Department of Climate Change, Energy, the Environment and Water

Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2022

Background, consultation and changes

June 2026

NSW GOVERNMENT

Acknowledgement of Country

Department of Climate Change, Energy, the Environment and Water acknowledges the traditional custodians of the land and pays respect to Elders past, present and future.

We recognise Australian Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to place and their rich contribution to society.

Artist and designer Nikita Ridgeway from Aboriginal design agency – Boss Lady Creative Designs, created the People and Community symbol.

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Glossary and abbreviations

Terms	Definition
Aquifer	An underground layer of water-bearing permeable rock or Cenozoic materials (gravel, sand, silt or clay) from which groundwater can be usefully extracted. The volume of water stored in an aquifer, the rate at which water can recharge, the volume of water extracted from it, and the rate at which water can move through the aquifer are all controlled by the geologic nature of the aquifer.
BLR	Basic landholder right
GDE	Groundwater-dependant ecosystem These are ecosystems that rely on groundwater for their species composition and their natural ecological processes.
LTAAEL	Long-term average annual extraction limit This is the long-term average annual volume of water in an extraction management unit available to be lawfully extracted or otherwise taken under access licences and basic landholder right requirements.
MER	Monitoring, evaluation and reporting
NRAR	Natural Resources Access Regulator
NRC	Natural Resources Commission
NSW	New South Wales
Share component	An entitlement to a given number of shares of the available water in a specified water source. The share component on an access licence certificate is expressed as a unit share. The share component of a specific purpose access licence (e.g. local water utility, major water utility and domestic and stock) is expressed in megalitres per year.
Third order or higher streams	'Stream order' is used to describe the hierarchy of streams from the top to the bottom of a catchment. To determine the stream order, apply the Strahler system to streams shown in the hydro line spatial data: https://www.water.dcceew.nsw.gov.au/our-work/licensing-and-approvals/controlled-activity-

Terms	Definition
	approvals/development-activities-waterfront-0#hydro-line-spatial-data
WM Act	NSW *Water Management Act 2000*
WSP	Water sharing plan. Generalised term used for any water sharing plan, not specific to a particular plan.

Contents

1 Introduction

Water sharing plans were developed for rivers and groundwater systems across New South Wales (NSW) following the introduction of the NSW *Water Management Act 2000* (WM Act). These plans protect the health of our rivers and groundwater while also giving water users perpetual access licences; sustainable resource management, equitable water sharing arrangements, and increased opportunities to trade water.

NSW water sharing plans are valid for 10 years from their start date. The NSW Department of Climate Change, Energy, the Environment and Water (the department) amends water sharing plans throughout their life to ensure they comply with changing legislation and to help carry them out. However, near the end of a plan's 10-year term, the Natural Resources Commission (NRC) formally reviews it to identify any changes that are necessary to deliver better outcomes for all water users, including the environment.

Water in the Lower North Coast area has previously been managed through the Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2009 (Lower North Coast 2009 plan). This plan expired in June 2022 and was replaced with the Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2022 (Lower North Coast 2022 plan) which commenced on 1 July 2022 and underwent a minor amendment in 2024.

This document gives high-level background information on the planning process as well as details of changes to management arrangements in the Lower North Coast 2022 plan.

The Lower North Coast 2022 plan covers 23 water sources: those defined in the 2009 plan, plus one new water source - the Lower North Coast Coastal Floodplain Alluvial Groundwater Source.

You can find links to the plan, maps and rule summary sheets on the North Coast region page on the department's website.

The resources in 'Appendix A – References and supporting documents' give more details of the plan area, its water resources and resource management.

2 Changes to the plan in 2024

In 2024, the Lower North Coast 2022 plan was amended to correct minor errors and address other issues that were considered to have minimal impact on water users. Due to the scope and minimal impact of the changes the amendment process did not involve a public exhibition and formal submission process. However, the amendments were developed in consultation with interagency representatives including from Department of Primary Industries and Regional Development (DPIRD) Agriculture and Fisheries and the department's Conservation Programs, Heritage and Regulation (CPHR) group.

The most substantial changes relate to the take of water from natural off-river pools and in-river dam pools to improve consistency with the WM Act principles and the department's pools policy. These include applying a default no-drawdown below full pool capacity rule to protect natural off-

river pools, except where otherwise authorised, and removing a similar no-drawdown rule that was mistakenly applied to in-river dam pools.

The amended rules allow the drawdown of an in-river dam pool where the dam is referenced on the relevant work approval or licence and extraction occurs in accordance with the conditions of the approval or licence.

If the dam is not referenced, then water cannot be taken where flow classes are established, and flow is in the very low flow class, or if the in–river dam pool is below full pool capacity. It is a requirement that water users hold appropriate approvals for their in-river dams. Further information on approval requirements can be obtained from the WaterNSW website or by contacting WaterNSW.

Other changes include minor grammatical and referencing corrections, and wording improvements to clarify the intended application of rules.

The details of the specific changes can be found below in 'Appendix D – Summary of changes made to the Lower North Coast 2022 plan in 2024'. More information on the changes can be found in the Summary of Changes fact sheet located on the North Coast Region page on the department's website. Information on the amendment process can be found in the Water sharing plan amendment protocol fact sheet on the department's website.

3 Purpose of water sharing plans

Expansion of water extraction across NSW since the beginning of the 20th century has seen increasing competition between water users (towns, farmers and industries) for access to water. This has placed pressure on the health and biological diversity of our rivers and aquifers.

In December 2000, the Parliament of NSW passed the WM Act, which has the overall objective of providing for the sustainable and integrated management of the state's water sources for the benefit of both present and future generations.

Water sharing plans play a major role in achieving this objective by providing a legal basis for sharing water between the environment and consumptive water users.

Water sharing plans are the primary implementation instrument of the WM Act. They protect the basic rights of landholders to extract water and seek to balance the sustainable use of water for economic and environmental outcomes.

4 Legislation, policy and planning framework

4.1 Water Management Act 2000

The WM Act is the guiding legislation for water management in NSW. The WM Act allows for the sustainable and integrated management of water sources. It considers ecologically sustainable development, the protection and enhancement of the environment, and social and economic benefits.

The WM Act sets a maximum initial lifespan of 10 years for water sharing plans, at which point they need to be reviewed and replaced or extended. When deciding whether to extend or replace an existing water sharing plan, the responsible minister must consider:

- the most recent audit of the water sharing plan conducted under section 44 of the WM Act
- a report from the NRC that reviews (within the previous 5 years) if the water sharing provisions have significantly helped to achieve, or have failed to achieve, environmental, social and economic outcomes, and if those provisions should change.

Under the WM Act, a water sharing plan may be extended for up to 2 years past the expiry date to allow the department to prepare a replacement plan.

You can review the NSW *Water Management Act 2000* on the NSW Legislation website.

4.2 Water sharing plans

A water sharing plan sets out locally appropriate rules and management arrangements for specific water sources that align with the principles of the WM Act.

Key elements of water sharing plans include:

- providing water for the environment by protecting a proportion of the water available for fundamental ecosystem health
- protecting the water required to meet basic landholder rights
- setting annual limits on water extractions to ensure security for water users and the environment
- giving water users a clear picture of when and how water will be available for extraction
- giving licence holders flexibility in the way they can manage their water accounts
- specifying rules in groundwater plans to minimise effects on other groundwater users, Groundwater-Dependent Ecosystems (GDEs), culturally significant sites, water quality and the stability of the aquifer
- specifying the rules for water trading/dealings
- setting the mandatory conditions that apply to licence holders

You can review the Lower North Coast 2022 plan on the water sharing plan pages of the department's website.

4.3 NSW water policy

We are continuously evolving and improving water-related policy and decision-making processes to ensure the legislative framework is implemented effectively and water resource management objectives are achieved.

We develop plans in line with the principles of the WM Act and the National Water Initiative.

You can find more information on the National Water Initiative on the Australian Department of Climate Change, Energy, the Environment and Water website.

