potentially the surface water LTAAEL (**Section 3.1.1**)
- having a single surface water source makes it difficult to manage sustainable extraction at the appropriate scale (**Section 3.1.2**)
- groundwater source boundaries overlap with other plans and, along with unclear definitions, are confusing for stakeholders (**Section 3.1.3**).

In addition to these elements, the Plan does not adequately recognise the linkages within and between water sources in the Plan area, underlying the Plan area and across state boundaries (**Section 3.1.4**).

3.1.1 The area around Silverton and Umberumberka Reservoir is not in a surface water source

The boundary of the North Western Water Source shown in the registered Plan map does not include the southern tip of the Plan area (circled in **Figure 11**). This area includes Silverton village and Umberumberka Reservoir.[149] This area is also not included in the neighbouring *Water Sharing Plan for the Lower Murray-Darling Unregulated River Water Source 2011*. The surface water and any licences in this area are therefore not covered by any surface water sharing plan provisions, as they directly refer to water sources.[150] As such, surface water extraction in this area is unaccounted for and cannot be managed by the Plan.

DPE-Water recognises that this may be an error and should be addressed in the Plan remake. Depending on how the surface water LTAAEL was calculated, and whether it includes this area, it may also require redefinition to account for the additional area. Given this area is hydrologically in the NSW Lake Frome catchment, which runs along the South Australian border to Queensland, the Commission considers it is most appropriate to include the area in the remade Plan, as opposed to the Lower Murray-Darling Plan.

149 Umberumberka Dam is a 7,800 ML reservoir in the Plan area, 30 kilometres north-west of Broken Hill on Umberumberka Creek.

150 Note that this area is covered by the Adelaide Fold Belt North Western Groundwater Source for groundwater.

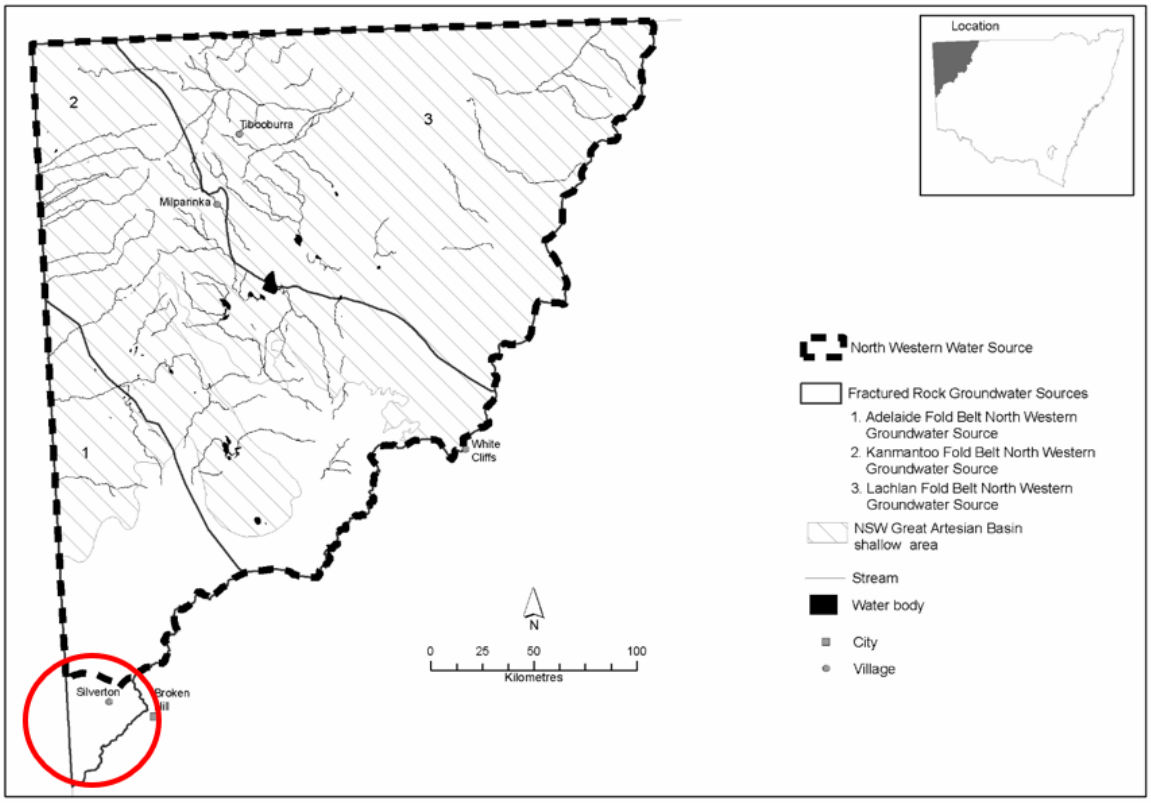

Figure 11: Comparison of water source and water sharing plan boundaries, showing in red the area around Silverton not included in the surface water source

3.1.2 A single surface water source makes it difficult to manage extraction at the right scale

The Plan has one surface water source covering four drainage basins. Having a single surface water source means that there is only one LTAAEL for the Plan area, despite the catchments having different extraction profiles and extraction risks. For example, no licensed extraction is permitted in the Cooper Creek drainage basin as it is wholly in a national park,[151] while there is potential for future increases in extraction in other catchments. Having a single LTAAEL may make it difficult to effectively manage sustainable extraction at the appropriate scale if demand for water increases in one catchment, as it would require management actions to be taken across the whole Plan area rather than targeting the area of issue.

The replacement Plan should include four surface water sources in the Plan aligned with drainage basins, with individual LTAAELs for each. Given water access licences are not permitted in the Cooper Creek catchment, its LTAAEL should be near zero to permit a small volume of basic landholder rights in the national park. The surface water LTAAEL may have to be recalculated to account for the additional area near Silverton (see **Section 3.1.1**). When completing this step, the additional action of separating the single source into four should not be resource intensive and may better protect outcomes by assisting with spatial management of extraction if extraction increases, or transboundary trade occurs in future. Having four water sources aligned with the drainage basins will increase transparency for stakeholders about the sustainable limit in their area.

DPE-Water should revise the water source boundaries before issuing additional licences, with the exception of issuing unallocated water to support better outcomes for Aboriginal people consistent with the water management principles under Section 5 of the Act (see **Chapter 5**).

151 Clause 44(2) of the Plan.

3.1.3 Groundwater source descriptions and definitions create management uncertainties

There is a lack of clarity around groundwater sources and therefore applicable provisions across the Plan, the GAB Plan and the GAB Shallow Plan. **Section 2.1.2** provides detail on groundwater sources. In the northern portion of the Plan area, the Plan only applies to deeper fractured rock which is overlain by the GAB plans. This is not clearly described in the Plan, its background document or documents associated with the GAB plans and is confusing for stakeholders, which may lead to poor outcomes. For example, alluvial water sources in the north are managed under the GAB Shallow Plan but in the southern portion are managed by the Plan. Areas where groundwater is managed under the GAB and GAB Shallow plan areas should be clearly identified and marked on the Plan map, and clear linkages should be made between plans.

The Plan only applies to fractured rock aquifers. Porous aquifers are excluded under Clause 4(5). Plan documents currently have two different definitions for porous and fractured rock – one in the background document and one in the Plan dictionary (**Table 3**). The Plan dictionary's definition of fractured rock overlaps with its definition of porous rock. The Plan dictionary definition is the binding definition but having different definitions could cause confusion for water users and makes it unclear where Plan provisions should apply. It is currently unclear whether water sources (and therefore Plan provisions) include porous rocks in the southern portion of the Plan area, including the productive Bancannia Trough.

Table 3: Comparison of definitions of porous and fractured rock aquifers in Plan documents

	Plan dictionary definition	Plan background document definition[152]
Porous rock	Consolidated sedimentary rock containing voids, pores or other openings (such as joints, cleats and/or fractures) which are interconnected, in the rock mass and are capable of transmitting water	Aquifers found in rock formations such as sandstone or limestone – groundwater occurs within the pore space in the rock matrix
Fractured rock	Sedimentary, igneous and metamorphic rocks with fractures, joints, bedding planes and cavities in the rock mass that are capable of transmitting water	Aquifers found in rock formations such as granite or basalt – groundwater occurs mainly within the fractures and joints of these rocks

There are 161 works approvals for bores for basic landholder rights (mostly stock) under the Plan's groundwater sources, with additional bores under the two GAB plans.[153] Stakeholders expressed doubts about whether bores in the Plan area were in fractured rock or more likely to be in other, more productive water sources (alluvial or porous rock).[154] DPE-Water advised that, based on its assessment, there are no porous rock aquifers in the Plan area, only fractured rocks with overlying sands and sediments or alluvials. Clarity of definitions and water sources would improve stakeholder confidence in Plan management. The Commission notes that more recent water sharing plans have greater clarity and supports DPE-Water's continued improvement of definitions. Definitions should be made clear and exclusive in the remade Plan, with the background document providing any necessary additional context, and definitions should be aligned between documents.

Stakeholders also advised the Commission and provided information showing that the Plan's groundwater mapping is '*at least 30 years out of date… the Lachlan fold belt doesn't cross the Darling River*', and the Plan should include the Adelaide Fold Belt, the Bancannia Trough, the

152 NSW Office of Water (2011) *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources – Background document*, p. 4
153 Basic landholder rights data provided by WaterNSW.
154 Interview: Pastoralists' Association of West Darling, 1 February 2022

Delamerian Fold Belt then the Thompson Fold Belt.[155] The Plan's water sources and nomenclature should be revised based on best available evidence, including from the NSW Geological Survey and Geoscience Australia.

The Bancannia Trough is a sedimentary sub-basin consisting of porous rock and unconsolidated sediment (see **Section 2.5.3**).[156] Stakeholders advised that the Trough is a large freshwater source relied upon by landholders.[157] It has also been identified by the NSW Government as having potential for gas production (see **Section 2.5.3**). A geologist familiar with the area suggested that the Bancannia Trough should be treated as a separate water source.[158] The formation is currently managed under the Plan's Kanmantoo and Adelaide Fold Belt Groundwater Sources, as well as the GAB and GAB Shallow plans. Splitting management across multiple plans may impact the management of any future growth in use and limit outcomes.

While managing the Bancannia Trough as a single water source would be ideal, the Commission understands resource limitations within DPE-Water may prevent this from occurring. At a minimum, the inclusion of any porous rock aquifers (including the Bancannia Trough) in the southern portion of the Plan area should be specified in the remade Plan to provide clarity for stakeholders. DPE-Water should also consider future separation of the Bancannia Trough to ensure extraction can be effectively managed if its resources are exploited.

3.1.4 The Plan does not address connectivity

Ground and surface waters are inextricably linked, and their connectivity varies significantly between systems and over time.[159] The Plan includes an objective to '*provide recognition of the connectivity between surface water and groundwater*'.[160] However, it does not recognise the importance of connectivity within and between water sources in the Plan area, underlying the Plan area and across state boundaries to Queensland and South Australia. The Plan also does not recognise the role that surface-groundwater connectivity plays in ecological processes and ecosystem function. This was recognised in stakeholder feedback:

> '*There seems to be a missing link in information regarding connectivity, not just between surface and groundwater, but the different layers of groundwater. Part of the problem is the separate plans … not enough research has been put in and the water sharing approach doesn't allow for the right level of consideration for connectivity issues and interrelatedness*.'[161]

> '*This water sharing plan has totally ignored the Great Artesian Basin, a major geological feature of the area, present in various depths ranging from nothing at all, to several hundred metres.*'[162]

According to the Plan's background document, when the Plan was developed the groundwater sources were considered 'less highly connected' and consequently recharge calculations only used a proportion of rainfall, not movement between aquifers.[163] Since the Plan was developed,

155 Interview: Nature Conservation Council, 2 March 2022.
156 Geological Survey of NSW (2020) *Bancannia Trough Resource Assessment Report*
157 Interviews: Pastoralists' Association of West Darling, 1 February 2022
158 Interview: Nature Conservation Council, 2 March 2022
159 Office of Water (2011) *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources – Background document*
160 Clause 8(h) of the Plan.
161 Interview: Inland Rivers Network, 7 December 2021.
162 Interview: Nature Conservation Council, 2 March 2022.
163 NSW Office of Water (2011) *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources – Background document*,

understanding of surface-groundwater connectivity has improved. For example, evidence shows recharge to the GAB in an area around Tibooburra.[164]

The Plan does not adequately consider connectivity to the porous rock and alluvial aquifers that underlay the northern part of the Plan (managed under the GAB plans – see **Section 2.1.2**), including their importance to, and connectivity with, the Plan's surface waters. It also does not recognise connectivity between surface water and shallow groundwater aquifers. This includes their important role in the arid zone and for GDEs, including vegetation and wetlands recently mapped for the Western Division as part of DPE-Water's GDE HEVAE project (see **Chapter 5**).

The level of connectivity should be reassessed given new information and recognised in the Plan and the GAB plans. Where there is a moderate to high degree of connectivity, DPE-Water should evaluate the need for linked access rules between the Plans (such as linked cease to pump conditions) to protect surface and groundwater sources.

