NSW GOVERNMENT

Natural Resources Commission

Final report

Review of the Water Sharing Plan for the Castlereagh Unregulated River Water Sources 2011

June 2022

Acknowledgement of Country

The Natural Resources Commission acknowledges and pays respect to Aboriginal peoples, the Traditional Owners of NSW. 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 Plan area, the Commission pays its respects to the Wiradjuri, Gomeroi/Kamilaroi/Gamilaraay, Ngemba, Wailwan, and Ngiyampaa Traditional Owners past, present and future, as well as other Aboriginal peoples for whom these waterways are significant. The Commission hopes that the involvement of Aboriginal peoples, groups and Local Aboriginal Land Councils throughout the review process will help to shape collaborative water planning and sharing that is beneficial to Aboriginal peoples and their Country.

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Acronyms and units of measurement

Act	the *Water Management Act 2000* (NSW)
AWD	Available water determination
the Basin Plan	*Basin Plan 2012*
BDL	Baseline Diversion Limit
the Commission	the Natural Resources Commission
DoI-Water	Former NSW Department of Industry – Water
DPI	Department of Primary Industries
DPE	Department of Planning and Environment
DPE-E&H	Department of Planning and Environment – Environment and Heritage
DPE-Water	Department of Planning and Environment – Water
DPI	Department of Primary Industries
DPIE*	Department of Planning, Industry and Environment
DPIE-EES*	Department of Planning, Industry and Environment – Environment, Energy and Science division
DPI-Fisheries	Department of Primary Industries – Fisheries
DPE-Water Utilities	Department of Planning and Environment – Water Utilities
GDE	Groundwater-dependent ecosystem
HEVAE	High Ecological Values Aquatic Ecosystem
ILUA	Indigenous Land Use Agreement
LALC	Local Aboriginal Land Council
LGA	Local government area
LTAAEL	Long-term average annual extraction limit
MDBA	Murray-Darling Basin Authority
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
NRAR	Natural Resources Access Regulator

NSW	New South Wales
OEH	(former) Office of Environment and Heritage
the Plan	*Water Sharing Plan for the Castlereagh Unregulated River Water Sources 2011*
R/ SA	Recommendation/ Suggested action
SDL	Sustainable diversion limit

***Note regarding DPIE / DPE**: During this review, DPIE was restructured and renamed to DPE. The water related functions of DPIE were transferred to DPE. DPIE-EES was renamed DPE-E&H. Where text refers to something that occurred while the department was DPIE, it is referred to as such.

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Executive summary

The Natural Resources Commission (the Commission) has reviewed the *Water Sharing Plan for the Castlereagh Unregulated River Water Sources 2011* (the Plan) in the NSW Murray-Darling basin, 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. The Commission considers there are changes needed that warrant extending and remaking the Plan.

Several Plan-specific issues should be addressed. There is a high degree of connectivity between the Plan and adjacent ground and surface water plans, but the Plan does not adequately manage this. There is a lack of transparency regarding how floodplain harvesting is managed within the Plan boundary where it overlaps with the Barwon-Darling designated floodplain. The management of spearpoints also needs to be clarified. Addressing these issues may require amending adjacent plans to ensure consistent and thorough management of water sources.

There are also many issues that are common to most water sharing plans and remain to be addressed, including support for Aboriginal water rights, the protection of cultural values, and the management of future climate threats to water availability. Most critically, there is still no sustainable, numeric extraction limit for unregulated water sharing plans. Based on *Basin Plan 2012* (the Basin Plan) estimates, unregulated river entitlement across the Castlereagh and Macquarie catchments vastly exceeds the baseline diversion limit.

The current practice of using a default 100 percent annual water allocation in the absence of long term annual average extraction limit (LTAAEL) compliance assessment means there is no assurance that planned environmental water or basic landholder rights are being protected as intended and is inconsistent with the priorities of the Act. Entitlement holders also cannot adequately assess their risk of future reductions in available water determinations (AWDs) and may be unaware of the risks. Compounding this uncertainty, relative AWD reductions for special additional high flow access licences are not clearly specified.

Since the Plan commenced, the NSW Government released the *NSW Water Strategy*, committing to, among other matters, improving river and floodplain health and connectivity, and recognising Aboriginal people's rights and values associated with water. The remake of unregulated Plans provides opportunities for the NSW Government to deliver upon its strategic commitments. There is considerable new data to inform the Plan remake, including from the development of water resource plans, risk assessments and long term water plans.

Overall finding on Plan extension and replacement

The Commission has identified several opportunities to improve environmental, social, cultural and economic outcomes that justify replacing the Plan. The Commission recommends an extension of two years to the existing Plan to allow time to undertake required analysis, consultation, and development of amended provisions (see **Table 1**).

A summary of key areas to improve the Plan are outlined in **Figure 1.** To ensure clarity, the Commission has developed a detailed set of 11 recommendations and 2 suggested actions (**Figure 1**).

Figure 1: Key areas to improve Plan performance

Establishing sustainable extraction

The lack of sustainable, numeric extraction limits and compliance with these limits creates a risk of overextraction which may result in a reduction of planned environment water and creates uncertainty for users around future reductions in AWDs. There are also potential risks to domestic and stock users and cultural values given the LTAAEL is unquantified and a lack of LTAAEL compliance assessments.

The Plan includes several special additional high flow access licences, which should receive AWD reductions before or at a greater rate than other licences. Other plans such as the *Water Sharing Plan for the Macquarie-Bogan Unregulated Rivers Water Sources 2012* clearly specify the relative reductions in AWDs (as a percentage) where the extraction limit is exceeded. No decision has been made around relative reductions in the Castlereagh Plan, and they are not specified in the Plan, leaving a lack of clarity for licence holders.

The Barwon-Darling designated floodplain overlaps with the Plan boundaries. The Department of Planning and Environment – Water (DPE-Water) indicated its intent that floodplain harvesting in that area will be accounted for under the *Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012*. DPE-Water proposes to amend that plan to include floodplain harvesting provisions to enable licensing and regulation of floodplain harvesting. However, the Castlereagh Plan indicates that it covers all surface water within the Plan area and does not exclude floodplain harvesting licensed to another Plan (as some other water sharing plans do). Water that is taken within the Plan boundary, but is accounted for outside of the Plan, makes it difficult to assess risks and manage sustainable extraction within the Plan area.

Growth in basic landholder rights and climate change may impact water availability but are not adequately considered in the Plan.

Strengthening environmental protections

Plan rules are generally inadequate for protecting low flows given a lack of flow classes. There appear to be significant risks to low flows in the upper and lower catchment. Rules in the previous water sharing plan for the Castlereagh Above Binnaway Water Source were more stringent and would have provided greater protection than rules in the current Plan had they been implemented.

A lack of monitoring means there is uncertainty about the extent of impacts of spearpoint access between Binnaway and Coonamble during periods of no flow on connected water sources and environmental assets, including groundwater dependent ecosystems.

Rules for bypass releases[1] from Timor Dam are not codified in the Plan and releases have not occurred due to infrastructure issues. There is also no clarity around how the Plan protects water to contribute to end of system flows for the Barwon-Darling. There is limited recognition and protection for environmental assets, including wetlands that provide critical drought refugia for the broader region, and amendment provisions may risk eroding the protection of pools.

[1] DPE-Water advised the releases from Timor Dam are ‘bypass releases’, which includes environmental releases, basic landholder rights and exemptions.

Recognising surface-groundwater connectivity and subsurface riverbed flows

Extensive river sand beds between Binnaway and Coonamble are a unique feature of the Plan area. While the Plan contains access rules for spearpoints extracting water from riverbed sediments, it does not clearly recognise riverbed sediments as being covered by the Plan. The Plan was amended in 2020 to remove alluvial groundwater sources. While the alluvial plans indicate that they cover sediments, the rules for extraction from sediments (spearpoints) remain in the Plan. The Plan's spearpoint access rules based on a rostering system are theoretically robust, reducing stress on the system and environmental risk, but rules are currently not tied to any monitoring of subsurface water levels or flows, and during prolonged drought conditions, access to subsurface flows would likely require further restrictions.

Provisions to maintain the linkages between alluvial and surface water sources were not included when the Plan was amended to remove alluvial groundwater sources. The proximity of many alluvial groundwater licences to the Castlereagh River between Binnaway and Gilgandra has the potential to impact surface water flows.

Delivering outcomes for Aboriginal people

Critical state-wide barriers to native title, Aboriginal water rights, and the protection of cultural values remain. There is work to be done to proactively engage with native title claimants and other Aboriginal stakeholders, including to ensure water is provided to satisfy native title rights. There is limited recognition and protection of Aboriginal values in the Plan. The complexity and limitations on Aboriginal specific water licences inhibit any meaningful uses by Aboriginal people.

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. The *NSW Water Strategy* and associated Aboriginal water strategy include several actions to address these issues but details on timelines and processes for the actions, including co-design with Aboriginal stakeholders are now required.

Securing town water supply

While allocations for town water supply are adequate, many towns suffered water insecurity during major droughts, highlighting limitations in the Plan's ability to manage severe droughts. These issues were particularly significant in Warrumbungle Shire, with Coonabarabran identified as having very high water security risk. Future climate scenarios and potential releases from Timor Dam may place pressure on water available for town water supply. Spearpoint access is currently prioritised above local water utility access in Mendooran, which does not reflect the priorities of the Act.

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 the recommendations of this review.
Establishing sustainable extraction	
R 2	In the Plan remake, to improve protection of the water sources and their ecosystems, as well as provide certainty and transparency for users, DPE-Water should: a) determine a sustainable numeric LTAAEL that considers: i. impacts from extractions in the adjacent *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Sources Order 2020* and *Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012* ii. best available information, including climate change projections, long-term climate data sets, updated and improved models, and contemporary observations of streamflows and water access during the most recent drought (2017 to 2019) iii. up-to-date estimates of basic landholder rights and accounts for estimated growth in domestic and stock use b) accurately estimate historic extraction to allow calculation of up-to-date numeric LTAAELs c) prepare estimates of current extraction based on reasonable estimates of all forms of take (noting it is unrealistic to expect all water users will be metered) and assess the potential that extraction has increased above the LTAAEL d) incorporate provisions that require the Minister to consider setting the AWD to the ratio of the numeric LTAAEL to the entitlement, if LTAAEL compliance using evidence of actual annual take during the water year is not undertaken e) include provisions to clearly specify the relative AWD reductions for the special additional high flow access licenses f) engage with licence holders early in the remake process to ensure the risk of reduced AWDs is transparent and to understand potential impacts to users so that environmentally protective AWDs are set in a manner that minimises impacts on licence holders.
R 3	In the Plan remake, to clarify how floodplain harvesting in the Plan area that intersects with the Barwon-Darling River designated floodplain is managed and improve the accuracy and transparency of the management of floodplain harvesting, DPE-Water should: a) revise the Plan to clearly specify that it excludes floodplain harvesting licensed within the *Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012*, if that is how DPE-Water intends to manage floodplain harvesting b) ensure any floodplain harvesting extraction excluded from the Plan area is accurately accounted for in the *Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012* when assessing the LTAAELs c) ensure the actual location of floodplain harvesting extraction is used when assessing if the level of extraction is sustainable and the risks of extraction are acceptable. d) create a separate management zone for the portion of the Castlereagh Below Coonamble Water Source that is in the Barwon-Darling River Floodplain to assist with (b) and (c).

R 4	In the Plan remake, to reduce pressure on low flows in the Castlereagh Above Binnaway Water Source and address risks from climate change, DPE-Water should investigate creating a high flow licence category and allow trade into high flows where there is a low risk to high flow dependent environmental values.
Strengthening environmental protections	
R 5	In the Plan remake, to improve environmental outcomes, DPE-Water should: a) ensure the Plan reflects the latest information on environmental water requirements from the *Macquarie-Castlereagh Long Term Water Plan* and associated fish and flows advice from DPI-Fisheries b) review the flow classes for the Castlereagh Above Binnaway Water Source based on best available information regarding environmental flow requirements and suitable flow reference points, then incorporate and implement as part of the replacement Plan c) for the Castlereagh River Below Coonamble Water Source, investigate options to better protect low flows and first flush following cease to flow periods; establish a management zone for the lower floodplain to manage overflows from the Barwon-Darling River and ensure that when protected from extraction in the Barwon-Darling they are not extracted by Castlereagh licence holders d) determine the contribution of flows from the unregulated Castlereagh River to the Barwon-Darling and include relevant flow targets in the replacement Plan e) work with DPE-E&H and DPI-Fisheries to identify regionally significant wetlands, assess the risks to these sites and the adequacy of current rules in protecting environmental values from extraction f) retain current pool protection rules in the remade Plan and remove Schedule 2A and the amendment provision to mitigate the risk of an erosion of environmental protections, including planned environmental water.
R 6	In the Plan remake, to codify environmental releases from Timor Dam into the Plan to support environmental outcomes, DPE-Water should: a) use best available information to determine a suitable, outcomes-focused environmental flow regime and associated infrastructure upgrades to deliver environmental flows from Timor Dam and include these rules in the Plan b) establish the operating rules (including environmental release and domestic and stock requirements) in the Plan for application as mandatory conditions to the water supply works approval and ensure that these conditions are enforceable and compliable. Include requirements for quantitative measurement and records if this is required to assess compliance with operating rules. c) review the gauging network and ensure there is accurate monitoring of inflows and outflows from Timor Dam and include appropriate flow reference points in the Plan.
R 7	In the Plan remake, to improve the management of groundwater-dependent ecosystems (GDEs), DPE-Water should: a) clarify the extent to which GDEs in the Castlereagh Alluvium are impacted by licensed users from the Plan (including spearpoints extracting water from river sand beds) and ensure Plan provisions (implemented via mandatory conditions on approvals and/or licences) provide adequate protection for GDEs b) ensure the requirements in the *Water Sharing Plan for the Macquarie Castlereagh Groundwater Sources 2020* are reflected in the Plan remake, including listing GDEs in the Schedule and map and should specify the level of protection required for GDEs.

SA 1	DPE-Water and DPE-E&H, with input from DPI-Fisheries should undertake further monitoring and analysis of the Castlereagh wetlands to ascertain their importance as drought refugia and determine whether further protection of environmental values is warranted.
Recognising connectivity between surface and groundwater	
R 8	In the Plan remake, to improve the management of spearpoints and surface-groundwater connectivity, DPE-Water should: a) update Clause 4(3) of the Plan to recognise that the Plan's water sources also consist of water in riverbed sediments. The Plan should clearly delineate the maximum depth of riverbed sediments the Plan applies to. The relevant groundwater plans should also be clear that they exclude water in riverbed sediments that are covered by the Plan. b) prioritise the installation of shallow piezometers between Gilgandra and Coonamble and update access rules (under clause 46(6)) to link access via spearpoints with piezometer measurements. c) improve consistency between access rules for alluvial groundwater bores regulated by the *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Sources 2020* and spearpoints covered by the Plan, by adopting linked access rules and rostering. This should include adopting consistent restrictions for spearpoints to shallow groundwater bores and investigating extending the spatial extent of the water sources covered by the groundwater plan.
SA 2	DPE-Water should consider adopting the rostering arrangements for spearpoint access in the Plan for connected systems in other water sharing plan areas including for extraction points in the alluvial groundwater that are likely to be highly connected to the water in riverbed sediments.
Delivering outcomes for Aboriginal people	
R 9	In the Plan remake, to better achieve Aboriginal water objectives as stated in the Plan, DPE-Water should: a) include registered native title claims and Indigenous Land Use Agreements (ILUAs) of the Gomeroi, the Ngemba/Ngiyampaa, Wangaaypuwan and Wayilwan, and the Tubba-Gah peoples, and allow sufficient time to undertake detailed engagement with these Traditional Owners and other Aboriginal knowledge holders to identify cultural values and provisions to protect and support these values b) identify and protect known high value cultural sites in the replacement Plan and undertake further work with a range of Traditional Owners and knowledge holders to better understand water values and uses, identify the rules to protect them, and support water access and use c) update amendment provisions to state that the Plan can be amended to protect cultural values based on best available information and any amendments based on new information should occur in a timely manner d) ensure that where additional entitlement becomes available, that Aboriginal water needs are assessed and provided for as a priority e) undertake state-wide actions identified in the Commission's water sharing plan reviews to improve consideration and respect for native title and Aboriginal values in water sharing plans.[2]

[2] Minimum recommended state-wide actions to support Aboriginal water rights, values and uses are outlined in **Section 6.4**.

Securing town water supply	
R 10	In the Plan remake, to address risks to water security, DPE-Water should: a) in consultation with Warrumbungle Shire Council, the Natural Resources Access Regulator (NRAR) and DPE-Water Utilities, ensure town water supply security is not compromised as part of the review of environmental flows from Timor Dam (see **R 6**) b) assess the adequacy of access rules for licensed users, including spearpoint setback requirements, to ensure protection of town water supply requirements in accordance with the Act c) collaborate with DPE-Water Utilities to reflect the town water supply requirements for Coonamble and Gulargambone and ensure their future town water needs are included in Plan provisions.
Monitoring, evaluation and reporting (MER)	
R 11	By June 2024, to improve Plan-specific MER, DPE-Water should: a) expedite the finalisation and publication of DPE-Water's water sharing plan evaluation framework and methods manuals and ensure there is multi-agency support and oversight of their implementation b) identify feasible and appropriate resourcing to support ongoing MER activities in line with the *NSW Water Strategy* c) specify timely reporting requirements of the results of MER activities to support transparency, public awareness, adaptive management and to leverage the effectiveness of MER investment d) identify and address critical knowledge gaps to support adaptive management e) use the recently developed prioritisation framework to prioritise MER activities based on values and risk.

1 Review background

1.1 Water sharing plans and the Commission's role

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

The *Water Sharing Plan for the Castlereagh Unregulated River Water Sources 2011* (the Plan) commenced on 30 January 2012 and is due for extension or replacement on 1 July 2022.

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.

The Commission may recommend extending or replacing a plan depending on its review findings. Section 43A(3A) of the Act requires the Commission to consider some potential compensation requirements resulting from recommended changes to a plan.[3] Under the Act, compensation is payable by the state to access licence holders only in certain circumstances[4] where water allocations under a water sharing plan are reduced.

The Commission must also consider the water management principles,[5] including the water sharing principles, of the Act 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).[6]

Further, the water management principles should be prioritised in the order that they are set out above.[7] Water sharing plans must be based on evidence to achieve these outcomes.

For reference, the roles of the various NSW water management agencies are summarised in **Figure 2.**

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3 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.

4 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.

5 Section 5 of the Act.

6 Section 5(3) of the Act.

7 Section 9(1) of the Act.

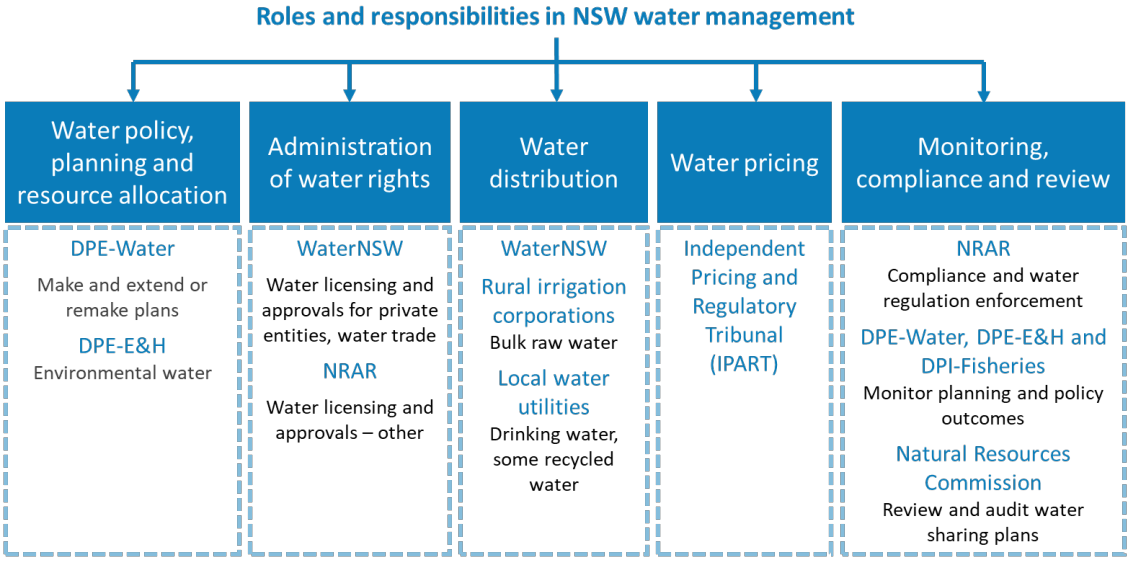

Figure 2: Roles and responsibilities in rural and regional water management[8]

Figure notes: (1) During this review, DPIE was restructured and renamed to DPE. The water related functions of DPIE were transferred to DPE. During this review DPIE-EES was renamed DPE-E&H. Where text refers to something that occurred while the department was DPIE, it is referred to as such; NRAR has several licensing and approval responsibilities, including for major and local utilities, state agencies, irrigation corporations, entities operating under the *Mining Act 1992* (NSW) and holders of specific purpose access licences with an Aboriginal subcategory.

1.2 Review approach

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

- **Consultation** – with government agencies, community and industry organisations.
- **Consultation with Aboriginal stakeholders** – the Commission provided the opportunity for input from Traditional Owner groups, Local Aboriginal Land Councils (LALCs) and relevant government agency staff in the Plan areas. The Commission undertakes ongoing consultation on Aboriginal water issues at the state level with NSW Aboriginal Land Council, Aboriginal Affairs NSW, Indigenous Land and Sea Corporation and Aboriginal staff in relevant NSW Government agencies.
- **Document review** – the Commission reviewed the Plan and its background document.[9] It also obtained publicly available information and reports from water management agencies, including DPE-Water, DPE-Utilities, DPE-E&H, DPI-Fisheries, NRAR, Gilgandra Shire Council, Warrumbungle Shire Council and Local Land Services.
- **Relevant state-wide and regional government policies and agreements** – as required, the Commission considered other relevant state-wide and regional government policies and agreements that apply to the Plan area. The Commission considered the *NSW Water Strategy* published in September 2021 and recognises that the NSW Government is preparing the *Macquarie-Castlereagh Regional Water Strategy* and *Aboriginal Water Strategy*, which will have implications for the way water is managed in the Plan area (see **Section 2.8**).

8 Revised from DoI-Water (2019) *NSW Regional Water Statement*
9 DPI-Water (2016) *Water sharing plan for the Castlereagh Unregulated and Alluvial Water Sources: Background document for amended plan 2016*

- **Technical advice** – consultants provided expert analysis on key aspects of the Plan including social and environmental objectives, the effectiveness of Plan provisions and opportunities for improvement.
- **Submissions** – the Commission called for and considered public submissions via letters and calls to key stakeholders, and advertising on the Commission's website. Stakeholders were asked to respond to the following five questions to assess the contribution of the Plan to environmental, social, cultural and economic outcomes:
  - To what extent do you feel the Plan has contributed to social outcomes?
  - To what extent do you feel the Plan has contributed to environmental outcomes?
  - To what extent do you feel the Plan has contributed to economic outcomes?
  - To what extent do you feel the Plan has contributed to meeting its objectives?
  - What changes do you feel are needed to the Plan to improve outcomes?

The Commission received four submissions. Non-confidential submissions are published on the Commission's website.[10]

The Commission evaluated the performance of the Plan against its stated objectives, strategies and performance indicators, which were linked to each of the broader outcome categories required as part of the review (environmental, social, cultural and economic outcomes). These are provided in **Appendix A**. Noting that the objectives changed over the Plan period, the Commission has assessed the Plan against the current objectives, strategies and indicators. The Commission recognises many of the objectives were not in place for the full period of the Plan.

[10] Natural Resources Commission (2021) *2019-2020 Water sharing plan reviews*

2 The Plan area

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

2.1 The Plan area and water sources

The Castlereagh catchment is part of the Murray-Darling Basin in central-western NSW, draining an area of 17,400 square kilometres. The Castlereagh River rises in the Warrumbungle Range and flows east to Coonabarabran, south to Binnaway, before flowing to the north-west where it enters the Macquarie-Wambuul River north of Carinda, close to its confluence with the Barwon River near Brewarrina. Many smaller creeks and streams (including Womat and Wanourie creeks) join the Castlereagh River downstream of Gulargambone, forming a floodplain that carries flows between the Castlereagh and Barwon rivers during floods (**Figure 3**).[11]

Terrain in the Plan area is mostly flat, with about a fifth of the catchment area covered with hills and a small area of mountainous land with a maximum elevation of around 1210 metres. There are extensive in-river sand beds around the towns of Mendooran, Gilgandra and Gulargambone. The river's discharge is highly variable, with large sections of sandy riverbed, which is often dry.[12] The Castlereagh Floodplain is around 15 to 20 metres lower in elevation than the Macquarie-Wambuul River floodplain, separated by alluvial ridges.