4.4 Changes to policy for harvestable rights in coastal areas

In May 2022 the limit for uptake of harvestable rights water in coastal catchments was raised from 10 % to 30 %. As of 27 September 2023, the harvestable rights limit for coastal NSW has been returned to the previous limit of 10 %, to allow sustainable levels of extraction to be determined prior to any increase in harvestable rights. The department has been in contact with the small number of customers who have registered to increase their harvestable rights storage capacity during this time and is working with the individuals to find suitable solutions.

The Lower North Coast 2022 plan includes an amendment to assess uptake of harvestable rights within 3 years of the plan commencement to determine if there has been any increase in uptake of water due to the increase to 30 %. The amendment also includes the ability to modify access rules in Parts 6 to 8 of the plan in response to any significant increases of uptake to protect critical environmental needs and basic landholder rights.

Due to the small number of instances where land holders have registered their intent to increase harvestable rights uptake, the department does not expect any significant changes to rules in the plan. as a result of an increased uptake of harvestable rights. For more information on the specific changes to harvestable rights please visit the department's frequently asked questions webpage or for general information, the harvestable rights webpage.

5 Water sharing plan review and replacement process

Under the WM Act, water sharing plans have a 10-year duration.

During the life of a plan, it will undergo an independent review at least twice, as follows:

- The implementation of the plan will be audited in the first 5 years of the plan under section 44 of the WM Act.
- The performance of the plan will be reviewed in its last 5 years under section 43A of the WM Act.

The Natural Resources Commission (NRC) is the independent body that audits and reviews water sharing plans. The section 44 audits aim to identify where improvements are needed to ensure effective application of the plan rules. The section 43A review is to determine if the plan is achieving the intended environmental, social and economic outcomes.

The NRC reports the findings of the audits and reviews to the NSW minister responsible for water, who decides whether to extend a plan for another 10 years or to replace it. If the NRC recommends

replacing the plan, the department considers the commission's recommendations when developing the replacement plan.

More information and links to the review for the Lower North Coast 2009 plan are in section 6 of this document.

The minister at the time adopted the NRC's recommendation to replace the Lower North Coast 2009 plan. To allow time to review and replace the plan, it was extended by 2 years.

You can find more information on the water sharing plan review and replacement process in the Replacement Water Sharing Plan Manual (PDF 2.2 MB).

6 The Lower North Coast 2022

6.1 Overview

The Lower North Coast 2022 area (shown in Figure 1) is located to the north of Sydney. The Lower North Coast catchments are located on the southern end of the Mid-North Coast of NSW. The plan area is bounded by the Hastings River basin to the north and north-west and the Hunter Valley to the south and west. It comprises the catchments of the Manning and Karuah rivers and the Great Lakes.

The Manning River, with a length of over 250 km and an average annual discharge to the sea of 2,530,000 megalitres, has a catchment of about 8,420 $km^{2.}$ The river flows from a plateau of the Mount Royal range north of the Barrington Tops at a height of 1,570 m. It then traverses relatively mountainous country with steep-sided valleys until its confluence with the Gloucester River. Alluvial flats along the upper parts of the Manning River are small and very sparsely located.

The main western tributary of the Manning, the Barnard River, rises in the Great Dividing Range. As with the Manning River, most of the Barnard River traverses rugged mountainous country with little alluvial development along its entire course. The Nowendoc River rises to the east of Black Sugarloaf at an elevation of about 1,460 m and traverses hilly to undulating country from its headwaters downstream to the Nowendoc village.

The Barrington and Gloucester rivers rise in the Barrington Tops and Gloucester Tops respectively. The upper sections of these rivers also transverse steep, rugged country, and enter a larger alluvial floodplain south-west of Barrington and Gloucester respectively.

The Manning River then flows in an easterly or south-easterly direction through alluvial valleys before traversing the coastal riverine plain zone. The coastal fringes are characterised by extensive low riverine plains of sand dunes, swamps, lagoons, and other sand deposits. Myall Lake, Boolambayte Lake, the Broadwater, and adjacent wetland systems are notable features.

The Great Lakes consist of Wallis Lake, Smith Lake and the Myall Lakes, and have a catchment of approximately 2,110 km^2. Smith Lake is an intermittently closed and open lake, much smaller than the other 2 lake systems, with only very small tributary streams of very little average annual flow. Wallis Lake is a large lake with 2 major tributaries – Wallamba River and Coolongolook River. Myall Lakes is a series of closely linked lakes with the upper Myall River flowing into the most

downstream lake, Bombah Broadwater, and the lower Myall River linking the Bombah Broadwater to Port Stephens near the ocean entrance. The upper Myall River provides a large proportion of the freshwater input to the lakes and has the most influence on Bombah Broadwater.

Freshwater inflow affects the functioning of an estuarine ecosystem to different extents. The Manning River estuary has medium sensitivity to inflows (the large catchment area provides freshwater flushing; however, the saline gradient may move upstream with low-flow extractions in upper catchments). The Wallis Lake coastal lagoons have a low sensitivity to inflows (saline lagoon areas). The Myall Lakes have a high inflow sensitivity (freshwater/brackish water lake). The intermittently opening estuaries such as Khappinghat Creek and Smiths Lake are also highly sensitive to inflows. The reduction of freshwater inflows to estuaries due to upstream water extraction may increase upstream saline intrusion, cause hyper-salinity, reduce nutrient and organic inputs required for primary production, change biological structure and function, and alter the physical features of the estuary mouth.

In the south, the Karuah catchment is drained mainly by the Karuah and Myall Rivers south to Port Stephens. The Karuah catchment area is approximately 4,480 km^2. The upper catchment is characterised by narrow valley floors bound by steep ridges and consists of the upper reaches of the Myall and Karuah Rivers.

Extending 20 km upstream from the coastline, the middle section of the Karuah valley comprises the middle and lower reaches of the river, floodplains, and adjacent rolling lands. This zone, characterised by wide river valleys in the lower reaches and narrow valleys in the higher reaches, drains the extensive system of north–south ridge lines.

Significant industries in the area include oyster farming, forestry, fisheries, beef and dairy production, manufacturing, tourism, and coal and gravel quarries.

Major population centres include Gloucester, Wingham, Taree, Karuah, and Forster-Tuncurry.

Seasonal populations increase significantly in the coastal and mountainous areas from tourism because of the natural beauty of the area and the proximity to major urban centres such as Sydney and Newcastle.

In the Great Lakes catchments (including the Myall Lakes, Myall River, Coolongolook River and Wallamba River water sources) the major settlements of Foster and Tuncurry are supplied with water from the Manning River. Hawks Nest and Tea Gardens rely on groundwater and Bulahdelah takes water from the Crawford River.

In the Manning River catchments, domestic water for residents of the lower Manning centres of Taree and Wingham is sourced predominantly from the Manning River, via Bootawa Dam. Gloucester draws its water directly from the Barrington River.

MidCoast Water provides water to Stroud and the Stroud Road area via an off-stream storage connected to the Karuah River.

Hunter Water supplies a small volume of bulk treated water to MidCoast Water customers in Karuah.

There are no significant on-stream storages on the Manning River, although Macquarie Generation has constructed the Barnard River diversion scheme in the upper catchment. The diversion is designed to supply the power stations of the Hunter Valley with water in times of drought but has not been operational for the last 10 years.

The Port Stephens–Great Lakes Marine Park extends from Cape Hawke near Forster south to Birubi Beach at the northern end of Stockton Beach. The Marine Park is approximately 980 km^2 and includes:

- offshore waters to the 3 nautical-mile limit of NSW waters
- all of Port Stephens, the Karuah River, the Myall River, Myall and Smiths Lakes, and their creeks and tributaries up to the tidal limit.

The 2017 NSW Marine Estate Threat and Risk Assessment has identified modified freshwater flows in estuaries as a threat to environmental values of the marine estate in NSW. Reduced freshwater flows can significantly affect water quality, geomorphology, entrance opening regimes and the health and extent of key fish habitat including mangroves, saltmarsh and seagrass.

Total licenced entitlement for the plan area is approximately 89,203 ML a year. This entitlement represents average annual potential extraction. Reliable estimates of actual water usage across the plan area will not be possible until major extraction works are metered (as required by December 2024).

In addition to licenced extraction, water is also required to meet basic landholder rights (BLR).