In its 2018 review of the GAB Plan, the Commission suggested that DPE-Water '*consider merging the two existing Great Artesian Basin water sharing plans due to an improved understanding of hydraulic connectivity between groundwater sources covered by the two water sharing plans'.*[165] This was to align with best available evidence, better manage inter-source exchange, streamline plan administration and provide clarity for water users who had expressed confusion over having two GAB plans. Although these plans were not merged, the findings of this review reinforce the need to consider clarity, inter-source connectivity and appropriate provisions to maintain connectivity.

The importance of groundwater managed under the GAB Shallow Plan for significant wetlands in the Plan area (**Chapter 5**) also requires further investigation. The ecological character description for the Ramsar-listed Lake Pinaroo (in Sturt National Park in the Lake Eyre basin) published in 2008 indicated there were knowledge gaps around the role of groundwater at Lake Pinaroo and extent of groundwater flow into or out of the lake.[166] The recently published plan of management for Sturt National Park indicates this knowledge gap remains, with understanding of the lake's hydrology and ecology, and relationship between surface and groundwater still limited.[167]

There is a lack of available data on groundwater-surface water connectivity and wetland function for the Ramsar-nominated Caryapundy Swamp, though surface-groundwater connections are likely important for its maintenance.[168] The connectivity and movement of water between water sources in this Plan and the GAB Shallow Plan should be recognised. Mutawintji Lands also have knowledge gaps:

> '*The Mutawintji Lands groundwater resources have not been comprehensively investigated. Groundwater reserves are known to occur along Homestead Creek … The implications for the creek's fringing River Red Gum community and other biophysical systems, of drawing down this aquifer remain unclear*'.[169]

To adequately protect surface and groundwater sources and their dependent ecosystems, these knowledge gaps should be resolved (see **Section 7.3**), connectivity between the Plan, GAB Plan and GAB Shallow Plan should be described, and DPE-Water should consider linking access rules for surface water and alluvium in the GAB Shallow Plan and the Plan.

---

164 For example, Ransley, T., Radke, B., Feitz, A., Kellett, J., Owens, R., Bell, J., Stewart, G., Carey, H. (2015) *Hydrogeological Atlas of the Great Artesian Basin*.

165 Natural Resources Commission (2018) *Review of the NSW Great Artesian Basin Groundwater Sources 2008*

166 Department of Environment and Climate Change NSW (2008) *Lake Pinaroo Ramsar site: ecological character description*

167 NPWS (2018) *Plan of Management – Sturt National Park*

168 An unpublished draft ecological character description for Caryapundy Swamp was shared with the Commission to inform this review.

169 Mutawintji Board of Management and NPWS (2013) *Mutawintji Lands Plan of Management*

3.2 LTAAELs are not based on best available evidence

The amount of water available for extraction (the LTAAEL) depends in large part on the estimation of the water volume in the system. To achieve the Plan's objectives, the LTAAELs should be set according to realistic estimates of rainfall and groundwater input (and output), based on a robust assessment of sustainability using best available evidence. The pressures on resources in the Plan area are not well known and are likely to increase as, along with the extraction from existing basic landholder rights and licences, emerging extractive industries (including mining and gas) may seek to licence unallocated water and increase extraction.

Unlicensed extraction (for basic landholder rights, road maintenance, and town water supply; see **sections 3.3, 3.6** and **Chapter 4**) is unknown, and the LTAAEL does not include extraction for harvestable rights, which is expected to be significant in the Plan area (see **Section 3.3**).

Licensed extraction is currently low, and the current Plan's estimation of LTAAELs suggest that there are large volumes of available unallocated water (**Figure 12**). For example, the Plan's surface water LTAAEL (for the North Western Water Source) is represented to have 62 percent (1,740 ML of 2,807 ML) of water available for issue and licensing through a controlled allocation process. However, the current surface water LTAAEL is not based on an assessment of sustainable extraction levels and the assessment of take does not include harvestable rights.

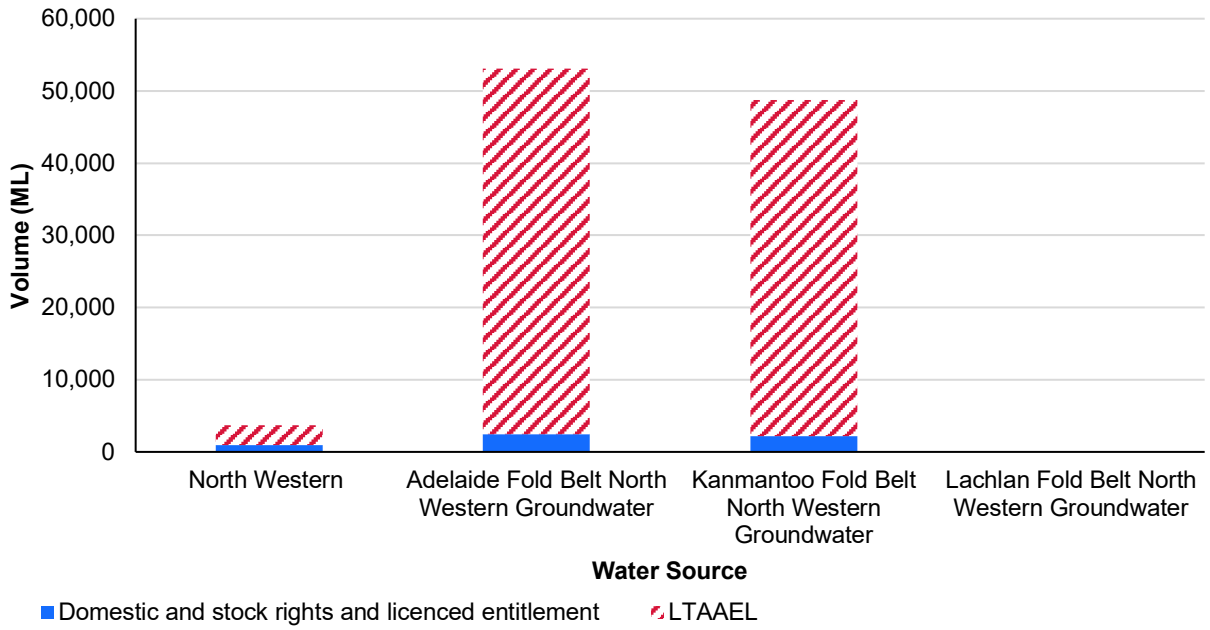

Figure 12: Licensed entitlement and domestic and stock rights, and LTAAELs for each water source with striped area showing the large volumes of unallocated water

The Plan's current LTAAEL is instead set at 10 percent of runoff, based on modelling and historic rainfall records, and justified with comparison to harvestable rights use in eastern NSW, which has a significantly different climatic context.[170] The Plan's background document states that the surface water LTAAEL was set above zero '*to provide scope for small scale development such as tourism, in the water source*'.[171] The environmental justification for setting the LTAAEL at 10 percent of runoff appears to be limited to the fact that an increase in use '*will not affect flows at the Murray mouth*'.[172] This LTAAEL is in addition to the 100 percent of rainfall

170 Office of Water (2011) *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources – Background document*
171 *Ibid*, p. 12.
172 Office of Water (2011) *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources – Background document.*

runoff that is allowed to be captured through the use of dams on minor streams under harvestable rights (see **Section 3.3**).

The Commission considers that the LTAAEL, and therefore the Plan, may not protect surface waters for the local ecosystems or inhabitants, nor does it consider risks to values in the Plan area from increased extraction. It is unlikely to '*protect, preserve or maintain*' high priority water dependent ecosystems, or prioritise them as required by the Act. Specifically, the following outcomes may be at risk in the Plan area from increased extraction:

- **environmental outcomes**: internationally important wetlands, threatened species and interconnected water dependent ecosystems rely on the ephemeral presence of water across systems and the remaining refugia in critical locations during drought.
- **social outcomes**: basic landholder rights and town water supplies may be affected if extraction increases and is locally unsustainable. Aboriginal and cultural requirements are not specifically protected and are likely to be affected if extraction is unsustainable.
- **economic outcomes**: the local economy is based on pastoral leases and tourism. Basic landholder rights and stock use may be impacted at critical times if there is significant growth in extraction due to the 'boom-bust' environment and severe droughts. Tourism is focused on the area's unique natural environment and relies on adequate and sustainable water supplies.

Given the limited analysis underpinning the surface water LTAAEL, DPE-Water should assess evidence gaps and complete targeted research into the Plan area's hydrology, connectivity and environmental water needs in the short term to enable the LTAAEL to be assessed for adequacy. Sufficient information should be sought to determine whether the LTAAEL has been set at a sustainable level.

Critically, the limit must include all forms of extraction and interception, as outlined in the following sections. Continuing growth in harvestable rights or a new large scale economic activity in the area such as gas, mining or large scale solar or wind energy is possible and would likely require significant water resources (see **Section 2.5**).

Like the surface water LTAAEL, most of the potential extraction under the groundwater LTAAEL is unallocated. Two of the Plan's groundwater sources have been included in controlled allocation orders, which can lead to new shares being issued. New shares have not been issued to date, but there may be a growth in use during the next Plan period.

Groundwater LTAAELs were set based on DPE-Water's standardised 'macro' approach using a sustainability index and risk matrix. It should be revisited based on best available evidence and considering the increase in identified high value environmental areas. The assessment was based on limited studies of recharge values, and the area considered of high environmental value has increased during the Plan period.[173] It assigned higher protections to high value environmental areas, protecting all recharge (5,145 ML per year) in these areas.[174]

The environmental risk for the Plan was considered low and 60 percent of remaining average annual recharge in the Kanmantoo Fold Belt and Adelaide Fold Belt North Western groundwater sources was made available for extraction.[175] However, these assumptions were based on limited and potentially inaccurate data. For example, climate change modelling for the region

[173] High value areas are national parks, nature reserves, historic sites, Aboriginal areas, State conservation areas and karst conservation areas. Office of Water (2011) *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources – Background document*, pp. 17-18.
[174] *Ibid*.
[175] *Ibid*.

uses recharge figures of about 50 millimetres per year[176] and 1-10 millimetres per year.[177] In comparison, the Plan assumed around 8 millimetres per year of recharge.[178]

Having groundwater LTAAELs based on rudimentary recharge estimates and little knowledge of connectivity risks Plan outcomes and long-term sustainability of the groundwater aquifers, as well as the environmental and cultural values of GDEs (discussed in detail in **Chapter 6**). Stakeholders raised concerns around the accuracy of this assessment, noting that the groundwater source LTAAELs are '*extremely high*'[179] and highlighting that '*you need to use the precautionary principle in these situations [where there is a lack of data]*'.[180]

The Plan includes provisions that it may be amended to vary the amount of recharge reserved as planned environmental water and the groundwater LTAAELs due to recharge studies undertaken or assessed as adequate by the Minister.[181] It is assumed these provisions were included given the lack of data when the Plan was developed. While there is limited local research on other aquifers or connectivity to verify groundwater recharge assumptions, there is more research available on the GAB in the north of the Plan area.[182]

To address these concerns and ensure groundwater extraction is sustainable, DPE-Water should assess existing available information and undertake targeted research into hydrogeology and surface water connectivity to refine the groundwater LTAAELs. The amendment provision should be retained in the Plan and additional research should be prioritised before the Plan's groundwater sources are included in another controlled allocation order.

If the groundwater LTAAEL calculation method remains the same, then the LTAAEL should be updated to reflect the best available information regarding environmental values, including those values associated with the new national parks and State conservation area.

In relation to groundwater extraction, stakeholders raised issues with bores drying up or taking a long time to recover during drought (though the inclusion of these bores under the Plan's groundwater sources is unknown due to the three water sharing plans in the same geographic area and stakeholder uncertainty, see **Section 3.1.3**). Given the arid climate, the volume of unallocated water as estimated under the current Plan may be unrealistically high, posing a risk to groundwater resources and associated dependent ecosystems.

In addition to ensuring LTAAELs are sustainable based on historic water availability, both the surface and groundwater LTAAELs should consider risks to future water availability under climate variability and climate change. The Plan does not currently consider the impacts of climate change and is not based on best available information regarding climate projections.

Based on climate change modelling, minimum and maximum temperatures in the Plan area are expected to increase by 0.7 and 2.1 degrees Celsius by 2030 and 2070 respectively.[183] The number of days above 35 degrees Celsius is likely to increase from over 70 per year by an additional 10–20 days by 2030 and over 40 by 2070.[184] This warming trend is large compared to

176 Office of Environment and Heritage (2015) *Hydrology Climate Change Impact Snapshot*, p. 5.
177 Crosbie, R.S., Pickett, T, Mpelasoka, F.S., Hodgson, G., Charles, S.P. and Barron, O.V. (2013) 'An assessment of the climate change impacts on groundwater recharge at a continental scale using a probabilistic approach with an ensemble of GCMs', *Climatic Change*, 117(1), pp.41-53.
178 Office of Water (2011) *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources – Background document*
179 Interview: Nature Conservation Council, 2 March 2022.
180 *Ibid.*
181 Clauses 66 and 67 of the Plan.
182 This is discussed in the Commission's Review of the Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources 2008
183 Office of Environment and Heritage (2014) *Far West climate change snapshot*
184 *Ibid.*

the region's natural variability in temperature.[185] These 2014 estimates are the latest publicly available for this region but are potentially outdated given advances in climate science. Increasing temperatures will increase evaporation from soil, rivers, dams, and other waterbodies, potentially increasing by up to 5 percent by 2070 compared to levels in 1990-2009.[186]

Rainfall is expected to decrease in spring in the near (2020-2039) and far (2060-2079) future and decrease in winter in the near future.[187] Autumn and summer rainfall in the Plan area is expected to increase in the near and far future.[188]

Increasing temperatures, increased evaporation and changing rainfall patterns is reducing water availability and affecting water quality in parts of NSW.[189] These changes will impact the volume of water available, either through groundwater via recharge or through runoff and streamflow. Long term reductions in water available due to climate change should be reflected in reduced extraction allowances, otherwise the volume of environmental water will be reduced. A mechanism to achieve this should be built into water sharing plans to avoid future shocks.