The Plan includes seven water sources and eight management zones[13] in one extraction management unit – the Castlereagh Valley Extraction Management Unit[14] (see **Appendix B**). The water sources often coincide with sub-catchment boundaries.[15] Most of the unregulated surface water licences are located adjacent to the Castlereagh River in the Castlereagh above Binnaway Water Source, which was formerly part of the *Water Sharing Plan for the Castlereagh River above Binnaway Water Source 2003*. Most of the remaining licences are located adjacent to the Castlereagh River between Binnaway and Coonamble.[16]

Before 1 July 2020, the Plan also included the Castlereagh Alluvial Groundwater Source. However, the alluvial groundwater source was moved into a separate water sharing plan (the *Water Sharing Plan for the Macquarie-Castlereagh Alluvial Groundwater Sources 2020*[17]) to align with the water resource plans required under the Basin Plan.

11 DPE (n.d.) *Water in NSW - Castlereagh Catchment Snapshot*
12 DPI-Water (2016) *Water sharing plan for the Castlereagh Unregulated and Alluvial Water Sources: Background document for amended plan 2016*
13 The Binnaway to Gilgandra Water Source includes two management zones and the Castlereagh River Above Binnaway Water Source has six management zones.
14 Note the Plan's background document refers the Castlereagh Valley Extraction Management Unit but the 2020 version of the Plan does not include the name of the extraction management unit.
15 DPI-Water (2016) *Water sharing plan for the Castlereagh Unregulated and Alluvial Water Sources: Background document for amended plan 2016*
16 *Ibid*.
17 NSW Government (2016) *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Sources Order 2020*

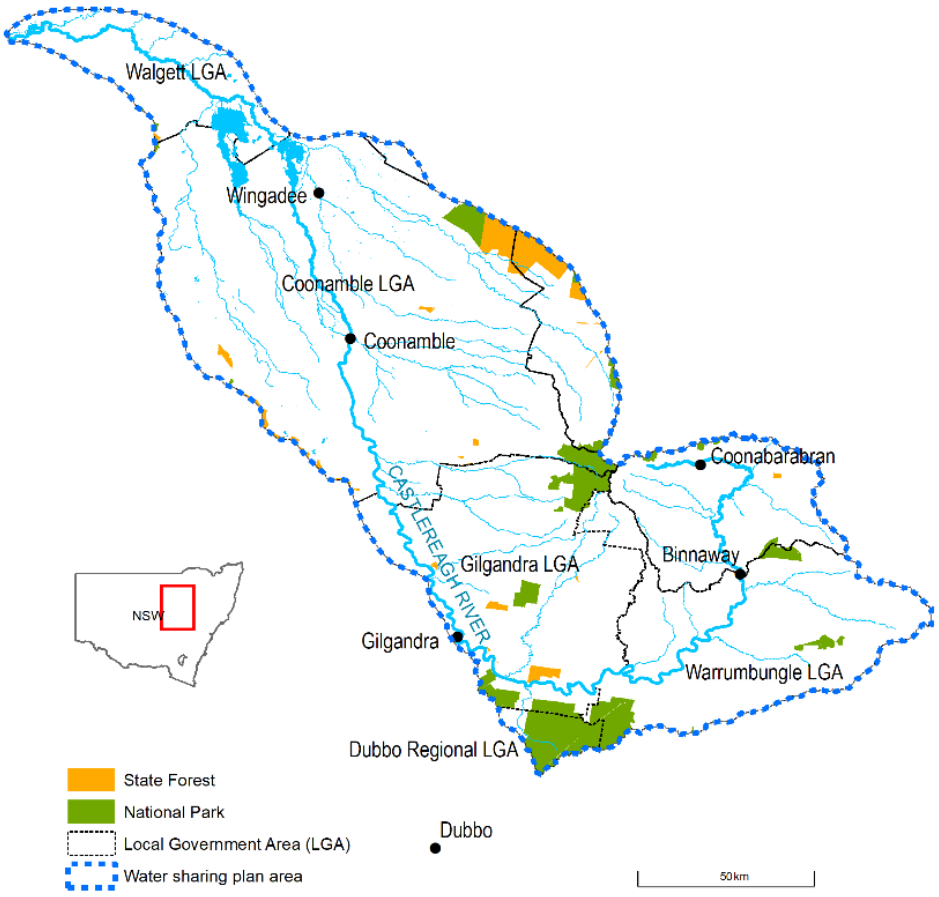

Figure 3: The Plan area including local government areas (LGAs)

2.2 Water licences and entitlements

Table 2 shows the breakdown of licence entitlements, with 225 water licences totalling 23,537 megalitres (ML) per year.[18] Unregulated river access licences hold the largest entitlement at 17,266 ML, or 73 percent of the total entitlement. Unregulated river (special additional high flow) access licences are the second highest entitlement at 3,330 ML per year, followed by local water utilities licences at 2,730 ML per year (based on data from the WaterNSW Water Licensing System). The Commission notes there are minor discrepancies between the entitlement in the Plan and the WaterNSW Water Licensing System, which should be reviewed when remaking the Plan.

[18] Data provided by WaterNSW from its Water Licensing System, accessed in November 2021.

Table 2: Breakdown of entitlement by licence category for the Plan

Category*	Entitlement^ (as listed at Plan commencement)[19]	Entitlement^ (at Plan amendment) [20]	Entitlement WaterNSW Water Licensing System[21]	Number of licences
Unregulated river access	13,322	17,312	17,266	172
Unregulated river (special additional high flow) access	3,300	3,300	3,330	2
Local water utility access	1,820	2,779	2,730	8
Domestic and stock access	395	399	211	43
Total entitlement	**18,867**	**23,820**	**23,537**	**225**

2.3 Town water supply and water storages

The original Plan provided for 1,820 ML per year of entitlement for local water utility access licences from the Castlereagh River and other tributaries to service the townships of Coonabarabran, Mendooran, Merrygoen, Gilgandra, Tooraweenah, Gulargambone and Coonamble.[22] Local water utility entitlements were adjusted over the life of the Plan:

- the Plan was amended in 2016 to include the Castlereagh above Binnaway Water Source, with local water utility entitlements of 959 ML per year
- alluvial local water utility entitlements were removed from the Plan and included in the *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Sources 2020*.[23]

The net result of the two adjustments was a local water utility total entitlement of 2,779 ML per year in 2020.[24] Local water utility entitlement is 12 percent of the Plan's total entitlement.

The Plan provides town water entitlements to several townships:

- Warrumbungle Shire Council (Warrumbungle Water) manages a 1,134 ML per year surface water licence for the Coonabarabran community from the Castlereagh above Binnaway Water Source and the Mendooran and Merrygoen communities from the Binnaway to Gilgandra Water Source.
- Gilgandra Shire Council manages a 1,537 ML per year surface water licence for the Gilgandra and Tooraweenah communities from Castlereagh River Gilgandra to Coonamble Water Source and the Tooraweena to Coonamble Tributaries.

19 NSW Government (2011) *Water Sharing Plan for the Castlereagh Unregulated and Alluvial Water Sources 2011*, version as of 16 September 2011.
20 NSW Government (2020) *Water Sharing Plan for the Castlereagh Unregulated and Alluvial Water Sources 2012*, version as of 1 July 2020.
21 Data provided by WaterNSW from its Water Licensing System, accessed in November 2021.
22 See Clause 23 of the 2012 version of the Plan.
23 NSW Government (2011) *Water Sharing Plan for the Castlereagh Unregulated and Alluvial Water Sources 2011*, version as of 16 September 2011.
24 See Clause 23 of the 2020 version of the Plan.

- Coonamble Shire Council manages a 108 ML per year surface water licence for the Gulargambone and Coonamble communities from the Castlereagh River Gilgandra to Coonamble Water Source.[25]

The main storage for Coonabarabran's town water supply is Timor Dam, which is located on the Castlereagh River 12 kilometres west of Coonabarabran. The dam catchment area is 20 square kilometres and the reservoir storage area at full supply level is 1,140 ML.[26] Timor Dam releases are covered under Clause 45(9) of the Plan, which links the flows of all dams to conditions specified on the works approval. However, there have been issues with releases from the dam (see **Section 4.2**).

2.4 Environmental context

The Castlereagh catchment provides aquatic and terrestrial habitats for a range of threatened species and ecological communities that are listed under NSW and Commonwealth legislation. The Castlereagh catchment contains 16 threatened plant species, six of which are listed as endangered. There are also 52 threatened animal species (31 birds, 20 mammals, and one snake). Highly endangered mammals found in the catchment include the brush-tailed rock wallaby (*Petrogale penicillata*), golden bandicoot (*Isoodon auratus*) and burrowing bettong (*Bettongia lesueur*). The largest number of threatened plant and animal species are found in the upper catchment, where the most extensive areas of uncleared habitat exist, and which are likely to be the most unaffected by water extraction.

Fish community status is generally poor to fair along the main stem of the Castlereagh River downstream of Gilgandra and good along a number of tributaries.[27] Priority target species for the Macquarie Valley listed in the *Basin-wide Environmental Watering Strategy* have been recorded in the Castlereagh catchment, including river blackfish (*Gadopsis marmoratu*), freshwater catfish (*Tandanus tandanus*) and southern purple spotted gudgeon (*Mogurnda adspersa*).[28] The latter has been recorded in the Castlereagh Above Binnaway Water Source,[29] contributing to its classification as having very high instream value.[30] Murray cod *(Maccullochella peelii*), the endangered olive perchlet (*Ambassis agassizii*) and critically endangered flathead galaxias (*Galaxias rostratu*) are predicted to occur in the Plan area. The Castlereagh River from below Binnaway is part of an endangered ecological community (the Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Darling River).

Just under 76,000 hectares of the Castlereagh catchment are conserved by national park and conservation areas, including large areas in Warrumbungle National Park (in the upper catchment) and Goonoo State Conservation Area, 30 kilometres southeast of Gilgandra. The remaining smaller protected areas are found in the eastern third of the Plan area.

The Warrumbungle National Park features a rugged volcanic landscape of rocky spires, domes and deep canyons where the headwaters of the Castlereagh River begin. Several vegetation communities and a wide variety of fauna are found in the park, including a large koala population.[31] It also supports one of the last remaining outlying populations of the threatened

25 See Clause 23 of the 2020 version of the Plan and DPI-Water (2016) *Water sharing plan for the Castlereagh Unregulated and Alluvial Water Sources: Background document for amended plan 2016*
26 Warrumbungle Shire Council (2018) *Timor Dam Raising Concept Design report*
27 DPI (2016) *Fish communities and threatened species distributions of NSW*
28 MDBA (2019) *Basin-wide environmental watering strategy, version 2*
29 DPIE-EES (2020) *Macquarie-Castlereagh Long Term Water Plan Part B*
30 DoI-Water (2018) *Risk Assessment for the Macquarie-Castlereagh water resource plan Area (SW11)*
31 National Parks and Wildlife Service (2012) *Warrumbungle National Park Plan of Management*

brush-tailed rock-wallabies (*Petrogale penicillate*) west of the Great Dividing Range.[32] The Goonoo State Conservation Area, which was converted from State forest in 2005, contains the largest remaining area of blue-leaf ironbark in NSW and provides habitat for the endangered mallee fowl. In 2011, Wingadee and Gilwarny nature reserves (a combined area of around 1,500 hectares) were added to the reserve system. They include some small ephemeral wetlands.[33]

A 2003 study mapped around 17,000 hectares of wetlands within the catchment, with most of this area representing two large areas of floodplain woodland and shallow swamps that are associated with Nedgera and Mowlma Creeks on the lower floodplain.[34] Subsequent studies have identified these wetlands to be of high ecological value and resilient to drought compared to other wetlands in the Murray-Darling Basin.[35,36]

2.5 Current climate

Climate zones across the Plan vary from desert (hot, persistently dry) in the north west through subtropical (no dry season) and temperate (no dry season, hot summer) in the south east.[37] At Coonamble towards the lower end of the catchment, annual temperatures vary from 11.8 to 26.5 degrees Celsius[38] and from 7.4 to 23.7 degrees Celsius at Coonabarabran[39] in the upper catchment.

Average annual rainfall ranges from around 800 millimetres in the Warrumbungle Ranges to 400 millimetres on the riverine plains in the north.[40] In the north of the Plan area, rainfall shows slight summer dominance, with January and February having the highest rainfall at Coonamble, and August and September the lowest.[41] At Coonabarabran, rainfall is higher and more evenly distributed throughout the year, with summer months receiving the highest rainfall and April and August the lowest.[42]

The region has a highly variable climate, with severe droughts – usually of relatively short duration – occurring on average every 20 years over the last 125 years.[43] Over the life of the Plan, much of the catchment experienced the lowest rainfall year on record (2019) and either the lowest or very much below average 24-month and 36-month rainfall periods on record (between 2017 to 2019).[44]

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32 Menkhorst, P. and Hynes, E. (2012) National Recovery Plan for the Brush-tailed Rock-wallaby *Petrogale penicillate*

33 University of New England (2012) *Vegetation and floristics of Gilwarny and Wingadee Nature Reserves*, report prepared for the National Parks and Wildlife Service.

34 Kingsford, R., Brandis K, Thomas R, Chriton P, Knowles E & Gale E (2003) *The distribution of wetlands in New South Wales*. Report prepared for the NSW National Parks and Wildlife Service.

35 Cairns, J. and Driver, P. (2012) *Investigations to aid the protection of river flows and wetlands of the Castlereagh River, New South Wales*. Conference paper. In: Grove, J. and Rutherford, I., eds. The 6th Australian Stream Management Conference, Managing for Extremes, 6-8 February 2012 Canberra.

36 Thompson, P. (2010) *Wetlands of the Lower Castlereagh River*. Unpublished report by the Office of Environment and Heritage (OEH).

37 Bureau of Meteorology (2001) *Map of Climate Zones of Australia*

38 Bureau of Meteorology (2022) *Climate statistics for Australian locations - Summary statistics Coonamble Airport AWS*, accessed 10 January 2022.

39 Bureau of Meteorology (2022) *Climate statistics for Australian locations - Summary statistics Coonabarabran (Showgrounds)*, accessed 10 January 2022.

40 DPI Office of Water (2017) *Macquarie-Castlereagh Water Resource Plan Surface water resource description*

41 *Ibid*.

42 Based on median monthly rainfall over the period 2001-2021 sourced from Bureau of Meteorology (2022) *Climate statistics for Australian locations - Summary statistics Coonabarabran (Showgrounds)*, accessed 10 January 2022.

43 DPIE (2020) *Draft Regional Water Strategy: Macquarie-Castlereagh: Strategy*

44 Bureau of Meteorology (2021) *Recent and historical rainfall maps*, accessed 5 November 2021.

Long term observations show that temperatures across the region increased in the second half of the 20th Century, with the largest increases in temperature occurring in the last two decades.[45] In the last 30 years, annual rainfall has been relatively stable across the Central West region, although the distribution across the year has changed, with winter and autumn rainfall being unreliable.[46]

Since records began in 1970, there are declining streamflow trends in 94 percent of gauges across the northern Murray-Darling Basin, particularly in the headwaters of catchments.[47] CSIRO and Bureau of Meteorology research indicates that reductions in rainfall and streamflow across the northern Murray-Darling Basin over the last twenty years are largely due to a combination of natural variability on decadal timescales and changes in large-scale circulation caused by increased greenhouse gas emissions.[48]

2.6 Aboriginal peoples of the Castlereagh

Water is essential to Aboriginal people's identity. Based on consultation with Aboriginal peoples for the draft regional water strategy for the Macquarie-Castlereagh region, the strategy states that:

> '*… when the rivers are healthy, the people are healthy. Water fills sacred places, supports animals and fish, allows fishing and recreation, and provides gathering places for communities. Access to rivers and water is essential for fulfilling cultural obligations and passing down knowledge to the next generation.*'[49]

The Traditional Owners of the Plan area are peoples of the Wiradjuri, Gomeroi/Kamilaroi/Gamilaraay, Ngemba, Wayilwan, and Ngiyampaa Nations, who have cultivated and cared for the lands and waters of the Macquarie-Castlereagh region for over 60,000 years.[50]

Specific Aboriginal sites around Gilgandra that have been identified and studied include rock shelters, open campsites and scarred trees. The large waterhole in the Castlereagh River around Gilgandra attracted different groups to the area, with the Coonabarabran tribe of the Gamilaraay People camping on the eastern side of the river and Mole tribe of the Wiradjuri on the western side.[51]

Figure 4 shows there are eight LALCs across the area and two active native title claims; one by the Gomeroi People (filed in December 2012),[52] and one by the Ngemba/Ngiyampaa, Wangaaypuwan and Wayilwan People (filed in March 2012).[53] **Appendix C** provides the native title rights claimed by the Gomeroi People and the native title rights claimed by Ngemba/Ngiyampaa, Wangaaypuwan[54] and Wayilwan People, including rights related to water.

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45 OEH (2014) *Central West and Orana climate change snapshot*
46 Bureau of Meteorology and CSIRO (2019) *Regional weather and climate guide: Central West NSW*
47 CSIRO and Bureau of Meteorology (2020) *State of the Climate 2020*
48 *Ibid*.
49 DPIE (2020) *Draft Regional Water Strategy, Macquarie-Castlereagh*
50 *Ibid*.
51 DPI-Water (2016) *Water sharing plan for the Castlereagh Unregulated and Alluvial Water Sources: Background document for amended plan 2016*
52 National Native Title Tribunal (2019) *Register of Native Title claims details - Gomeroi People (NC2011/006)*
53 National Native Title Tribunal (2019) *NC2012/001 - Ngemba, Ngiyampaa, Wangaaypuwan and Wayilwan native title determination application*
54 Note: the native title claim spans parts of the Bogan and Macquarie-Wambuul River catchment. The Wangaaypuwan people are from the Macquarie-Wambuul River area, which is outside of the Plan area.

The Tubba-Gah ILUA is registered for a southern section of the Plan area. The agreement covers all lands and waters in the external boundary of Goonoo Community Conservation Area, an area of just under 630 square kilometres, approximately 40 kilometres north-east of Dubbo.[55] The Tubba-Gah (maing) Wiradjuri Aboriginal Corporation is the Representative Corporation for the Tubba-Gah People of the Wiradjuri Nation.[56] Other known high-value areas include:

- Nandi Common, a declared Aboriginal Place under the *National Parks and Wildlife Service Act 1974*, located near the Castlereagh River west of Coonabarabran, significant to the Gomeroi/Kamilaroi/Gamilaraay People and contains a bora ground (circular earthen or rock structures used for ceremonies such as the initiation of young men), several stone formations, grinding grooves, rock formations, a burial ground and site of initiations and battles.[57]
- Happy Valley Fringe Camp, a declared Aboriginal Place located on the southern outskirts of Coonabarabran. The Gomeroi/Kamilaroi/Gamilaraay People have a strong spiritual and emotional attachment to this area as it is the site of a camp established by the Aboriginal community outside and in opposition to the official reserve system. It also contains an ochre quarry, and a range of bush tucker and bush medicine, and is used by the local community to connect with and pass on knowledge about their history and culture.[58]
- Table Top Mountain, adjacent to the Warrumbungle National Park north-east of Tonderburine, is significant to Gomeroi culture as a story place, known for its stone resources, and as a signalling station and vantage point for a large section of Gomeroi Country.[59]
- The Castlereagh River and its catchments such as the Gulargambone, Baronne and Tenandra creeks have been identified by Traditional Owners as integral elements of the cultural landscape.[60]

In 2016, Aboriginal and Torres Strait Islander people comprised 18 percent on average of the population of the Plan area. In specific areas, Aboriginal and Torres Strait Islander people comprise 29 percent in Coonamble, 28 percent in Walgett, 14 percent in Gilgandra, and 10 percent in Warrumbungle (**Table 3**).[61] This is significantly higher than the NSW average of 2.9 percent and of regional NSW at 3.7 percent.[62]

Table 3: Aboriginal and Torres Strait Islander percentage of total population, Castlereagh LGAs in 2011 and 2016[63]

LGA	Proportion of population who are Aboriginal and/or Torres Strait Islander (%)[64]	
	2011	2016
Coonamble Shire	29	20
Gilgandra Shire	12	14
Warrumbungle Shire	9	10

55 National Native Title Tribunal (2016) *Extract from Register of Indigenous Land Use Agreements*
56 *Tubba-Gah (maing) Wiradjuri Aboriginal Corporation*
57 Heritage NSW (n.d.) *State Heritage Inventory Report – Nandi Common*
58 Heritage NSW (n.d.) *State Heritage Inventory Report – Happy Valley Fringe Camp*
59 Jacobs GHD (2020) *Technical Report 6 Aboriginal Cultural Heritage Assessment Report. Narromine to Narrabri Environmental Impact Statement*. Report prepared for the Australian Rail and Track Corporation
60 *Ibid*.
61 Australian Bureau of Statistics (2021) *Regional Summaries by LGA*
62 *Ibid*.
63 *Ibid*.
64 Australian Bureau of Statistics (2021) *Estimated Resident Population by LGA 2001-2019*

Walgett Shire	28	29

Figure 4: LALC and native title claim areas and determination areas for the Plan area

2.7 Socio-demographic context

Population and housing

Population and development patterns have implications for the demand and supply of town water, basic landholder rights and future water sharing planning. The total population for the Plan area in 2019 was 23,460, 0.8 percent of the total estimated population of regional NSW.[65] There are five LGAs in the Plan area, with most of the population living in the Warrumbungle, Walgett and Gilgandra Shires (**Table 4**).[66] While Dubbo Regional Shire contains a large population overall, only a small portion the LGA is found in the Plan area and was not included in the population statistical analysis.

The Warrumbungle Shire has the largest population in the Plan area with 9,277 people and includes the township of Coonabarabran (**Table 4**). Since 2016, population in all LGAs has declined.[67]

Between 2016 and 2036, Warrumbungle Shire and Gilgandra Shire populations are projected to decline to 12,500, with an annualised fall of 0.6 percent.[68] In comparison, regional NSW and the

65 Australian Bureau of Statistics (2021) *Regional Summaries by LGA*
66 *Ibid*.
67 *Ibid*.
68 NSW Government (2018) *Castlereagh Regional Economic Development Strategy 2018–2022*

whole of NSW is expected to have annual growth of 0.6 percent and 1.2 percent respectively.[69] Combined with an aging population, population decline can be a significant barrier to maintaining economic sustainability and access to a suitable workforce in the future.

Table 4: Castlereagh LGAs Population snapshot for 2019[70]

LGA	Estimated resident population 2019	Population density (persons/km^2)
Coonamble Shire	2,338	0.4
Gilgandra Shire	4,441	0.8
Walgett Shire	5,828	0.3
Warrumbungle Shire	9,277	0.7
Total population/regional NSW average	**23,460/ 2,777,280**	**0.4**

Above regional NSW average; Below regional NSW average

In 2019, there were 8,806 households in the Plan area LGAs across 10,207 total dwellings. Both dwellings and households have declined since 2016.[71] In June 2019, the median house valuation in the area ranged from $85,000 to $160,000 – all below the regional NSW median house price of $491,578.[72] Median value fluctuated across the LGAs from 2011 to 2016.