Table 1: Estimated requirements for water in the Lower North Coast 2022 plan – Basic landholder rights

Extraction type	Potential extraction (ML/year)
Domestic and stock	10,872
Native title	Zero at start of plan
Harvestable rights	131,329

Table 2: Estimated requirements for water in the Lower North Coast 2022 plan – Licenced extraction

Licenced extraction subcategory	Potential extraction (ML/year)
Domestic and stock	102
Local water utility	17,256
Major utility	20,000
Unregulated river	50,569
Aquifer	1,275.5

The plan area is divided into sections known as extraction management units. The limits on the volume of water that can be extracted from water sources are set at the extraction management unit scale.

The Lower North Coast 2009 plan managed surface water and alluvial groundwater to the extent of any downstream limit identified on the plan map. The Lower North Coast 2022 plan establishes a coastal floodplain alluvial groundwater source to manage water in the coastal alluvial resources

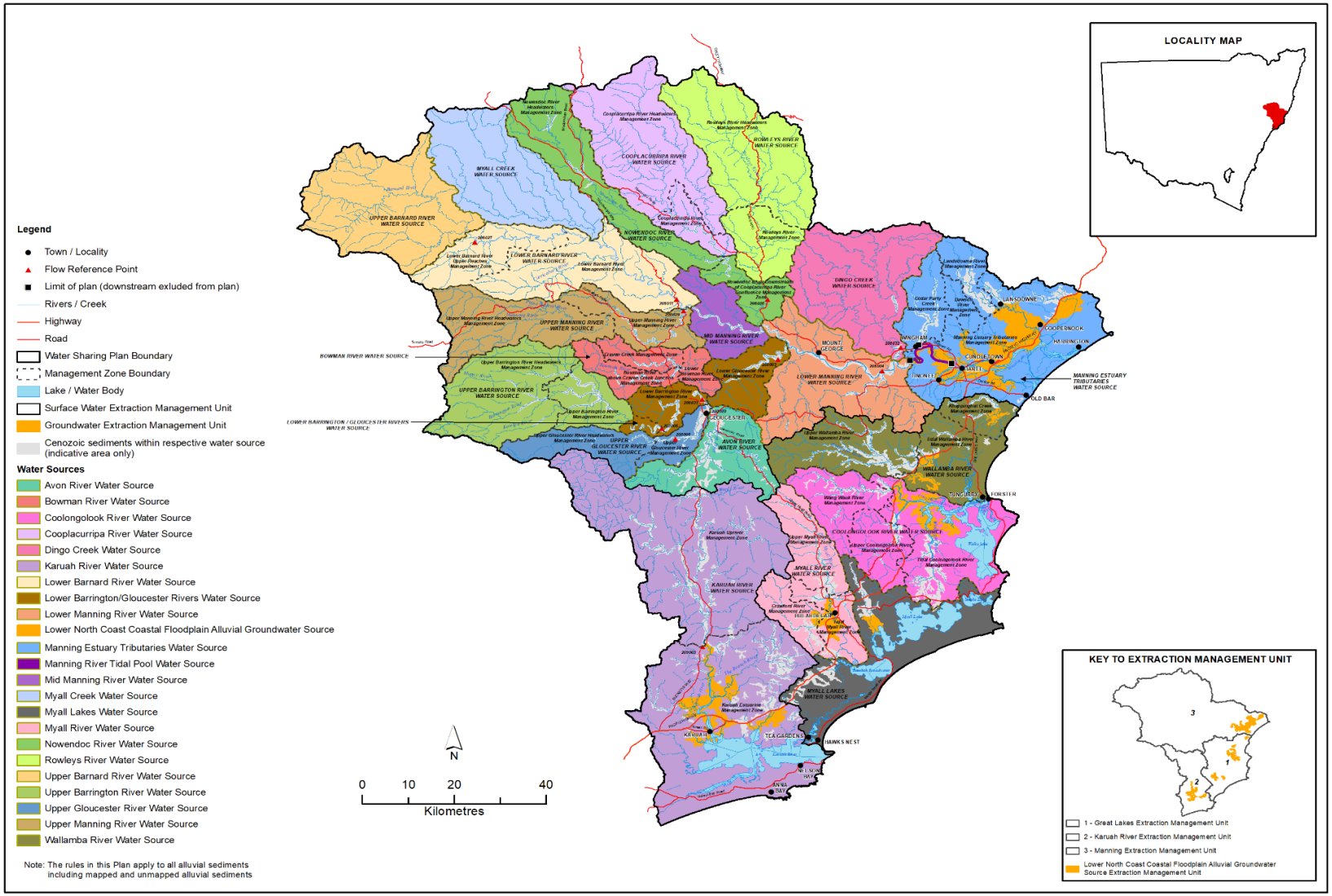
that are less connected to surface water, in areas located downstream of the tidal limit. More information on this water source can be found in section 7.3.

The Extraction Management Units (EMUs) and water sources that are managed under the Lower North Coast 2022 plan are shown in table 3.

Table 3: Extraction management units and Water Sources in the Lower North Coast 2022 plan

Extraction Management Unit	Water Sources
Great Lakes	a. Coolongolook River b. Myall Lakes c. Myall River d. Wallamba River
Karuah River	Karuah River
Manning Extraction	a. Avon River b. Bowman River c. Cooplacurripa River d. Dingo Creek e. Lower Barnard River f. Lower Barring/Gloucester Rivers g. Lower Manning River h. Manning Estuary Tributaries i. Manning River Tidal Pool j. Mid Manning River k. Myall Creek l. Nowendoc River m. Rowleys River n. Upper Barnard River o. Upper Barrington River p. Upper Gloucester River q. Upper Manning River
Lower North Coast Coastal Floodplain Alluvial Groundwater	Lower North Coast Coastal Floodplain Alluvial Groundwater Source

Figure 1: Lower North Coast Unregulated and Alluvial water sharing plan area map



6.2 Previous plan

The current water sharing plan began on 1 July 2022.

The Lower North Coast 2009 plan began on 24 July 2009 and was amended in 2016 to include the Karuah River Water Source and relevant management provisions. This water source was previously managed under the:

- Water Sharing Plan for the Karuah River Water Source 2003

You can find more information on the development of the Lower North Coast 2009 plan in the Water Sharing Plan for the Lower North Coast 2016 – Background document.

The Lower North Coast 2009 plan was developed using the macro approach and included extensive stakeholder and interagency consultation. For details of the macro-planning approach, refer to:

- Macro water sharing plans - approach for unregulated rivers (PDF 647 KB).
- Macro water sharing plans – access and trading rules for pools (PDF 621 KB)
- Macro water sharing plans - the approach for groundwater (PDF 1.67 MB)

As of 1 July 2022, the water sources are managed under the Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2022.

When access rules in a water sharing plan change, licence holders are required to comply with the existing licence conditions until they are notified of updated licence conditions by receipt of a new Statement of Conditions. For further information see the factsheet - Complying with new or changed access rules.

6.3 Developing the 2022 plan

The processes that the department have used in developing the replacement plan are an update on the previous macro–planning approach.

The development of replacement plans now follows the processes described in the Replacement Water Sharing Plan Manual (PDF 2.2 MB).

We continue to use some methods described in the macro-planning approach. This background document will describe the most recent and specific methods used to prepare the Lower North Coast 2022 plan.

The department is responsible for implementing the WM Act, including developing water sharing plans for NSW water resources. When drafting the replacement water sharing plan, we considered:

- the section 44 audit between 2009 and 2014 of the Water Sharing Plan for the Lower North Coast Unregulated Water Sources 2009 (PDF 359 KB)
- recommendations from the Natural Resources Commission Review of the Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2009 (PDF 3.09 MB
- updated information and science
- changes in policy

- the deliberations across government agencies including the department's Water Group and CPHR Group, the DPIRD Agriculture and Fisheries branches, and the Natural Resources Access Regulator (NRAR)
- consultation with Mid Coast Council
- consultation with the wider community.

You can find the Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2022 on the Department's website.

Details of the changes from the Lower North Coast 2009 plan are in Section 7 of this document.