DPE-Water should ensure the replacement Plan functions under variable climatic conditions, as required by the Act. The insights provided by recent studies and the implications for the next Plan period should be considered, as well as implications from observed changes in climate over the last few decades.

3.3 Increasing harvestable rights extraction is a significant risk

Basic landholder rights are prioritised under the Act and do not require water licences.[190] They include harvestable rights dams, domestic and stock rights and native title rights (discussed in **Section 5.1**). In the Western Division, landholders can capture all rainwater runoff using a dam or dams on 'minor streams' (first and second order, ephemeral streams) under their harvestable rights.[191]

Water capture and use under harvestable rights is potentially significant as a proportion of water available in the Plan area due to the relatively flat landscape, 100 percent harvestable rights allowance, ease of earthworks and the nature of arid zone ephemeral streams.[192] In the Plan's flat and arid landscape, streams reach a point where they cannot move sediment in a defined channel and the channel breaks down to wetlands or floodouts.[193] This means there are many first and second order streams, which can be dammed for harvestable rights. The wetlands and floodouts are highly productive for pastoralists, as well as being environmentally valuable. The growth in harvestable rights use was described by one stakeholder:

> *'If you see drainage lines as being a tree and the trunk is a third order stream … if you cut off every branch and bough of the tree, and just leave the trunk, that is essentially killing the tree.'*[194]

185 Office of Environment and Heritage (2014) *Far West climate change snapshot*
186 DPE-Water (2022) *Draft Western Regional Water Strategy*
187 Office of Environment and Heritage (2014) *Far West climate change snapshot*
188 *Ibid*.
189 AdaptNSW (2022) *Climate change impacts on our water resource*, accessed 7 February 2022.
190 Sections 52-55 of the Act.
191 NSW Government (2006) *NSW Government Gazette 40 - 31 March 2006,* (pp. 1628-1631); NSW Government (2006*) NSW Government Gazette 37 - 24 March 2006* (pp. 1500).
192 Farm dams require a water supply works approval and water access licence if they are on a third order or greater river, a permanent spring fed first or second order stream.
193 Larkin, Z.T., Ralph, T.J., Tooth, S., Fryirs, K.A. & Carthey, A.J. (2020) 'Identifying threshold responses of Australian dryland rivers to future hydroclimatic change', *Science Reports*, 10:6653.
194 Interview: Pastoralists' Association of West Darling, 1 February 2022.

While the Plan's background document states that '*most properties are already fully watered for stock and domestic purposes*', the Commission heard from multiple stakeholders that this statement is incorrect, and earthworks to capture water under harvestable rights have increased during the Plan period. Stakeholders advised that dams and blockbanks have increased in size and number over the Plan period due to the increasing availability, size, and comfort of earthmoving equipment. Due to the arid and relatively flat landscape, long and low works will be able to capture large proportions of available water.

Land use is dominated by grazing and there are very few viable stock and domestic water supply options. The existing supplies are crucial to graziers and increases in extraction at one point are likely to affect pastoralists downstream. Stakeholders raised concerns around the impact of this increase on downstream users:

> *'Existing regulations are skewed to the advantage of upstream stakeholders … right across the western division. This is an issue for downstream users and the environment.'*[195]

Stakeholders also noted that heavy rainfall events that overtop dams on first and second order streams and other earthworks are rare in the arid Plan area, and smaller events may be unable to reach downstream environments. Stakeholders advised that reduced downstream flows are being noticed across the area and can sometimes be linked to specific upstream works, impacting businesses, families and downstream ecosystems.[196] The cumulative impact of harvestable rights, an increase in earthworks, arid geomorphology and boom-bust events is likely to increase periods of reduced or no flow events.

There is no monitoring available of extraction, river flows, or environmental condition to determine the scale of water capture, or its impact. Targeted remote sensing before, during and after select rainfall events would be able to detect the scale of capture and enable estimates of take to be developed (see **Section 3.4**). The Commission considers there is a high risk of downstream impacts on the environment, businesses and communities and the investment in this work is warranted.

DPE-Water provided the Commission with an updated estimate of basic landholder rights use in the Plan area, which estimates a decrease in use (see **Table 2**). This estimate only covers domestic and stock rights and not harvestable rights, which is excluded from LTAAEL assessment under the Plan. It does not align with the strong message provided by stakeholders that harvestable rights use (and therefore basic landholder rights extraction) has increased notably during the Plan period.

The Plan's required annual assessment of LTAAEL compliance has not occurred.[197] However, without an estimate of extraction under harvestable rights, there would be minimal value in assessing LTAAEL compliance. The Plan currently does not,[198] but should, require the best available estimate of harvestable rights to be used when assessing LTAAEL compliance, once available or by Year 5 of the Plan.

It is critical that DPE-Water comprehensively assess and manage the environmental, social and economic risks associated with harvestable rights in the Western Division, specifically in the Plan area. The scale and impact of all forms of basic landholder rights extraction, including harvestable rights, should be quantified using the best available estimation methods in the next

195 Interview: Pastoralists' Association of West Darling, 1 February 2022.
196 Confidential submission and interviews: Dog Fence Maintenance Board, 8 March 2022; Individual, 17 March 2022; Interview: Pastoralists' Association of West Darling, 1 February 2022.
197 Alluvium and Vista Advisory (2019) *Audit of the Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources 2011*
198 Clause 26 of the Plan.

five years and monitored thereafter, with an amendment clause to make Plan adjustments at Year 5 of the Plan if extraction is greater than expected.

DPE-Water should also engage with stakeholders to assess if the harvestable rights provisions in the Western Division are serving their intended purpose without compromising other stakeholders and water dependent values.

3.4 LTAAEL assessment should use best available techniques

LTAAEL assessment in the Plan area will not benefit significantly from NSW's metering policy due to the low number of licences and high level of extraction under harvestable rights take. A small proportion of extraction is anticipated to be metered or recorded. However, LTAAEL assessment must still be undertaken to ensure compliance with a sustainable and equitable level of extraction.

Annual LTAAEL assessment would be impractical in the Plan area, with the Commission considering three to five yearly assessments more appropriate. Given lack of metering, once a baseline level has been estimated and defined, assessment could be via monitoring change rather than direct measurement. An assessment method could estimate, and then periodically review:

- domestic and stock basic landholder rights – changes in number of stock or properties
- harvestable rights basic landholder rights – any increases in works or other extraction through remote sensing
- native title basic landholder rights – new claims or determinations
- licensed extraction – changes in the number or volume of shares, including volumes for town supplies
- other capture – new development approvals for mines, other major developments, and activities such as rangeland rehabilitation.

Targeted remote sensing before, during and after a rainfall event would be able to detect the scale of activity and may allow estimates of extraction to be derived. If the above activities have a known start point below the LTAAEL and are stable, it would be reasonable to assess that LTAAELs are not exceeded.

If the LTAAEL assessment did indicate exceedance, under the Act's order of priority, available water determinations would need to be reduced for licences. Due to the predominance of basic landholder rights, this may be to zero. Basic landholder rights may be able to be limited in extreme circumstances under Section 331 of the Act[199] to protect the environment and other landholders' access to basic landholders rights, but the Commission suggests that if the LTAAEL were exceeded, innovative solutions could be developed. For example, new developments requiring alternative water access or supporting landholder access to alternative water sources such as the GAB where available.

3.5 Rehydration activities impact water availability and use

Floodplain rehydration works have increased in the Plan area during the Plan period. These works are a type of rangeland rehabilitation specifically aimed at restoring pre-European river function. Their goal is ecological sustainability and agricultural productivity. Programs should adhere to relevant policy and guidelines, and typically involve the construction of contour and

[199] Section 311 of the Act permits the Minister, to direct a landholder exerting domestic and stock or harvestable basic landholder rights, to take specified measures to protect the environment, to preserve basic landholder rights or to overcome a threat to public health.

spreading banks to retain water in the landscape and promote infiltration.[200] Western Local Land Services have funded programs in the Plan area.[201]

These programs have several intended benefits, including restored landscape function, dust suppression, reduced runoff and erosion, increased fodder production, improved biodiversity, and seed source viability.[202] They can also have catchment-wide impacts on water movement. Stakeholders raised concerns that the increasing implementation of these programs is affecting downstream landholders and environments. Some stakeholders advised the Commission that in addition to increases in harvestable rights use, rangeland rehydration activities were affecting runoff patterns on their land and further reducing flows in rainfall events.

For example, after implementing works, one landholder in the Plan area observed that after the '*first significant rainfall of 24 millimetres… virtually all the water spread and [was] captured by waterholes which will eventually result in the growth of green grass*'.[203]

A study of rangeland rehabilitation works (contour furrowing and allied treatments) over 40 years (1950s to 1990s) in the Western Catchment of NSW found that these treatments have a complex relationship with the landscape and are strongly affected by site-specific conditions.[204] The research highlighted the lack of, and need for, ongoing monitoring and evaluation of benefits and impacts of these works.

Western Local Land Services has begun a review of rangeland rehabilitation programs to:

- engage program participants to consolidate evidence of program outcomes and landholder perspectives
- develop a scope for determining the landscape scale ecological and hydrological impacts of the works
- review conflicting regulations and provide evidence to support current and future project development and approval.

The Commission understands that there is no funding available for the landscape scale monitoring program of determining ecological and hydrological impacts of rehydration works. Linking outcomes to project design and landscape context will improve outcomes under the Plan by informing the water balance and LTAAEL. The Commission suggests that DPE-Water support Local Land Services to secure funding to monitor the local and catchment-scale benefits and impacts of these works. This would align with DPE-Water's MER principle to '*emphasise collaboration and builds on existing programs to improve efficiency and reduce duplication in effort*'.[205] Findings should be used to improve programs and inform water availability assumptions under the Plan.

3.6 Road maintenance water use is not licensed

Sealing the Silver City Highway has changed Transport for NSW's water use patterns in the Plan area. Once it has been sealed, Transport for NSW will focus maintenance on remaining unsealed roads and generally improving the condition of the whole network.[206] The water demand of road maintenance was raised by some stakeholders, with one observing that *'in the*

200 Wakelin-King, G. (2011) 'Using Geomorphology to assess contour furrowing in western New South Wales, Australia', *The Rangeland Journal*, 33:153-171.
201 Interview: Local Land Services, 19 May 2022.
202 Wakelin-King, G. (2011) 'Using Geomorphology to assess contour furrowing in western New South Wales, Australia', *The Rangeland Journal*, 33:153-171.
203 The Land (2017) 'Successful Rangeland Rehabilitation', *The Land*, 15 November.
204 Wakelin-King, G. (2011) 'Using Geomorphology to assess contour furrowing in western New South Wales, Australia', *The Rangeland Journal*, 33:153-171.
205 DPIE-Water (2018) *NSW Water Management Monitoring, Evaluation and Reporting Framework*
206 Interview: Transport for NSW, 24 March 2022.

dry, with the amount of truck movements, the bulldust builds up and movements corrugate roads. RMS use tanker after tanker of water to keep the roads up to standard for safety … these works are for the benefit of the community'.[207] Water use for general road maintenance is not considered when assessing water use under the Plan. Public authorities (such as Transport for NSW) are exempt from requiring water access licences with approvals only required for the bores and any surface works.[208]

Transport for NSW maintenance requirements vary and increase in both very dry and very wet conditions as road surfaces need additional repairs. Surface and bore water is generally sourced from properties, with surface water preferred when available and when impacts assessed to be acceptable for local stakeholders.[209] Transport for NSW has installed bores throughout the far west to increase supply of water for construction in dry periods. They monitor bores and has rescheduled works '*if we are taking too much water*'.[210]

In extreme drought, Transport for NSW extracted from multiple bores to reduce potential drawdown and recharge impacts, carted water in for maintenance so it did not divert water from pastoral properties, and preferentially used lower quality water unsuitable for stock (such as saline water that is still suitable from an engineering perspective).[211] Water use is normally intensive and short term, usually one to two days per site using a 10,000 to 20,000-litre tanker. One stakeholder observed that *'[Transport for NSW] will sometimes draw on water from ephemeral lakes and swamps. This can take quite a lot of water from these surface water sites*'.[212]

As the extraction is not licensed, Plan restrictions on extraction below cease to pump thresholds do not apply. DPE-Water should work with road authorities to ensure that use in the Plan area is appropriately managed to support Plan outcomes, for example through construction environmental management plans requiring that surface water will not be extracted if:

- there is no visible flow in the water source at the location at which water is proposed to be taken
- a natural pool, lagoon or lake outside a river or stream, on a flood-runner or floodplain, or on an effluent that only starts to flow in high flows, is below 100 percent full
- an in-river dam pool is not passing such flows as specified on the water supply work approval.[213]

3.7 Lack of gauging limits the improvement of cease to pump rules

Dryland rivers in arid landscapes have among the world's most variable and unpredictable flow regimes.[214] They are mostly temporary, with large floods and long cease to flow periods.[215] In the Plan area, lower energy discontinuous rivers lose their channels, forming into networks of smalls channels, extensive wetlands, and unchanneled plains called floodouts. These provide refuges and ecosystem services in the otherwise dry environment in cease to flow periods.[216]

207 Interview: Pastoralists' Association of West Darling, 22 December 2021.
208 Clause 34(1) and Schedule 4, Clauses 2 to 5 of the *Water Management (General) Regulation 2018.*
209 Interview: Transport for NSW, 24 March 2022.
210 *Ibid.*
211 *Ibid.*
212 Interview: Individual, 22 December 2021.
213 Clause 40 of the Plan.
214 Bunn, S.E., Thoms, M.C., Hamilton, S.K. & Capon, S.J. (2006) 'Flow variability in dryland rivers: Boom bust and the bits in between', *River Research and Applications*, 22:179-186.
215 *Ibid*.
216 Larkin, Z.T., Ralph, T. J., Tooth, S., Fryirs, K. A. & Carthey, A. J. R. (2020) 'Identifying threshold responses of Australian dryland rivers to future hydroclimatic change', *Nature*, 10:6653.