In 2019, Coonamble had 15 percent and Gilgandra had 17 percent of the population living in an overcrowded dwelling requiring one or more additional bedrooms.[73]

Remoteness Classifications

Most of Australia's population lives in major cities, with only 2 percent living in remote and very remote regions.[74] The Coonamble and Walgett Shires are classified as remote, and Gilgandra and Warrumbungle Shires are classified as outer regional. Outer regional and remote areas are more likely to experience larger impacts from changes, such as water reform, drought, or agriculture because the local economy is often more dependent on agriculture than is the case in inner regional areas or in major cities.[75]

Industries and employment

In 2016, key industries for employment were agriculture, forestry and fishing, healthcare and social assistance, and education and training.[76] Agriculture, forestry and fishing is the largest employer in Coonamble Shire (31 percent), Gilgandra Shire (29 percent), Walgett Shire (27 percent) and Warrumbungle Shire (28 percent).[77]

69 *Ibid*.
70 Australian Bureau of Statistics (2021) *Regional Summaries by LGA*
71 Australian Bureau of Statistics (2021) *Regional Statistics by 2019, 2011-2019 LGA*
72 *Ibid*.
73 *Ibid*.
74 Schirmer, L. and Mylek, M. (2020) *Thriving, surviving, or declining communities: socio-economic change in Murray-Darling Basin communities*, report prepared for the Panel for the Independent Assessment of Social and Economic Conditions in the Murray-Darling Basin.
75 *Ibid*.
76 Australian Bureau of Statistics (2021) *Regional Summaries by LGA*
77 *Ibid*.

Agriculture occupies a large portion of the Plan area, with livestock production being the main activity. Since 2001 there has been a shift from mixed farming operations to specialised beef and sheep enterprises, which combined represent 51 percent of the agriculture workforce.[78] Cropping in the area includes cereals (wheat, barley, oats, rye and sorghum), oil seed crops and legume crops.[79]

Water extracted from the Castlereagh catchment is used for a range of agricultural purposes but is mainly used in spring and autumn as a supplement to rainfall for fodder and cereal crops.[80] Within the Plan area there are considerably fewer licences due to the combination of less fertile soils, low rainfall and unreliable water flows resulting in grazing and dryland cropping being the most common agricultural activities.[81]

Tourism is considered an important industry that touches across almost every sector in the Castlereagh economy, contributing to just under 11 percent of total value added in 2016.[82] The tourism sector was impacted by the Wambelong bushfire in 2013, which resulted in damage to the region's natural tourism assets, including large areas of Warrumbungle National Park, and less tourist visits.[83]

Emerging industries for Warrumbungle LGA include goat production, piggeries, specialist poultry, horse studs, native seed and plant production and tourism, particularly leveraging astronomy-related tourism. Sand extraction is considered to have significant potential in the Castlereagh River and potentially the Talbragar River.

2.8 Policies, plans and agreements relevant to the Plan area

As part of its review, the Commission is to consider relevant state-wide and regional government policies or agreements that apply to the Plan area. The following have been identified as relevant (including those that are under development):

- *NSW Water Strategy*[84] – released by the NSW Government in August 2021. It is a 20-year, state-wide strategy to improve the security, reliability, and quality of NSW's water resources over the coming decades. The strategy addresses key challenges and opportunities for water management and service delivery across NSW and sets the long-term strategic direction for the NSW water sector. It is complemented by 12 regional and two metropolitan water strategies. An implementation plan outlines key actions and roles and responsibilities to deliver the strategy, with annual reporting against these actions.
- *Draft Macquarie-Castlereagh Regional Water Strategy*[85] – regional water strategies are being developed as part of the NSW Government's commitments in response to the *NSW State Infrastructure Strategy 2018*, including the Macquarie-Castlereagh as one of six priority areas. A draft strategy was on public exhibition until December 2020 and a final is due by the end of 2022. The draft strategy includes a long list of options for improving water security and reliability, protecting, and enhancing natural systems and community preparedness for climate extremes. These strategies do not replace water sharing plans but initiatives under the strategy and studies underpinning these (including climate modelling) may inform the water sharing plans and future water sharing

78 NSW Government (2018) *Castlereagh Regional Economic Development Strategy 2018–2022*
79 DPI-Water (2016) *Water sharing plan for the Castlereagh Unregulated and Alluvial Water Sources: Background document for amended plan 2016*
80 *Ibid*.
81 *Ibid*.
82 NSW Government (2018) *Castlereagh Regional Economic Development Strategy 2018–2022*
83 *Ibid*.
84 DPIE-Water (2021) *NSW Water Strategy*
85 DPIE-Water (2020) *Draft Regional Water Strategy: Macquarie-Castlereagh Strategy*

arrangements. The strategies will also likely drive state-level funding for water infrastructure projects going forward.

- *Aboriginal Water Strategy* – this state-wide strategy is currently under development by DPE-Water and will be co-designed with First Nations/Aboriginal people. The purpose of the strategy is to identify measures to deliver on First Nations' water rights and interests in water management.
- *Macquarie-Castlereagh Long Term Water Plan*[86] – DPE-E&H developed long-term water plans as part of the environmental water management framework established under the Basin Plan. They set objectives, targets and environmental flow requirements for key water dependent species and river functions based on best available information and input from a range of technical experts. These plans will help to guide water management and improve environmental outcomes over the long term. Water resource plans, and by association the relevant water sharing plans, must have regard to the relevant long term water plan for their area. How the long term water plan can inform the Plan provisions is discussed in **Chapter 4**.

The replacement Plan should take these initiatives into consideration and align with them where consistent with the intent and requirements of the water sharing plans, including the priorities and water management principles under the Act.

[86] DPIE-EES (2020) *Macquarie-Castlereagh Long Term Water Plan, Part A: Macquarie-Castlereagh catchment*

3 Establishing sustainable extraction

The Plan does not currently establish extraction limits based on clear estimates of sustainable use at the appropriate scales, creating significant risk to the environment over the long term. In addition, the absence of clearly defined and measured extraction limits results in a significant lack of clarity for users impacting on their ability to assess risk to water availability in the future, particularly if growth in use is unsustainable. Key issues include:

- The Plan lacks a clear, numeric LTAAEL that is based on an estimate of sustainable use at the appropriate scale. The lack of numeric LTAAEL makes it difficult to manage compliance, and the current approach to managing extraction is inconsistent with the priorities of the Act (**Section 3.1**)
- Current entitlement is greater than estimated in the Plan, creating risks that the LTAAEL may be exceeded (**Section 3.2**). Given these risks, a precautionary approach should be taken to setting AWDs in high-risk water sources until a clear, numeric LTAAEL is established and compliance is assessed (**Section 3.3**)
- a lack of clarity in how floodplain harvesting is managed where the Plan area intersects the Barwon Darling designated floodplain in the Castlereagh below Coonamble Water Source (**Sections 3.4 and 3.5**)
- the policy for reductions in special additional high flow access licences relative to other users to meet extraction limits is unclear (**Section 3.6**)
- the Plan does not currently consider the impacts of climate change on future water availability and is not based on best available information regarding climate projections (**Section 3.7**)
- the Plan currently prohibits trade into high flows, which is a key mechanism to address future risks to water availability from climate change (**Section 3.8**)
- the Plan needs to consider up-to-date estimates for basic landholder rights extraction and account for potential future growth (**Section 3.9**).

3.1 Sustainable extraction limits are required for the Plan area

Water sharing plans are responsible for ensuring ecologically sustainable levels of extraction at appropriate scales to protect water sources, their dependent ecosystems and landholder rights. A central role of a water sharing plan is to establish LTAAELs to specify the amount of water available over the long term for extraction and interception by licensed users and under basic rights, with all remaining water being made available for the environment. This is a fundamental strategy (alongside other rules for managing short term and low flow impacts) and is required by legislation to meet a water sharing plan's targeted environmental and economic objectives and contribute to Aboriginal cultural and social objectives.[87]

The NSW Government is also a signatory to the Intergovernmental Agreement on the National Water Initiative. Under that initiative, it was agreed that water access entitlements and planning frameworks would enhance the security and commercial certainty of water access entitlements by clearly specifying the statutory nature of those entitlements.

DPE-Water has not released numerical LTAAEL figures for the Plan area. Establishing numeric LTAAELs to achieve sustainable levels of extraction is a recurring recommendation in the Commission's water sharing plan reviews. The Commission considers there are no material barriers to establishing a numeric LTAAEL for the Plan remake beyond potential resourcing

[87] See clauses 9(3)(a), 10(3)(b), 11(3)(c) and 11A(3)(b) of the Plan.

needs, and this should be undertaken as a priority before public consultation on the replacement Plan. A review of extraction limits would need to take into consideration the requirements of the Basin Plan and if done in a timely manner could inform the review of sustainable diversion limits for the *Macquarie-Castlereagh Surface Water Resource Plan*.

In addition to the LTAAEL, the Plan also incorporates the sustainable limit required by the Basin Plan for the *Macquarie-Castlereagh Water Resource Plan* area – known as the Sustainable Diversion Limit (SDL).[88] This was incorporated into the water sharing plan for consistency with the Basin Plan.

The SDL must be met based on estimates of the amount of extraction prior to the Basin Plan, called the Baseline Diversion Limit (BDL), less reduction achieved by water purchase programs and other works and measures set out in the Basin Plan.[89,90] However, the Basin Plan sets the SDL for the entire water resource plan area (the Macquarie-Castlereagh SDL resource unit (SS20)), which covers three water sharing plans; for the Castlereagh unregulated water sources, the Macquarie-Bogan unregulated water sources and the Macquarie and Cudgegong regulated water sources.

The Plan requires that a plan-specific SDL be determined. Clause 31 states that:

> '*... the long-term average sustainable diversion limit for these water sources is the component of the baseline diversion limit for the Macquarie-Castlereagh SDL resource unit as calculated in accordance with Schedule 3 of the Basin Plan, that in the Minister's opinion is attributable to these water sources*'.

The Plan further requires that the Minister undertake an annual assessment of compliance with the portion of the SDL for *Macquarie-Castlereagh Water Resource Plan* area that is attributable to the Plan's water sources. However, the Commission understands this assessment has not been undertaken for the Plan area and only the SDL for the whole *Macquarie-Castlereagh Water Resource Plan* area is reported annually to the Murray-Darling Basin Authority (MDBA). The Plan includes an amendment, which allows the SDL in the Castlereagh Plan to be combined with the Macquarie-Bogan unregulated and Macquarie regulated water sources.[91]

The SDL for the whole water resource plan area is not suitable to ensure sustainable extraction within the Castlereagh Plan area or for individual water sources. To meet the requirements of the Act, sustainability needs to be considered at scales most relevant to protecting the ecosystems within the Plan areas, which are smaller than those considered for the water resource plan SDL.

It is important to note that the current LTAAEL is not based on an assessment of sustainability. Instead, it is set to historic usage averaged over the period 1 July 1993 to 30 June 1999 (plus basic landholder rights and plantation forestry take that existed on 30 June 2009). This level of extraction has not been assessed to consider if it maintains water dependent ecosystems. The Commission is not aware of any study that indicates water dependent ecosystems can be maintained under historic level of usage. It is therefore not clear if water management principles and priorities from the Act are being given effect.

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88 As required under Clause 35 of the Plan. SDL is used to refer to the limit required by the Basin Plan for the Macquarie-Castlereagh Water Resource Plan area, while other references to 'sustainable limit' or similar are used to refer to an LTAAEL in the WSP under NSW legislation, and an LTAAEL that is set on a sustainable basis to protect water dependent ecosystems

89 Turner, G., Vanderbyl, T. and Kumar, S. (2019) *Final Report of the Independent Panel's Review of the Sustainable Diversion Limit (SDL) Water Accounting Framework*

90 MDBA (2020) *Sustainable diversion limit (SDL) accounting framework improvement strategy 2020 – 2025*

91 Clause 73(2)(a) of the Plan.

DPE-Water should undertake studies to determine sustainable levels of extraction based on the needs of water dependent ecosystems, including the potential impacts of climate change over the life of the Plan. Given the close interconnection with the alluvial sources in the *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Sources 2020*, any allowable extraction from the alluvial system and impacts of those extractions on the Plan area should be considered in establishing a sustainable limit for the Plan. DPE-Water should also ensure all forms of take, including any floodplain harvesting (**Section 3.4**), are accurately considered in the LTAAEL and licensing system.

3.1.1 Lack of LTAAEL assessment and compliance is inconsistent with the Act's priorities

Once an LTAAEL is established, assessing LTAAEL compliance allows for remedial action to be taken when extraction limits are exceeded. Compliance also underpins an effective water market and the valuing of water as a limited resource.

The Plan provides for future extractions to be managed through reductions in AWDs if non-compliance with the LTAAELs is found.[92] This becomes more important as licensees that were inactive (or only partially active) between 1993 and 1999 start to use (activate) their access licences.

Compliance assessments comparing the actual average annual extraction for each extraction management unit against their LTAAELs have not been undertaken.[93] In addition, the Plan only has descriptive LTAAELs based on historic levels of extraction (see **Section 3.1**), which means it does not contain numeric limits against which to compare actual use.

The lack of assessment of compliance with the LTAAEL, while an implementation issue, has considerable impact on the ability to ensure achievement of environmental and social outcomes. This is because these rules are fundamental strategies adopted by the Plan to achieve these outcomes and are also needed to meet the objects and principles under the Act. The Act specifies an order of priority for water sharing and access.[94] Protection of the water sources and their dependent ecosystems has the highest priority under the Act. Water remaining above these extraction limits is planned environmental water and is the Plan's most basic protection for the environment.

The first object under the Act is to apply the principles of ecologically sustainable development to provide for the sustainable and integrated management of water sources for the benefit of both present and future generations. These principles include the precautionary principle that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Failing to assess and enforce compliance with the LTAAEL creates a material risk that the objects and priorities under the Act are not being met, as there is then no means to ensure that planned environmental water is not being inappropriately taken from the system. Further, it is not possible to ensure that other priority users such as towns and those with basic landholder rights are being given appropriate priority.

In the absence of assessment with LTAAEL compliance, DPE-Water has continued to allocate AWDs of 100 percent. This places all the risk of an unknown LTAAEL exceedance on the environment and downstream water users, which is inconsistent with the priorities under the Act and the precautionary principle.

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92 See clauses 34 to 38 of the Plan.

93 Alluvium and Vista Advisory (2019) *Audit of the Water Sharing Plan for the Castlereagh River Unregulated and Alluvial Water Sources 2011*

94 See sections 5(3), 9(1) and 58 of the Act.

The last Plan audit[95] found the following Plan provisions were not being given effect to during the audit period:

- Clause 30 – Assessment of average annual extraction against the long-term average annual extraction limit for the Castlereagh Valley Extraction Management Unit
- Clause 32 – Compliance with the LTAAEL for the Castlereagh Valley Extraction Management Unit.[96]

The audit found no procedures available for unregulated surface water LTAAEL compliance.[97] Stakeholders reflected these concerns in submissions to this review:[98]

> '*The first element to the strategies listed in Part 2 of the WSP to reach targeted environmental objectives is to 'establish and maintain compliance with a long-term average annual extraction limit and a long-term average sustainable diversion limit'. There is no calculation of extraction as required under Part 6 cl.29, and therefore no assessment of extraction against LTAAEL as is required under cl. 30 and no subsequent management of compliance with the LTAAEL as required under cl. 31. Without broad scale metering in this water source, the assessment of compliance is not possible*.'[99]

DPE-Water indicated that, since the Plan audit, annual reporting against the SDL is required by the MDBA. However, as discussed in **Section 3.1**, the SDL for this portion of the whole water resource plan area is not calculated or reported at a scale appropriate to understand what is happening in the Castlereagh unregulated water sources.

More importantly, this reporting is not based on an assessment of actual usage during the reporting year. Rather, the MDBA allows reporting based on estimates of historical long-term average take, which was the basis for the BDL and the LTAAEL. Since the 1993-99 period, there has been no re-assessment of actual extraction. In practice, the annual report is just a re-reporting of the historical values provided for establishing the BDL. This is not sufficient to ensure actual compliance with sustainable limits. Further, Clause 29 of the Plan requires the Minister to calculate the total annual extraction from these water sources following the end of the water year, based on the take of water in that year, which is not being undertaken.

Limited metering in the Plan area adds to the challenge of establishing a numeric LTAAEL and assessing LTAAEL compliance. The roll-out of the *NSW Non-Urban Metering Policy*[100] will go some way to addressing this issue, but many works in the unregulated water sources will be exempt. However, other methods are available to consider the volume of extraction and the risk to LTAAEL compliance. These include:

- periodic repeat of the volumetric use survey to update the 1990s figures
- survey of logbooks as can be required under water sharing plan and water access licence/approval conditions
- remote sensing methods to detect significant increases in regional water use and crop growth over time (GIS methods are available to compare crop water use and greenness from satellite images and could potentially be calibrated to the 1990s survey).

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95 Alluvium and Vista Advisory (2019) *Audit of the Water Sharing Plan for the Castlereagh River Unregulated and Alluvial Water Sources 2011*

96 Clause 32 is now Clause 33 of the Plan.

97 Alluvium and Vista Advisory (2019) *Audit of the Water Sharing Plan for the Castlereagh River Unregulated and Alluvial Water Sources 2011*

98 Submission: Nature Conservation Council of NSW, received 15 July 2021.

99 Submission: Inland Rivers Network, received 16 July 2021.

100 DPIE (2020) *NSW non-urban metering policy*, published November 2012 and updated November 2020.

Risks to the environment and other priority water users are exacerbated by significant entitlement being issued in the Plan's water sources over and above available estimates of historic extraction on which the extraction limits are based (see **Section 3.2**). Water users are legally entitled to use all water allocated to them subject to conditions on licences and approvals. Risks to water sources are further compounded by the Plan setting no limits on daily take and having rules that allow for 100 percent carry over to the next water year.[101]

Establishing and ensuring compliance with sustainable, numeric LTAAELs has been a key recommendation in the Commission's water sharing plan reviews but, to date, DPE-Water has not adopted these recommendations. As such, in this review the Commission has considered additional steps that should be taken to adequately protect water sources, communities and basic landholder rights until such time as sustainable numeric LTAAELs are established and adhered to (**Section 3.3**).

3.1.2 LTAAEL compliance should be undertaken using best available information

LTAAEL assessment requires a reasonable estimate of actual annual extraction and the establishment of numeric LTAAELs. A lack of perfect information regarding extraction should not prevent DPE-Water from making the best estimates possible based on available information to assess LTAAEL compliance, until improved data can be collected.

The Commission supports a risk-based approach to allocate resources. Water sources at high risk of creating an exceedance of the LTAAEL should be more thoroughly evaluated, while more simplified estimates may be appropriate for lower risk sources. In the Plan area, the Commission has identified the Castlereagh River above Binnaway Water Source as being a high-risk source for which extraction should be carefully examined. However, given there is only one extraction management unit, DPE-Water would need to assess the risk of exceedance for the overall extraction management unit. This should include consideration of:

- where significant additional entitlement has been granted since the LTAAEL was established
- remote sensing data that indicates a potential increase in water usage
- water sources in which shifting of extraction from the regulated system to the unregulated system may be occurring
- water sources in which there is significant capture of floodplain water that has been incorporated into unregulated water licenses.

Where increased risk has been identified in any water source, the overall extraction management unit would need to be considered high risk unless it could be demonstrated there has been a significant decrease in extraction in other water sources.

The Commission notes that, as of 1 December 2021, all surface water infrastructure works in inland northern regions, except pumps less than 100 millimetres in diameter, must comply with the *NSW Non-Urban Water Metering Policy*.[102]

Reasonable estimates of extraction by small volume users are also needed to enable full assessment of LTAAELs. DPE-Water should publish and implement a method to assess extraction and LTAAEL compliance in unregulated water sources that will not be fully metered under the *NSW Non-Urban Water Metering Policy*. It may be sensible and cost effective to

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101 Clause 47 and 48 under the Plan state that there are no total daily or individual daily extraction limits. Clause 43(5) under the Plan allows for carryover of 100 percent (or 1 ML per unit share) on domestic and stock, local water utility and unregulated river access licences.

102 DPIE (2021) *Non-urban metering - What water users need to know*, accessed 18 November 2021.

assume 100 percent of entitlement is used by any remaining small users that are actively using their licences in the absence of any better information to ensure that planned environmental water and basic landholder rights are protected.

The NSW Government should make the LTAAEL assessment and compliance as per the Plan rules a priority. This is critical if protections intended by the Plan are to be realised.

3.2 Entitlement is greater than estimated in the Plan, creating risks

In the absence of a clear numeric LTAAEL and an accurate assessment of take the Commission could only assess the risk that the LTAAEL might be exceeded. Schedule 3 Part 12 of the Basin Plan requires that surface water extraction across the combined areas of the Plan, the *Water Sharing Plan for the Macquarie-Bogan Unregulated Rivers Water Sources 2012* and the *Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2020* is limited to the BDL. For unregulated water sources, the Basin Plan requires that the long-term annual average extraction of water is limited to the historical extraction averaged over the period from July 1993 to June 1999 for unregulated water users, plus basic landholder rights at 2009 and commercial plantation forestry interception at 30 June 2009. The definition of the BDL for the unregulated water sources is consistent with the definition of the LTAAELs in both unregulated plans. As such, the BDL for these water sources is equal to the sum of the LTAAELs across the two plans.

While the Basin Plan does not distribute the BDL between the Plan and the *Water Sharing Plan for the Macquarie-Bogan Unregulated Rivers Water Sources 2012*, the Basin Plan's estimate for the BDL for unregulated water sources across both plan areas is 44,000 ML per year. The current sum of entitlements is 23,687 ML for the Plan (see **Table 2**) and 207,968 ML a year for the *Water Sharing Plan for the Macquarie-Bogan Unregulated Rivers Water Sources 2012*,[103] a total of 231,655 ML per year.

Given the lack of understanding of the actual take within either system, it is not possible to estimate the likelihood of an exceedance of the BDL for each individual plan, but the extent to which the entitlement exceeds the BDL certainly creates risks that significant reductions in extraction are required in both plans. This risk needs to be assessed and addressed as a matter of urgency.

Figures used for the BDL as published by the MDBA for the relevant water resource plan area are not broken down to individual extraction management units or plan areas. The Commission has previously advised DPE-Water to provide updated BDL estimates at scales smaller than the water resource plan area as the LTAAEL is derived from 'volumetric conversion' surveys of individual licences.[104] A review of the access licences shows many large licences were converted after the 1993 to 2000 figures were provided to the MDBA, suggesting that the MDBA estimates are potentially incomplete. If the BDL is not updated to reflect these conversions, to comply with the Basin Plan and the Plan rules, significant reductions would potentially need to be made in water allocations to comply with the SDL. This is because current entitlement across the water resource plan area far exceeds the allowable take under the SDL if users are granted 100 percent water allocation.

103 NSW Government (2012) *Water Sharing Plan for the Macquarie-Bogan Unregulated Rivers Water Sources 2012*

104 The Commission understands that DPE-Water carried these surveys out on a licence-by-licence basis to determine an appropriate volumetric conversion for licences that were previously based on spatial area and type of use.

3.3 A precautionary approach should be taken to setting the AWD

The Commission considers that continuing to propose water sharing plans that rely heavily on LTAAELs to protect the first priorities under the Act without establishing or assessing against clear, numeric LTAAELs does not sufficiently protect the environment and basic landholders. It is essential that, before the Plan is remade, a clear, numeric LTAAEL – against which compliance can be assessed – is determined. Consultation on the impact of potential AWD reductions should also be undertaken.

Until this occurs, there should be other mechanisms to ensure the Plan is accountable for protecting the environment. If LTAAEL compliance assessments are not undertaken, the Plan should require a conservative approach to provision of AWDs until there is a numeric LTAAEL and compliance provisions are implemented. Under the precautionary principle, for water sources identified as high risk, this should be a reduction in AWD equivalent to the ratio of the LTAAEL to entitlement across the extraction management unit. If that cannot be calculated, this should be the ratio of the unregulated BDL to the unregulated river access entitlement. This would ensure that water intended to be planned environmental water in the Plan area is not being extracted,[105] giving effect to the priorities of the Act.

The Commission recognises that such a reduction would have a significant impact on water users. This ratio should only be used where an alternative AWD cannot be justified based on reasonable evidence of actual take. An assessment of LTAAEL compliance does not require perfect information. The Commission supports a risk-based approach and use of available data to estimate LTAAEL compliance until improved information, such as metering data, is available. For instance, DPE-Water indicated it may be possible to undertake remote sensing assessments to identify where extraction may be exceeding the LTAAEL and focus additional resources in these areas. Further, the proposed approach provides an incentive to users to monitor actual take and report this to DPE-Water.

A reduced AWD should be applied to unregulated river access licences (including special additional high flow). This reduced AWD should not be applied to town water supply, local water utility or domestic and stock access licences. If the ratio of BDL to total entitlement must be used (because individual numeric LTAAELs are not established), DPE-Water should consider apportioning AWD reductions based on extraction management units, to more fairly reflect where take is likely to exceed the LTAAEL.