You can find information on the public exhibition of this plan in Section 6.5 of this document.

6.4 First Nations consultation

Local Aboriginal land councils were invited to participate in consultation during development of the draft Lower North Coast 2022 plan. However, this was not possible because of the COVID-19 pandemic. Consultation will be ongoing throughout the life of the plan.

6.5 Public exhibition and finalising the 2022 plan

The department exhibited the draft replacement Lower North Coast 2022 plan from 17 January to 27 February 2022. We held 2 public live webinar information sessions rather than face-to-face meetings because of the COVID -19 pandemic.

We received 36 submissions. Issues raised in submissions are summarised in the Outcomes of Public Exhibition fact sheet on the department's website.

In finalising the replacement plan, the department considered submissions as well as further deliberations and input from government agencies including the department's Water Group and CPHR Group, the DPIRD Agriculture and Fisheries branches, and NRAR.

Section 7 details changes from the Lower North Coast 2009 plan to the final Lower North Coast 2022 plan. Appendix B – Substantive changes made between draft exhibited plan and final Lower North Coast 2022 plan provides details of changes, including if a change was in response to submissions received. Appendix C details changes to the Lower North Coast 2022 plan that occurred through an amendment in 2024.

7 Changes from the 2009 plan to the 2022 plan

7.1 Overview

Key drivers for the changes in the Lower North Coast 2022 plan were:

- the NRC's review recommendations
- contemporary water resource policy – changes to the plan align it with current policy to help improve efficiency and consistency in achieving water resource management objectives across the state
- updated data and knowledge improvements
- consultation on the draft plan, feedback and submissions.

Changes to the plan reflect improved understanding and updated data. They aim to modernise and simplify the water sharing plan to make it easier to understand while ensuring provisions are practical and legally accurate.

Changes were made to:

- the general layout of the plan
- include a new alluvial groundwater water source
- the location of planned environmental water provisions
- the vision, objectives, strategies, and performance indicators
- update the definition of the Long-Term Average Annual Extraction Limit (LTAAEL)
- update basic land holder rights estimates and access licence share components
- update flow reference points and access rules for:
  - Avon River
  - Dingo Creek
  - Lower Barrington River
  - Upper Gloucester River Headwaters
  - Karuah River Water Source
  - Upper Manning River
- remove some total and individual daily extraction limits (TDELs and IDELS)
- prohibit in-river dams in some water sources
- update distance rules for groundwater works to protect existing water users
- prohibit water supply works near coastal wetlands (Resilience and Hazards State Environmental Planning Policy) and potential acid sulfate soils

- update distance rules for groundwater works to protect high-priority, Groundwater-Dependent Ecosystems (GDEs)
- update trade provisions
- change the map and plan extent
- the high-priority, GDE map to reflect updated information
- adaptive management and amendment provisions.

For a summary of all issues raised in submissions, regardless of whether they led to a change, please refer to the Outcomes of Public Exhibition fact sheet on the department's website.

Rule summary sheets for each water source are available on the department's website. These detail the relevant rules that apply to each water source under the Lower North Coast 2022 plan.

7.2 General layout changes

There are several structural layout changes in the Lower North Coast 2022 plan. We have moved or reworded clauses, but their intent is the same. Such changes reflect updated template styles that provide a more standard and consistent layout across the state's water sharing plans at the time, as well as making the water sharing plan easier to understand.

For example, we have removed unnecessary notes, as well as moving and consolidating amendment provisions to the amendment part of the plan.

7.3 Inclusion of a new alluvial groundwater source

Not all groundwater in alluvial sediments downstream of the tidal limits was included in the Lower North Coast 2009 plan. The Lower North Coast 2022 plan establishes a new water source, the Lower North Coast Coastal Floodplain Alluvial Groundwater Source (Coastal Floodplain Alluvial (CFA)water source). The CFA water source covers the alluvial floodplain deposits that are hydrogeologically distinct from the upriver alluvial deposits, which are more connected to surface water. The boundaries of the CFA water source are shown on the map in Figure 1. You can find a high-resolution map of the Lower North Coast water sharing plan area on the department's website.

Existing WM Act groundwater licences within the boundaries of the CFA water source will be amended to reflect the new water source. The establishment of the CFA water source will not result in tangible changes for existing water users taking water or affect water availability for these users.

Water sources managed under a water sharing plan are subject to LTAAELs. A LTAAEL of 8,750 megalitres/year has been set for CFA water source. This volume caters for current and estimated future demand and is equivalent to 25 % of the average annual recharge for the water source.

In determining the limit, the department considered the principles set out in Macro water sharing plans – the approach for groundwater (PDF, 1.67 MB).

Unlike other water sources in the Lower North Coast 2022 plan, more licence shares may be granted in the CFA water source through a controlled allocation process. This is because the sum of current entitlement and BLR is well below the LTAAEL.

Aboriginal community development and Aboriginal culturally specific-purpose access licences may also be granted in the CFA water source.

Trading into the CFA water source is not permitted as it is not hydrologically highly connected to any other water sources.

The Minister for Water makes Available Water Determinations (AWDs) each year to allocate a volume of water to each water allocation account. The Lower North Coast 2022 plan sets out the rules for how those accounts are to be managed.

AWDs are also used to return extraction in a water source to the LTAAEL if it is exceeded. This is unlikely in the case of the CFA water source as the LTAAEL is much higher than combined current entitlement and BLR use.

7.4 Vision, objectives, strategies and performance indicators

Part 2 of the Lower North Coast 2022 plan describes the vision and objectives. The plan's vision encompasses the overall aim of the plan. The vision of the plan is to provide for the:

- health and enhancement of the water sources and their dependent ecosystems
- continuing productive extraction of water for economic benefit
- spiritual, social, customary and economic benefits of water for Aboriginal communities
- social and cultural benefits of water for urban and rural communities.

The objectives are arranged into 4 categories: environmental, economic, Aboriginal cultural, and social and cultural. They are to:

- protect, and where possible, enhance and restore the condition of the water sources and their water-dependent ecosystems
- maintain, and where possible, improve access to water to optimise economic benefits for agriculture, water-dependent industries and local economies
- maintain, and where possible, improve the spiritual, social, customary and economic values and uses of water by Aboriginal people
- provide access to water to support water-dependent social and cultural values
- help prevent structural damage to aquifers resulting from groundwater extraction.

We will include more detailed and Specific, Measurable, Achievable, Realistic and Timely (SMART) objectives in the relevant Monitoring, evaluation and reporting (MER) plan. These will clearly link objectives, strategies and performance indicators. This addresses the NRC's recommendation to strengthen MER of the plan outcomes.

The detailed vision, objectives, strategies and performance indicators that will form part of and guide the MER plan are specified in Appendix C.

7.5 Updated basic landholder rights estimates and licence share components

We have updated the estimate of extraction of water under BLR. The water access licence share components (water entitlements for each water source) have also been updated to reflect total share components for each water source at the commencement of the plan. The new figures are in Part 3 of the Lower North Coast 2022 plan.

Since the development of the first water sharing plans, which began before 2003, numerous methods have been followed to estimate water requirements for domestic and stock BLR. These methods were superseded in 2010 by a standard NSW approach to support the development of surface and groundwater macro-water sharing plans.

We adopted the same method used in the development of macro-water sharing plans for estimating the water requirements of domestic and stock BLR. This method is in Appendix 5 of the Replacement Water Sharing Plan Manual (PDF 2.2 MB).

The revised estimates may differ from those in the Lower North Coast 2009 plan because of changes in land use, population density and the availability of more accurate spatial data.

An estimate was made for the annual volume of water used from harvestable rights dams. This involved identifying dams that were not located in third order or larger streams and determining the annual volume of water that could be taken from those dams for each water source. For more detail, please see Appendix E.

7.6 Planned environmental water provisions

Planned environmental water (PEW) is a key component of water sharing plans. The Lower North Coast 2009 plan had a discrete section on planned environmental water that pointed to other parts of the plan to identify where water is reserved for the environment. This included access rules.

Instead of having a separate section on PEW, the Lower North Coast 2022 plan includes rules associated with PEW in the relevant sections. Wherever a clause or section of the plan relates to PEW, a note is included, pointing to the relevant section of the WM Act.