Cease to pump conditions are set at visible flow, or the full containment volume of pools, lakes, and other water bodies across the Plan area due to practical constraints.[217] When the Plan was established, there were two flow gauging stations, covering only 400 square kilometres of the Plan's total area (just over 62,300 square kilometres).[218] This led the North Western Interagency Regional Panel to recommend a no visible flow rule when the Plan was developed.[219] There are now no gauging stations in the Plan area.

While low level gauging is a common issue in arid zones, some level of information on streamflow is expected to be captured to inform management.[220] DPE-Water should focus resources and effort on understanding how streamflow is affected by the connectivity between surface and groundwater to help achieve outcomes in the Plan area. This could be tied to the stated knowledge gaps in the Ramsar listing at Lake Pinaroo and potential listing at Nariarra-Caryapundy, or in the *Mutawintji Lands Plan of Management*. The Commission suggests looking to remote sensing methods used in other arid environments such as Western Australia as part of this work.[221]

While the visible flow cease to pump conditions pose a risk to environmental outcomes in particular, the Commission does not recommend that this is changed in the Plan remake due to the complete lack of gauges and data for the Plan area, and limited resources. The Commission recommends that DPE-Water revisits the gauging strategy and invests in gauges in the Plan area to be able to monitor any changes and character of watercourses.

Stakeholders familiar with the area advised that there are historic flow records for many Western Divisions streams, recorded on paper by stilling wells (height gauges), which were stored at Wentworth and never digitised. These should be digitised to fill knowledge gaps and improve the evidence base. With increased earthworks, a changing climate and poor data, there is a high risk to the ongoing health and sustainability of the systems.

DPE-Water may be able to collaborate with NPWS and target funding and research across the parks network over the next five years to help understand and monitor hydrology and connectivity. This could focus on the Ramsar listed wetland, Ramsar nominated wetland and nationally important wetlands. Any data gathered should be used in the subsequent remake to refine cease to pump thresholds and help achieve Plan outcomes.

---

217 Clause 40 of the Plan; Office of Water (2011) *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources – Background document*

218 Office of Water (2011) *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources – Background document*

219 *Ibid.*

220 See for example: Bourke, S.A., Degens, B., Searle, J., de Castro Tayer, T. & Rothery, J. (2021) 'Geological permeability controls streamflow generation in a remote, ungauged, semi-arid drainage system', *Journal of Hydrogeology: Regional Studies*, 38.

221 *Ibid*.

3.8 Recommendations

R 2	To adequately protect surface and groundwater sources and their dependent ecosystems, DPE-Water should: a) revise the North Western Water Source into four surface water sources in the remade Plan, aligned with the four drainage basins and calculate individual LTAAELs for each water source (including a minimal LTAAEL for the Cooper Creek Water Source) b) in the next five years, assess existing available information and collaborate with DPE-E&H and NPWS to complete targeted research (including gauging) into the Plan area's hydrology, environmental water requirements, hydrogeology, recharge rates and connectivity c) update groundwater source boundaries (including the definition of the Bancannia Trough) in the remade Plan based on contemporary evidence, and distinguish the Plan area from the GAB and GAB Shallow Plan areas d) identify and describe connectivity between water sources (including surface and groundwater, and interstate) and include common objectives for maintaining connectivity within the Plan, and between the Plan and the GAB and GAB Shallow plans.
R 3	To improve LTAAEL assessment and compliance, DPE-Water should: a) estimate all forms of extraction and interception (including harvestable rights) in the Plan area in the next five years using best available techniques b) include amendment provisions in the remade Plan stating that the surface water and groundwater LTAAELs should be revised at Year 5 (using evidence from **R 3(a)**) c) use the estimates from **R 3(a)** to assess LTAAEL compliance on a defined schedule from Year 5 d) include a provision in the remade Plan requiring the Minister to consider using the precautionary approach and excluding the Plan's surface and groundwater sources from controlled allocation orders until further research has been completed (under **R 2**) and used to refine LTAAELs (in **R 3(c)**), and water has been provided for Aboriginal rights and access (in **R 5**).
SA A	DPE-Water should prioritise engagement with stakeholders to determine if the harvestable rights provisions in the Western Division are serving their intended purpose without compromising downstream stakeholders' basic landholder rights and water dependent values.
SA B	DPE-Water should support Local Land Services to seek funding for monitoring impacts of rangeland rehabilitation on catchment scale water movement. Results should be used to assess changes in water availability assumed under the Plan in **R 2(b)**.
SA C	DPE-Water should work with road authorities in the Plan area to ensure that water extraction exempt from licensing under the Plan is consistent with Plan objectives.

4 Supporting socioeconomic outcomes

The Plan area's landscapes, climate, land use and policy frameworks are unlike those found elsewhere in NSW and present a unique array of challenges for water management to deliver socioeconomic outcomes. The small, remote communities are vulnerable to water stress in the arid environment. These vulnerabilities may be compounded in the future due to emerging industries such as mining, gas production and tourism, increasing pressure on volunteer committees and climate change. The Plan remake should not assume that existing water extraction and water use drivers will continue.

Most extraction during the Plan period has been for stock and domestic use for pastoral leases, or town water. Many stakeholders observed that growth in water use is unlikely to be from agriculture:

> '*with this area being low rainfall, people run their livestock at a conservation rate to manage total grazing pressure. The water use by stock will likely remain similar to what it has been for the past 20 years*'.[222]

There is a general expectation that increased use will likely be linked to mining and increases in tourism.[223]

The Plan does not limit water extraction, with unallocated water available, rather the physical availability of water limits use (see **Section 2.1**). Water availability is a key consideration in economic development in the Plan area. NSW Crown Lands advised that when it receives queries about new land uses in the Plan area, the first question is '*does this proposal require water and if so, where is your water coming from?*'.[224] Given physical limits on availability, water is sourced from outside the Plan area for a range of uses. Examples include:

- Silverton Village receives water from the regulated Murray River through the Wentworth to Broken Hill pipeline (see **Section 2.3.2**).
- AGL's Silverton wind farm project was modified in 2016 to alter the water source for construction from Umberumberka Reservoir to the Stephens Creek pipeline to increase reliability. Local groundwater is unavailable and road haulage was the only alternative option.[225]
- The Mundi Mundi Bash does not have drinking water onsite, with the organisers recommending attendees bring drinking water for the three-day event from Broken Hill, outside the Plan area.[226]
- Farmers in the Murrumbidgee region donated 28 ML of water in February 2020 for critical stock and domestic needs. It was carted to the far west and offered to drought-affected families around Silverton, Milparinka and Tibooburra.[227]

Climate change is expected to result in increased temperatures and evaporation across the Plan area. Higher temperatures and changes to rainfall patterns, along with the existing 'boom-bust' variability of the arid environment will increase strain on town water supplies. Recognising the overriding influence that physical water availability has in the Plan area, there are several issues that can be addressed in the Plan remake to support socioeconomic outcomes, while ensuring the priorities of the Act are maintained:

- town water requirements and outcomes can be clarified (**Section 4.1**)

222 Interview: Pastoralists' Association of West Darling, 22 December 2021.
223 Submission: Inland Rivers Network, received 19 July 2021.
224 Interview: Crown Lands, 14 December 2021.
225 NGH Environmental (2016) *Modification 3 Report: Silverton Windfarm*
226 Mundi Mundi Bash (2022) *Mundi Mundi Bash 2022*
227 Dickins, J. (2020) 'MIA water soon to reach Far West NSW', *The Area News*, 13 January.

- the assessment of economic benefits in the Plan area can be broadened to include tourism and other emerging water-dependent activities (**Section 4.2**)
- village committees can be more proactively engaged in water management (**Section 4.3**)
- while outside of the Plan, communities can be better engaged on opportunities relating to water availability for amenity value (**Section 4.4**)
- provisions should be retained in the Plan to protect high value water sources and ecosystems considering potential mining and gas development (**Section 4.5**).

4.1 Town water requirements and outcomes are unclear

There are four villages in the Plan area, but the Plan does not include entitlements for town water supplies and only one licence is held under the Plan for a domestic and stock licence, subcategory town water supply (as described in **Section 2.3.2**). Town water needs are not mentioned in the Plan's objectives but there are performance indicators for the change in, and extent to which, local water utility requirements have been met.[228]

The lack of clarity in the Plan and a lack of use data makes it difficult to determine town water requirements for the Plan area or determine if town water needs have been met. The Commission has drawn on WaterNSW data and stakeholder interviews to describe and assess town water requirements for the Plan area to the best extent possible.

Town water needs must be licensed and specified in the Plan to enable adequate protection in accordance with the Act if licensed extraction increases. While the Plan area has a low population, maintaining access to town water supply is essential to meet critical needs, particularly given existing disadvantage and vulnerabilities of these remote villages.[229]

As outlined in **Section 2.3**, the Plan's villages do not have local councils. Town water supplies are managed and operated by volunteer village committees, with assistance for planning and strategy from WaterNSW, DPE-Water and Regional Development Australia – Far West. For example, Tibooburra's town water supply has been managed and operated by a single volunteer for years, with support now from a committee and a part time employee.[230] Issues with this arrangement are discussed in **Section 7.1**.

Tibooburra – holding a 52 ML domestic and stock licence under the Plan's North Western Water Source – is the only town with water use data. Tibooburra used an average of 40 ML per year over the last five years (see **Figure 13**).[231] Town water supply is limited by the water treatment plant rather than supply, and it was able to manage the recent drought without implementing water restrictions.[232] The town's water use peaked in 2021 due to the reopening of internal NSW travel restrictions between COVID-19 lockdowns, and an influx of maintenance workers on the Moomba to Sydney pipeline and road sealing projects:

> *'If it wasn't for COVID the corner would really be going off. To give you an example our yearly usage is between 35 and 37 ML a year, last year it was 45 ML, a huge increase.'*[233]

228 Part 2 of the Plan.
229 Schirmer, L. and Mylek, M. (2020) *Thriving, surviving, or declining communities: socio-economic change in Murray-Darling Basin communities*, p. 13, report prepared for the Panel for the Independent Assessment of Social and Economic Conditions in the Murray-Darling Basin.
230 Interview: Tibooburra Water, 31 January 2022.
231 *Ibid.*
232 *Ibid.*
233 *Ibid.*

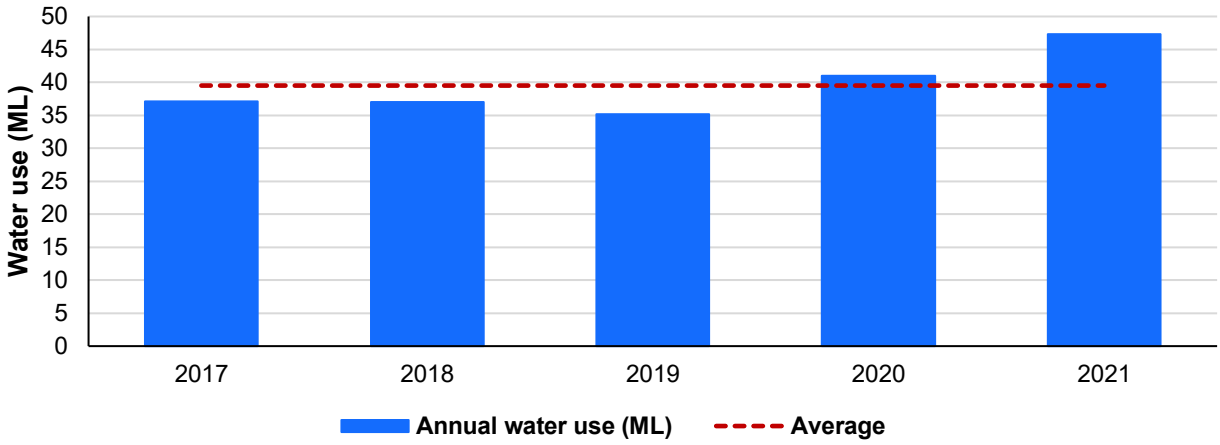

Figure 13: Tibooburra town annual water use showing a peak in use in 2021[234]

The Commission was unable to report on the adequacy of Packsaddle and Milparinka's town water supplies due to their lack of licences, limited submissions and access to stakeholders for interviews. Both villages had to cart water during the serious drought in 2019.[235] The Commission understands this is due to the scale of drought rather than inadequacy of the Plan. While Milparinka has both a surface water supply and licence from the underlying GAB Plan (see **Section 2.3.2**), Packsaddle relies on surface water from the Plan area. It is important that these towns are consulted as part of the Plan remake. Packsaddle and Milparinka's town water supplies should have water supply works approvals and licences and be recognised under the Plan.