The Commission recognises that the risk that the AWDs may need to be significantly reduced to meet LTAAEL compliance is not transparent to most users, and that a shift to full LTAAEL compliance, or setting of a conservative LTAAEL until LTAAEL compliance can be demonstrated may have significant impact on users. It is critical that, first, the risks of a reduced AWD are made transparent to license holders. Second, this approach should only apply to water sources that are at risk of serious or irreversible harm from over-extraction. Third, DPE-Water should engage early with license holders to make them aware of the risks as soon as possible. This would also allow DPE-Water to understand potential impacts to users. This may allow DPE-Water to focus its compliance assessment activities and develop more nuanced adjustments to the AWD that adequately protect the environment in a manner that has the least impact on users.

[105] Clauses 14, 15 and 16 of the *Water Sharing Plan for the NSW Border Rivers Unregulated River Water Sources 2012*

3.4 The Plan's management of floodplain harvesting should be reviewed

Clause 781(a) allows the Plan to be amended to provide rules to manage floodplain harvesting in the Plan's water sources. However, the extent of and accounting for floodplain harvesting is unclear. Under the Basin Plan, the Macquarie-Castlereagh (SS20) BDL includes water that can be taken by floodplain harvesting (excluding take under basic rights). This is calculated by summing the quantity of water that would have been taken by those forms of take for each year of the historical climate conditions under NSW water management law (as if the applicable water sharing plan was not suspended) as at 30 June 2009.

The report, *Macquarie Valley: Floodplain harvesting in water sharing plans*, which was published in March 2021 to assist community consultation,[106] did not cover, and is silent on, the Plan area. It indicates that floodplain harvesting access licences would only be issued for the Macquarie and Cudgegong Regulated Rivers Water Source, which falls under the *Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2020*.

DPE-Water indicated that, in unregulated systems, the take of overland flow outside of a designated floodplain was incorporated into the unregulated river access licenses. A portion of the Plan area (specifically the Castlereagh Below Coonamble Water Source) forms part of the Barwon-Darling River Floodplain, which is a designated floodplain. The *NSW Floodplain Harvesting Policy* applies to floodplain harvesting activities on properties where all or part of that property is located within a designated floodplain.[107] The Plan is unclear on how its water source that intersects the designated floodplain is managed. The Plan's description of water sources states that the Plan applies to all surface waters in the Plan area.

DPE-Water indicated that floodplain harvesting within the boundary of the Plan that takes place within the Barwon-Darling River designated floodplain is excluded from the Plan and is accounted for in the *Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012*. However, the Plan currently does not exclude water taken via floodplain harvesting in the Barwon-Darling River designated floodplain.

Unlike the Plan, the adjoining *Water Sharing Plan for the Macquarie-Bogan Unregulated River Water Sources 2012* specifies which water sources it excludes. For example, it states that it does not apply to water contained in the Barwon-Darling Unregulated River Water Source to which the Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012 applies.[108] It also excludes water taken in the course of floodplain harvesting under a floodplain harvesting (regulated river) access licence.[109]

The Barwon-Darling River designated floodplain spans water sources in three adjoining water sharing plans. In addition to the Plan, it covers the Lower Macquarie River Water Source in the *Water Sharing Plan for the Macquarie-Bogan Unregulated Rivers Water Sources 2012* and the *Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012*. Through the floodplain, the water sources of the Plan are physically connected to these adjacent plans (in that water from one plan area flows into the other plan area), as well as through the water accounting framework. Consideration of this connectivity is a requirement of the Basin Plan and water resource plan accreditation process and is also necessary to meet the connectivity objectives of the Plan.

106 DPIE-Water (2021) *Macquarie valley: Floodplain harvesting in water sharing plans - report to assist community consultation*
107 DPI (2019) *NSW Floodplain harvesting policy*
108 Clause 4(5)(c) of the *Water Sharing Plan for the Macquarie-Bogan Unregulated Rivers Water Sources 2012*
109 Clause 4(5)(d) of the *Water Sharing Plan for the Macquarie-Bogan Unregulated Rivers Water Sources 2012*

Depending on the flow event/s, water in this area could either flow down the Castlereagh River, or flow overland from the Barwon-Darling River, the Macquarie-Wambuul River, or the Namoi River. Floodplain harvesting associated with the *Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012* allowed within the designated floodplain may in fact be extracting water within the area of the Plan.

The floodplain areas managed in adjacent plans are larger. For example, the Castlereagh River drains an area of 17,410 square kilometres and the Macquarie-Wambuul River an area of 85,532 square kilometres. Further, the water source immediately downstream of the Plan, which is in the *Water Sharing Plan for the Macquarie-Bogan Unregulated Rivers Water Sources 2012* contains 51,934 unit shares.[110] One water access licence in that water source has more entitlement than the Castlereagh Plan's total entitlement. As such, a small change in the total extraction from adjacent plans, or an error in allocating take between plan areas could have a large impact on the Castlereagh Plan users within the floodplain.

Understanding the impact of extraction and the access and trading rules on the floodplain (and downstream) requires an understanding of the cumulative impact of all extraction within the Barwon-Darling River Floodplain across multiple plans. When setting a sustainable LTAAEL for the Castlereagh system, DPE-Water should consider these connectivity issues. In addition, when restrictions are placed on the Barwon-Darling, they should also be placed on those sections of the Plan that connect with or occur on Barwon-Darling River Floodplain. The Commission intends to further investigate this issue as part of the review of the *Water Sharing Plan for the Macquarie-Bogan Unregulated Rivers Water Sources 2012*.

DPE-Water has indicated its intent that floodplain harvesting in the Barwon-Darling River Floodplain will be accounted for under the *Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012*. This plan is being amended to include floodplain harvesting provisions to enable licensing and regulation of floodplain harvesting. When changing the Barwon-Darling Plan, connected water sources will also need to be considered. This includes the Castlereagh Plan and the fact that this plan does not currently exclude floodplain harvesting licensed to another plan. Water that is taken within the Plan boundary but is accounted for outside of the Plan makes it difficult to assess risks and manage sustainable extraction within the Plan area. DPE-Water should consider how this use can be properly accounted for and considered as part of the Castlereagh Plan remake.

3.5 The floodplain should be managed under a separate unit

The Commission considers that it will be difficult to fairly manage water usage without separating out the floodplain harvesting usage from the extraction from the river in the lower portions of the system. While the majority of the Castlereagh Below Coonamble Water Source is covered by the Barwon-Darling River Floodplain, it also includes upstream portions of the Castlereagh River. Extraction in the upper reaches of the Castlereagh River is characterised by a large number of water users primarily undertaking instream and riverbed extraction (via spearpoints between Binnaway and Coonamble). In contrast, the floodplain contains a smaller number of users who take larger volumes from flood runners and the floodplain during higher flow events. For example, two licences with conditions to access higher flow account for 68 percent of entitlement in this water source.

To adequately assess the impact of extraction across the broader Barwon-Darling River Floodplain on values in the Plan area, the Plan should consider the portion of the Plan within the designated floodplain as a discrete planning unit. In the Plan remake, DPE-Water should separate the Castlereagh Below Coonamble Water Source into two management zones or two

[110] NSW Government (2012) *Water Sharing Plan for the Macquarie-Bogan Unregulated Rivers Water Sources 2012*

water sources. These water sources should have separate LTAAELs to ensure that increase in one type of use does not unfairly impact on allowable extraction of a different type of use.

3.6 A decision must be made around reductions for special additional licences

The Plan includes several special additional high flow access licences, which were established after other licences in the Plan area. special additional high flow access licences have a level of priority lower than other unregulated licences, meaning that in the event of a reduction in access under an AWD they may receive reductions before or at a greater rate than other licences.

The Plan recognises the lesser right of the special additional high flow access licences. Clause 73 Part 6 (3) of the Plan states that the Plan '*may be amended to specify that reductions to available water determinations for unregulated river (special additional high flow) access licences may be made prior to, or at a rate greater than, reductions for unregulated river access licences*'. However, it does not specify the relative level of reductions.

While there is currently no publicly accessible policy for special additional high flow access licences, a policy is referred to in the background document for the *Water Sharing Plan for the Namoi Unregulated and Alluvial Water Sources 2016*, which states that:[111]

> '*The rules for this licence adopted in the plan are in accord with policy, namely that:*
> 1. *the [special additional licence] is not tradeable, having been created for a site or circumstance specific situation*
> 2. *there is no carry over of unused allocation from one water year to the next*
> 3. *any reduction in the available water determination to address exceeding the LTAAEL (growth in use response) is twice that of other unregulated water access licences.*'

In reviewing the other plans, the Commission notes this policy was not adopted uniformly across all water sharing plans, with each plan adopting different ratios to address exceedances in the LTAAEL.

The *Water Sharing Plan for the Macquarie Bogan Unregulated Rivers Water Sources 2012* specifies any special additional access licences are reduced at 80 percent of the AWD of unregulated access licences. For example, if the unregulated access licences are reduced to 80 percent, then special additional access licences would be reduced to 64 percent.

The relative reduction is an equity issue, which once again requires a numeric LTAAEL for proper consideration. The Plan should include provisions, which clearly outline how special additional high flow access licences would be reduced relative to other licence holders to allow licence holders of both types of licence to understand their risks.

[111] DPI (2016) *Water Sharing Plan Namoi Unregulated and Alluvial Water Sources: Background document*. Note: the document was updated July 2016 to include Phillips Creek, Mooki River, Quirindi Creek and Warrah Creek Water Sources.

3.7 The Plan should be underpinned by latest climate data and modelling

Long term observations across the Castlereagh River region show that temperatures have been increasing since the 1970s (see **Section 2.5**).[112] Available climate change projections for NSW 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.[113] Changes in temperature, evapotranspiration and rainfall all impact on how much water is available in a catchment, either through groundwater via recharge or through surface runoff and streamflow.

In the Plan area, average temperatures are expected to increase by 0.7 and 2.1 degrees Celsius by 2030 and 2070, respectively.[114] In the western plains, the number of days each year where the maximum temperature exceeds 35 degrees Celsius is expected to increase by up to 40 days by 2070.[115] In the upper catchment around Coonabarabran, the number of hot days is expected to increase by up to 30 days per year by 2070.[116] Rainfall is expected to decrease in summer, winter and spring in the near future (2020-2039) and spring in the far future (2060-2079).[117] Rainfall is expected to increase in autumn in both the near and far future, and in summer and winter in the far future.[118]

One of the key risk factors to consider in water planning is the impact of drought on water availability. Across many regions of southern and eastern Australia, more time in drought is anticipated in the coming decades.[119] In the Plan area, previous studies have considered climate change and impacts on surface runoff and water availability. CSIRO found that surface water availability under a best estimate climate change scenario and current levels of development would reduce by 1 percent by 2030, and end of system flows at Coonamble would reduce by 2 percent. However, it was noted that these changes were insignificant when compared to the uncertainties in the surface water modelling.[120]

CSIRO also found that by 2030, surface runoff would reduce by 4 percent. In contrast, research prepared for the then OEH found that surface runoff was likely to increase by 3.4 percent in the near future (2020 to 2039).[121] However, comparing these studies is difficult as they used different outputs from NARCliM, with the OEH study using averaged outputs, and the earlier CSIRO study using median outputs.

These previous studies applied the climate change scenarios produced by NARCliM to historic climate observations. However, the current generation of global climate models used for NARCliM are not able to accurately estimate droughts of the duration and intensity of Australian droughts and there is relatively low confidence in projections for future changes to large-scale drivers such as the El Niño Southern Oscillation.[122] This means there is uncertainty in likely changes in drought for NSW in the future.[123]

112 OEH (2014) *Central West and Orana climate change snapshot*
113 *Ibid*.
114 *Ibid*.
115 *Ibid*.
116 *Ibid*.
117 *Ibid*.
118 *Ibid*.
119 CSIRO and Bureau of Meteorology (2020) *State of the Climate 2020*
120 CSIRO (2008) *Water Availability in the Macquarie-Castlereagh. A report to the Australian Government from the CSIRO Murray-Darling Basin Sustainable Yields Project*
121 Littleboy, M., Young, J. and Rahman, J. (2015) *Climate change impacts on surface runoff and recharge to groundwater*. A report prepared by OEH and Flow Matters Pty Ltd.
122 DPIE (2020) *NSW Climate Extremes Baseline Assessment: Summary report*
123 *Ibid*.

To address this issue, synthetic climate datasets are being generated as part of the development of regional water strategies across NSW.[124] In the Plan area, the draft *Macquarie-Castlereagh Regional Water Strategy* has considered risks to future water availability using this data.[125] Historic climate observations have been augmented using paleoclimate data (500+ years) and stochastic modelling to create a synthetic dataset of 10,000 years of climate data and climate variation.[126] The NARCliM climate change projections were then applied to the synthetic climate dataset to assess climate change impacts and likelihood of extended periods of drought.[127] The approach adopted a conservative, worst-case (driest) scenario as an input to updated hydrological models.[128] This was done to stress test the water system to understand what the worst-case scenario may do to water availability in the catchment.

While the analysis undertaken in the draft strategy to date has not quantified potential impacts to water availability, it has highlighted anticipated risks across the region, which include:[129]

- a higher likelihood of longer duration droughts, with a 2-3 percent probability of droughts similar to the 2017-2020 drought in any given year
- droughts occurring in closer succession, with less time to recover in between
- significantly greater probability of cease to flow days
- reduced frequency of floods, but significantly higher flood flows when they do occur, particularly during the summer-autumn period.

While the Plan does not currently consider the impacts of climate change and is not based on best available information regarding climate projections, the remake is an opportunity to address this. 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.

In the context of a changing climate, Plan provisions have the potential to support security of water supply and the resilience of the water sources and associated water dependent ecosystems. For example, rules to better manage water during extended dry periods. This will provide transparency to all water users, to understand how shares of water will be managed during future droughts, including provisions for the environment. To support this work, improved surface water modelling and monitoring are required, as highlighted by CSIRO[130] and the MDBA[131] respectively.

124 DPIE (2020) *Regional Water Strategies Guide*
125 DPIE (2020) *Draft Regional Water Strategy: Macquarie-Castlereagh: Strategy*
126 DPIE (2020) *Regional Water Strategies Guide*
127 *Ibid*.
128 *Ibid*.
129 DPIE (2020) *Draft Regional Water Strategy: Macquarie-Castlereagh: Strategy*
130 CSIRO (2008) *Water Availability in the Macquarie-Castlereagh. A report to the Australian Government from the CSIRO Murray-Darling Basin Sustainable Yields Project*
131 Submission: MDBA, received 7 July 2021.

3.8 Trade into high flow would support outcomes and adaptation

The Plan has an objective to '*maintain, and where possible improve, access to water to optimise economic benefits for agriculture, surface water-dependent industries and local economies*', and a targeted objective to '*maintain, and where possible improve, water trading opportunities for surface water-dependent businesses*'.[132] Water trading will be an important and cost-effective part of a suite of adaptation strategies for climate change.[133,134] This is critical given climate change is likely to cause a long-term decline in water availability, as well as more frequent and intense periods of water scarcity (see **Section 3.7**).

However, the Plan currently prohibits most forms of trade, only allowing some trades to occur in the same water source or trading zone.[135] The Plan prohibits the:

- conversion of access licence to new category (Dealings under section 71O of the Act[136])
- assignment of rights dealings:
  - between trading zones and water sources within the same water management area and between natural pools
  - between lagoons, lakes or wetlands listed in schedules (Dealings under Section 71Q of the Act)
  - if the licence is a special additional high flow licence
- amendment of share component dealings – same as 710 (Dealings under Section 71R of the Act)
- an access licence being amended to nominate a water supply work located in a different trading zone to that specified in the extraction component of the access licence (Dealings under Section 71W of the Act).

The Plan's background document indicates that the high level of restrictions placed on trade were due to a conclusion by the Interagency Regional Panel that the high hydrologic stress in all water sources across the catchment meant that allowing trades between water sources would result in unacceptable environmental and/or third-party impacts.[137] There was no documented assessment to validate this conclusion, and the recent risk assessment prepared as part of the water resource plan indicated that not all water sources are under high hydrologic stress.[138] In addition, the macro approach used in the Plan's development did not consider high flow trades.

Unlike other regional water strategies, there are currently no options in the draft *Macquarie-Castlereagh Regional Water Strategy* to improve trade or review water markets in the region. However, improving trade rules is supported by the National Water Initiative, which promotes the progressive removal of barriers to trade in water and facilitate the broadening and deepening of the water market, with an open trading market to be in place.[139]

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132 Clause 11(2)(a) of the Plan

133 Loch, A., Wheeler, S., Bjornlund, H., Beecham, S., Edwards, J., Zuo, A. & Shanahan, M. (2013) *The role of water markets in climate change adaptation*, prepared for the National Climate Change Adaptation Research Facility.

134 *Ibid*.

135 A trading zone is an area within a water source that is different to a management zone, established in Clause 57 of the Plan and shown on the Plan Map, to which restrictions on dealings apply.

136 Clause 59(2) of the Plan.

137 DPI-Water (2016) *Water sharing plan for the Castlereagh Unregulated and Alluvial Water Sources: Background document for amended plan 2016*

138 DPI-Water (2019) *Macquarie-Castlereagh Surface Water Resource Plan Risk Assessment*

139 Australian Government Department of Agriculture, Water and the Environment (n.d.) *National Water Initiative*

To address risks from climate change and optimise the use of available water, the flexibility of the water market in the Plan area could be increased by introducing a high flow licence category and allowing trade into high flows across the extraction management unit. This would be subject to an investigation of risks to environmental values, and high flow classes would need to be defined. This approach has been previously recommended in the Commission's water sharing plan reviews.

Introducing a high flow category would increase the pool of licences available for trade and the flexibility of how and where water is used, which would promote economic outcomes while reducing stress on the river at low flow and moving extraction away from areas with high instream values. It would also enable entitlement holders to adapt to seasonal variability and climate change in a cost-effective way.[140]

Other Murray-Darling Basin unregulated water sharing plans have provisions that have more flexible trading rules. For example, the *Water Sharing Plan for the Murray Unregulated River Water Sources 2011* limits trade at low flows due to high hydrologic stress and high ecological values but facilitates trade into high flows.[141] Limiting low flow trade helps to protect ecological values, but it is also critical to recognise the importance of high flows in enhancing ecological values and recovery following no or low flow periods. This flow dependency and daily extraction limits should be taken into consideration with any revisions to trade rules.

Further, there is already precedence for a high flow category with the Plan area. Clause 46A of the Plan allows for the establishment of flow classes for daily flow shares for each management zone of the Castlereagh above Binnaway Water Source. However, these classes only cover the Very Low Flow Class and A Class. The original *Water Sharing Plan for the Castlereagh above Binnaway Water Source 2003* had previously provided for B Class, but this class was removed in 2016 when it was incorporated into the current Plan. The Plan does not currently provide for this amendment.

However, the Plan specifically prohibits trade of unregulated river access licences into another category or trade high flow licences between management zones. Division 2 of Part 8[142] limits the establishment of new classes to situations where new water sources or management zones are created. In the Plan remake, the general clauses prohibiting trade into high flows should be removed and replaced with provisions that allow trade into high flows where appropriate pending assessment of risks to environmental values, including downstream on the floodplain.

While establishing trade into high flow is generally supported, provisions allowing this must consider environmental values and ensure high-flow-dependent values are protected. The Commission understands that DPE-Water is updating its HEVAE mapping and has undertaken an assessment of high flow ecological risk (hydrologic stress and instream value) as part of water resource plan development. This assessment should be used to develop trade rules alongside other relevant best available knowledge to inform risks and management actions. Further, the Commission recognises that increased trade could increase extraction and therefore the likelihood of LTAAEL exceedance. This potential should be evaluated in undertaking any revisions to trade rules.

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140 Loch, A., Wheeler, S., Bjornlund, H., Beecham, S., Edwards, J., Zuo, A. & Shanahan, M. (2013) *The role of water markets in climate change adaptation*, prepared for the National Climate Change Adaptation Research Facility.

141 Clause 57(2) - Dealings under section 71O of the Act are prohibited unless the conversion is from an unregulated river access licence to an unregulated river (high flow) access licence in the following water sources or management zones.

142 Division 2 Part 8 allows that the Plan '*may be amended to establish new or additional flow classes in any water source where management zones are added or in any water source or management zone that is amended during the term of this Plan, as specified in clause 71, provided that the Minister is satisfied that the amendment will not have significant adverse impact on the access to water of licence holders in that affected water source or management zone*'.

3.9 Basic landholder rights need to be reflected in the Plan remake

There are three types of basic landholder rights to water in NSW, which are given priority under the Act and do not require water access licences:[143]

- **Domestic and stock rights** – owners or occupiers of land that is overlaying an aquifer or has river, estuary or lake frontage can take water without a licence for domestic (household) purposes or to water stock.
- **Harvestable rights – dams** – landholders in most rural areas can collect a proportion of the runoff on their property and store it in one or more farm dams up to a certain size, subject to Ministerial Harvestable Rights Orders.
- **Native title rights** – individuals who hold native title (as determined under the Commonwealth *Native Title Act 1993*) can take and use water consistent with the traditional laws and customs by which they are held and recognised under the common law of Australia.[144]

The extent to which basic landholder rights requirements have been provided for under the Plan is difficult to determine as there is no monitoring of domestic and stock use. However, anecdotal evidence from stakeholders indicates that estimated volumetrics requirements for basic landholder rights are likely to have been provided for, except in continued periods of drought when users sought alternative surface and groundwater supplies.

In Gilgandra, landholders supplemented domestic and stock use from surface water with bore water.[145] In other parts of catchment some landholders had to cart water for critical needs:

> '*In the Castlereagh region there definitely was not enough water for critical needs. They had to cart water for stock because the drought was so severe. Water availability was not the cause – it was a lack of water out of the sky*.'[146]

As noted in **Section 3.7**, security of supply in times of drought is an inherent risk for all water users, including basic rights users. The Act requires the Plan to provide basic landholder rights before licensed users.

No volume of water has been issued under native title rights within the Plan area (see **Section 6.1**).

The Plan's basic landholder rights requirements were calculated during the development of the Plan in 2012, with the exception of Castlereagh Above Binnaway Water Source, which was calculated in 2003.[147] DPE-Water recently developed new basic landholder rights estimates for the Plan area, which will inform the Plan remake and suggest estimates will increase around 100 percent to 1,805 ML per year of basic landholder rights usage.[148] It is understood this increased estimate is based upon a more accurate understanding of domestic and stock use.[149]

The increase in updated basic landholder rights estimates for domestic and stock use will have implications for extraction limits[150] and need to be reflected when establishing a sustainable, numeric LTAAEL. It is important to ensure that it is transparent to all stakeholders that updated

143 Sections 52-55 of the Act.
144 See Section 223 of the *Native Title Act 1993*
145 Interview: Gilgandra Shire Council, 24 November 2021.
146 Interview: Local Land Services, 18 October 2021.
147 See Clause 19 of the 2012 version and the 2020 (Amended) version of the Plan.
148 DPIE-Water (2021) *Basic Landholder Rights Estimates Castlereagh Plan*. Unpublished report provided to the Commission for this review.
149 *Ibid*.
150 Clause 28 (b) and (c) of the Plan.

estimates of basic landholder rights are included in the numeric LTAAEL. An increase in basic landholder rights could have impacts on other users in accordance with the hierarchy of the Act.

DPE-Water also advised it will have a public consultation process to finalise the reasonable use guidelines for domestic consumption and stock watering in 2022. Making these guidelines publicly available will improve transparency about basic landholder rights requirements for users.