7.7 Update to the definition of extraction limits

Extraction limits restrict total extractions within an Extraction Management Unit (EMU) over the long term.

The NRC recommended that we establish and publish sustainable, fixed, numeric extraction limits. In response, we have split the extraction limit into 2 components:

1. The standard LTAAEL applies to take from all flows (excluding take from licences that access high flows only) and includes all BLR extraction. This is a fixed volume.
2. The higher flow extraction limit applies to extraction that can only occur from high flows. This volume can vary as licences are converted to high flow licences or specific-purpose licences in

high flows are granted, such as high flow licences, licences for initial fill of dams and Aboriginal community development licences.

Fixing the standard LTAAEL and including maximum harvestable rights – as at the start of the Lower North Coast 2009 plan –allows us to manage any growth in water extraction. If the 3-year average extraction increases to more than 5 % above the standard LTAAEL, then we may announce a reduced AWD to bring extractions back to the extraction limit. The AWD can only be applied to licenced water users.

The standard LTAAELs for EMUs covered by the Lower North Coast 2022 plan are:

- Great Lakes EMU - 26,846 ML/year
- Karuah EMU - 26,584 ML/year
- Lower North Coast Coastal Floodplain Alluvial EMU - 8,750 ML/year
- Manning EMU - 171,915 ML/year

The annual higher flow extraction limit is defined as the largest sum of the share components of all higher flow extraction licences within the EMU occurring within a water year.

7.8 Aboriginal community development licences

The Lower North Coast 2022 plan provides more opportunity for applications to be made for Aboriginal Community Development Licences (ACDLs) across a number of water sources.

In the CFA water source, the total share components of all aquifer (Aboriginal community development) access licences in the water source are limited to 500 ML/year.

The Lower North Coast 2009 plan provided for ACDLs to be granted in Dingo, Lower Manning, Lower Barrington, Upper Gloucester, Mid Manning and Karuah water sources. The Lower North Coast 2022 plan now provides for unregulated river (Aboriginal community development) access licences to be granted to take water from B class flows if the total share components of all unregulated river (Aboriginal community development) access licences in the following water sources does not exceed the following volumes:

- Avon River Water Source — 400 ML/year
- Bowman River Water Source — 500 ML/year
- Cooplacurripa River Water Source — 500 ML/year
- Dingo Creek Water Source — 430 ML/year
- Lower Barrington/Gloucester Rivers Water Source — 500 ML/year
- Lower Manning River Water Source — 500 ML/year
- Mid Manning River Water Source — 500 ML/year
- Myall Creek Water Source — 500 ML/year
- Nowendoc River Water Source — 500 ML/year
- Rowleys River Water Source — 500 ML/year
- Upper Barrington River Water Source — 500 ML/year

- Upper Gloucester River Water Source — 450 ML/year
- Upper Manning River Water Source — 500 ML/year

The issuing of ACDLs is providing for the take of additional water on top of the current level of entitlement (as opposed to trading of existing entitlement).

7.9 Updated flow reference points and access rules

Part 6 Division 4 and Schedule 1 of the Lower North Coast 2022 plan details the rules for taking surface water.

Avon River Water Source

The Lower North Coast 2009 plan referred to the Gloucester River at Gloucester gauge (208020) as the flow reference point for the Avon River water source. This gauge is located upstream of the confluence with the Avon River and outside the water source. No very low flow or A class thresholds were established in the Lower North Coast 2009 plan.

The Lower North Coast 2022 plan now refers to the Avon River at Waukivory gauge (208028) to establish thresholds for very low flows and A Class flows. New access rules apply in this water source.

Dingo Creek Water Source

The Lower North Coast 2009 plan referred to the Dingo Creek at Munyaree Flat gauge (208019) as the flow reference point for the Dingo Creek Water Source. This gauge was decommissioned in 2011 and in 2010, a new hydrometric site (Dingo Creek at Belbourie Bridge gauge (208032)) was established as a replacement, located 11 km downstream of the original gauge.

The 2020 risk assessment which reviewed the Lower North Coast 2009 plan, identified the Dingo Creek water source as having high risks to base and low flows, which is consistent with the 2009 results. In light of these circumstances, we will maintain and apply existing flow classes at the Dingo Creek at Belbourie Bridge gauge (208032).

Lower Barrington/Gloucester Rivers Water Source

The Lower North Coast 2009 plan referred to the Gloucester River at Doon Ayre gauge (208003) as the shared flow reference point with common access for the Lower Barrington River and Lower Gloucester River management zones of the Lower Barrington/Gloucester Rivers water source. As part of the Hydrometric Network Expansion project in 2009–2010, a new gauging station at Barrington River at Relf's Road (208031) was established in the Lower Barrington River Management Zone. The site was observed to be in a good position for a new flow reference point and suitable for incorporation into future water sharing plans.

We have adopted new access rules in the Lower Barrington River Management Zone, applying the same flow percentiles that were applied at the Doon Ayre gauge to the new Relf's Road gauge.

Upper Gloucester River Water Source

The Lower North Coast 2009 plan referred to the Gloucester River at Gloucester gauge (208020) as the shared flow reference point with common access rules for the Upper Gloucester River headwaters and Upper Gloucester River management zones of the Upper Gloucester River water source. Because of the high ecological values and lack of extraction in the upper catchment, it was recommended that the Upper Gloucester River Headwaters Management Zone have its own access rules that give the high-value areas greater protection.

The Gloucester River at Forbesdale gauge (208008) is in the most suitable location for the Upper Gloucester River Headwaters Management Zone. We have adopted new access rules for this management zone with a cease to pump at the 95th % (1ML/day) as measured at the Forbesdale gauge.

Karuah River Water Source

The Stroud Weir, on the Karuah River, had been identified as a significant barrier to fish moving both upstream and downstream. In 2007, construction of a rock-ramp fishway was completed.

The Water Sharing Plan for the Karuah River Water Source 2003 had a planned environmental water provision that allowed for the cease-to-pump limit to be increased at Stroud Weir in June–July and October–November once the Stroud Weir fishway was operational. We have adopted new access rules to provide supplementary environmental water rules for the Stroud Weir fishway and freshwater fish migration.

Upper Manning River Water Source

There were only 3 years of data available from the Manning River at Leslies Bridge gauge (2028029) for the Upper Manning River Water Source for the Lower North Coast 2009 plan which led to inaccurate flow percentiles being adopted.

Updated flow data suggests the 2009 very low-flow class is in the mid-80th percentile range.

The Lower North Coast 2009 plan identified that the very low-flow class should be reviewed when the plan was replaced and there was a greater period of record.

The Lower North Coast 2022 plan adopts the 90th percentile flow, as measured at the Leslie Bridge gauge, as the very low-flow class. This is when flows are equal to or less 12 ML/day (90th %) on a falling river.

This represents a change to the flows on the falling river only. The 17 ML/day on a rising river is maintained to achieve the flushing and fresh flows to the same extent they are maintained in the current plan.

7.10 Total daily extraction limits

We have now placed the total daily extraction limits that apply to local water utility extraction in the Karuah River Water Source as a licence condition in the water sharing plan.

7.11 Prohibition of in-river dams

Water sharing plans contain specific rules relating to the construction and operation of in-river dams.

Current policy prohibits the construction of new in-river dams in third or higher order streams in water sources identified as having high instream value or where such a prohibition is already in place in the current water sharing plan.

The risk assessment for the Lower North Coast 2022 plan used the High Ecological Value Aquatic Ecosystem (HEVAE) approach to identify water sources with high or very high in-stream value.

The risk assessment indicated that Dingo Creek Water Source has high in-stream values. We have added Dingo Creek to the list of water sources where the prohibition exists.

In-river dams on third or higher order streams are prohibited in all water sources that flow into or contain the Port Stephens–Great Lakes Marine Park.

7.12 Distance rules for groundwater works

The Lower North Coast 2022 plan includes standard distance rules for water supply works that take groundwater. A detailed description of all current rules is available in the Rules Summary Sheet for Groundwater Works Approvals on the department's website.