Silverton does not currently use water sourced from the Plan area. Until 2019, Silverton drew water from Umberumberka Reservoir. Despite its catchment falling in the Plan area (see **Section 3.1.1**), and Essential Water drawing from it, it does not have a water supply works approval or licence under the Plan.

The Plan is in an arid zone and security of supply is challenging in this area. There are also several emerging pressures on water supply, including new and growing industries such as mining and energy (see **Section 2.5.3**) as well as climate change. Under the Act, water utility extractions for town water supply are given higher priority than extractions for commercial purposes.[236] Without Plan provisions identifying town water supplies or local water utility licences for the Plan's water sources, the Plan has no mechanism to prioritise local water utility requirements in accordance with the Act if licensed entitlement increases. Further, if town water needs are not assessed there is limited scope to use to the Plan to address future supply issues.

Over the Plan period, most of NSW experienced major drought. Drought conditions in 2019 placed pressure on water availability, during which water was carted into Milparinka and Packsaddle villages:

> *'In the drought, I had to call for water carting four times for the Unincorporated NSW area. I sought funding from the Federal and State government for Packsaddle and Milparinka which regularly ran out.'*[237]

234 Data on town water five yearly water use provided by Tibooburra Water, 7 February 2022.
235 Interview: Regional Development Australia – Far West, 3 February 2022.
236 Section 58(1) of the Act states that '*for the purposes of this Act, … (a) local water utility access licences, major utility access licences and domestic and stock access licences have priority over all other access licences … (2) If one access licence (the higher priority licence) has priority over another access licence (the lower priority licence), then if the water allocations under them have to be diminished, the water allocations of the higher priority licence are to be diminished at a lesser rate than the water allocations of the lower priority licence.*'
237 Interview: Regional Development Australia – Far West, 3 February 2022.

Tibooburra secured funding from (the then) DPIE-Water to set up tanks and infrastructure in preparation for carting water but they were not required:

> *'Rainfall saved us. We did get funding from DPIE-Water for water carting. Luckily we didn't need it in the end.'*[238]

Tibooburra Water advised that its current infrastructure provides about two years of supply, and the water treatment plant can receive carted water in an emergency. Silverton Village Committee advised that Silverton town water supply security had improved over the life of the Plan with the transition to the Wentworth to Broken Hill pipeline supply. However, town water restrictions had to be introduced in dry times and water quality was difficult to maintain:

> '*Our water has all too frequently been anything from slightly brown through to black with a disgusting stench. The residents … have installed water filters at their own expense*.'[239]

The Silverton Village Committee is looking to secure funding to address these challenges.[240] Stakeholders also advised there was a lack of water to fight property fires across the communities:

> *'If there is a housefire in those communities, there's no paid firefighters, and then no water to fight the fire.'*[241]

In the Plan remake, DPE-Water and DPE-Water (Utilities – West) should work with village committees to define and, where appropriate, license the town water requirements for each of the villages in the Plan area. DPE-Water should also consider any additional planning information, including any integrated water cycle management plans and the *North West Regional Water Strategy* when determining town water requirements. The towns should have water supply works approvals and extraction should be licensed in the relevant water source, and DPE-Water should recognise these in the remade Plan (or relevant plan). This will enable the Plan to prioritise town water if licensed extraction increases in future, in line with the priorities in the Act.

The Commission recognises that there is a considerable volume of unallocated water under the Plan, and the Plan's ability to influence town water security is limited due to the arid nature of the area, but it should define volumetric requirements to enable monitoring and protection of town water supplies. A volumetric entitlement for each village is relatively simple to define and would provide greater security and transparency for water users and stakeholders.

4.2 Tourism and events require water from an already-limited supply

As previously discussed, LTAAELs are not based on best available evidence, there appear to be significant volumes of water available for extraction, and the Plan may not protect environmental values. If the area's environmental values are not maintained, the economic value of the area for tourism may decrease. **Section 2.5.2** summarises the benefits of sealing the Silver City Highway, with stakeholders describing the social and economic benefits:

> '[the social and economic value] *for the community is incredible…Tibooburra tourism has grown exponentially … emergency agencies can now get through more easily, locals can*

238 Interview: Tibooburra Water, 31 January 2022.
239 Silverton Water (2021) *Silverton Submission to NSW Independent Regulatory Tribunal,* provided by Silverton Water.
240 Interview: Silverton Community Committee, 1 February 2022.
241 Interview: Regional Development Australia – Far West, 3 February 2022.

> *drive to medical appointments or hospital in Broken Hill in a day … and seafood is now on the menu at Tibooburra*'.[242]

While this has significant benefit, tourism may be at risk from poor town water security, and the increase in tourism may risk the security of town water supplies.

Tourism may be at risk from insecure and unpotable town water supplies affecting the visitor experience in villages. Silverton receives a non-potable supply from Essential Water (from outside the Plan area, see **Section 2.3.2**).[243] Silverton Local Village Committee highlighted that it is '*one of the most popular attractions in the district*'. However, '*it is a concern to visitors when they see the 'do not drink' signs on taps at our public facilities and camping areas*', as visitors expect '*good, clean, drinkable water and often ask if the water is actually safe*'.[244]

Increased water use from tourism may impact the security of town water supply for villages. Maintenance and construction workers also increase town populations as they undertake regular and extraordinary maintenance (see **Section 4.1**).[245]

The growth in access and visitation to the area since the Plan commenced is reflected in the establishment of the Mundi Mundi Bash, a new 10,000-person, three-day music festival held on a property on the Mundi Mundi Plains near Silverton. Attendees can camp or drive in for day attendance and are required to bring their own water, with the organisers recommending attendees bring it from Broken Hill.[246] While tourism will affect town water supplies, large events such as this may not impact water use in the Plan area as attendees must bring their own.[247]

Stakeholders noted that the area regularly brings large groups in for filming, from advertisements to full length feature films.[248] Filming in the area appears to have increased in the last decade and is expected to continue to grow with government investment and increasing accessibility to the area:

> '*It seems like there's a lot more interest in creating events and spectacles in the last ten years. And filming, there's been a lot of filming*'.[249]

To achieve the economic outcomes of the Plan area, access to town water to support tourism events is needed.

DPE-Water should consider the predicted growth in tourism and key events across the Plan area when determining demand and entitlements for town water supplies, licensing them and defining these in the Plan. Given the importance of tourism, and its reliance on town water, the assessment of economic benefits in the Plan area should be broadened to include consideration of tourism and other water dependent activities.

---

242 Interview: Transport for NSW, 24 March 2022

243 Essential Water (2021) *Essential Water Pricing Proposal: Submission*

244 The Commission notes that while town water treatment is outside the Plan's scope, it is important to understand how these intertwined water access issues limit achievement of the Plan's economic and social objectives. Silverton Village Committee (2021) *Submission to IPART on the Essential Water Pricing Proposal*. Provided by Silverton Village Committee.

245 Interviews: Silverton Village Committee, 1 February 2022; Tibooburra Water, 31 January 2022

246 Mundi Mundi Bash (2022) *FAQs – food and drink facilities*

247 Mundi Mundi Bash (2022) *Mundi Mundi Bash 2022*

248 Interviews: Crown Lands, 14 December 2021; Silverton Village Committee, 1 February 2022; Regional Development Australia-Far West, 3 February 2022.

249 Interview: Crown Lands, 14 December 2021. For example, Mad Max 2 was filmed in Silverton in 1981, with the sequel Fury Road having to shift to Africa because the Silverton area had received good rainfall and was too green. The next film in the series 'Furiosa' is expected to be filmed in the Silverton area in 2022-23. The Mad Max movie crew are expected to set up 140 people for four months in Penrose Park, Silverton. This more than doubles the village's population and will increase their town water use (noting that this is currently sourced outside the Plan area).

4.3 Village committees must be engaged in water management

Responsibility for managing town water in the Plan area falls to volunteer committees, as Unincorporated NSW does not have local councils or water authorities (except for Silverton) (see **Section 2.1**). These committees are not recognised as local water utilities under the Plan.[250]

The region's unique institutional arrangements can create difficulties for volunteer committees in managing town water, with stakeholders raising several concerns:

- There is no clear governance mechanism to resolve alternative town water supplies (such as carting water in) when access to town water is reduced. Instead, communities must rely on local agency contacts to represent their needs: *'When their water runs out, [committees] call [RDA – Far West] and I call the Minister to try to get water carted out to them. When they run out something happens quickly, but they have to be drinking mud before something happens.'*[251]
- There has been inadequate committee engagement in decisions made externally that impact on communities' town water supplies: *'Even though Umberumberka Reservoir is here because of Silverton, we aren't consulted with respect to it. Essential Water consult with Broken Hill not us. We usually hear about announcements from media or other sources.'*[252]
- There is little resourcing for committees or DPE-Water to adequately manage town water supplies for these small, remote communities.

As discussed in **Section 4.1**, DPE-Water should engage village committees early in the Plan remake to provide their perspectives on the adequacy of town water over the life of the Plan and their future needs. Town water arrangements should be clearly outlined and the Plan's background document should recognise village committee's local water management responsibilities to improve transparency for all parties.

Stakeholders advised the management and operation of town water often falls to small groups of volunteers who also have many additional responsibilities within the community. Servicing town water supply – a critical community need – places significant responsibility on individuals and resourcing is often difficult when volunteers are unavailable and funds to employ staff are hard to secure.[253] DPE-Water provides some support in this space, for example:

- Tibooburra recently received funding through DPE-Water (Utilities – West) to develop operational documents and a drinking water management system and were able to gather funds through the Tibooburra Village Committee for a part time employee to replace a single long-term volunteer, to better secure operation of their water treatment plant and water supply.[254]
- The volunteer village committees rely on DPE-Water (Utilities – West) to manage the preparation of water optioneering and strategies.

Without adequate resourcing for planning and implementation, village town water needs may not be adequately reflected in planning decisions. Villages in the Plan area are some of the most remote and vulnerable in NSW and the NSW Government should provide adequate funding and technical support to resource the management of town water and support the Plan's social objectives.

250 See Clause 21 of the Plan.
251 Interview: Regional Development Australia Far West, 3 February 2022.
252 Interview: Silverton Village Committee, 1 February 2022.
253 Interview: Tibooburra Water, 31 January 2022.
254 *Ibid.*

4.4 Water availability in the arid environment affects liveability

Water is critical for social wellbeing and cohesion. It is challenging to separate out community concerns around water availability due to various limiting factors in the area. Water is limited in the Plan area due to the arid environment, drought, and limited local reticulation[255] and water treatment infrastructure. While these issues are not attributed to the Plan, when remaking it DPE-Water should consider community concerns and work with the communities to explain and, where there is opportunity, address these issues.

Stakeholders advised that perceptions of drought, limited availability of water for amenity and liveability, and non-potable tap water is off-putting for attracting professionals, including doctors:

> *'It really impacts on the population, liveability and ability to access specialist services.'*[256]

Water availability affects the villages' physical amenity and liveability. Stakeholders raised the importance of water to support locals' wellbeing and attract tourists, particularly in extended periods of drought:

> *'Really, really important factors are liveability and it's also worth mentioning health and the social determinants of not having green spaces. For sports and tourism, we don't have the opportunities to have carnivals out here because we don't have the water to ovals … There isn't an oval in the whole Unincorporated Area, so there isn't any Saturday sport. Everything comes back to water.'*[257]

Access to water for basic amenity like green spaces and recreational activities, particularly in an arid zone, would have many social benefits for the area. For example, in Tibooburra, access to water enabled the LALC to propagate and establish native plants, as well as providing an education opportunity and amenity (see **Section 5.2**). In Silverton, Umberumberka Reservoir is seen as an important natural asset to the local community for visual amenity and has the potential to be used for recreation, education and as a tourist attraction:

> *'Water attracts people, even the locals go for a drive up there [Umberumberka Reservoir] to look at the water and check. It's an attraction and mental health thing.'* [258]

Public access to Umberumberka Reservoir is currently restricted due to its history as a water supply catchment (see **Section 2.3.2**), as well as access, safety and maintenance issues.[259] Silverton Village Committee, Regional Development Australia – Far West and Essential Water all support the recreational use of Umberumberka Reservoir, with Essential Water advising that funding is required for site access, development and ongoing maintenance.[260] Silverton Village Committee further aim to use the reservoir to improve green space and amenity across Penrose Park and Silverton.[261]

These plans may affect the type of water supply works approval and licence required for the dam's water capture and should be considered as part of the Plan remake process. The Commission suggests that DPE-Water and DPE-Water (Utilities – West) liaise with Silverton Village Committee and Essential Water regarding the reservoir's future and licence

---

255 For example, Silverton Village Committee advised that it was unable to plant street trees as the water mains were not capable of carrying another line to irrigate the trees. Interview: Silverton Village Committee, 1 February 2022.
256 Interview: Regional Development Australia – Far West, 3 February 2022.
257 *Ibid.*
258 Interview: Silverton Village Committee, 1 February 2022.
259 Interview: Essential Water, 11 April 2022.
260 Interviews: Silverton Village Committee, 1 February 2022; Regional Development Australia – Far West, 3 February 2022; Essential Water, 11 April 2022.
261 Interview with Silverton Village Committee, 1 February 2022.

requirements before the Plan remake. The appropriate licence can then be sought and included in entitlements under the Plan.