3.10 Recommendations

R 2	In the Plan remake, to improve protection of the water sources and their ecosystems, as well as provide certainty and transparency for users, DPE-Water should: a) determine a sustainable numeric LTAAEL that considers: i. impacts from extractions in the adjacent *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Sources Order 2020* and *Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012* ii. best available information, including climate change projections, long-term climate data sets, updated and improved models, and contemporary observations of streamflows and water access during the most recent drought (2017 to 2019) iii. up-to-date estimates of basic landholder rights and accounts for estimated growth in domestic and stock use b) accurately estimate historic extraction to allow calculation of up-to-date numeric LTAAELs c) prepare estimates of current extraction based on reasonable estimates of all forms of take (noting it is unrealistic to expect all water users will be metered) and assess the potential that extraction has increased above the LTAAEL d) incorporate provisions that require the Minister to consider setting the AWD to the ratio of the numeric LTAAEL to the entitlement, if LTAAEL compliance using evidence of actual annual take during the water year is not undertaken e) include provisions to clearly specify the relative AWD reductions for the special additional high flow access licenses f) engage with licence holders early in the remake process to ensure the risk of reduced AWDs is transparent and to understand potential impacts to users so that environmentally protective AWDs are set in a manner that minimises impacts on licence holders.
R 3	In the Plan remake, to clarify how floodplain harvesting in the Plan area that intersects with the Barwon-Darling River designated floodplain is managed and improve the accuracy and transparency of the management of floodplain harvesting, DPE-Water should: a) revise the Plan to clearly specify that it excludes floodplain harvesting licensed within the *Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012*, if that is how DPE-Water intends to manage floodplain harvesting b) ensure any floodplain harvesting extraction excluded from the Plan area is accurately accounted for in the *Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012* when assessing the LTAAELs c) ensure the actual location of floodplain harvesting extraction is used when assessing if the level of extraction is sustainable and the risks of extraction are acceptable.

	d) create a separate management zone for the portion of the Castlereagh Below Coonamble Water Source that is in the Barwon-Darling River Floodplain to assist with (b) and (c).
R 4	In the Plan remake, to reduce pressure on low flows in the Castlereagh Above Binnaway Water Source and address risks from climate change, DPE-Water should investigate creating a high flow licence category and allow trade into high flows where there is a low risk to high flow dependent environmental values.

4 Strengthening environmental protections

The Plan aims to protect the needs of the environment by setting and managing extraction against LTAAELs and establishing trade restrictions and access rules. However, there is limited evidence to indicate how effective these provisions have been in supporting environmental outcomes. Risk assessments undertaken as part of the development of the *Macquarie-Castlereagh Surface Water Resource Plan* indicate that more can be done to protect key components of the flow regime across some of the Plan's water sources, particularly around base flows and managing cease to flow periods. Changes are also warranted to ensure that the Plan supports connectivity within and downstream of the Plan area with the Macquarie-Wambuul and Barwon-Darling rivers. Key issues include:

- inadequate protection of low flows, particularly in the Castlereagh above Binnaway Water Source (**Section 4.1**)
- lack of releases from Timor Dam for environmental and domestic and stock purposes (**Section 4.2**)
- limited clarity around how the Plan contributes to end of system flows (**Section 4.3**)
- limited recognition of regionally significant wetlands (**Section 4.4**) and GDEs (**Section 4.5**)
- risks to pools from amendment provisions (**Section 4.6**)

Since the Plan was developed, work has been undertaken to better understand environmental water requirements. This includes the development of the *Macquarie-Castlereagh Long Term Water Plan* by DPE-E&H and DPI-Fisheries' Fish and Flows Framework for identifying significant flow components to support the life stages of native fish. DPI-Fisheries also advised that the monitoring program for water management related activities relevant to native fish in the NSW Murray-Darling Basin, including the *Macquarie-Castlereagh Surface Water Resource Plan* area, is being refined with a focus on incorporating both 'traditional' sampling using electrofishing techniques and environmental DNA (eDNA) methods at priority sites. These studies provide an important evidence base for refining plan provisions to deliver better environmental outcomes.

4.1 Protections for low flows are inadequate

For most water sources in the Plan area, the main access rule for unregulated river licence holders extracting from rivers and creeks is cease to pump when there is no visible flow in the vicinity of the pump site (restrictions also apply to spearpoints - see **Section 4.5**). This access rule is not commensurate with the risk posed by extraction to environmental values in some water sources, including the Castlereagh Above Binnaway and the Castlereagh River Below Coonamble water sources. Further, there are existing gauges that, subject to further investigation, could be referenced to strengthen rules to protect environmental values and give effect to existing Plan provisions, particularly in the Castlereagh Above Binnaway Water Source.

Castlereagh Above Binnaway Water Source

In 2016, the Castlereagh Above Binnaway Water Source was included in the Plan when the *Water Sharing Plan for the Castlereagh River Above Binnaway Water Source 2003* was due for replacement. This water source includes many licences and comprises five management zones that were created to protect key features in the water source, including threatened species habitat in the upper management zone and the town water supply of Coonabarabran and Binnaway (see **Section 2.3**).[151]

[151] DPI-Water (2016) *Water sharing plan for the Castlereagh Unregulated and Alluvial Water Sources: Background document for amended plan 2016*

The original water sharing plan for this water source intended to manage extraction based on flow classes, subject to a suitable flow reference being identified. Flow classes were included in the Plan as part of 2016 amendments. Clause 46A of the Plan makes provision to commence the flow classes, which would effectively increase the cease to pump to a referenced flow, rather than when there is no visible flow. However, the flow classes do not appear to have been given effect, as flow reference points have not yet been prescribed by the Minister.[152]

In submissions to the draft *Macquarie-Castlereagh Surface Water Resource Plan*, stakeholders raised concerns that these provisions have not been given effect and potentially erode planned environmental water:

> *'Table B showing flow classes in the current water sharing plan identifies low flow and A class flow heights to be protected from extraction. The management of these environmental rules relied on the installation of gauges at the end of 5 zones within the water source. The NSW Government failed to protect PEW in the implementation of the current water sharing plan because it failed to install the necessary gauges needed to regulate cease-to-pump rules.'*[153]

For the flow classes to be given effect, the Plan recognises that suitable infrastructure needs to be installed or appropriate infrastructure must exist for use as a flow reference point. There are four existing gauges in this water source, but it is unclear if the suitability of these gauges as flow reference points for the flow classes has been investigated, or if a new gauge (or gauges) is required.

DPE-Water's recent hydrometric review identified one site in the Plan area for potential upgrade, but this was to monitor flows in the lower Castlereagh. Two stations in the Castlereagh Above Binnaway Water Source were listed for potential downgrade (Castlereagh River at Coonabarabran no. 5 (420022) and Belar Creek at Warkton (420003)).[154] The basis for these potential downgrades is unclear. It is also unclear if there has been consideration of the flow classes as part of the hydrometric review.

When making an order to implement the flow classes, the Minister is to consider environmental water requirements and socio-economic impacts. During the term of the Plan, DPE-E&H developed the *Macquarie-Castlereagh Long Term Water Plan*. The plan sets out environmental water requirements for the water source (based on an equivalent planning unit) and includes several potential strategies to improve environmental outcomes in the Castlereagh Above Binnaway Water Source. For example, introducing a commence to pump of 15 ML per day at the Castlereagh at Binnaway gauge (420007) and rostering access during low flows. Introducing a commence to pump rule would help to protect the first flush, which is particularly important after extended dry spells and can provide a range of benefits in terms of connectivity, pool replenishment and water quality.

Threatened fish species have been recorded in the Castlereagh Above Binnaway Water Source, including eel tailed catfish and southern purple spotted gudgeon, and Murray cod is expected to occur in the water source.[155] Given the high instream values, as well as the extraction occurring in the Castlereagh Above Binnaway Water Source, the water source received a 'very high consequence' and high overall risk rating as part of the risk assessment for the *Macquarie-Castlereagh Surface Water Resource Plan*. As such, priority should be given to investigating a suitable reference point for implementing flow classes, but also reviewing

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152 Alluvium and Vista Advisory (2019) *Audit of the Water Sharing Plan for Castlereagh River Unregulated and Alluvial Water Sources 2011*, p. 30.

153 Healthy Rivers Dubbo (2020) *Submission to Draft Macquarie-Castlereagh Surface Water Resource Plan*

154 DPIE (2021) *Murray Darling catchments – surface water and storage monitoring network review*, p. 111. Unpublished report.

155 DPIE-EES (2020) *Macquarie-Castlereagh Long Term Water Plan Part B*

access rules (cease to pump and a potential commence to pump) based on environmental needs. A submission to the draft *Macquarie-Castlereagh Surface Water Resource Plan* noted:

> *'Healthy Rivers Dubbo expects the MDBA to insist the new gauges are installed in the Castlereagh River, and the existing cease-to-pump and start-to-pump rules be activated as per the current water sharing plan. If this does not occur, the result is undeniably a reduction in planned environmental water in the Castlereagh River.'*[156]

Castlereagh River Below Coonamble

The *Macquarie-Castlereagh Surface Water Resource Plan* risk assessment determined cease to flow periods and low flows to be highly altered in the Castlereagh Below Coonamble Water Source, with an increased frequency in cease to flow periods and low flows.[157] This water source has 4,868 ML of unregulated river access licences and 3,330 ML of special additional high flow entitlement across two licences. Cease to pump conditions for the unregulated licences reference a gauge plate on Castlereagh River at the Carinda-Walgett Road bridge.

The *Macquarie-Castlereagh Long Term Water Plan* recommends a range of changes to water sharing provisions to reduce the frequency and duration of cease to flow periods and better protect low flows in this water source.[158] This includes investigating raising the commence to pump to 30 ML per day at the Gungalman gauge (420020) to help protect base flows and investigating a first flush rule for reconnecting in-river pools without causing adverse water quality issues following cease to flow periods.

Given the location of this water source in the lower catchment (the western Plan boundary adjoins the Barwon-Darling River) and contribution to flows via the Macquarie-Wambuul River, there is also potential for creating a management zone for licences that may receive overflows from the Barwon-Darling. The long term water plan recommends restrictions on take in this water source when restrictions exist in the Barwon-Darling River.[159] The Commission supports this measure to protect flows through the Barwon-Darling that should not be extracted by water users in the Plan area.

4.2 The Plan should specify operating rules for Timor Dam

Timor Dam is in the Castlereagh River Above Binnaway Water Source. The dam has a storage capacity of 1,140 ML and is used for Coonabarabran's town water supply. It has a 600 ML outlet valve for releases downstream.

Rules for releases from Timor Dam are not codified in the Plan. Clause 46(10) requires releases from the in-river dam to occur in accordance with the works approval. The conditions on the works approval were carried forward from the original conditions under the *Water Act 1912* and have not been reviewed or updated for several years to reflect new information.

The water supply works approval conditions for Timor Dam require that:[160]

- when dam inflows are less than 15 litres per second (around 1.3 ML per day), the discharge rate must be equal to the inflow rate
- when dam inflows are greater than 15 litres per second, the discharge rate must be equal to or greater than this volume.

156 Healthy Rivers Dubbo (2020) *Submission to Draft Macquarie-Castlereagh Surface Water Resource Plan*
157 DPI-Water (2019) *Macquarie – Castlereagh Surface Water Resource Plan Risk Assessment.*
158 DPIE-EES (2020) *Macquarie-Castlereagh Long Term Water Plan Part B*
159 *Ibid*.
160 Water NSW (n.d.) *Water supply works approval 80WA700001*, accessed 17 November 2021.

The basis for these conditions is unclear, but it would plausibly include domestic and stock needs and provision of base flows. Warrumbungle Shire Council advised that releases from the dam in accordance with these conditions have not occurred due to issues with dam infrastructure.[161] There is also no monitoring of inflows to the dam to determine what releases are required. It should be a requirement that inflows and outflows are measured and that records are kept to determine if the volume being discharged is consistent with works approval conditions. These conditions should be included as operating rules in the Plan, particularly for transparency.

A concept design study was undertaken to explore options to augment the dam to secure town water supply, which found that a new outlet system would be required, including a separate valve for environmental flows.[162] The Commission understands that augmentation of the dam is no longer being pursued as town water supply has been secured through groundwater access.

The Castlereagh Above Binnaway Water Source has very high ecological values, including provision of habitat for threatened native fish, and operation of the dam must take these values into consideration. The *Macquarie-Castlereagh Long Term Water Plan* recommends a review of the conditions on in-stream storages like Timor Dam, including '*consideration of the need for environmental releases or the enhancement of any existing releases'*.[163] Enabling these releases to occur will also require upgrades to dam infrastructure.

The Commission supports a study into environmental flows from Timor Dam with due consideration of town water supply, investment in infrastructure to facilitate such flows and incorporating operating rules for the dam in the water sharing plan. This would help to improve environmental outcomes downstream of the dam.

4.3 It is not clear how the Plan contributes to end of system flows

As part of the NSW Government's water reform package, information was released on possible measures to help improve the management of environmental water and improve environmental outcomes. One of the measures was the '*use of downstream environmental requirements as a trigger to manage upstream access'*.[164] This is underpinned by the active implementation of the *Interim Unregulated Flow Management Plan for the North West*. The measure focuses on implementing this framework in the northern regulated tributaries to improve the contribution of flows to the Barwon-Darling. This includes contribution of flows from the Macquarie-Wambuul River.

The Plan's water sources can, and should, contribute to downstream flow targets and their role in contributing to these targets needs to be recognised and reflected in the Plan. Ensuring end of system flows is also important for maintaining connectivity with the Macquarie-Wambuul and Barwon-Darling rivers. Ideally, there would be consistency in access rules across these connected water sources, particularly in periods of high flow when they are more likely to be connected.

Although mean daily flows at the end of the Castlereagh are generally low at 86 ML[165], it is an important contributor of unregulated inflows to the lower Macquarie-Wambuul River (joining the Macquarie-Wambuul River around 20 kilometres from its confluence with the Barwon-Darling). Also, flows greater than 100 ML per day at Gungalman Bridge (420020) are important for

161 Interview: Warrumbungle Shire Council, 20 October 2021.
162 NSW Public Works Advisory (2018) *Timor Dam raising concept design report*, prepared for Warrumbungle Shire Council.
163 DPIE-EES (2020) *Macquarie-Castlereagh Long Term Water Plan Part B*
164 DPI (2018) *NSW Water Reform Action Plan – Better management of environmental water consultation paper*
165 DPIE (2019) *Macquarie-Castlereagh Surface Water Resource Plan Area Description – Appendix A*

movement of fish recruits from the Barwon River into the Castlereagh.[166] This should be considered in the development of the replacement Plan and how inflows from the Castlereagh contribute to connection via the Macquarie-Wambuul River.

4.4 Significant wetlands are not recognised

Two large wetland areas have been mapped in the Castlereagh catchment, covering around 17,000 hectares (approximately 1 percent of the Castlereagh catchment).[167] They primarily fall in the Nedgera Creek Water Source, as well as the Castlereagh Downstream of Coonamble Water Source. These wetlands are largely unprotected under the reserve system, although areas of woodland and small ephemeral wetlands have been protected in the nearby Gilwarny and Wingadee nature reserves (covering around 1,500 hectares) created in January 2011.[168]

A 2012 study indicated that the Castlereagh wetlands provided drought refuge for water birds during the Millennium drought, when the nearby Macquarie Marshes dried out.[169] The Castlereagh wetlands were found to be more resilient to the effects of drought than other wetlands in the Murray-Darling Basin.[170] However, DPE-E&H advised there has been limited, if any, monitoring of the Castlereagh floodplain wetlands. Their importance as refugia during the recent drought when the Macquarie Marshes dried out in 2019 has not been studied.

The risks to these wetlands from water resource development are unclear and require further assessment to ensure their environmental assets are adequately protected. To ensure risks to regionally significant wetlands are considered, the Commission recommends that DPE-Water works with DPE-E&H and DPI-Fisheries as part of Plan replacement to:

- identify regionally significant wetlands and off-river pools where water access is currently permitted
- determine the dependency of these environmental assets on surface and groundwater
- assess the risks to these sites and the adequacy of current rules in protecting environmental values from extraction
- identify how the Plan can best give effect to the water management principles with respect to these wetlands as water dependent ecosystems.

Any changes to Plan rules should be considered in the context of protecting these floodplain wetlands and their role as drought refugia, particularly in a changing climate. In addition, an assessment of existing water infrastructure is required to ensure that flows to these sites can be effectively managed through the unregulated system.

166 DPIE-EES (2020) *Macquarie-Castlereagh Long Term Water Plan Part B*
167 Kingsford, R., Brandis K, Thomas R, Chriton P, Knowles E & Gale E (2003) *The distribution of wetlands in New South Wales*. Report prepared for the National Parks and Wildlife Service.
168 Hunter, J. (2015) *Vegetation and flora of the Gilwarny and Wingadee Nature Reserves*. Report prepared for the National Parks and Wildlife Service.
169 Cairns, J. & Driver, P (2012) *Investigations to aid the protection of river flows and wetlands of the Castlereagh River, new South Wales*. Conference paper.
170 *Ibid*.

4.5 Groundwater dependent ecosystems should be protected

In line with Plan objectives, the original Plan had provisions to protect identified high priority GDEs and included a schedule for identified GDEs.[171] When the Plan commenced, no high priority GDEs were identified. The Castlereagh Alluvial Groundwater Source was classified as less highly connected in the original Plan process and therefore was managed by groundwater rules.[172]

In 2020, the Castlereagh Alluvial Groundwater Source was moved into the *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Sources 2020 (*the Groundwater Plan)[173] and all provisions and schedules relating to GDEs were removed from the Plan. As a result, GDEs are no longer protected under the Plan. Stakeholders expressed concern that this leaves GDEs exposed:

> '*The objective to 'protect, preserve, maintain and enhance the important river flow dependent and high priority groundwater dependent ecosystems of these water sources' has not been met*.'… '*The [water sharing plan] does not identify specific target ecological populations, nor does it include plans or processes with which to measure performance*.'[174]

During the term of the Plan, DPE-Water developed and applied a method for identifying high probability and high value GDEs.[175] The following high priority GDEs were identified for the Castlereagh Alluvial Groundwater Source and included on a GDE map in the Groundwater Plan:[176]

> '*In the Castlereagh alluvial groundwater source area, the dominant vegetation communities were river red gum and river oak-rough-barked apple-red gum-box riparian tall woodland/wetland GDE communities. These communities were characterised by having a threatened bird species present, extensive connected riparian corridors and vegetation patches which contribute to the very high habitat diversity, high distinctiveness and medium naturalness. These criteria contributed to the overall ecological value in this groundwater source of high*.'[177]

The indicative distribution of Carex Sedgeland Endangered Ecological Community also appears to overlay the upper Castlereagh catchment.[178] Key threats to the community include, but are not limited to, changed catchment hydrology and agricultural activities including stock grazing and trampling, vegetation removal and water harvesting.

Some of these GDES are highly dependent on the Castlereagh alluvial groundwater system. They are also likely to be dependent on water in the hyporheic zone, where groundwater and surface water mix.[179] Several spearpoints extract water from this zone in the reach between Binnaway and Coonamble managed under the Plan. However, they do not have the same

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171 See Clause 10, 55 and Schedule 5 of the 2012 Plan.
172 DPI-Water (2016) *Water sharing plan for the Castlereagh Unregulated and Alluvial Water Sources: Background document for amended plan 2016*
173 NSW Government (2019) *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Sources 2019*
174 Submission: Nature Conservation Council of NSW, received 15 July 2021.
175 Kuginis, L., Dabovic, J., Byrne, B., Raine, A and Hemakumara, H. (2016) *Methods for the identification of high probability groundwater dependent vegetation ecosystems*.
176 See Appendix 2 of the *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Sources 2020*.
177 DPIE (2019) T*he Basin Plan Implementation Macquarie-Castlereagh Alluvium Water Quality Management Plan Schedule F*. Document provided to the Commission by DPE-Water for this review.
178 DPIE-EES (2021) *Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions*.
179 The hyporheic zone is the porous sediment beneath and beside a water body. Hyporheic flow is the dynamics and behaviour of water in this zone (DPIE (2020) *Water Science Research Prospectus Project Information Sheet*)

setback distance requirements as the Groundwater Plan or provisions to protect GDEs as groundwater bores.
There is a risk that spearpoint extraction could impact on GDEs, particularly if they have less stringent provisions than licences under the Groundwater Plan. The impact of spearpoints on water-dependent ecosystems (including GDEs) should be investigated and considered in the Plan remake. If extraction via these works is found to impact on GDEs, provisions should be revised to provide adequate protection, while considering impact on social and economic outcomes.

The extent to which GDEs are managed should be clearly outlined in both the Plan and the Groundwater Plan, including a list and map of GDEs that may be at risk from extraction, and an explanation how they work together to manage risks to the GDE, including appropriate rules to mitigate risks to identified GDEs.

Further, as noted in **Section 4.4**, there are two large wetland areas in the Castlereagh Catchment in the Nedgera Creek Water Source and the Castlereagh Downstream of Coonamble Water Source, which may constitute regionally significant GDEs and require protection under both surface and groundwater plans.[180]

4.6 Erosion of current pool protections should not be allowed

In 2011, DPE-Water published the *Macro Water Sharing Plans Approach for Unregulated Rivers Access and Trading Rules for Pools Policy* (the Pools Policy). The purpose of the Pools Policy is to '*ensure that water sharing plans contain rules that meet the requirements of the Act, adequately protect and restore the environmental values of pools and share water equitably among water users*'. The Act requires water source protection including of associated water dependent ecosystems. The Pools Policy also seeks to identify known cultural values of in-river and off-river pools.

The Plan provides protection to the natural water levels of pools in the Plan area. Plan provisions do not permit licensed extraction from in-river and off-river pools when they are less than full capacity for all water sources.[181] This is consistent with the Pools Policy and Plan objectives that recognise the importance of protecting pools for environmental, social and cultural purposes '*contributing to the protection of native fish populations, swimming and recreational areas and riparian vegetation'*.[182]

The Plan includes a schedule for access licences (including local water utility) used to take surface water that are exempt from cease to pump rules, including rules for protecting pools.[183] However, no access licences are listed in this schedule. Therefore, no exemptions to pool protection rules exist and this schedule should be removed.

The Plan contains amendment provisions to allow for changes to be made to access rules for lagoons, lakes, in-river pools, and other lentic water bodies.[184] The basis for this amendment provision is unclear. Any changes to current rules that permit pool drawdown are not supported by the Commission, as this would be an erosion of planned environmental water, is unlikely to be consistent with the water management principles and may be inconsistent with protection of planned environmental water as required under the Basin Plan. The Commission's review did not reveal any licensed extraction from pools in the Plan area. The Commission recommends that this amendment provision be removed.

180 DPIE-EES (2020) *Macquarie-Castlereagh Long Term Water Plan Part B*
181 See Clauses 46 and 46b of the Plan.
182 See Clauses 10 3(c), 12 3(d) and 12a 3(c) of the Plan.
183 Schedule 2A of the Plan.
184 See Clause 74 Part 8 of the Plan.

The Plan area comprises a range of aquatic habitats, including pools, that provide an important role in the provision of habitat, breeding areas and food source, providing a critical refuge for aquatic organisms such as native fish, invertebrates and mammals such as water rats, during low flow periods.[185] To adequately protect pools the current provisions to restrict extraction must be retained in the remake of the Plan.

4.7 Recommendations

R 5	In the Plan remake, to improve environmental outcomes, DPE-Water should: a) ensure the Plan reflects the latest information on environmental water requirements from the *Macquarie-Castlereagh Long Term Water Plan* and associated fish and flows advice from DPI-Fisheries b) review the flow classes for the Castlereagh Above Binnaway Water Source based on best available information regarding environmental flow requirements and suitable flow reference points, then incorporate and implement as part of the replacement Plan c) for the Castlereagh River Below Coonamble Water Source, investigate options to better protect low flows and first flush following cease to flow periods; establish a management zone for the lower floodplain to manage overflows from the Barwon-Darling River and ensure that when protected from extraction in the Barwon-Darling they are not extracted by Castlereagh licence holders d) determine the contribution of flows from the unregulated Castlereagh River to the Barwon-Darling and include relevant flow targets in the replacement Plan e) work with DPE-E&H and DPI-Fisheries to identify regionally significant wetlands, assess the risks to these sites and the adequacy of current rules in protecting environmental values from extraction f) retain current pool protection rules in the remade Plan and remove Schedule 2A and the amendment provision to mitigate the risk of an erosion of environmental protections, including planned environmental water.
R 6	In the Plan remake, to codify environmental releases from Timor Dam into the Plan to support environmental outcomes, DPE-Water should: a) use best available information to determine a suitable, outcomes-focused environmental flow regime and associated infrastructure upgrades to deliver environmental flows from Timor Dam and include these rules in the Plan b) establish the operating rules (including environmental release and domestic and stock requirements) in the Plan for application as mandatory conditions to the water supply works approval and ensure that these conditions are enforceable and compliable. Include requirements for quantitative measurement and records if this is required to assess compliance with operating rules. c) review the gauging network and ensure there is accurate monitoring of inflows and outflows from Timor Dam and include appropriate flow reference points in the Plan.