The Lower North Coast 2022 plan includes a new rule for the minimum distance that a groundwater bore can be located from a groundwater-dependent, culturally significant site.

The minimum distance is 100 metres from a groundwater-dependent, culturally significant site if the bore is for basic landholder rights, and 200 metres for all other bores.

The plan also includes a rule that requires a minimum distance of 200 metres from a high-priority, Groundwater-Dependent Ecosystem (GDE) identified on the GDE map for new groundwater bores, if the department has confirmed the high probability of groundwater dependence. However, consistent with the Lower North Coast 2009 plan, the restrictions in relation to GDEs does not apply if:

- the work is to be used solely for basic landholder rights
- it is a replacement work
- the work is for monitoring environmental remediation activities or emergency services
- the location of the work at a lesser distance would result in no more than minimal harm to the groundwater-dependent area.

Additionally, a water supply work approval must not be granted for a water supply work located within 200m of a wetland or spring and within 500m of a karst system in any water source unless, in the minister's opinion, there will be no more than minimal harm to any wetland mapped under the State Environment Planning Policy (Resilience and Hazards) 2021 or any declared Ramsar wetland.

The plan includes rules that prohibit the construction of new bores in an area classed as having a high probability of occurrence of acid sulfate soils if there is significant risk of acidification of the water sources. There is a map available on the department's SEED information portal to determine where there is a high probability of acid sulfate soils in coastal areas of NSW.

The distance rules for new bores from existing bores on neighbouring properties have also changed. To prevent effects on bores on neighbouring properties, standard distances have been applied. To minimise interference between water supply works, a new bore must be located at least:

- 200metres from a bore on a neighbouring property (whether it is used solely for basic landholder rights or licenced extraction)
- 100metres from the boundary of another property that has a bore unless the licence holder of the bore on the neighbouring property has given written consent.

Before a water supply work approval is granted, the application goes through an assessment process to make sure the work would not impact connected surface water, the aquifer, neighbouring bores or GDEs. More information on groundwater assessments is found on the department's website.

7.13 Prohibition of water supply works near SEPP wetlands and potential acid sulfate soils

The Lower North Coast 2022 plan prohibits the construction of water supply work approvals that take water from sources where it will cause more than a minimal impact 3 km upstream of, or within a declared Ramsar wetland and 200 m upstream of, or within wetlands listed under the State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP).

The *Coastal Management Act 2016* and State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP) specify how developments within the coastal zone should be assessed. The Resilience and Hazards SEPP identifies wetlands to protect their ecological values. Coastal water sharing plans recognise these same wetlands to ensure protection to align regulatory objectives.

The Lower North Coast 2022 plan prohibits new or amended water supply works being constructed unless it can be demonstrated that they would result in no more than minimal harm to a wetland mapped under the Resilience and Hazards SEPP.

You can find more information about the Resilience and Hazards SEPP on the Coastal management page of the department's website.

The Lower North Coast 2022 plan also includes rules to prevent the acidification of water sources through drainage of potential acid sulfate soils. The rule prohibits new or amended water supply works that take groundwater being constructed within an area classed as having a high probability of containing acid sulfate soils.

7.14 Protection of high-priority, groundwater-dependent ecosystems (GDEs)

The Lower North Coast 2022 plan includes a map of GDEs. High-priority GDEs previously listed in a schedule to the Lower North Coast 2009 plan have been retained and are shown on a map.

GDEs are those ecosystems that need access to groundwater to maintain their plant and animal communities and ecological processes.

The mapped GDEs are the result of a departmental program to identify and prioritise GDEs in NSW. The identification method incorporated existing vegetation community mapping and remote sensing to identify vegetation communities. The method includes analysing monitoring-bore data to identify potential groundwater dependence of vegetation communities and identifying vegetation communities as terrestrial GDEs overlying alluvial resources.

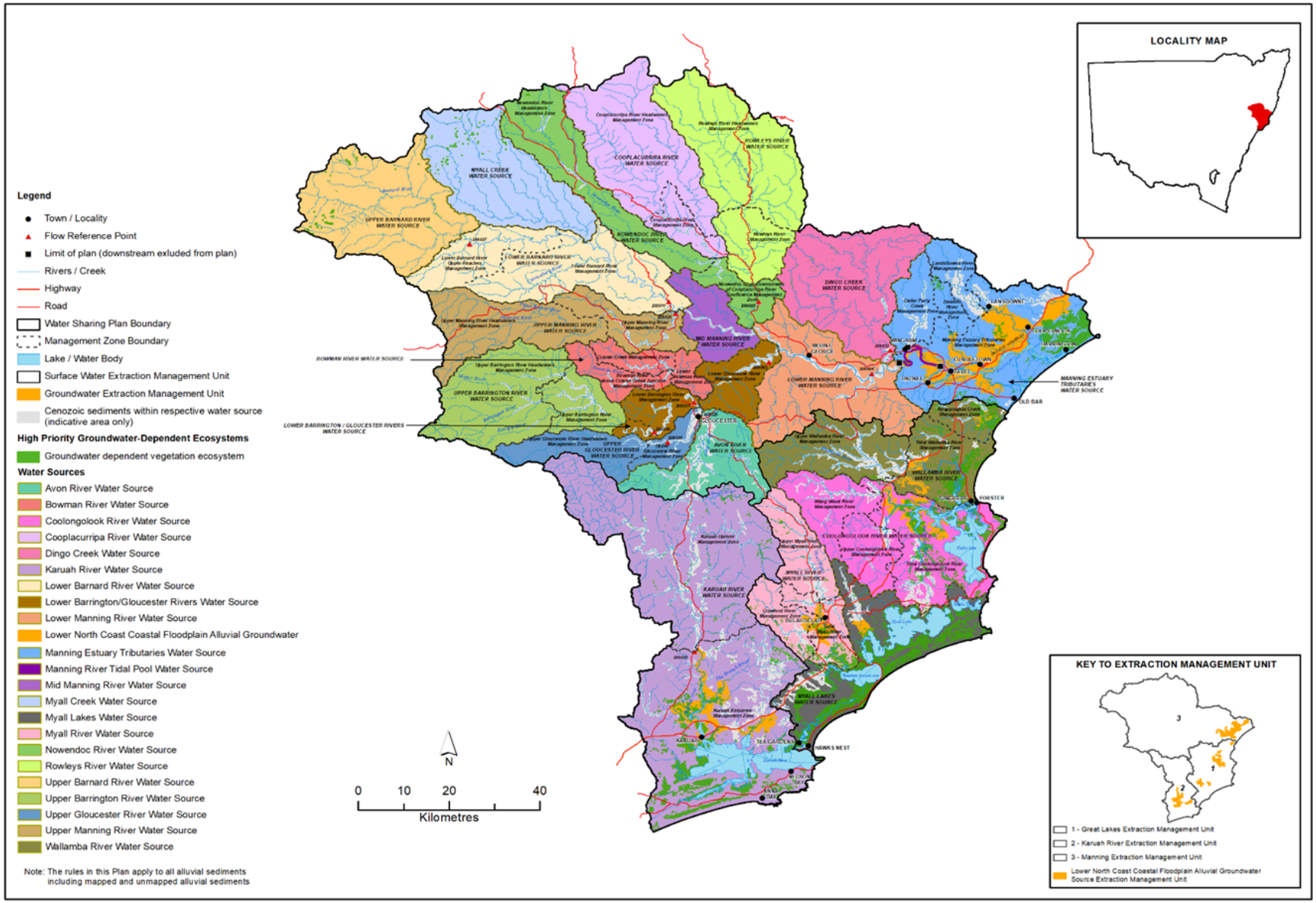
The mapping was supported by field-based verification in sample areas representing different land cover types. Sites were selected from almost all major catchments distributed across NSW to ensure that each area had a representative geographic sample that reflected the diverse environmental conditions and management practices.

The high-priority GDEs we identify on a map in the Lower North Coast 2022 plan are vegetation ecosystems that have a high probability of being groundwater-dependent and are of very high or high ecological value. As it is not certain (only highly probable) that the vegetation community is groundwater-dependent, the distance rules for groundwater works from the GDEs shown on the map are subject to the department confirming the high probability of groundwater dependence of the ecosystem.