4.5 Mining or gas production may benefit from unallocated water and trade

Water licences are valuable assets, which can be traded to manage water requirements and move water to its highest value use. Some trade is allowed for under Plan rules, but the significant volumes of unallocated water limit demand for trade. In the 2020 controlled allocation order, 1,171 and 1,077 shares were made available in the Adelaide Fold Belt North Western and Kanmantoo Fold Belt North Western groundwater sources, respectively.[262] There was no demand for these shares and none were issued.

Mining or petroleum and gas production may be future economic contributors (see **Section 2.5.3**). It could be a significant consumer of water and may occur anywhere in the Plan area,[263] with one submission stating that '*the most likely reason for a controlled allocation in the North Western region would be for mining development*'.[264] Another stakeholder noted potential '*impacts on environment, grazing and tourism of giving out those controlled allocations*'.[265] The Commission notes that mining or production require a reliable source of water, so may preference groundwater sources managed by the deeper GAB or GAB Shallow plans.

The Bancannia Trough, which crosses the Plan area (see **Section 2.5.3**), has been highlighted by the NSW Government as one of the more prospective potential sources of tight gas and conventional gas in the state.[266] Water (of any quality) would be required for production if this is developed. As discussed in **Section 3.1**, the apparently high volume of unallocated water and poor evidence base for the LTAAEL risks Plan outcomes if the extractive or gas industry establishes in the area. This reinforces the benefits of redefining the LTAAELs and recalculating the volume of unallocated water based on solid evidence (see **Section 3.2**).

Stakeholders raised concerns around the Plan's cease to pump exemption for licences nominating an aquifer interference approval.[267] The Commission has raised serious concerns with this type of exemption in previous reviews.[268] However, the Plan's exemption only applies to licences in the North Western Water Source, not groundwater sources.[269] The remade Plan should not exempt any such licences from cease to pump thresholds without requiring full mitigation of impacts at an appropriate temporal scale.

The Plan's trade rules address disconnection between water sources and protect its high value water sources and ecosystems. Trades cannot occur into the Cooper Creek catchment.[270] The Plan allows for limited interstate trading if administrative arrangements have been agreed to and put in place by NSW, South Australia (if the trade is from the Lake Frome catchment or Adelaide Fold Belt Groundwater Source) and Queensland (if the trade is from the Bulloo River catchment or Kanmantoo Fold Belt Groundwater Source).[271] Trades can only occur within drainage basins and not between water sources.[272] Licences cannot be converted into new

262 DPIE-Water (2021) *Controlled allocation order 2020 – outcomes*
263 It was further observed that there are many quarries and pits for road maintenance and commercial revenue, and the potential for sand extraction on creeks and rivers in future.
264 Submission: Nature Conservation Council, received 15 July 2021.
265 Interview: Inland Rivers Network, 7 December 2021.
266 Geological Survey of NSW (2020) *Bancannia Trough Resource Assessment Report*
267 Submission: Inland Rivers Network, received 19 July 2021.
268 See reviews of the Greater Metropolitan region and Hunter unregulated and alluvial water sharing plans at Natural Resources Commission (n.d.) *Water Sharing Plan Reviews*
269 Clause 40(1) of the Plan.
270 Clause 58(b) of the Plan.
271 Clause 58 of the Plan.
272 Clauses 55, 56 and 57 of the Plan.

categories.[273] These limitations should be retained in the new plan to maintain protection of high value water sources and ecosystems.

4.6 Recommendations

R 4	To support socioeconomic outcomes while ensuring the priorities of the Act are maintained, DPE-Water should: a) work with volunteer village committees during the Plan remake to define town water supply needs b) licence all villages' town water requirements identified in **R 4(a)** in the next two years and include these entitlements in the remade Plan c) consider all water-dependent activities when assessing economic benefits in the Plan area during the Plan remake, including tourism and amenity value d) retain trade rules in the remade Plan to protect high value water sources and ecosystems and support socioeconomic outcomes.
SA D	DPE-Water should liaise with Essential Water and Silverton Village Community Committee regarding Umberumberka Reservoir's licence requirements in the next two years. The appropriate water supply works approval and licence should then be assigned and included in the remade Plan (see **R 4(b)**).
SA E	DPE-Water should clearly describe town water arrangements in the remade Plan's supporting documents, recognising village committees' local water management responsibilities, all town water sources and entitlements to improve transparency for all parties.
SA F	The NSW Government should provide adequate funding and technical support through DPE-Water (Utilities) to resource the management of town water in remote villages and achieve the Plan's social objectives.

[273] Clause 53 of the Plan.

5 Restoring Aboriginal water rights, values and uses

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 across all water sharing plan reviews in the 2020-22 period.[274] This review highlights several specific examples of these critical issues for Aboriginal water in the Plan area:

- The Plan does not protect and allocate water for native title determinations and does not proactively consider water requirements for registered claims and other Aboriginal land ownership, despite the large volume of unallocated water available. Further, additional shares have been offered under controlled allocations without first providing for native title basic landholder rights (**Section 5.1**).
- Provisions for Aboriginal water limit uses to traditional cultural applications only, not supporting other desired purposes such as economic uses (**Section 5.2**).
- Aboriginal water cultural assets are not adequately identified and protected, and watering needs are not provided for under current water sharing plan provisions (**Section 5.3**).

Engagement and collaboration with Aboriginal stakeholders was poor during Plan development. As noted in previous reviews, Aboriginal engagement in water planning, monitoring and management has been inconsistent and inadequate across NSW, limiting knowledge and support of Aboriginal water values and uses and preventing genuine co-design approaches.[275] DPE-Water should establish meaningful, appropriate and integrated processes for Aboriginal peoples with relevant knowledge of water management to have input at all levels and stages of water planning, management and monitoring. This could consider existing relationships between other government departments such as NPWS with local Aboriginal bodies.

The Commission notes that key barriers to Aboriginal water rights and interests are systemic and institutional and require state-wide legislative, policy and practice change, significant increases in Aboriginal staff and resourcing – as acknowledged in the *NSW Water Strategy*.

5.1 The Plan does not recognise native title rights

The Plan includes an objective, strategy and performance indicators regarding the availability of water for native title requirements.[276] There were native title claims but no determinations when the Plan commenced.[277] An amendment provision was included to provide water to satisfy native title rights where a determination is made.[278] Despite this, the Plan was not updated to include the Barkandji Native Title determination in 2015,[279] which includes rights relating to water. The replacement Plan should specifically acknowledge the native title determination for the Barkandji Traditional Owners #8 (Part A) and recognise their connection to Country through culturally appropriate and meaningful engagement and collaboration in the Plan remake. Without doing so, the Plan cannot achieve its objectives.

---

274 Natural Resources Commission (2021) *Murray Unregulated Water Sharing Plan Review* (draft provided to agencies); Natural Resources Commission (2021) *Review of Intersecting Streams and Lower Murray-Darling Unregulated Water Sharing Plans* (draft provided to agencies).

275 The Commission notes that DPE-Water had initially been working with key Aboriginal stakeholders as part of a state-wide Aboriginal Water Coalition to develop the Aboriginal Water Strategy and to improve engagement across NSW. However, there were delays and significant barriers, and the group has been disbanded.

276 Clauses 8(c), 9(b),10(f) and 10(h) of the Plan.

277 The Barkandji Traditional Owners claim was registered in 1998 and the Wongkumara claim was registered in 2008.

278 Clause 73(4) of the Plan.

279 National Native Title Tribunal (2015) *Extract from the National Native Title Register - Barkandji Traditional Owners #8 v Attorney-General of New South Wales*. Federal Court Number: NSD6084/1998. NNTT Number: NCD2015/001.

In the development of any new Plan, DPE-Water should draw on native title claims and Indigenous Land Use Agreements to inform the identification of cultural assets and plan provisions, as they are often the best available information for a Plan area and can support the achievement of the Plan's cultural objectives.

Much of the Plan area is covered by two large registered native title claims by the Malyangapa People Part A, and Wongkumara peoples. Claimants should be proactively engaged during Plan development to identify cultural values and include provisions to protect and support these values. Under the claim registration test, registered native title claimants have proven their connection to Country to an extent where government departments must consult with them on certain acts.[280] There are also determinations immediately adjacent to the Plan, whose determinants may have water dependent assets or values linked to the Plan area.

DPE-Water should proactively engage with Traditional Owners and other Aboriginal knowledge holders to identify cultural values and provisions to protect and support these values. This should include consultation with native title holders and claimants within and adjacent to the Plan area. Engagement should then continue through Plan development and implementation in line with actions under Priority 2 of the *NSW Water Strategy*.[281]

5.2 Aboriginal water access rights are not recognised

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)[282] and allocations are capped at up to 10 ML per licence per year.[283] There is no water assigned for native title or Aboriginal cultural licences in the Plan, and no Aboriginal cultural licences have been issued under the Plan. Further, there is no allowance for issuing 'Aboriginal community development' licences under this Plan.

The Commission has highlighted in previous reports[284] that the limitations placed on Aboriginal cultural licences are inequitable, including that they are highly restrictive, inherently limiting by excluding economic uses[285] and unable to be easily accessed and applied for. These concerns were reflected in stakeholder submissions to this review:

> *'We note that Water Sharing Plans may provide for Aboriginal Cultural Access Licences, Aboriginal Community Development Water Access Licenses, and Aboriginal commercial licences however with a range of constraining parameters. We ask that the NSW Government remove constraints on these licences and provide support to Aboriginal communities and Aboriginal Land Councils to access these licences. These provisions must be improved to better meet the needs of Aboriginal water users, ensure the health of our communities, and protect our cultural sites.*'[286]

> '[NSW Aboriginal Land Council], *LALCs and Aboriginal people have long called for … increased access to and ownership of water for Aboriginal peoples for cultural and economic purposes … The right to economically develop natural resources, consistent with cultural obligations, is also of significant importance.*'[287]

280 Federal Court of Australia (2022) *Native Title - What is the process for a determination?*
281 Priority 2 is to 'Recognise First Nations/Aboriginal People's rights and values and increase access to and ownership of water for cultural and economic purposes'. See DPE-Water (2021) *NSW Water Strategy*
282 Clause 61(4) of the Plan states that '*water must be used only 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.*'
283 Clause 34(3) of the Plan.
284 See previous reports at Natural Resources Commission (n.d.) *Water Sharing Plan Reviews*
285 Part 2, Section 12(1) of the Plan.
286 Submission: NSW Aboriginal Land Council, received 16 July 2021.
287 *Ibid.*

These limitations on Aboriginal access to water are particularly unreasonable in this Plan area considering the large volumes of unallocated water. The replacement Plan should take advantage of the Plan's unique volumes of unallocated water and pre-emptively define and quarantine a volume of water (if assessment of the LTAAEL concludes there is still water that should be available for allocation, if not another mechanism should be sought to provide water).

This should be in consultation with Aboriginal community stakeholders to accommodate any future native title determinations, and other water access rights for a range of desired uses including cultural and economic. This is in line with the object and principles of the Act,[288] the notification requirement under the Commonwealth *Native Title Act 1993*,[289] and would contribute to the inland waters target towards securing Aboriginal interests (when developed) under the *National Agreement on Closing the Gap*.[290]

In an example of what is enabled with access to water and funding, the Tibooburra LALC has used a NSW Government Environmental Trust grant for a project at their reserve in Tibooburra, to 'Increase Awareness of Aboriginal Heritage and Culture'. This connected water to the reserve, installed sustainable irrigation systems, propagated 500 plants, planted 1,200 native plants, established photo monitoring and installed education display boards.[291]

5.3 Aboriginal water values and assets are not defined

The Plan includes an objective to '*protect, preserve, maintain and enhance the Aboriginal, cultural and heritage values of these water sources*', as well as a related performance indicator.[292] However, these strategies and performance indicators are not SMART,[293] making them difficult to monitor.