185 DPI-Water (2016) *Water sharing plan for the Castlereagh Unregulated and Alluvial Water Sources: Background document for amended plan 2016*

R 7	In the Plan remake, to improve the management of GDEs, DPE-Water should: a) clarify the extent to which GDEs in the Castlereagh Alluvium are impacted by licensed users from the Plan (including spearpoints extracting water from river sand beds) and ensure Plan provisions (implemented via mandatory conditions on approvals and/or licences) provide adequate protection for GDEs b) ensure the requirements in the *Water Sharing Plan for the Macquarie Castlereagh Groundwater Sources 2020* are reflected in the Plan remake, including listing GDEs in the Schedule and map and should specify the level of protection required for GDEs.
SA 1	DPE-Water and DPE-E&H, with input from DPI-Fisheries should undertake further monitoring and analysis of the Castlereagh wetlands to ascertain their importance as drought refugia and determine whether further protection of environmental values is warranted.

5 Recognising surface-groundwater connectivity and subsurface riverbed flows

The Castlereagh River is considered a losing stream and plays an important role in recharging underlying aquifers.[186] When the Plan was developed in accordance with the macro planning process, the intent was to include alluvial aquifer systems in the unregulated river catchment in the unregulated river water sharing plan. This was a general principle of the planning process that sought to recognise the '*hydraulic connection between alluvial groundwater and surface waters*'.[187] The planning process for the Plan also recognised the extensive river sand beds between Binnaway and Coonamble as a unique feature of the Plan area and included access rules for works (spearpoints), which extract water from the riverbed sediments. This unique feature was noted in a stakeholder submission to this review:

> '*Part of the Castlereagh flows through sandy alluvium where flows immediately under the river surface are important. Low flows may "disappear" into the alluvium but when there are no inflows it will take longer after flows resume for outflows into the lower Castlereagh to appear.'*[188]

The Commission has identified several opportunities to strengthen the recognition and management of surface-groundwater connectivity and subsurface flows through riverbed sediments within the Plan and between the Plan and relevant groundwater plans, including:

- clarifying whether the Plan applies to water in riverbed sediments that are mainly accessed via spearpoints (**Section 5.1**)
- further strengthening access rules for spearpoints extracting from riverbed sediments – while these rules are theoretically robust, there are opportunities to better manage access during prolonged drought conditions (**Section 5.2**)
- aligning rules covering connected systems between the Plan and associated groundwater plans (**Section 5.3**).

5.1 It is unclear if the Plan includes water in riverbed sediments

The 2011 version of the Plan did not explicitly recognise subsurface flows through the riverbed sediments in the scope of the Plan but did include the alluvial groundwater source between Binnaway and Gilgandra.[189] This alluvial groundwater source was removed from the Plan when it was amended in 2020 to align water sources with water resource plan areas and is now regulated by the *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Sources Order 2020* (Macquarie-Castlereagh Groundwater Plan). Clause 4(3) was included in the Macquarie-Castlereagh Groundwater Plan, which states that the water sources covered by this plan include water in the unconsolidated alluvial sediments.

The rules spearpoint extraction from riverbed sediments and associated entitlements remain in the Castlereagh Plan, which may create confusion around which plan riverbed sediments are managed under.

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186 Herczeg, A. (2008) *Background report on the Great Artesian Basin* A report to the Australian Government from the CSIRO Murray-Darling Basin Sustainable Yields Project.

187 NSW Office of Water (2011) *Macro water sharing plans: the approach for unregulated rivers: A report to assist community consultation*

188 Submission: Inland Rivers Network, received 16 July 2021.

189 NSW Government (2011) *Water Sharing Plan for the Castlereagh Unregulated and Alluvial Water Sources 2011*, version as of 16 September 2011.

The alluvial groundwater sources between Gilgandra and Coonamble were not included in the Macquarie-Castlereagh Groundwater Plan. They appear to be covered by the *Water Sharing Plan for the NSW Great Artesian Basin Shallow Groundwater Sources 2020.*[190] This groundwater plan also does not contain rules for spearpoints that access water in the riverbed sediments.

The Commission is of the view that spearpoint access to water in riverbed sediments is best managed under the Castlereagh Plan, but Clause 4 of the Plan needs to clearly recognise that it applies to water in the riverbed sediments. The background document indicates that spearpoints can access to a depth of eight metres.[191] The Commission supports including this as a maximum depth in the Plan from which water in riverbed sediments can be extracted. Adjoining groundwater plans should also clearly specify that they do not apply to water in the riverbed sediments down to eight metres.

5.2 Access rules for water in riverbed sediments can be improved

Alluvial sediments can be divided into sediments that are closely associated with the riverbed (which typically consist of sandy alluvial sediments and channel infills from banks that are deposited on the riverbed) and the surrounding alluvial. Flows in riverbed sediments are typically subsurface through coarse sediment, resulting in a high degree of throughflow. In the reach between Binnaway and Coonamble,[192] water supply works that extract water from the riverbed sediments are predominantly spearpoints. The Plan includes access rules for spearpoints. However, the effectiveness of these rules is difficult to determine due to limited monitoring. There are also opportunities to refine these rules in the context of climatic variability and prolonged drought conditions.

The Plan's access rules for spearpoints (where they are the nominated water supply work) apply when there is no visible flow in the river.[193] The Plan contains a unique rostering-systems for these rules. For licences that nominate a spearpoint as the water supply work, the Plan requires that the licence holder must not pump on even-numbered calendar days (for 24 hours starting at 6:00 pm) when there is no visible flow.[194] The alternate-day access rule was developed in response to the unique feature of the Castlereagh River, providing a temporal limitation on access and establishing compliance requirements.

The Plan is the first unregulated water sharing plan reviewed by the Commission that prescribes this rostering system. As a concept to reduce the extraction in systems that have a storage volume, the Commission considers it is a significant improvement on traditional binary pump or cease to pump rules. Rostering provides significant benefits by extending the time in which water can be extracted and reducing the stress on the system earlier and therefore the risk to the environment is reduced. DPE-Water should consider applying a similar rostering system for connected systems in other water sharing plan areas.

While these rules help to regulate access to water in riverbed sediments, the Plan does not clearly state that it applies to water in riverbed sediments, as discussed in **Section 5.1**.

190 Clause 4(3)(b) of the Water Sharing Plan for the NSW Great Artesian Basin Shallow Groundwater Sources 2020 indicates that this plan applies to all waters in alluvial sediments at any depth below the surface of the ground.

191 DPI-Water (2016) *Water sharing plan for the Castlereagh Unregulated and Alluvial Water Sources: Background document for amended plan 2016*, p. 20.

192 Castlereagh River Binnaway to Gilgandra Management Zone of the Binnaway to Gilgandra Water Source and the Castlereagh River Gilgandra to Coonamble Water Source.

193 Clause 46(6) of the Plan.

194 Clause 46(6) of the Plan, which applies to Castlereagh River Binnaway to Gilgandra Management Zone of the Binnaway to Gilgandra Water Source and the Castlereagh River Gilgandra to Coonamble Water Source.

In addition to this clarification, while the Commission supports the principle of the current rules to reduce extraction, the rules should be tied to subsurface flow. Currently the rule does not relate to any monitoring of subsurface water levels or flows, and during prolonged drought conditions, access to subsurface flows would likely require further restrictions.

Based on data from the WaterNSW Water Licensing System, there are a total of 105 water access licences along the Castlereagh River Binnaway to Gilgandra Management Zone and Castlereagh River Gilgandra to Coonamble Water Source that have nominated water supply works which are spearpoints (see **Table 5**). Many of the approvals with spearpoint conditions are concentrated around Gilgandra. The total entitlement available via these access licences is close to the average annual flows in the river (as recorded at Gungalman Bridge) and is likely unsustainable during prolonged drought periods (see **Figure 5**).

Based on daily flow data since 2001, the Castlereagh at Gungalman Bridge experiences cease to flow periods 44 percent of the time (see **Figure 6**). During these periods it is anticipated that access to water in the riverbed sediments via spearpoints would increase. There is also the potential for users to sink new spearpoints when they can no longer access water. However, there is no data available on extraction via spearpoints and there is uncertainty regarding the number of active spearpoints.

Spearpoint access between Binnaway and Coonamble would likely pose a risk to downstream users and the environment, including GDEs (see **Section 4.5**). However, there is inadequate monitoring between Binnaway and Gungalman, particularly between Gilgandra and Coonamble, to determine the impacts of spearpoint extraction, including during drought periods. The lack of empirical data makes it difficult to draw conclusions around the effectiveness of Plan rules and the impacts of more densely concentrated spearpoints around Gilgandra. Shallow piezometers should be installed as a priority between Gilgandra and Coonamble to address this gap and provide a reference point for access rules.

Table 5: Licences with spearpoint condition in Plan water sources

Water source	Number of licences	Licences with spearpoint condition[195]	Total entitlement (ML)	Spearpoint entitlement (ML)
Below Binnaway to Gilgandra	65	50	8,473	7,189
Gilgandra to Coonamble	77	55	4,845	3,193
Total	**142**	**105**	**13,318**	**10,382**

[195] The 'spearpoint' condition (MW0552-00001) assigned to almost half the unregulated river water source licences states that '*water may be taken under this access licence for a 24-hour period commencing at 18.00 on an odd-numbered calendar day if (a) there is no visible flow in the water source at the location where water is to be taken, and (b) the nominated water supply work is a spearpoint within the alluvial sand beds. This restriction does not apply if water is to be taken from a runoff harvesting dam or an in-river dam pool*'.

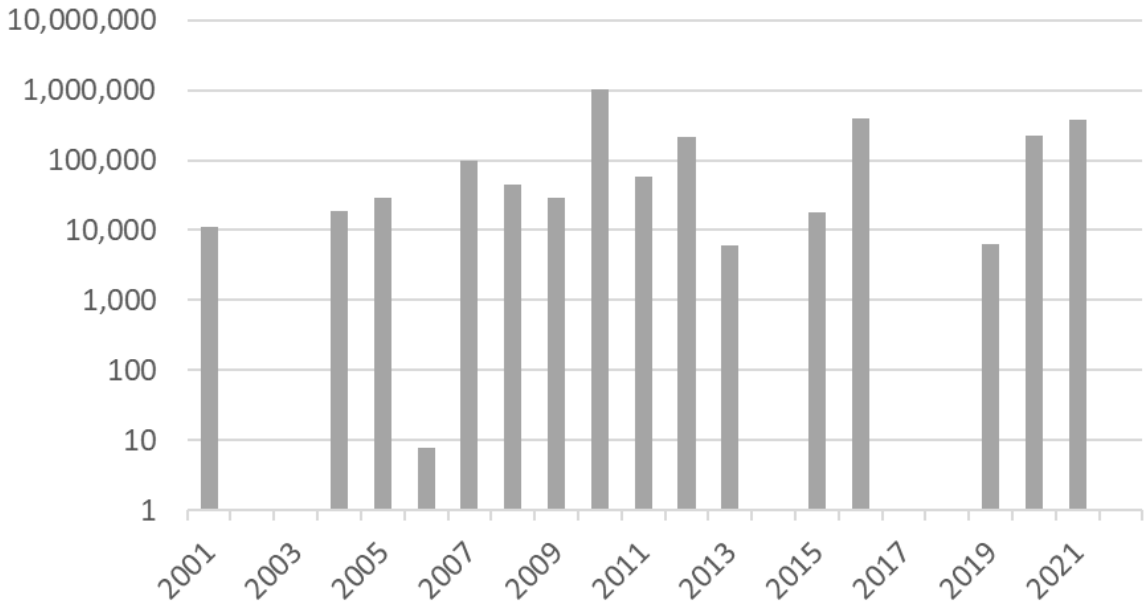

Figure 5: Mean annual discharge (ML) in the Castlereagh River at Gungalman Bridge (420020)[196]

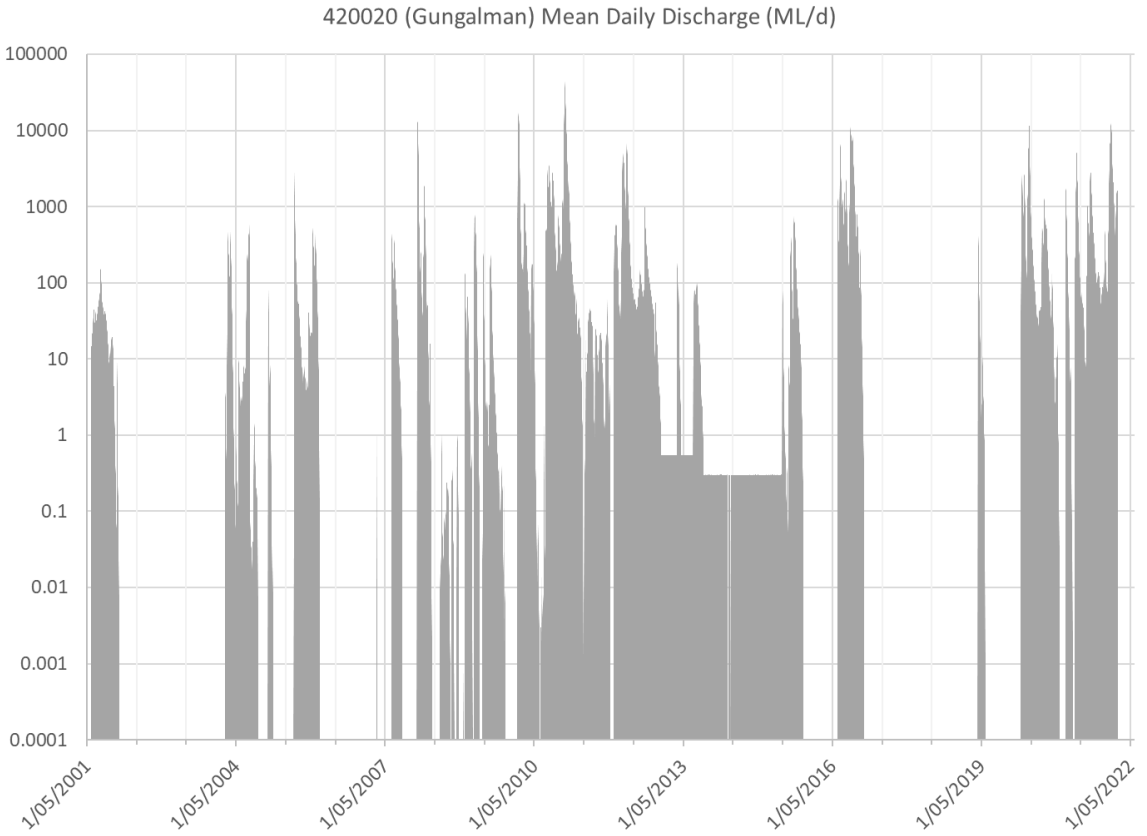

Figure 6: Daily flows (ML) in the Castlereagh River at Gungalman Bridge (420020)[197]

196 Data used to generate this graph derived from WaterNSW (2022) *Real time data: 420020 (Castlereagh River at Gungalman)*

197 WaterNSW (2022) *Real time data: 420020 (Castlereagh River at Gungalman)*

5.3 Rules for connected water sources are inconsistent

The removal of the alluvial groundwater sources from the Plan was not accompanied by provisions to maintain the linkages between alluvial and surface water sources. The connectivity between the surface water, the water in the riverbed sediments and the surrounding alluvial needs to be considered across the water sharing plans.

In NSW, water sources are defined as 'highly connected' if 70 percent or more of groundwater pumped in an irrigation season is derived from stream flow.[198] Under that definition, for the purposes of managing surface and groundwater connectivity, the Castlereagh Alluvial Water Source is considered less highly connected to the unregulated Binnaway to Gilgandra Water Source.[199] However, this definition does not consider the spatial setting of shallow bores. Many alluvial groundwater licences are located adjacent to the main trunk of the Castlereagh River between Binnaway and Gilgandra and therefore groundwater extraction has the potential to impact surface water flows.

Alluvial groundwater is generally fresh, but low yielding, except where major wells are installed that tap deeper underground river water in unconsolidated sands and gravels. Approximately 60 percent of all alluvial aquifer licences are located between Mendooran and Gilgandra. There are a significant number of shallow bores, including dug wells. These licences do not have rates or cease to pump rules, despite being in close proximity to the river channel.

Inconsistencies between the rules for shallow groundwater bores and wells regulated by the *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Sources* and spearpoints regulated under the Plan need to be addressed. This includes the spatial extent of the water sources covered (Binnaway to Gilgandra in the groundwater plan and Binnaway to Coonamble in the surface water plan).

Unlike the alternative-day access rules for spearpoints, there are no corresponding restrictions on take that apply to groundwater bores. Consequently, there is a risk that extraction of shallow groundwater and linkages between surface and groundwater are not effectively managed under the current water sharing plans. In the Plan remake, DPE-Water should clearly link access rules between licences that allow water take from the alluvial aquifer and through the riverbed sediments.

198 DPI-Water (2015) *Macro water sharing plans – the approach for groundwater.* A report to assist community consultation, p. 6.

199 DPI-Water (2016) *Water sharing plan for the Castlereagh Unregulated and Alluvial Water Sources: Background document for amended plan 2016*

5.4 Recommendations

R 8	In the Plan remake, to improve the management of spearpoints and surface-groundwater connectivity, DPE-Water should: a) update Clause 4(3) of the Plan to recognise that the Plan's water sources also consist of water in riverbed sediments. The Plan should clearly delineate the maximum depth of riverbed sediments the Plan applies to. The relevant groundwater plans should also be clear that they exclude water in riverbed sediments that are covered by the Plan. b) prioritise the installation of shallow piezometers between Gilgandra and Coonamble and update access rules (under clause 46(6)) to link access via spearpoints with piezometer measurements. c) improve consistency between access rules for alluvial groundwater bores regulated by the *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Sources 2020* and spearpoints covered by the Plan, by adopting linked access rules and rostering. This should include adopting consistent restrictions for spearpoints to shallow groundwater bores and investigating extending the spatial extent of the water sources covered by the groundwater plan.
SA 2	DPE-Water should consider adopting the rostering arrangements for spearpoint access in the Plan for connected systems in other water sharing plan areas including for extraction points in the alluvial groundwater that are likely to be highly connected to the water in riverbed sediments.

6 Delivering outcomes for Aboriginal people

The Commission continues to identify critical issues in water sharing plans relating to native title, Aboriginal water rights, and protection of cultural values across all its water sharing plan reviews in the 2020-22 period (see **Box 1**).[200] This review highlights several specific examples of these critical issues for Aboriginal water in the Plan area.

Box 1 - Key issues for Aboriginal water in water sharing plans

- Provisions fail to protect and allocate water for native title determinations, and do not proactively consider water requirements for native title registered claims and other Aboriginal land ownership.
- Aboriginal water cultural values are not adequately identified and protected, and watering needs are not provided for under current water sharing plan provisions.
- Provisions for Aboriginal water limit uses to traditional cultural applications, and do not supporting a range of values, including economic uses as defined in water sharing plan objectives, vision, and the Act.
- Aboriginal engagement in water planning, monitoring and management has been inconsistent and inadequate, limiting knowledge and support of Aboriginal water values and uses.
- 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*.

The Commission acknowledges that the COVID-19 pandemic and lockdowns from June to October 2021 limited face-to-face stakeholder engagement for this review, including with Aboriginal peoples. The Commission supports engagement with Aboriginal communities as part of any Plan replacement process and views this as critical in the path towards improving outcomes for Aboriginal peoples. The Plan replacement process is the responsibility of DPE-Water, including stakeholder engagement. The Commission is committed to stakeholder engagement as part of its review process and will continue to engage with Aboriginal stakeholders as part of its review scope.

The *NSW Water Strategy* recognises and specifies several actions to address key issues for Aboriginal water, including state-wide commitments under an Aboriginal water strategy.[201] These actions respond to recurring recommendations from the Commission's and other reviews and offer the foundations for addressing ongoing injustices in Aboriginal water rights and interests.

200 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).

201 Priority 2 under the *NSW Water Strategy 2021* sets out several actions to '*Recognise First Nations/Aboriginal People's rights and values and increase access to and ownership of water for cultural and economic purposes*', to:

- strengthen the role of First Nations/Aboriginal people in water planning and management
- develop a state-wide Aboriginal water strategy
- provide Aboriginal ownership of and access to water for cultural and economic purposes
- work with First Nations/Aboriginal people to improve shared water knowledge
- work with First Nations/Aboriginal people to maintain and preserve water-related cultural sites and landscapes.

Research continues to demonstrate issues of inequity under NSW legislation that need to be addressed at a state-wide scale,[202] in line with new Closing the Gap targets[203] and the recent Productivity Commission review of national water reform.[204] This was further reinforced in a submission:

> '*[NSW Aboriginal Land Council] seeks to ensure that the NSW Government meets its commitments outlined in the National Agreement on Closing the Gap (CtG)…All governments have committed to increasing Aboriginal water rights through specific CtG targets. NSWALC has previously recommend that this should include increasing the volume of water access entitlements allocated under state and territory water rights regimes to Aboriginal and Torres Strait Islander organisations.*'[205]

To address common issues, the Commission has also outlined state-wide recommendations for Aboriginal water (see **Section 6.4**).

Details on the timelines and processes for implementing the Aboriginal water strategy and actions are now required – this needs to be co-designed with key Aboriginal stakeholders and with increased Aboriginal staff involvement and leadership. DPE-Water advised the Commission that a draft for consultation will be shared by mid-2022. As noted in previous reviews, there have been significant limitations in engagement of Aboriginal peoples that are hindering genuine co-design approaches.[206] 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.

The draft *Macquarie-Castlereagh Regional Water Strategy*[207] also specifies several actions to recognise and protect local Aboriginal water rights, interests, and ensure greater involvement of Aboriginal people in water management. The strategy emphasises the importance of water sharing plans embedding these actions going forward:

> *'The challenge now is to embed these commitments and actions in the NSW water planning and water licencing framework. Water sharing plans are one of the ways that Aboriginal rights and interests in water can be recognised, quantified and transparently actioned in ways that support cultural and economic needs.'*[208]

Priority options in the strategy that could inform the replacement Plan include mapping water dependent cultural sites, review of cultural access licences and a culturally appropriate water

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202 A recent study of empirical water entitlement data in the NSW portion of the Murray-Darling Basin showed that while Aboriginal people in this area constitute nearly 10 percent of the population, their organisations hold only 0.2 percent of the available surface water. In addition, 17.2 percent of Aboriginal water holdings by volume were lost from 2009−18. See: Hartwig, L., Jackson, S., Osborne, N. (2020) 'Trends in Aboriginal water ownership in New South Wales, Australia: The continuities between colonial and neoliberal forms of dispossession', *Land Use Policy* 99.

203 The National Agreement on Closing the Gap (July 2020) includes an additional outcome area '*Aboriginal and Torres Strait Islander people maintain a distinctive cultural, spiritual, physical and economic relationship with their land and waters*' and two associated targets for land and water: '*a) Target 15a: By 2030, a 15 percent increase in Australia's landmass subject to Aboriginal and Torres Strait Islander people's legal rights or interests; b) Target 15b: By 2030, a 15 percent increase in areas covered by Aboriginal and Torres Strait Islander people's legal rights or interests in the sea*'. See: Closing the Gap (2020) *National Agreement on Closing the Gap*

204 Productivity Commission (2021) *National Water Reform 2020*

205 Submission: NSW Aboriginal Land Council, received 16 July 2021.

206 The Commission notes that DPIE-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 the state. However, there were several delays, significant barriers and the group has been disbanded.

207 DPIE (2020) *Draft Regional Water Strategy: Macquarie-Castlereagh Strategy*

208 *Ibid*.

knowledge program.[209] DPE-Water should ensure the replacement Plan aligns and supports the Aboriginal cultural and economic objectives proposed in the draft *Macquarie-Castlereagh Regional Water Strategy.*

6.1 Proactively recognise native title and Aboriginal land

Much of the Plan area is covered by two large registered native title claims and an ILUA, and the area has a large and strongly connected Aboriginal population (see **Section 2.6**). The Gomeroi, the Ngemba/Ngiyampaa, Wangaaypuwan and Wayilwan, and the Tubba-Gah Wiradjuri peoples need to be engaged as a priority, including in the co-design of plan provisions.