For more information on the methods we employed to identify GDEs, see the paper Methods for the identification of high probability groundwater dependent vegetation ecosystems (PDF 8.8 MB).

The GDE map included in the plan is shown in Figure 2. You can view a high-resolution version of the high-priority GDE map on the department's web page.

Figure 2: High-priority, groundwater-dependent ecosystem map for the Lower North Coast 2022 plan



7.15 Trade provisions

Trade is an important tool for making both environmental and economic improvements. If trading rules are too restrictive it limits the ability to move take of water out of high environmental value areas to lower environmental value areas, provides no flexibility for water users, and hinders the establishment of a water market. Where water sources have medium to low environmental value and are not flow stressed trade should be permitted.

The Lower North Coast 2022 plan prohibits trade into the following water sources:

1. Bowman River
2. Coolongolook River
3. Dingo Creek
4. Myall Lakes
5. Myall River
6. Upper Gloucester River
7. Wallamba River
8. Karuah River
9. Lower North Coast Coastal Floodplain Alluvial Groundwater.

This change reduces the potential for additional extractive stress to the high-risk freshwater ecosystems as identified in the risk assessment that informed the replacement plan process.

Consistent with the Lower North Coast 2009, the Lower North Coast 2022 plan prohibits trade:

- between water sources that are not hydrologically connected, or
- into water sources or management zones that have high ecological value, and
- where there are no references points/gauges.

7.16 Adaptive management and amendment provisions

Adaptive management means changing things in response to new information. During the life of a water sharing plan, this information may come from data collection and monitoring or from some other improvement in understanding. Such information could include difficulty in implementing rules, socio-economic studies, hydrological modelling, ecological studies and information about Aboriginal cultural sites.

Adaptive management is a requirement of both the WM Act and the National Water Initiative. The WM Act allows for changes to a water sharing plan during its life if this is in the public interest. The plan also allows for amendments during its life as described in Part 10 of the plan.

Examples of adaptive environmental water provisions in the Lower North Coast 2022 plan include the ability to amend:

- access and trade rules if it is found that increased capture of rainfall run-off in harvestable rights dams is above the current 10 % harvestable rights limit. Any such review would consider

the effect the increased harvestable rights capture has on river flows. Given the change in policy around harvestable rights in the coastal areas this is unlikely to be triggered.

- or update the long-term average annual extraction limits to be a proportion of flow during the life of the plan
- the plan if we find climate change is affecting water quantity or quality.

8 Monitoring, evaluation and reporting

Monitoring, evaluation and reporting (MER) are key components to adaptive management. They ensure that water sharing plans are effective in meeting their objectives.

Comprehensive MER programs are resource-intensive and long term. We must prioritise areas where there is a high risk of water extraction affecting environmental assets or where the demand for water is relatively high compared to the volume of water available.

The department is working on a project to prioritise water sources for MER activities, based on risk in areas that have high levels of extraction, ecological value, or stakeholder needs.

The MER plan is a framework specifically designed for the water sharing plan. It will follow established guidelines and include freshwater and estuarine ecosystems.

9 Areas of further work

9.1 Metering and record keeping

The NSW Government's non-urban water metering framework, initiated in December 2018, aims to ensure the fair and equitable sharing of water among users, enhancing transparency and efficiency in water management across the state. The framework's implementation was staged to allow water users, suppliers, and installers sufficient time to achieve compliance. The NSW Government has recently completed a review of the non-urban metering rules and has updated the regulation to make compliance quicker, easier and more cost effective.

The new metering rules require water users to assess their compliance requirements using their total entitlement and work size. Large water users must comply with the highest metering standards whilst smaller water users now have less prescriptive metering requirements.

Water users are encouraged to consult the department's non-urban metering website for detailed information and updates. To verify individual access licence details, please refer to the WaterNSW Water Register.

Water use information obtained through the water metering program may provide a useful indicator of actual water usage. Water sharing plans have to date largely been developed using licenced entitlement because estimates of actual water usage have until now been unreliable. Future water

sharing plans will now be able to incorporate actual water usage when assessing risks and developing rules.

9.2 Flow requirements for key assets and functions

Several government agencies including DPIRD – Fisheries and the department's Conservation Programs, Heritage and Regulation Group are working on flow requirements for key assets and ecosystem functions. As these become available and there is sufficient flow data, we can use this information in making water-sharing decisions.

9.3 Cultural flows and improving the involvement of First Nations Peoples in water management

The department will work towards priorities in the State Water Strategy. Priority 2 of the State Water Strategy is to Recognise First Nations/Aboriginal Peoples' rights and values, and increase access to, and ownership of water for cultural and economic purposes.

The NSW Government recognises First Nations/Aboriginal People's rights to water and our aim is to secure a future where water for First Nations/Aboriginal People is embedded within the water planning and management regime in NSW, delivering cultural, spiritual, social, environmental and economic benefit to communities.

Actions under the State Water Strategy include:

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

The department is committed to providing greater opportunities for Aboriginal water management and participation in water sharing. A new Aboriginal water directorate has been established within the department and work is progressing on an Aboriginal Water Strategy which will identify the ways in which we can achieve the priorities under the State Water Strategy. The department has established Regional Aboriginal Water Advisory Committees in each of the NSW water regions and piloted some cultural watering plans in various parts of NSW.

9.4 Stormwater harvesting

The department is developing a stormwater harvesting policy to determine the best way to manage stormwater extraction to maximise the benefits of re-using stormwater and reducing erosion of water ways while ensuring adequate water is available for the environment and water users.

9.5 Sustainable long-term average annual extraction limits

The NRC has recommended that LTAAELs on the coast be set at a sustainable level. The department is considering ways of doing this.

The plan sets numerical and fixed LTAAELs to cover all flows and a separate, specific limit for just high flows. This will limit take from low flows to that which was generally provided for at the start of the first water sharing plan.

9.6 Climate change

Australia has a highly variable climate, and rainfall is especially variable. This makes it vital that we understand as much as we can about our climate so we can work out how we manage our water supplies. The frequency and duration of wet and dry events determine how much water we have available.

NSW is already experiencing trends of higher average temperatures and reduced cool season rainfall. There are indications from climate models that drought conditions may become more frequent and severe, and last longer.

Higher demand from a growing population, alongside reductions in supply, will increase water scarcity, putting more pressure on all users, including the environment (Productivity Commission, National Water Reform Issues Paper, May 2020, p.2). We must collectively improve our understanding of these risks to better manage water supply and ensure that our operational, planning and future development decisions take future water reliability and security into account.

The department has developed river models that incorporate stochastic long-term data to help guide regional water strategies. We can use these models to inform water sharing decisions as they are developed across the state. For example, as we understand what sustainable LTAAELs are, we will consider the future effects of climate change. Rising sea level models will also be incorporated into future water sharing decisions.

Priority 4 of the State Water Strategy is to increase resilience to changes in water availability (variability and climate change). The 2021/22 action plan looks to improve and apply our understanding of climate variability and change. This includes work to determine a methodology and progressively incorporate climate risk data into water sharing plans and environmental water management decision making.

Appendix A – References and supporting documents

- Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2022, maps, background document and rule summary sheets
- NSW Legislation website – contains NSW legislation, including the WM Act
- National Water Initiative
- The previous water sharing plan, The Water Sharing Plan for the Lower North Coast Unregulated Water Sources 2009
- The background document for the previous (2009) water sharing plan
- Details of the macro-planning approach can be found here:
  - Macro water sharing plans - approach for unregulated rivers (PDF 647 KB).
  - Macro water sharing plans – access and trading rules for pools (PDF 621 KB)
  - Macro water sharing plans - the approach for groundwater (PDF 1.67 MB)
- The Natural Resources Commission's review of the previous (2009) water sharing plan
- Lower North Coast Unregulated Water Sharing Plan Audit
- Risk Assessment for the Lower North Coast unregulated and alluvial water sharing plan 2020 (available upon request)

Appendix B – Substantive changes made between public exhibition draft and final Lower North Coast 2022 plan

Note: This section should be read in conjunction with Appendix D as amendments were made to the plan in 2024 which may supersede some of the changes described in this Appendix.