The Plan contains protections for cultural sites, including setback distances for groundwater dependent culturally significant sites. However, no sites have been identified and included in the Plan.[294] There is also no definition of what a culturally significant site is and the process to identify them for inclusion in the Plan is unclear, with a non-binding note stating '*culturally significant sites will be identified as a part of the assessment undertaken by the NSW Office of Water during the processing of an application for the granting or amending of a water supply work approval*'.[295]

While WaterNSW checks the register for Aboriginal heritage sites when approving licence applications, the replacement Plan can better recognise and protect key assets. There are no Aboriginal water dependent cultural sites recognised in the Plan. For example, Lake Pinaroo Ramsar site – identified by the Australian Government as having '*extremely high cultural values*' – is not recognised.[296]

The Plan includes a provision allowing amendments to protect identified water-dependent Aboriginal cultural assets after Year 5, including by identifying assets in a schedule.[297] The Commission assumes this timing was provided to allow time for DPE-Water to work with Aboriginal stakeholders to identify assets. However, the Plan provisions were not updated over the ten years of the Plan and Aboriginal cultural assets were not identified. DPE-Water should

288 Sections 3(c)(iv), 5(3) and 9(1) of the Act.
289 Section 24HA(7) of the *Native Title Act 1993*.
290 Clause 87(b) of the *National Agreement on Closing the Gap*
291 The Family Hotel (2022). *Tibooburra Local Aboriginal Land Council*
292 Clause 8(b) and 10(j) of the Plan.
293 Specific, measurable, achievable, relevant and time bound.
294 Clause 50 of the Plan.
295 Note under Clause 50 of the Plan.
296 Australian Government Department of the Environment, Water Heritage and the Arts (2008) *Ecological character description: Lake Pinaroo Ramsar site*
297 Clause 73(5) of the Plan.

engage with Aboriginal Traditional Owners, native title claimants, other groups and knowledge holders in the Plan area to identify and protect water-dependent cultural assets.

The Plan includes an amendment provision to enable the protection of water dependent Aboriginal cultural assets '*including.. (b) amending the access rules …(c) restricting the granting and amendment of water supply works…, and/or (d) amending the dealing rules*'.[298] Once water dependent Aboriginal cultural assets have been identified, the Plan should provide for protection of these through suitable provisions, in ways that are supported by the traditional owners and local Aboriginal peoples in the Plan area.

5.4 Recommendations

R 5	To better achieve the Plan's Aboriginal water objectives, DPE-Water should continue its current related work and: a) recognise in the remade Plan the native title rights of the Barkandji Traditional Owners in the Plan area, consistent with their native title determination b) consult with Traditional Owners, native title claimants, and other Aboriginal groups and knowledge holders to quarantine water allocations for future native title determinations or other cultural water access rights before releasing additional controlled allocations c) protect high value water dependent cultural assets in the remade Plan, by: i) undertaking detailed engagement with Traditional Owners, native title claimants and other Aboriginal groups and knowledge holders to identify high value water dependent cultural assets in the Plan area and provisions to protect and support these assets ii) reviewing existing provisions such as setback distances to consider if they provide appropriate protection, and revise if appropriate d) include provisions in the remade Plan to protect assets identified in **R 5(c)(i)**, consistent with the existing amendment provision.

[298] Clause 73(5) of the Plan.

6 Protecting groundwater dependent ecosystems

Plan provisions must adequately recognise and protect GDEs, particularly given the critical role they play in arid zones.

The Plan includes an objective to '*protect, preserve, maintain and enhance the important river flow dependent and high priority groundwater dependent ecosystems*'.[299] It provides for this protection by identifying high priority GDEs and karst environments and establishing rules for groundwater bores near these environmental assets.[300] These rules encompass setback distances ranging from 500 to 2,000 metres, depending on the category of GDE and type of water use. The effectiveness of these rules in protecting these GDEs is unclear given a lack of monitoring.

There are several opportunities to strengthen recognition and protection of GDEs in the Plan remake, which are discussed in the following sections, including:

- updating the list of high priority GDEs based on the latest information (**Section 6.1**)
- recognising and protecting significant wetlands (**Section 6.2**)
- identifying and protecting culturally significant GDEs (**Section 6.3**).

6.1 High priority GDEs may be missed across three plans

The Plan protects four GDEs, including two listed as karst environments. These are all within the southern portion of the Plan area, outside the intersection with the GAB Plans (see **Section 3.1.3**). GDEs listed in the GAB Plan (Central Groundwater Source) or GAB Shallow Plan (GAB Central Shallow (North Western) Groundwater Source), may be in the Plan area. The GAB Plan lists three high priority geothermal spring GDEs in the Plan area: Bingewilpa, Paralna and Youltoo.[301] The GAB Shallow Plan shows multiple Ramsar / Directory of Important Wetland sites in the Plan area, but only one swamp (Tuneeilkeree Swamp, not part of the Ramsar listing) is listed for protection in the Plan area.[302] As groundwater extraction is regulated by the two GAB Plans in the northern part of the Plan area, GDEs should be listed in those plans and cross referenced in this Plan's supporting documents.

The Commission understands there may be high priority GDEs in the northern portion of the Plan area that may not be included in any of these three plans. For example, at least one artesian bore in Narriearra Caryapundy Swamp National Park is considered a potential site of a mound spring and displays characteristics of the Artesian Springs Ecological Community in the Great Artesian Basin listed under the *Biodiversity Conservation Act 2016* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*[303] This should be included in the GAB Plan.

There is also scope to consider expanding the definition of GDEs to be more consistent with the definition in the Shallow GAB Plan. The GAB Shallow Plan defines high priority GDE as being:

- '*any instream ecosystem associated with rivers that have a base flow component to their flow regime,*
- *vegetation that has a high probability of being groundwater-dependent, and is of very high or high ecological value,*

299 Clause 10(a) of the Plan.
300 Identified in Schedule 4 (and mapped in Appendix C), with related protective provisions in Clause 49 of the Plan.
301 Table 6 of the GAB Plan.
302 Schedule 2 and Appendix 2 of the GAB Shallow Plan.
303 NPWS (2021) *Statement of Management Intent - Narriearra Caryapundy Swamp National Park*

- *Ramsar wetlands, or wetlands listed in the Directory of Important Wetlands in Australia (2001)*' (see **Section 6.2** for sites with these listings).

DPE-Water must ensure that high priority GDEs are protected in all relevant plans, which in the Plan area include the GAB and GAB Shallow Plans. To aid with this, definitions of high priority GDEs should be consistent between plans.

6.2 Recognising and protecting high value GDEs

The Plan includes an amendment provision that foreshadowed further studies of groundwater dependent ecosystems. DPE-Water has tailored the surface water HEVAE framework and applied it to the Plan area to prioritise terrestrial vegetation GDEs for management.[304] The assessment identified additional vegetation and wetland GDEs, which DPE-Water should include in the replacement Plan, GAB Plan and GAB Shallow Plan as relevant. While both the GAB plans were remade in 2020, this should not prevent amendments occurring to protect these sites. Karst environments were not included in the scope of this project and the cultural significance of these newly identified GDEs is yet to be determined.

The new spatial data may help to address some of the issues raised by stakeholders around the current limited recognition of GDEs in the Plan. Stakeholders raised the need to protect riparian vegetation that would also have a groundwater dependency, such as river red gums, and sought expansion of the Plan's high value environmental assets:

> *'Not all river flow dependent ecosystems and high priority GDEs have been identified. Schedule 4 needs to be updated.'*[305]

The Plan does not list wetlands of national or international significance in the Plan area or protect them from water resource development. These include:

- the following Wetlands of National Importance:[306]
  - **Sturt National Park Wetlands** – comprises a large area of wetlands in Sturt National Park including Lake Pinaroo, which is a terminal basin on Fromes Creek[307]
  - **The Salt Lake** – a terminal salt lake that drains from Koonenberry Mountain[308]
  - **Salisbury Lake (Lake Altibouka)** – a saltwater lake near the Bulloo Overflow[309]
- a Ramsar listed wetland:
  - **Lake Pinaroo** – the largest terminal basin in NSW in this biogeographic region. The size of the lake and its capacity to retain water for extended periods play an important role for the survival of many species of plants and animals in the immediate and surrounding areas
- A Ramsar-nominated wetland and Wetland of National Importance:
  - **Caryapundy Swamp** – in the Bulloo River catchment in the Narriearra Caryapundy Swamp National Park. An ecological character description under development for Caraypundy Swamp recognises the importance of maintaining natural flows in the

304 Dabovic, J., Raine, A., Dobbs, L., Byrne, G. (2019) *A new approach to prioritising groundwater dependent vegetation communities in New South Wales, Australia*
305 Submission: Inland Rivers Network, received 19 July 2021.
306 Department of Agriculture, Water and the Environment (2001) *Directory of Important Wetlands in Australia*
307 Department of Agriculture, Water and the Environment (2001) *Directory of Important Wetlands in Australia - Sturt National Park Wetlands - NSW057*
308 Department of Agriculture, Water and the Environment (2001) *Directory of Important Wetlands in Australia – The Salt Lake - NSW058*
309 Department of Agriculture, Water and the Environment (2001) *Directory of Important Wetlands in Australia – The Salisbury Lake - NSW007*

> Bulloo River to conserve the ecological character of the proposed Ramsar site, due to the connectedness between the river, and the floodplains and wetlands.[310] It also recognises that upstream water resource development, increased water extraction and diversions presents a substantial risk to the site. The National Parks and Wildlife Service advised that the ephemeral swamp relies on groundwater when not in flood. The Bulloo catchment originates in Queensland where there are a small number of entitlement holders with a nominated entitlement of 20 ML.

DPE-Water should recognise these sites in the water sharing plans, understand their dependency on groundwater sources, and ensure that the Plan rules adequately protect them. The Ramsar Convention requires monitoring and reporting on changes in the ecological character of any Australian Ramsar wetland, meaning it is incumbent on government to avoid any adverse change in the ecological character of these wetlands.

The Plan also includes two high-priority karst environment GDEs – Mutawintji and Torrowangee.[311] Local stakeholders and experts in the area raised concerns that these GDEs were categorised as karst environments in error, which would cause them to have reduced protections.[312] The Mutawintji Lands Plan of Management does not list any karst environments, while recognising that '*the Land's groundwater resources have not been comprehensively investigated*'.[313] Setback distances for karst environments are less stringent than other GDEs.[314]

DPE-Water should engage the NSW Karst Management Advisory Committee[315] during the Plan remake to categorise and confirm any karst environments in the replacement Plan. Changes to the listed karst environments may lead to changes in setback distances for these assets.

6.3 Identifying and protecting culturally significant GDEs

The Plan includes provisions to protect sites of cultural significance, including setback distances for groundwater dependent culturally significant sites. No sites have been listed in the Plan[316] but it is likely that high environmental value GDEs may be culturally significant, given the importance of many of these features to Aboriginal peoples in the region.

There are initiatives led by Aboriginal people to identify places and sites of cultural significance in the Plan area. For example, the Wiimpatja people have developed a program for documenting culturally important places and objects in the Mutawintji Lands to support their objective:

> '*To protect the places of spiritual, ceremonial or cultural importance to Aboriginal owners and associated Wiimpatja, and to enable Wiimpatja to maintain close cultural associations and be actively involved in the safeguarding and management of these places.*'[317]

While the inclusion of set-back distances around groundwater-dependent culturally significant sites theoretically provides greater protection of these areas compared to many other water sharing plans, the setback distances are significantly less than those used to protect other high

---

310 The ecological character description for Caryapundy Swamp is currently an unpublished draft but has been shared with the Commission to inform this review.
311 Schedule 4 of the Plan.
312 Interview: Nature Conservation Council, 2 March 2022.
313 Mutawintji Board of Management and NPWS (2013) *Mutawintji Lands Plan of Management*
314 The setback distance in Clause 49 for water supply works approvals near high priority karst environments is 500 metres compared to 2,000 metres for other listed GDEs, but the setback distance of 500 metres is for both basic landholder rights and other purposes.
315 The Commission sought advice from the NSW Karst Management Advisory Committee regarding the listed karst environment GDEs but did not receive a response in time to inform this review.
316 Clause 50 of the Plan.
317 Mutawintji Board of Management and NPWS (2013) *Mutawintji Lands Plan of Management*

priority GDEs.[318] This difference is not justified and the logic behind it should be assessed during remake, in consultation with Traditional Owners, and Aboriginal groups and knowledge holders. The Commission considers that if groundwater dependent ecosystems require the setback distances in Clause 49, culturally significant groundwater dependent sites may require equivalent protections to prevent negative impacts.

Further details regarding Aboriginal rights and values and opportunities for DPE-Water to engage with Aboriginal people as part of the Plan remake are covered in **Chapter 5**.

6.4 Recommendations

R 6	To protect GDEs and associated values, DPE-Water should revise the list of high value water-dependent ecosystems and GDEs in the remade Plan using best available information, including: a) including internationally (Ramsar) and nationally listed wetlands b) reviewing the categorisation of the two listed karst environments and if required, amending access rules to align with other high value GDEs c) ensuring the Plan, GAB Plan and GAB Shallow Plan list all high value GDEs and high value water dependent ecosystems in the appropriate plan, and that definitions are consistent across plans d) investigating the groundwater dependency of significant wetlands in the Plan area to determine if setback distances in the Plan and GAB Shallow Plan are adequate to maintain and support their environmental values.

[318] For example, water supply works cannot be constructed within 2,000 metres of a listed groundwater dependent ecosystem, unless the Minister is satisfied no more than minimal drawdown will occur at the edge of the ecosystem, while the comparable distance for culturally significant sites is 100 metres if the water will be used for basic landholder rights or 200 metres for other uses.

7 Governance and implementation

7.1 Water governance

The Commission considers there are key issues outside the scope of the Plan that are relevant to water management and the achievement of Plan outcomes. There is an immediate need to address inadequate engagement of volunteer committees in water decisions. Key stakeholders repeatedly raised that they have few opportunities for input into water management and that a of lack of engagement from government agencies and utilities (where relevant) was common.