In line with other updated inland plans, this Plan includes a requirement to provide water to satisfy native title rights, where a determination or ILUA is made.[210] The Plan also includes a relevant objective, strategy and performance indicator to monitor the extent to which native title requirements have been met[211] and a provision to support amendments where native title rights may change under the *Native Title Act 1993*.[212]

In the *Gwydir Surface Water Resource Plan* consultation process, the Gomeroi People stated that access to water was critical to their survival and spiritual wellbeing. They also raised concerns about actively improving the health of river systems to support these needs:

> '*The wellbeing of Gomeroi people is dependent on water. Social activities like swimming, children's play and gathering revolve around rivers and creeks. They use water for cleaning, cooking, drinking, fishing and healing. Most Gomeroi people live by water. When the rivers are flowing, people are healthy, they say. When the rivers are dry, people get sick. Gomeroi people are greatly concerned about the levels of illness in their communities. Water health also has a major impact on emotional and mental wellbeing, particularly of youth. Young people commit crimes when there is no water in the river because they are bored. When youth and adults alike can't enjoy each other's company, swim and celebrate life by the river, their health suffers.*'[213]

> '*Gomeroi people would like to see the river systems restored to health. To them, this means that the flow, in particular, is restored closer to its natural state. They would like to see better water levels and water quality. They hope this would bring back more fish to the system. Fish could be restocked and bred. The Gomeroi would like to see riparian zones restored and native trees propagated. They would like to see research to build the connections between Country health and population health from a Western science perspective.*'[214]

Ten councils in the western region[215] were asked to register as interested parties for the Ngemba/Ngiyampaa, Wangaaypuwan and Wayilwan, and the Tubba-Gah Wiradjuri native title claim.[216] While the claim includes crown land and water in the area, the mayor of Warren Shire noted the need to clarify water supply as part of the native title claim process.

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209 See Option 42, 43 and 47 of DPIE-Water (2020) *Draft Regional Water Strategy: Macquarie-Castlereagh Strategy*).
210 Division 2, Section 20 of the Plan.
211 Part 2, Section 12(2), (3), (4) of the Plan.
212 Division 2, Section 20 of the Plan.
213 Department of Industry (2018) *Gwydir Surface Water Resource Plan: Report on culturally appropriate First Nations consultation with Gomeroi Nation. Appendix A to Schedule C* .
214 *Ibid*.
215 The claim takes in the Bogan, Brewarrina, Carrathool, Central Darling, Cobar, Coonamble, Gilgandra, Lachlan, Walgett and Warren council areas.
216 Herron, R. (2012) 'Councils register their stake in native title claim', *ABC News*, 4 October.

The Commission recommends that the Gomeroi and Ngemba/Ngiyampaa, Wangaaypuwan and Wayilwan native title claimants are engaged as a priority to identify water-dependent cultural values and how Plan provisions[217] can better support and protect these values as part of the Plan remake and ongoing Plan improvement. The Commission continues to raise concerns regarding the limitations of the extent to which native title determinations and established ILUAs are reflected in water sharing plan provisions.

In the development of any new Plan, DPE-Water should draw on native title claims and ILUAs 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. 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.[218]

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. The Commission also recommends that DPE-Water appropriately consult with the Tubba-Gah People as part of the Plan replacement process to ensure there are provisions in any new Plan to satisfy watering needs under the ILUA. Engagement should then continue through Plan development and implementation in line with actions under Priority 2 of the *NSW Water Strategy*.[219]

6.2 Identify and protect Aboriginal water values and uses

The Plan aligns with the updated inland plans to include common objectives,[220] vision,[221] strategies[222] and performance indicators[223] to maintain and improve values and uses of water by Aboriginal people. However, the Plan's background document provides very limited information on Aboriginal values. It notes there are Aboriginal sites around Gilgandra, a waterhole in the Castlereagh River and that camping on the eastern side of the river area are highly valued by Aboriginal people.[224] The background document does not identify any other Aboriginal assets in the region, including recognised Aboriginal places (see **Section 2.6** for key assets in the Plan area).

There is also a common provision that allows for amendments to protect any identified water-dependent Aboriginal cultural assets after Year 5 of the Plan.[225] The Commission's review revealed that Plan provisions have not been updated over the life of the Plan to recognise Aboriginal cultural assets or appropriate water sharing rules to maintain these assets. As a matter of priority best available information regarding cultural assets should be reviewed and DPE-Water should ensure that water sharing rules maintain these assets as provided for by the amendment provision. In general, the Commission considers that timed provisions to include cultural assets after a set period is unnecessary, inequitable and could result in harm or desecration of Aboriginal cultural assets.

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217 And provisions from other relevant water sharing plans, including those that relate to the Macquarie catchment.
218 Federal Court of Australia (2022) *Native Title - What is the process for a determination?*
219 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*)
220 Part 2, Section 12(2) of the Plan.
221 Part 2, Section 9 of the Plan.
222 Part 2, Section 12(3) of the Plan.
223 Part 2, Section 12(4) of the Plan.
224 DPI-Water (2016) *Water sharing plan for the Castlereagh Unregulated and Alluvial Water Sources: Background document for amended plan 2016*
225 Clause 78(4) of the Plan.

Water sharing plan provisions should be updated as a matter of priority over the life of the Plan as new information about Aboriginal cultural values becomes available. DPE-Water should establish systems and procedures that regularly check key sources for cultural and native title information updates.

Across all inland plan reviews, the Commission has received consistent feedback from Aboriginal stakeholders that the updated plans do not reflect the engagement undertaken as part of the water resource plan processes (although there has been some limited engagement in some areas), and they do not reflect the views of individual Aboriginal nations, instead being generically applied across all relevant plans.[226] This issue is described in one submission to this review:

> '*The current Plan, at Part 2, 12 Aboriginal cultural objectives, attempts to reflect DPIE's commitment to work with Aboriginal communities. Nevertheless, this section does not explicitly reference Aboriginal peoples spiritual, customary and economic relationship with water. [NSW Aboriginal Land Council] recommends, in consultation with local Aboriginal communities, further detail is provided in the Aboriginal cultural objectives and performance indicators in the Plan. This would support the intent to recognise the importance of rivers and ground water for Aboriginal peoples and to work closely with Aboriginal communities to develop water sharing plans."*[227]

It has been noted in other reviews that the strategies and performance indicators are impractical to implement and monitor and are not defined in the Schedule of the Plan. As a result, Aboriginal water values are not well recognised, integrated or protected.[228]

6.3 Provide for tangible water access and uses

Following the identification and protection of Aboriginal water values, water sharing plans need to provide for these values through rules in the plans, in ways that are supported by the Traditional Owners and local Aboriginal peoples in the Plan area.

In this Plan, only an 'Aboriginal cultural' specific purpose access licence is available to provide access to water. This can only be used for traditional cultural purposes (not commercial or trading activities)[229] and allocations are capped at up to 10 ML per licence per year.[230] This review has not identified any instances where these licences have been issued under the Plan.

The Commission's reviews consistently find that Aboriginal-specific water licences available in NSW are highly restrictive, inequitable, subject to significant limitations in use and awareness, and unable to be easily accessed and applied for, or monitored – as noted in a submission:

> *'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*

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226 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).

227 Submission: NSW Aboriginal Land Council, received 16 July 2021.

228 Submissions: *'The WSP has failed to protect, preserve, maintain and enhance the Aboriginal, cultural and heritage values or to protect basic landholder rights.'* (Inland Rivers Network, received 18 December 2020); *'The WSP has failed to protect, preserve, maintain and enhance the Aboriginal, cultural and heritage values or to protect basic landholder rights.'* (Charles Sturt University, received 18 December 2020).

229 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.

230 See Part 8, Clause 54(5); Part 7, Clause 35(3); Clause 36(4) of the Plan.

> *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*.'[231]

There is limited guidance available to help Aboriginal people apply for licences, or information on the process. Moreover, Aboriginal people are often constrained in using these licences due to limited resources and the infrastructure required to access water. The Commission understands that DPE-Water has factsheets (previously the responsibility of NRAR) available for applying for special purpose water access licences for Aboriginal cultural purposes.[232]

In addition, these licences are inherently limiting by excluding economic uses. This is despite the objectives of the Plan clearly stating that Aboriginal economic values are to be maintained, and where possible improved.[233] This was described in a submission to this review:

> *'[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 … Maintaining spiritual and cultural relationships with land, water and Country are intertwined for Aboriginal peoples. The right to economically develop natural resources, consistent with cultural obligations, is also of significant importance.'*[234]

This issue was also raised as part of the *Macquarie-Castlereagh Regional Water Strategy* public consultation process:

> '*We also heard that Aboriginal people want ownership of cultural water entitlements that allow for economic benefit. While there are Aboriginal businesses, groups and Aboriginal Land Councils that own water access licences (which are available on the market for trading), generally the cost involved means that Aboriginal people cannot afford to buy these entitlements and allocations*.'[235]

The Commission notes that Aboriginal peoples and representative groups have put forward a range of mechanisms that could better provide for Aboriginal water values as part of water sharing plans. The most appropriate ways to identify the mechanisms needed to provide for Aboriginal water values is to work closely with Traditional Owners, local Aboriginal groups, and knowledge holders as part of a well-resourced engagement effort in the Plan area. As noted in a submission to this review, engagement has been lacking and this has impacted on the ability of the Plan to identify and protect Aboriginal values:

> '*The Plan shows a large gap in engagement with Aboriginal peoples in water planning, and does not adequately reflect DPE's commitment to work with Aboriginal communities to develop water sharing plans…Aboriginal people have a spiritual, customary and economic relationship with water and can provide important insight into 'best practice' for natural resource management.'*[236]

> '*Aboriginal peoples are not merely one stakeholder among others, but we possess inherent and pre-eminent rights, values and interests in the lands and waters on account of our status as Australia's First Peoples. As such, Aboriginal peoples and communities should be engaged in meaningful consultation*.'[237]

231 Submission: NSW Aboriginal Land Council, received 16 July 2021.
232 DPIE (2019) *Factsheet: Application fees for water licences 2019-20*
233 Part 2, Section 12(1) of the Plan.
234 Submission: NSW Aboriginal Land Council, received 16 July 2021.
235 DPIE (2020) *Draft Regional Water Strategy, Macquarie-Castlereagh, September 2020*
236 Submission: NSW Aboriginal Land Council, received 16 July 2021.
237 Submission: NSW Aboriginal Land Council, received 16 July 2021.

To acknowledge this diversity of Aboriginal water interests, the Commission continues to recommend state-wide initiatives for DPE-Water to:

- adopt a common principle across all water sharing plans to ensure that, where additional allocations become available within Plans, Aboriginal water needs including Aboriginal water allocations and/or licences are assessed and provided for as a priority
- co-design licences or other water custodianship options (volumetric, non-volumetric and non-licensed solutions) with Aboriginal stakeholders that meet a range of identified needs (cultural, environmental, social, and economic uses).

6.4 Recommendations

R 9	In the Plan remake, to better achieve Aboriginal water objectives as stated in the Plan, DPE-Water should: a) include registered native title claims and ILUAs of the Gomeroi, the Ngemba/Ngiyampaa, Wangaaypuwan and Wayilwan, and the Tubba-Gah peoples, and allow sufficient time to undertake detailed engagement with these Traditional Owners and other Aboriginal knowledge holders to identify cultural values and provisions to protect and support these values b) identify and protect known high value cultural sites in the replacement Plan and undertake further work with a range of Traditional Owners and knowledge holders to better understand water values and uses, identify the rules to protect them, and support water access and use c) update amendment provisions to state that the Plan can be amended to protect cultural values based on best available information and any amendments based on new information should occur in a timely manner d) ensure that where additional entitlement becomes available, that Aboriginal water needs are assessed and provided for as a priority e) undertake state-wide actions identified in the Commission's water sharing plan reviews to improve consideration and respect for native title and Aboriginal values in water sharing plans. [238]

238 At a minimum, state-wide actions to support Aboriginal water rights, values and uses include to:
- hire and train Aboriginal staff to undertake culturally appropriate water planning, management and engagement
- proactively consider native title claims, ILUAs or other Aboriginal land and water agreements wherever possible as part of the planning, drafting and engagement process for plans.
- establish common provisions to undertake preliminary amendments to a plan within six months of a registered native title claim or determination. Allow for additional time to undertake detailed engagement with Traditional Owners to make any specific water allocations and final amendments to the plan required.
- work to identify Aboriginal values and uses, objectives and outcomes in all plan areas through extensive engagement with local Aboriginal knowledge holders – include linked strategies, indicators and monitoring plans to ensure these are met.
- use well-evidenced cultural flow and Country-based principles and processes for identifying, protecting, and monitoring Aboriginal water values and outcomes
- co-design options to support a wide range of cultural, environmental, social and economic water values and uses – for example, volumetric allocations from unallocated flows; water purchase or transfer of licences; improved licensing; other water custodianship that is non-volumetric/non-licensed; commercial and trading options.
- identify and support the appropriate infrastructure, resources and education needed to support Aboriginal water access and use
- co-design and deliver awareness-raising, capability-building and education measures on water sharing, planning and management in NSW
- support Aboriginal ownership, management and leadership in water and ensure this is well-resourced to help meet Closing the Gap targets
- consider, prioritise and commit to changes to legislation and policy that are needed to support these actions.

7 Securing town water supply

The Plan area experienced major droughts over the last period, with associated issues highlighting aspects of the Plan that are not adequate to manage severe drought. While town water supply entitlements would have been sufficient – if available – over the life of the Plan, councils in the Plan area advised that they were unable to access this entitlement during the 2019 drought due to inadequate inflows to dams and rivers. At this time, councils were required to augment town water supply systems with bores and access groundwater for short term use.

One exception was Gilgandra Shire, which advised that its town water supply entitlement was adequately provided for over the life of the Plan.[239] In times of drought the local community has relied upon long established bores to supplement town water supply.[240] These bores also supplemented a small number of some stock and domestic users during the drought. The impact of groundwater extraction on surface water is unknown.

Key issues associated with town water supply are discussed in the following sections and include:

- significant risks to Warrumbungle town water supply (**Section 7.1**)
- risks to Mendooran's town water supply from spearpoint extraction (**Section 7.2**)
- future risk to water availability under climate change across the Plan area (**Section 7.3**).

In considering water security issues, the Commission notes the Plan area's large and diverse Aboriginal and Torres Strait Islander populations (see **Section 2.6**). Research shows that Indigenous Australians experience much higher levels of disadvantage than non-Indigenous Australians.[241] As a result, it will be critical that DPE-Water engage with local councils and Aboriginal representatives during the Plan remake to determine if town water supply needs have been adequately provided for in associated entitlements and Plan provisions.

In particular, the Commission was unable to report if town water was adequately provided for in Coonamble and Gulargambone due to limited submissions and access to stakeholders for interviews because of the COVID-19 pandemic. It is important that these towns are consulted as part of the Plan remake. Maintaining Coonamble's access to town water supply is essential to meet critical needs, given existing disadvantage and vulnerabilities as a remote town.[242]

7.1 Warrumbungle Shire town water security was at risk

During the Plan period, townships in the Warrumbungle Shire were at risk of running out of town water. These impacts were felt in 2017, earlier than other towns in NSW. In 2018, Timor Dam dropped to 23 percent capacity and Coonabarabran required Level 6 water restrictions until bore access was established, which had significant wellbeing implications for residents.[243] Warrumbungle Water advised that seven additional bores were installed, attached to its

239 Interview: Gilgandra Shire Council, 24 November 2021.
240 Interview: Gilgandra Shire Council, 24 November 2021.
241 Closing the Gap (2020) *National Agreement on Closing the Gap*.
242 Schirmer, L. & 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.
243 Interview: Warrumbungle Shire Council, 20 October 2021; Level 6 restrictions were instated for residents and business in Coonabarabran, which require: grey water for outside uses; 3 minute showers; only two loads of clothes washing per week; limited air conditioner use; no turf farm irrigation or market garden watering (Warrumbungle Shire (2018) *Warrumbungle Shire Drought Management Plan*); McPherson, E. (2018) 'The NSW town that's running out of water', *Nine News*, 14 June; Carbonell, R. & Davies, J. (2019) 'Who's watching the water? Experts sound warning on deteriorating groundwater monitoring', *ABC News*, 2 March.

previous groundwater licences. The Warrumbungle Shire Council used this groundwater when surface water ran out, as well as purchasing temporary water.[244]

Warrumbungle Shire Council also advised that the Castlereagh River nearly ran dry during the drought, leaving Binnaway with no town water supply.[245] Historically, gauging records indicate this is a frequent occurrence. To address this risk, Warrumbungle Shire Council installed a backup bore as a supplementary water source. However, this approach still requires some access to surface water, as the groundwater has water quality issues (for example, fluoride was too high) and needs to be blended with surface water to meet water quality requirements.[246] The Plan remake should investigate the drivers of these issues and protect surface water flows and localised drawdown to ensure that town water requirements are met to the extent possible.

Securing quality drinking town water supply has been difficult because:

- the main water supply, Timor Dam, has a small catchment area
- there is insufficient capital to invest in water supply augmentation options
- the licence conditions for Timor Dam releases (particularly environmental flow conditions) made raising the dam wall cost ineffective.[247]

The *Regional Water Strategy for Macquarie-Castlereagh* identifies Coonabarabran, Dunedoo and Coolah in the Warrumbungle Shire as having a very high water security risk.[248] The *Warrumbungle Shire Drought Management Plan* also highlights these risks:

> *'The towns of Coonabarabran, Binnaway, Mendooran and Gilgandra on the unregulated Castlereagh river have been experiencing record low inflows, affecting their surface water availability. Across the region, securing water of a suitable quality for smaller towns that rely mainly on unregulated rivers and creeks for their water is becoming increasingly challenging in the context of a more variable climate.'*[249]
>
> *'Improved water security and reliability will also be critical to attracting people, businesses and jobs to the region, supporting the growing tourism industry and taking up new opportunities offered by the Inland Rail Project and other investments. There is the potential for a range of industries (such as manufacturing, services and education) to grow if there is enhanced water security for towns.'*[250]

In 2018, Warrumbungle Shire Council developed a drought management strategy to address town water security issues.[251] Strategies included:

- emergency capital works, including six bores to access groundwater as an alternative supply and minimising water losses in the water reticulation network
- water restriction policies to reduce water usage
- plant upgrades to improve water quality (for example, blue green algae) and flushing Timor Dam to manage the quality of dead water
- examining the costs and benefits of raising the Timor Dam wall – in 2019, Warrumbungle Water investigated the option to raise Timor Dam wall, but this was rejected. It is beyond the scope of the Commission's review to do a detailed analysis of raising Timor Dam. Ensuring water security for town water is critical element of water sharing plans and must

244 Interview: Warrumbungle Shire Council, 20 October 2021.
245 Interview: Warrumbungle Shire Council, 20 October 2021.
246 Interview: Warrumbungle Shire Council, 20 October 2021.
247 Interview: Warrumbungle Shire, 20 October 2021.
248 NSW Government (2020) *Draft Regional water Strategy – Macquarie-Castlereagh Strategy*
249 Warrumbungle Shire (2018) *Warrumbungle Shire Drought Management Plan*
250 *Ibid*.
251 *Ibid*.

be considered. Towns have the capacity to impact on the environment and other users. It is important that the remade Plan consider how to support town water supply needs without unacceptable impacts to the environment.

Warrumbungle Shire Council advised that required environmental flow releases have not been provided from Timor Dam due to the mechanisms that release water from the dam.[252] The environmental flow releases are likely to still be required from Timor Dam (see **Section 4.2**). However, Warrumbungle Shire Council advised that any releases from Timor Dam will place additional pressure on town water supply given Coonabarabran's high water security risk.[253] A review of the environmental flow requirements for Timor Dam alongside town water security needs is required as part of the Plan remake. This should consider latest climate change data, as well as the physical capacity of the dam to meet flow requirements. The flow requirements should adequately protect the environment, while providing as much access for town water as possible.

7.2 Rules to minimise interference with Mendooran's town water supply are needed

The Mendooran offtake is in the river reach where sand beds occur. Flows are intermittent through this reach as they move through the sand bed. Extraction from these sand beds is allowed through spearpoints and is managed under the Plan. All other groundwater in the area is managed under the *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Resources 2020*.[254] The groundwater plan includes setback distances for bores in the groundwater plan to protect town water supply bores from other groundwater extraction. However, the Castlereagh Plan does not include setback distances to minimise interference with local water utility works from spearpoint access. Warrumbungle Shire Council advised that the Plan offers reduced protections for town water supply compared to the *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Sources 2020*.[255,256] Rules that seek to minimise interference from spearpoints in proximity to works used by local water utilities should be considered as part of the Plan remake.

The level of protection for town water supply between the two plans should be reviewed, ensuring conditions reflect the priorities of the Act. Where spearpoint licences allow extraction beyond visible flow, setback distances to protect towns, basic rights and environmental assets in accordance with the Act priorities should be applied.

7.3 Risks from climate change should be considered

Population growth is not expected to be a risk to town water security over the life of the Plan, given growth in the Plan area since 2016 was relatively low and population is expected to decline with an annualised fall of 0.6 per year (see **Section 2.7**). However, extended drought will continue to place pressure on town water supply and are expected to increase in the Plan area under climate change predictions. The *Warrumbungle Shire Drought Management Plan*

252 Interview: Warrumbungle Shire Council, 20 October 2021.
253 DPIE (2020) *Draft Regional Water Strategy, Macquarie-Castlereagh*
254 Clause 39(1)(d) of the *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Resources 2020* requires seeks to minimise interference with works used by local water utilities by setting a setback distance of 500 metres from works nominated by a local water utility access licence or major utility access licence.
255 Interview: Warrumbungle Shire Council, 20 October 2021.
256 Clause 39 of the *Macquarie-Castlereagh Groundwater Resources Plan 2020* has setback distances for town water supply points (500 metres), as well as setback distances from basic landholder rights bores (200 metres). The spearpoint licences governed by the Plan do not have the same restrictions and licensed users can extract closer than groundwater licences.

references a 2016 CSIRO climate review indicating Central NSW has already experienced an increased warming of 0.8 degrees Celsius (pre-dating the recent drought).[257]

The catchment has also experienced significant change in annual rainfall, with a trend toward increasing rainfall of approximately 5 millimetres per decade in the north of the catchment (the Warrumbungle Shire). However, the increased evaporation resulting from the increased temperatures is likely to result in less runoff in future.[258]

DPE-Water Utilities is working closely with local councils to develop integrated water cycle management plans for drought management planning and to support future town water supply security:

> *'Local water utilities are responsible for undertaking long-term strategic town water services planning, including setting of service and investment priorities, revenue and pricing requirements. This planning includes the consideration of the local water utilities longer term and emerging risks to their water services.*
>
> *An Integrated Water Cycle Management Strategy is a 30-year plan developed by local water utilities that identifies an integrated water, sewerage and stormwater supply scenario that provides the best value for money on the basis of social, environmental and economic considerations. This encourages less reliance on limited natural water sources, less production of pollutant loads to the environment through stormwater and sewerage and involves efficient pricing and water management.'*[259]

The integrated water cycle management plans will provide important information on local water utility requirements for town water in the future and should be considered in the Plan remake. Adequate resourcing for DPE-Water and DPE-Water Utilities to collaborate in the development of plans will be critical going forward

7.4 Recommendations

R 10	In the Plan remake, to address risks to water security, DPE-Water should: a) in consultation with Warrumbungle Shire Council, NRAR and DPE Water Utilities, ensure town water supply security is not compromised as part of the review of environmental flows from Timor Dam (see **R 6**) b) assess the adequacy of access rules for licensed users, including spearpoint setback requirements, to ensure protection of town water supply requirements in accordance with the Act c) collaborate with DPE-Water Utilities to reflect the town water supply requirements for Coonamble and Gulargambone and ensure their future town water needs are included in Plan provisions.

257 Warrumbungle Shire (2018) *Warrumbungle Shire Drought Management Plan*
258 *Ibid*.
259 DPIE-Water (n.d.) *Water Utilities Best Practice Management – Integrated Water Cycle Management*

8 Monitoring, evaluation and reporting

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

The Commission recognises that DPE-Water is working to improve MER arrangements for water sharing plans (**Section 8.2**). However, this work will be subject to available funding. 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*.'[260] The Commission anticipates this action will be associated with funding commensurate with the importance of MER for assessing water sharing plan effectiveness and will support adaptive management.