DPE-Water should consider the following strategies to improve engagement with key stakeholders and licensees:

- **A single, 'customer' facing entity to guide stakeholders** to the appropriate water agency and facilitate responses to water issues. Water management is complex and there is no single point of government contact for village committees or licensed users. This is an issue that has been raised by stakeholders repeatedly across the Commission's reviews. In this review, a stakeholder commented that the Office of Drought Response led by Ken Harrison was beneficial during the drought crisis, as the office was a single port of call able to quickly respond to a range of water management issues.
- **Engage with key stakeholders**, involve them in decision making, and communicate changes. This should include native title holders and registered claimants, village committees (see **Section 4.3**), representatives from pastoral stakeholders, Aboriginal groups, National Parks and Wildlife Service, Local Land Services, Regional Development Australia, Lake Eyre Basin Community Advisory Committee, South Australia and Queensland governments, and other relevant local stakeholders.
- **Employ appropriate engagement tools to reach remote communities.** Engagement must be tailored for this remote area, which experiences unreliable digital connectivity and inaccessibility of agency staff as few are based in the area. For example, the Commission was advised that some stakeholders were concerned about changes to notification requirements for upstream works, with no requirement for advertising applications:

  'We want to ensure that … all downstream users have definitely been contacted if a dam is going to be built upstream of them. Evidence of that contact should be required.'[319]

  In remote areas with unreliable digital connectivity, it is unreasonable to expect that landholders will be aware of water licence applications that may affect their water security. It is equally unreasonable to expect landholders to monitor online portals for licence applications that may affect them. The Commission suggests that WaterNSW or DPE-Water should advise downstream property owners of potential works approvals upstream. Water agencies (DPE-Water, DPE-Water (Utilities – West), WaterNSW and NRAR) should be deliberative and collaborative in their actions, adequately resourced and organised to effectively engage these communities.

7.2 Pathway to improved MER

The NSW Government recognised the need for robust MER frameworks when water sharing plans were developed,[320] consistent with requirements of the Act and the National Water Initiative.[321] An MER framework is required to collect information to understand if plans are contributing to outcomes, inform timely decision making, improve plans and provide transparency. The lack of MER for this Plan can be seen in the following key issues:

319 Interview: Pastoralists' Association of West Darling, 22 December 2021.
320 Office of Water (2011) *Macro water sharing plans – the approach for unregulated rivers. A report to assist community consultation*
321 National Water Commission (2014) *The National Water Planning Report Card 2013*

- **No plan-specific MER framework** – the initially intended MER framework, which included performance indicator assessment was not implemented, and performance indicators were not assessed.
- **No clearly defined outcome, objectives, strategies and performance indicators** – SMART environmental, social and economic outcomes were not clearly specified.
- **No implementation of available amendments** – the Plan included amendment provisions[322] to enable adaptive management in response to new information during the Plan period, or at replacement.[323] These were not acted upon due to a lack of tracking or triggering systems, resources and MER.
- **Risks from unmeasured extraction and unknown flows** – the Plan area has no flow gauges and extraction was not measured or estimated.[324] The NSW Government's new metering framework for non-urban water meters in NSW, which commenced on 1 December 2018 will not cover most extraction in the Plan area (via harvestable rights) and may not cover a great proportion of domestic and stock extraction as not all require meters.[325] However, other methods can be used to estimate extraction such as remote sensing (see **Section 3.4**) for harvestable rights and assumed volumes per stock and per person for domestic and stock rights.

The Commission recognises that DPE-Water is working to improve MER arrangements for water sharing plans. The Commission notes the *NSW Water Strategy* includes an action under Priority 3 to '*invest in long term and effective monitoring, evaluation, reporting and research*.'[326] This action should be associated with funding commensurate with the importance of MER for assessing water sharing plan effectiveness.

DPIE-Water is currently taking steps to improve MER and support efficient and effective use of available resources. This includes developing the NSW MER Framework and customised environmental MER plans and investing in projects to strengthen MER and help target resources. The Plan's MER plan must incorporate these improvements and:

- have SMART objectives and performance indicators relating specifically to the Plan area
- explicitly identify areas for further research based on risk and value
- include clear roles and responsibilities for agencies who are adequately resourced to oversee and implement the MER plan.

DPE-Water advised the Commission that previous recommendations for SMART objectives, strategies and performance indicators will not be carried forward in future water sharing plan remakes. These will instead be captured in MER plans. It is therefore imperative that these documents are created and published in a timely manner and developed in consultation with Plan stakeholders. Ideally, they should be developed in parallel with the revised Plan and published at the same time. Without these MER plans, evaluation of Plan performance will continue to be challenging and accountability will be poor. Further, the Plan should refer specifically to the MER plan and require it to be implemented.

Given limited resources, it is critical that DPE-Water continues identifying efficiencies and works collaboratively with other government agencies and academic institutions to coordinate monitoring activities. MER activities should be prioritised based on value and risk, and public

322 Part 12 of the Plan.
323 Table 1, Office of Water (2011) *Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources – Background document*
324 Alluvium and Vista Advisory (2019) *Audit of the Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources 2011*
325 NSW Government (2018) *NSW non-urban water metering policy*; DPIE-Water (2021) *Fairer metering for small water users - Water in New South Wales*
326 DPIE-Water (2021) *NSW Water Strategy*

reporting of MER findings should be prioritised to improve transparency and public awareness around Plan outcomes.

The Commission understands that DPE-Water does not intend to prioritise this Plan for amendments during remake. While this is understandable considering the low number of licences, the Commission strongly recommends that fundamental monitoring and evaluation must be carried out in the Plan area in the next five years considering the potential for growth in extraction from mining and gas production (see **Section 2.5.3**), the observed impacts of growth in extraction during the last ten years (see **Section 3.3**) and the potential impacts on social and environmental outcomes. By the time the next Plan review, it may be too late to prevent poor outcomes.

The Plan audit found that during the audit period, NRAR had not established a proactive compliance auditing plan or strategy for the Plan's mandatory conditions.[327] The Commission notes that as of mid-2022, NRAR has three active compliance activities in the Plan area. While there are only a handful of licences in the Plan area, stakeholders were concerned about non-compliance in the area. NRAR should be adequately resourced to undertake compliance activities across the state including perceived lower risk locations. Lower risk should not mean that there is no compliance activity, rather that it is less intense or frequent than higher risk areas.

7.3 Knowledge gaps

There are significant knowledge gaps and limitations in monitoring of the Plan's unique geography, hydrology and ecosystems. Further monitoring and research is required to improve system knowledge, refine water sharing plan provisions and support whole of catchment planning. Areas requiring further research and monitoring include, but are not limited to:

- sustainability and equity of the Western Division's harvestable rights policy
- periodically estimating or surveying current levels of extraction (where not metered) and using spatial and other technology to identify risks to objectives, LTAAEL, low flows or connectivity
- targeted research into the Plan area's hydrology, connectivity and environmental water needs in the short term to enable the LTAAEL to be assessed for adequacy. Sufficient information should be sought to determine whether the LTAAEL has been set at a sustainable level
- collaborating with National Parks and Wildlife Service and targeting funding and research across the parks network over the next five years to help understand and monitor hydrology and connectivity of the internationally and nationally significant wetlands. This could focus on the Ramsar listed wetland, Ramsar nominated wetland and nationally important wetlands. For example, the NSW Government's significant purchase of Narriearra Caryapundy National Park is expected to be followed through with funding for research and MER to ensure it is successfully managed. This should be leveraged, along with any relevant research priorities for other national parks in the area
- understanding recharge and connectivity in the Plan area – some work on recharge and infiltration has been carried out at Fowlers Gap research station in the Plan area,[328] as well as recent work published on the GAB, and should be considered in the Plan remake

327 Alluvium and Vista Advisory (2019) *Audit of the Water Sharing Plan for the North Western Unregulated and Fractured Rock Water Sources 2011*

328 For example, Acworth, R. I., Rau, G. C., Cuthbert, M. O., Jensen, E. and Leggett, K. (2016) 'Long-term spatio-temporal precipitation variability in arid-zone Australia and implications for groundwater recharge', *Hydrogeology*, 24(4): 905-921; Dunkerley, D. L. (2012) 'Effects of rainfall intensity fluctuations on infiltration and runoff: rainfall simulation on dryland soils, Fowlers Gap, Australia', *Hydrological Processes,* 26(15): 2211-2224.

- understanding high value environmental assets' dependency on groundwater sources
- identifying Aboriginal and culturally significant sites, their values and water needs for protection under the Plan
- working with Local Land Services to monitor the local and catchment-scale benefits and impacts of rangeland rehabilitation works to inform water availability assumptions under the Plan.

7.4 Recommendations

R 7	DPE-Water should develop the Plan-specific MER plan by June 2024, publish it in conjunction with the remade Plan, and include a provision in the Plan requiring the MER plan to be implemented. The MER plan should identify feasible and appropriate resourcing to support ongoing MER activities in line with the *NSW Water Strategy* and should clearly articulate areas of priority for further research.
SA H	DPE-Water should engage with native title holders, village committees, pastoral representatives, Aboriginal groups, NPWS, Local Land Services, Regional Development Australia, Lake Eyre Basin Community Advisory Committee, South Australia and Queensland governments, and other relevant local stakeholders to inform the Plan remake and facilitate ongoing communication. This should be tailored to the engagement needs of the remote area.

8 Compensation implications of recommendations

Section 43A(3A) of the Act requires the Commission to consider some potential compensation requirements resulting from recommended changes to a plan.[329] Under the Act, compensation is payable by the state to access licence holders only in certain circumstances[330] where water allocations under a water sharing plan are reduced.

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 changes 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. However, the Commission considers that compensation might be payable under Section 87AA in relation to **Recommendation 3(b)**:

> *To improve LTAAEL assessment and compliance, DPE-Water should include amendment provisions in the remade Plan stating that the surface water and groundwater LTAAELs should be revised at Year 5 (using evidence from **R 3(a)**).*

Compensation may be payable under this recommendation only in the circumstance that the amendment is included and enacted, and the change results in a material reduction in long-term allocation for licence holders. Given the low number of licences currently in the Plan area, the Commission considers this is unlikely.

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

---

329 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.

330 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.

Appendix A - Plan objectives, strategies and indicators

Table 4: Objectives, strategies and indicators in the Plan[331]

Plan objective	Plan strategy	Plan performance indicator
The vision of this Plan is to provide for healthy and enhanced water sources and water dependent ecosystems and for equitable water sharing among users in these water sources.		
(a) protect, preserve, maintain and enhance the important river flow dependent and high priority groundwater dependent ecosystems of these water sources	(a) establish environmental water rules (d) establish rules for the granting of access licences and approvals (e) establish rules that place limits on the availability of water for extraction (f) establish rules for making available water determinations (h) establish rules which specify the circumstances under which water may be extracted	(a) change in low flow regime (b) change in moderate to high flow regime (c) change in surface water and groundwater extraction relative to the long-term average annual extraction limit (e) change in or maintenance of, the ecological value of key water sources and their dependent ecosystems,
(b) protect, preserve, maintain and enhance the Aboriginal, cultural and heritage values of these water sources	(d) (e) (f) (h)	(h) the extent to which native title rights requirements have been met (j) the extent of recognition of spiritual, social and customary values of water to Aboriginal people
(c) protect basic landholder rights	(b) identify water requirements for basic landholder rights (d) (e) (f) (h)	(f) the extent to which basic landholder rights requirements have been met (h)
(d) manage these water sources to ensure equitable sharing between users	(c) identify water requirements for access licences (d) (e) (f) (h)	(d) change in local water utility access (g) the extent to which local water utility requirements have been met
(e) provide opportunities for enhanced market based trading of access licences and water	(i) establish access licence dealing rules	(i) the change in economic benefits derived from water extraction and use

331 The Commission has mapped the objectives, strategies and indicators noting that they can straddle multiple objectives. For example, rules on the limits on the availability of extraction will aid in equitable sharing, and the protection of river flow and groundwater dependent ecosystem; Aboriginal, cultural and heritage values; and of basic landholder rights.

Plan objective	Plan strategy	Plan performance indicator
allocations within environmental and system constraints		
(f) provide water allocation account management rules which allow sufficient flexibility in water use	(f) (g) establish rules for the operation of water accounts	
(g) contribute to the maintenance of water quality		
(h) provide recognition of the connectivity between surface water and groundwater		
(i) adaptively manage these water sources	(j) establish performance indicators (k) identify triggers for and limits to changes to the rules in this Plan.	
(j) contribute to the environmental and other public benefit outcomes identified under the Water Access Entitlements and Planning Framework in the *Intergovernmental Agreement on a National Water Initiative (2004)*.[332]		

[332] Under the National Water Initiative, water provided by NSW to meet agreed environmental and other public benefit outcomes as defined within relevant water plans is to:
a) be given statutory recognition and have at least the same degree of security as water access entitlements for consumptive use and be fully accounted for,
b) be defined as the water management arrangements required to meet the outcomes sought, including water provided on a rules basis or held as a water access entitlement, and
c) if held as a water access entitlement, may be made available to be traded (where physically possible) on the temporary market, when not required to meet the environmental and other public benefit outcomes sought and provided such trading is not in conflict with these outcomes.