8.1 Existing monitoring programs in the Plan area

There has been limited monitoring in the Castlereagh catchment during the Plan period. Monitoring in the Macquarie-Castlereagh Valley has largely focused on environmental flows through the Macquarie-Wambuul River and further downstream, the health and condition of the Macquarie Marshes and the response of the marshes to these flows. Remote cameras that were intended to be installed for monitoring flows in the Castlereagh River Binnaway to Gilgandra Management Zone of the Binnaway to Gilgandra Water Source and the Castlereagh River Gilgandra to Coonamble Water Source did not proceed. The Commission understands this was due to a lack of funding. This monitoring was intended to inform potential amendments to access rules along these river reaches.

8.2 Pathway towards improved MER

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

- updates to water sharing plan objectives to make them measurable and more meaningful
- the development of the NSW MER framework and customised environmental MER plans
- investment in projects to strengthen MER and help target resources, including development of a framework for prioritising water sources for MER activities and development of a transferability model.

The NSW MER framework and MER plans seek to integrate MER activities across agencies and map out monitoring effort by research theme. The intent was to then develop theme-based methods manuals which set out monitoring sites, arrangements for cooperative research, sampling methods and data management and analysis techniques.

The Commission has seen a copy of the *Macquarie-Castlereagh Surface Water Resource Plan*'s MER plan, which was designed to meet Basin Plan reporting requirements.[261] The environmental MER plan is based on program logic developed for the water sharing plan objectives, but also objectives from the long term water plans and water quality and salinity management plans. The program logic is intended to guide monitoring activities, while risk assessments undertaken as part of the water resource planning process are intended to inform

260 DPIE-Water (2021) *NSW Water Strategy*
261 DPIE-Water (2018*) NSW Macquarie-Castlereagh Surface Water Resource Plan Monitoring, Evaluation and Reporting Plan: Schedule J.*

areas for further research.[262] The MER plan also maps out existing monitoring programs by research theme, but as noted above, they largely focus on the Macquarie-Wambuul River. However, there is room for improvement in relation to the Plan area:

- while the amended Plans include clearer, measurable objectives, plan provisions have not been updated to support the achievement of the revised objectives, meaning that in some respects, these objectives risk not being met
- the MER plans do not explicitly identify areas for further research based on risk and value
- there do not appear to be clear roles and responsibilities or adequate resources for overseeing and implementing the MER plans, which generates risks to implementation
- methods manuals referred to in the MER plan do not appear to have been finalised.

Given limited resources, it is critical that DPE-Water continue identifying efficiencies – focussing on the most critical MER needs – and continue to work collaboratively with other government agencies and academic institutions to coordinate monitoring activities that support the evaluation of the Plans. MER activities should be prioritised based on value and risk, and public reporting of MER findings should be prioritised to improve transparency and public awareness around Plan outcomes. Water source prioritisation and transferability studies currently underway by DPE-Water will help to target effort and resources.

8.3 Knowledge gaps

There are significant knowledge gaps and limitations in monitoring in the Plan area. 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:

- periodically estimating or surveying current levels of extraction (where not metered)
- reviewing the hydrometric network to better understand surface and subsurface flows through riverbed sediments, particularly between Binnaway and Coonamble, where the installation of piezometers should be considered to understand the impacts of spearpoint extraction and provide a reference for access rules
- understanding connectivity between surface and groundwater between the Plan and adjacent water sharing plans, and high flows between the Barwon-Darling and the lower Castlereagh rivers to inform setting of consistent access rules
- understanding the impacts of climate change and how it will affect river flows and associated instream values and subsurface flows, particularly between Binnaway and Coonamble where most water supply works are spearpoints
- understanding fish communities in the upper catchment above Binnaway, including the impacts of water resource development on key species to inform potential changes to access rules
- understanding regionally significant wetlands, including their location, condition and risks from extraction.

[262] DPIE-Water (2018*) NSW Macquarie-Castlereagh Surface Water Resource Plan Monitoring, Evaluation and Reporting Plan: Schedule J*.

8.4 Recommendations

R 11	By June 2024, to improve Plan-specific MER, DPE-Water should: a) expedite the finalisation and publication of DPE-Water's water sharing plan evaluation framework and methods manuals and ensure there is multi-agency support and oversight of their implementation b) identify feasible and appropriate resourcing to support ongoing MER activities in line with the *NSW Water Strategy* c) specify timely reporting requirements of the results of MER activities to support transparency, public awareness, adaptive management and to leverage the effectiveness of MER investment d) identify and address critical knowledge gaps to support adaptive management e) use the recently developed prioritisation framework to prioritise MER activities based on values and risk.

9 Compensation

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

Specifically, the Act states:

> '*(3A) If a report of the Natural Resources Commission under subsection (3) recommends changes to a management plan that will result in a reduction of water allocations in relation to which compensation might be payable under section 87AA, the Commission is to state in the report whether the purpose of the proposed change is:*
>
> - *(a) to restore water to the environment because of natural reductions in inflow to the relevant water source, including but not limited to changes resulting from climate change, drought or bushfires, or*
> - *(b) to provide additional water to the environment because of more accurate scientific knowledge that demonstrates that the amount previously allocated to the environment is inadequate*.'

Many of the recommendations can be advanced without triggering compensation. However, the Commission considers that compensation might be payable under Section 87AA in relation to some recommendations listed in **Table 6**.

Table 6: Recommendations that may trigger compensation

R 2a	DPE-Water should determine a sustainable numeric LTAAEL that considers: i. impacts from extractions in the adjacent *Water Sharing Plan for the Macquarie-Castlereagh Groundwater Sources Order 2020* and *Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012* ii. best available information, including climate change projections, long-term climate data sets, updated and improved models, and contemporary observations of streamflows and water access during the most recent drought (2017 to 2019) iii. up-to-date estimates of basic landholder rights and accounts for estimated growth in domestic and stock use
R 5 (a, b, c, d, e)	In the Plan remake, to improve environmental outcomes, DPE-Water should: a) ensure the Plan reflects the latest information on environmental water requirements from the *Macquarie-Castlereagh Long Term Water Plan* and associated fish and flows advice from DPI-Fisheries b) review the flow classes for the Castlereagh Above Binnaway Water Source based on best available information regarding environmental flow requirements and suitable flow reference points, then incorporate and implement as part of the replacement Plan c) for the Castlereagh River Below Coonamble Water Source, investigate options to better protect low flows and first flush following cease to flow periods; establish a management zone for the lower floodplain to manage overflows from the Barwon-Darling River and ensure that when protected from extraction in the Barwon-Darling they are not extracted by Castlereagh licence holders

	d) determine the contribution of flows from the unregulated Castlereagh River to the Barwon-Darling and include relevant flow targets in the replacement Plan e) work with DPE-E&H and DPI-Fisheries to identify regionally significant wetlands, assess the risks to these sites and the adequacy of current rules in protecting environmental values from extraction
R 10b	In the Plan remake, to address risks to water security, DPE-Water should: b) assess the adequacy of access rules for licensed users, including spearpoint setback requirements, to ensure protection of town water supply requirements in accordance with the Act

Recommendation 2c could require compensation if the analysis determines that the current LTAAEL based on historic extraction is too high to adequately protect the water sources and their ecosystems. In this case the compensation may be due both because of new scientific information about ecological requirements as well as natural changes in climate, which may result in a lower availability of water into the future.

Recommendations 5a,b,c,d,e and 10b may require compensation if cease to pump rules or other restrictions materially affect overall long-term allocation available to users. Changes made under these recommendations would be necessary to provide additional water to the environment because of more accurate knowledge that demonstrates that the water currently allocated to the environment in the plan is inadequate to achieve objectives.

The Commission acknowledges that there are other recommendations that may affect water allocations. However, these changes are allowed through amendment provisions provided for in the Plan or in the Commission's view would not affect long-term allocation. In particular, the Commission acknowledges the **Recommendation 2d** may well lead to a reduction to current AWDs. However, the Commission notes that the Act allows the Minister to set the AWD at their discretion. Further, this clause would only ensure that a precautionary approach is taken to setting the AWD to ensure the current LTAAEL is adhered to. As such the Commission does not anticipate that the compensation Clause 87AA would be triggered. However, DPE-Water should seek their own legal advice on this matter.

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

Appendix A – Plan objectives, strategies and indicators

Table A1: Objectives, strategies and indicators in the Plan

Plan Vision
9 The vision for this Plan is to provide for the following: (a) the health and enhancement of these water sources and their water dependent ecosystems, (b) the continuing productive extraction of surface water for economic benefit, (c) the spiritual, social, customary and economic benefits of surface water to Aboriginal communities, (d) the social and cultural benefits to urban and rural communities that result from surface water.
10 Environmental Objectives 10 (1) The broad environmental objective of this Plan is to protect, and contribute to the enhancement of, the ecological condition of these water sources and their water dependent ecosystems over the term of this Plan.

Objectives	Strategies
(2) The targeted environmental objective of this Plan is to protect, and contribute to the enhancement of, the following over the term of this Plan: (a) the recorded distribution or extent, and population structure, of target ecological populations, (b) the longitudinal and lateral connectivity within and between water sources to support target ecological processes, (c) water quality within target ranges for these water sources to support water-dependent ecosystems and ecosystem functions.	(a) establish and maintain compliance with a long-term average annual extraction limit and a long-term average sustainable diversion limit, Note. Part 6 sets out the provisions for maintaining compliance with the long-term average annual extraction limit and long-term average sustainable diversion limit. (b) reserve a portion of flows to partially mitigate alterations to natural flow regimes in these water sources, (c) restrict the take of water from in-river and off-river pools when the volume of that water is less than full capacity, (d) restrict or prevent water supply work approvals on third order or higher streams, (e) reserve a portion of flows to maintain longitudinal connectivity between these water sources.

Environmental Performance Indicators

10 (4) The performance indicator used to measure the success in reaching the broad environmental objective in subclause (1) is an evaluation of the extent to which the combined outcomes of the targeted objective in subclause (2) have contributed to achieving the broad objective.

(5) The performance indicators used to measure the success of the strategies for reaching the targeted environmental objective in subclause (2) are the changes or trends in ecological condition during the term of this Plan, as assessed using one or more of the following:

(a) the recorded range, extent or condition of target ecological populations,

(b) measurements of fish movements through priority fish passage areas

(c) the recorded values of water quality measurements including salinity, turbidity, total nitrogen, total phosphorous, pH, water temperature and dissolved oxygen.

6) In evaluating the effectiveness of the strategies in meeting the objectives in this clause, the following will be relevant:

(a) the extent to which the strategies in subclause (3) and provisions in this Plan have been implemented and complied with,

(b) the extent to which changes in the performance indicators can be attributed to the strategies in subclause (3) and rules in this Plan,

(c) the extent to which the strategies in subclause (3) support achievement of the environmental objectives,

(d) the extent to which external influences on these water sources during the term of this Plan have affected progress toward achieving the environmental objectives.

Note: External influences may include climate trends, land use patterns and other factors.

11 Economic Objectives

(1) The broad economic objective of this Plan is to maintain, and where possible improve, access to water to optimise economic benefits for agriculture, surface water-dependent industries and local economies.

Objectives	Plan strategy
(2) The targeted economic objectives of this Plan are as follows: (a) to maintain, and where possible improve, water trading opportunities for surface water-dependent businesses, Note. Trading is a generic term referring to dealings under Division 4 of Part 2 of Chapter 3 of the Act. (b) to maintain, and where possible improve, access to water for agriculture, surface water-dependent businesses and landholders, (c) to contribute to maintaining water quality within target ranges for agriculture, surface water-dependent businesses and landholders.	(3) The strategies for reaching the targeted economic objectives of this Plan are as follows: (a) provide for trade of water allocations and shares components subject to environmental constraints, Note. The provisions in Part 10 of this Plan permit a variety of dealings within environmental constraints, including assignment of rights under access licences and assignment of water allocations between access licences. (b) provide a stable and predictable framework for sharing water among water users, Note. The compliance with extraction and diversion limit provisions in Division 4 of Part 6 of this Plan and the flow class and access provisions in division 2 of Part 8 of this Plan provide certainty in how water will be shared between different categories of access licences. (c) provide flexibility of access to water, Note. The individual account management provisions in clause 43 of this Plan, including the limit on the volume of water that can be taken in any water year or over three consecutive water years and the amount of water that may be carried over from one water year to the next, provide flexibility that reflects the characteristics of the licence category. (d) manage extractions to the long-term extraction limit and long-term average sustainable diversion limit, Note. Part 6 of this Plan manages the extraction of water within the long-term average annual extraction limit and the long-term average sustainable diversion limit.

Economic Performance Indicators

(4) The performance indicator used to measure the success of the strategies for reaching the broad economic objective in subclause (1) is an evaluation of the extent to which the combined outcomes of the targeted economic objectives in subclause (2) have contributed to achieving the broad objective.

(5) The performance indicators used to measure the success of the strategies for reaching the targeted economic objectives in subclause (2) are the changes or trends in economic benefits during the term of this Plan, as assessed using one or more of the following:

(a) the economic benefits of water extraction and use,

(b) the economic benefits of water trading, as demonstrated by:

(i) the annual number or volume of share components of access licences transferred or assigned,

(ii) the weighted average unit price of share components of access licences transferred or assigned,

(iii) the annual volume of water allocations assigned,

(iv) the weighted average unit price of water allocations assigned,

(c) the recorded values of water quality measurements including salinity, sodium adsorption ratio, harmful algal blooms, total nitrogen, total phosphorus, pH and dissolved oxygen.

(6) In evaluating the effectiveness of the strategies in meeting the objectives in this clause, the following will be relevant:

(a) the extent to which the strategies in subclause (3) and provisions in this Plan have been implemented and complied with,

(b) the extent to which the changes in the economic benefits of water extraction and use can be attributed to the strategies in subclause (3) and provisions in this Plan,

(c) the extent to which the strategies in subclause (3) support achievement of the economic objectives,

(d) the extent to which external influences on surface water-dependent business during the term of this Plan have affected progress toward achieving the economic objectives.

Note: External influences may include trends in urban, agricultural and industrial development, energy costs, commodity prices, interest rates, technology advances, climate or changes in industry policy or regulation.

12 Aboriginal Cultural Objectives

(1) The broad Aboriginal cultural objective of this Plan is to maintain and, where possible improve, the spiritual, social, customary and economic values and uses of water by Aboriginal peoples.

Objectives	Strategies
(2) The targeted Aboriginal cultural objectives of this Plan are as follows: (a) to provide access to water in the exercise of native title rights, (b) to provide access to water for Aboriginal cultural use, including fishing, (c) to protect, and where possible improve, identified surface water-dependent culturally significant areas, including important riparian vegetation communities, (d) to contribute to the maintenance of water quality within target ranges to ensure suitability of water for Aboriginal cultural use.	(3) The strategies for reaching the targeted Aboriginal cultural objectives of this Plan are as follows: (a) manage access to water consistently with the exercise of native title rights, (b) provide for water associated with Aboriginal cultural values and uses, Note. The provisions in Part 7 of this Plan provide opportunities for Aboriginal people to access water by allowing for the granting of an access licence of the subcategory “Aboriginal cultural”. (c) reserve a portion of flows to partially mitigate alterations to natural flow regimes in these water sources, (d) restrict the take of water from in-river and off-river pools when the volume of that water is less than full capacity, Note. The provisions in clauses 46 and 46B of this Plan restrict the take of water from in-river and off- river pools when the volume is less than full capacity, thereby contributing to the protection of native fish populations, swimming and recreational areas and riparian vegetation. (e) reserve a portion of natural flows to maintain hydrological connectivity within and between water sources.

	Note. The provisions in clauses 46, 46A and 46B of this Plan ensure that a portion of natural flows are protected from extraction.

Aboriginal Performance Indicators

(4) The performance indicator used to measure the success of the strategies for reaching the broad Aboriginal cultural objectives in subclause (1) is an evaluation of the extent to which the combined outcomes of the targeted Aboriginal cultural objectives in subclause (2) have contributed to achieving the broad objective.

(5) The performance indicators used to measure the success of the strategies for reaching the targeted Aboriginal cultural objectives in subclause (2) are the changes or trends in Aboriginal cultural benefits during the term of this Plan, as assessed using one or more of the following:

(a) the use of water by Aboriginal people by measuring factors including:

(i) the extent to which native title rights are capable of being exercised, consistently with any determination of native title or indigenous land use agreement,

(ii) the extent to which access to water has contributed to achieving Aboriginal cultural outcomes,

(b) the recorded range or extent of target populations of native fish,

(c) the recorded range or condition of target populations of riparian vegetation,

(d) the recorded values of water quality measurements including salinity, harmful algal blooms, total nitrogen, total phosphorus, pH, water temperature and dissolved oxygen.

(6) In evaluating the effectiveness of the strategies in meeting the objectives in this clause, the following will be relevant:

(a) the extent to which the strategies in subclause (3) and provisions in this Plan have been implemented and complied with,

(b) the extent to which changes in the performance indicators can be attributed to the strategies in subclause (3) and provision in this Plan,

(c) the extent to which the strategies in subclause (3) support achievement of the Aboriginal cultural objectives,

(d) the water made available for Aboriginal cultural values and uses during the term of this plan through available water determinations and the granting of new access licences,

(e) the extent to which external influences on surface water-dependent Aboriginal cultural activities during the term of this Plan have affected progress toward achieving the Aboriginal cultural objectives.

Note: External influences may include trends in Aboriginal cultural activity, urban, agricultural and industrial development, climate or changes in policy or regulation.

13 Social and Cultural Objectives

(1) The broad social and cultural objective of this Plan is to maintain and, where possible, enhance the efficient and sustainable access to water to support critical human water needs, and water dependant values, culture, heritage and recreational uses.

Objectives	Plan strategy
(2) The targeted social and cultural objectives of this Plan are to maintain and, where possible, improve: (a) access to water for basic landholder rights, town water supply and licensed domestic and stock purposes, (b) access to water for surface water-dependent cultural, heritage and recreational uses, including recreational fishing (c) water quality within target ranges for basic landholder	(3) The strategies for reaching the targeted social and cultural objectives of this Plan are as follows: (a) provide access to water for basic landholder rights, town water supply, and for licensed domestic and stock purposes, (b) reserve a portion of flows to partially mitigate alterations to natural flow regimes in these water sources, (c) restrict the take of water from in-river and off-river pools when the volume of that water is less than full capacity, (d) reserve a portion of flows to maintain hydrological connectivity within and between these water sources.

rights, town water supply, domestic and stock purposes and water-dependent cultural, heritage and recreational uses, including recreational fishing.

13 Social and Cultural Indicators

(4) The performance indicator used to measure the success of the strategies for reaching the broad social and cultural objectives in subclause (1) is an evaluation of the extent to which the combined outcomes of the targeted social and cultural objectives in subclause (2) have contributed to achieving the broad objective.

(5) The performance indicators used to measure the success of the strategies for reaching the targeted social and cultural objectives in subclause (2) are changes or trends in social and cultural benefits during the term of this Plan, as assessed using one of more of the following:

(a) the social and cultural uses of water during the term of this Plan, by measuring factors including:

(i) the extent to which basic landholder rights and licensed domestic and stock requirements have been met,

(ii) the extent to which major utility access licence and local utility access licence requirements have been met,

(b) the recorded range or extent of target populations of native fish that are important for recreational fishing,

(c) the recorded takes of native fish that are important for recreational fishing within legal age and size classes,

(d) the recorded values of water quality measurements, including salinity, harmful algal blooms, total nitrogen, total phosphorus, pH, water temperature and dissolved oxygen.

(6) In evaluating the effectiveness of the strategies in meeting the objectives in this clause, the following will be relevant:

(a) the extent to which the strategies in subclause (3) and provisions in this Plan have been implemented and complied with,

(b) the extent to which the changes in the performance indicators can be attributed to the strategies in subclause (3) and provisions in this Plan,

(c) the extent to which the strategies in subclause (3) support achievement of the social and cultural objectives,

(d) the extent to which external influences on surface water-dependent social and cultural activities during the term of this Plan have affected progress toward achieving the social and cultural objectives.

Note: External influences may include trends in urban, agricultural and industrial development, social or cultural behaviour, climate or changes in policy or regulation.

Appendix B – Water sources

Table B1: Plan water sources

Water source	Management zones
Binnaway to Gilgandra (Low)	▪ Castlereagh River Binnaway to Gilgandra ▪ Binnaway to Gilgandra Tributaries
Castlereagh River below Coonamble (Low)	
Castlereagh River Gilgandra to Coonamble (Low)	
Nedgera Creek (Low)	
Teridgerie Creek (Medium)	
Tooraweenah to Coonamble Tributaries (Low)	
Castlereagh River above Binnaway (Very high).	▪ Castlereagh River-Timor Dam to Pound Yard Weir ▪ Castlereagh River-Pound Yard Weir to Merryula Road Crossing ▪ Castlereagh River-Merryula Road Crossing to Belar Creek Confluence ▪ Castlereagh River-Belar Creek Confluence to New Mollyann Road ▪ Belar Creek ▪ Independent Tributaries

Note: (I) denotes high in-stream value; (E) denotes high level of economic significance[263]
Note: (Low – Very high) denotes consequence rating (HEVAE consequence score)[264]

[263] DPI (2012) *Water Sharing Plan for the Murray Unregulated and Alluvial Water Sources – Background document*

[264] DoI-Water (2018) *Risk Assessment for the Macquarie-Castlereagh water resource plan Area (SW11)*.

Appendix C – Native title rights claims in the Plan area

Gomeroi People (Part A) – application for native title rights include:

The native title rights claimed by the Gomeroi People in their native title application (NC2011/006), which are exercisable on or in relation to waters are as follows:[265]

- the right to access the area
- the right to use and enjoy the area
- the right to move about the area
- the right to camp on the area
- the right to erect shelters and other structures on the area
- the right to live being to enter and remain on the area
- the right to hold meetings on the area
- the right to hunt on the area
- the right to fish in the area
- the right to have access to and use the natural water resources of the area
- the right to gather and use the natural resources of the area (including food, medicinal plants, timber, tubers, charcoal, wax, stone, ochre and resin as well as materials for fabricating tools, hunting implements, making artwork and musical instruments)
- the right to manage natural resources including the right to carbon
- the right to share and exchange resources derived from the land and waters within the application area
- the right to participate in cultural and spiritual activities on the area
- the right to maintain and protect places of importance under traditional laws, customs and practices in the area
- the right to conduct ceremonies and rituals on the area
- the right to transmit traditional knowledge to members of the native title claim group including knowledge of particular sites on the area
- the right to speak for and make non-exclusive decisions about the area in accordance with traditional laws and customs
- the right to speak authoritatively about the area among other Aboriginal People in accordance with traditional laws and customs
- the right to control access to or use of the lands and waters within the area by other Aboriginal People in accordance with traditional laws and customs.

[265] National Native Title Tribunal (2019) *Extract from Schedule of Native Title Applications, Federal Court Number: NSD37/2019, NNTT number: NC2011/006, Gomeroi People v Attorney General of New South Wales (Gomeroi People)*

Ngemba/Ngiyampaa, Wangaaypuwan and Wayilwan People (Part A) – application for native title rights include:

The native title rights claimed by the Ngemba/Ngiyampaa, Wangaaypuwan and Wayilwan People in their native title application (NC2012/001), which are exercisable on or in relation to waters are as follows:[266]

- the right to access the area
- the right to use and enjoy the area
- the right to move about the area
- the right to camp on the area
- the right to erect shelters and other structures on the area
- the right to live being to enter and remain on the area
- the right to hold meetings on the area
- the right to hunt on the area
- the right to fish in the area
- the right to have access to and use the natural water resources of the area
- the right to gather and use the natural resources of the area (including food, medicinal plants, timber, tubers, charcoal, wax, stone, ochre and resin as well as materials for fabricating tools, hunting implements, making artwork and musical instruments)
- the right to share and exchange resources derived from the land and waters within the area
- the right to participate in cultural and spiritual activities on the area
- the right to maintain and protect places of importance under traditional laws, customs and practices in the area
- the right to conduct ceremonies on the area
- the right to transmit traditional knowledge to members of the native title claim group including knowledge of particular sites on the area
- the right to speak for and make non-exclusive decisions about the area in accordance with traditional laws and customs
- the right to speak authoritatively about the area among other Aboriginal People in accordance with traditional laws and customs
- the right to control access to or use of the lands and waters within the area by other Aboriginal People in accordance with traditional laws and customs.

266 National Native Title Tribunal (2019) *Extract from Schedule of Native Title Applications, Federal Court Number: NSD38/2019, NNTT number: NC2012/001, Ngemba/Ngiyampaa People v Attorney General of New South Wales*