Table 4 explains the substantive changes made between the draft exhibited plan and the final Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2022.

Table 4: Changes between the draft and 1 July 2022 versions of the Lower North Coast 2022 plan

Provisions publicly exhibited draft plan	Final 2022 plan provision	Reason for change
In the Dingo Creek Water Source as measured at 208032 Dingo Creek at Belbourie Bridge **Very Low-Flow Class** **Less than or equal to 2 ML/day on a rising river or less than or equal to 1 ML/day on a falling river** **A Class** **More than 2 ML/day and less than 110 ML/day on a rising river or more than 1 ML/day and less than 110 ML/day on a falling river** **B Class** **More than or equal to 110 ML/day**	As measured at 208032 Dingo Creek at Belbourie Bridge Very Low-Flow Class Less than or equal to 4.6 ML/day on a rising river or less than or equal to 2.6 ML/day on a falling river A Class More than 4.6 ML/day and less than 110 ML/day on a rising river or more than 2.6 ML/day and less than 110 ML/day on a falling river B Class More than or equal to 110 ML/day	Water users requested via submissions to have the same volume of flow applied to the new gauge at Belbourie Bridge that applied to the old gauge at Munyaree Flats. The 2020 risk assessment identified the Dingo Creek as having high risks to base and low flows, which is consistent with the 2009 macro result. In light of these circumstances, we amended rules to maintain the current discharge rates and applied them at 208032 Dingo Creek and at Belbourie Bridge.

Provisions publicly exhibited draft plan	Final 2022 plan provision	Reason for change
In the Upper Manning River Water Source as measured at 208029 Manning River at Leslies Bridge **Very Low-Flow Class** **Less than or equal to 17 ML/day on a rising river or less than or equal to 14 ML/day on a falling river** **A Class Flows** **More than 17 ML/day and less than 99 ML/day on a rising river or more than 14 ML/day and less than 99 ML/day on a falling river** **B Class Flows** **Equal to or more than 99 ML/day**	As measured at 208029 Manning River at Leslies Bridge Very Low-Flow Class Less than or equal to 17 ML/day on a rising river or less than or equal to 12 ML/day on a falling river A Class Flows More than 17 ML/day and less than 99 ML/day on a rising river or more than 12 ML/day and less than 99 ML/day on a falling river B Class Flows Equal to or more than 99 ML/day	Change instigated by a submission received expressing concern the current cease-to-pump limit of 14 ML/day as measured at 208029 Manning River at Leslie's Bridge is too onerous on users. Only 3 years of data was available when the 2009 plan was developed. This led to inaccurate flow percentiles. Updated flow data suggests the existing cease-to-pump flow percentile is in the mid-80th percentile range. The 2009 plan flagged that the cease-to-pump limit should be reviewed when the plan was replaced and when there was a greater period of record. The plan adopts the 90th percentile cease-to- pump limit as measured at the Leslie Bridge gauge, so the very low-flow class is when flows are equal to or less than 17 ML/day (86th %) on a rising river, or equal to or less than 12 ML/day (90th %) on a falling river. This represents a change only to the flows on the falling river from 14 ML/day to 12 ML/day. The 17 ML/day on a rising river is maintained to achieve the flushing and fresh flows to the same extent they are maintained in the current plan.
The draft plan proposed to prohibit the granting or amending of water supply work approvals in water sources where there will be more than minimal impact on Coastal SEPP wetlands. **The Coastal SEPP 2018 applied to wetlands and proximity areas**	Part 7 Division 2 and Division 3 of the 2022 plan prohibits the granting of approvals for surface water or groundwater works if it would result in more than minimal harm to a Ramsar wetland or a coastal wetland mapped under the Coastal Wetlands and Littoral Rainforests Area Map in the State	The *Coastal Management Act 2016* and State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP) specifies how developments within the coastal zone should be assessed. This Resilience and Hazards SEPP replaced the Coastal SEPP 2018,

Provisions publicly exhibited draft plan	Final 2022 plan provision	Reason for change
identified on the Coastal Wetlands and Littoral Rainforests Area Map. **SEPP 14 wetlands were referred to on the draft High-Priority Groundwater Ecosystem Map.**	Environmental Planning Policy (Resilience and Hazards) 2021. 'Coastal wetlands', 'Ramsar wetland', 'Coastal Wetlands and Littoral Rainforests Area Map', and 'wetland' are defined in the dictionary of the water sharing plan.	which in turn replaced SEPP 14. It identifies wetlands in order to protect their ecological values. Coastal water sharing plans must recognise these same wetlands to protect them and align regulatory objectives. Reference to Ramsar, Directory of Important Wetlands in Australia (DIWA) and SEPP 14 wetlands was removed from the High-Priority Groundwater Ecosystem Map. DIWA wetlands have no regulatory status and SEPP 14 has been superseded as noted above. Coastal wetlands and Ramsar wetlands are mapped independently and may change over the life of the water sharing plan; therefore, they are referenced in the text rather than included in plan maps.
The draft plan proposed that the long-term average annual extraction limit (LTAAEL) for unregulated rivers extraction management units be calculated as the sum of all access licence share components plus an estimate of the annual extraction under basic landholder rights.	The department has split the LTAAEL for unregulated rivers into 2 components: a standard LTAAEL for take from all flows and a higher flow extraction limit that can only occur from higher flows. The standard LTAAEL has been fixed and includes harvestable rights at the start of the first water sharing plan. The higher flow limit can increase in limited circumstances, such as high-flow conversions and where special-purpose access licences such as Aboriginal Community Development Licences are granted.	NRC recommendations included setting a fixed and numeric LTAAEL. This is the standard LTAAEL. This ensures that extraction from low flow will be no more than could occur at the start of the first water sharing plan. While the higher flow limit can increase, this is to allow us to implement high-flow conversions where a larger volume of water can be taken at higher flows than at lower flows. This is to reduce the stress on lower flows, and to support the department's position of increasing Aboriginal involvement in natural resource management. Extraction limit figures are included in the final plan.

Appendix C – Detailed vision, objectives, strategies and performance indicators

Vision statement

The vision for the Lower North Coast Unregulated and Alluvial Water Sharing Plan 2022 is to provide for the following:

a. the health and enhancement of the water sources and their dependent ecosystems

b. the continuing productive extraction of water for economic benefit

c. the spiritual, social, customary and economic benefits of water to Aboriginal communities

d. the social and cultural benefits to urban and rural communities that result from water.

10 Environmental objectives

1. The broad environmental objective of this plan is to protect, and where possible, enhance and restore the condition of the water sources and their water-dependent ecosystems. Note: the water-dependent ecosystems of the water sources include in-stream, riparian and floodplain ecosystems, and groundwater-dependent ecosystems
2. The targeted environmental objectives of this plan are:
    a. to protect, and where possible, enhance and restore the following over the term of this plan:
        i. the recorded distribution or extent of target ecological populations including native fish and native vegetation
        ii. the population structure of target ecological populations including native fish, native vegetation, low-flow macroinvertebrate communities and high-priority groundwater-dependent ecosystems
        iii. the connectivity between and within water sources, including to support surface and groundwater exchange and downstream processes including priority fish passages
        iv. connectivity between tidal pools, connected estuaries and connected upstream water sources
        v. water quality within target ranges to support water-dependent ecosystems and ecosystem functions
        vi. flows that support ecosystem values and processes within connected estuaries
    b. to contribute to the prevention of structural damage to aquifers of the water sources resulting from groundwater extraction.
3. The strategies for reaching the targeted environmental objectives of this plan are:
    a. reserve all water volume in excess of each long-term average annual extraction limit for the environment

b. reserve a portion of natural flows to partially mitigate alterations to natural flow regimes in the water sources

c. restrict the take of water from an in-river pool or off-river pool when the volume of water in the pool is less than the volume of water that can be held by the pool when at full capacity

d. restrict or prevent water supply work approvals on third-order or higher streams within specified water sources

e. reserve a portion of natural flows to maintain hydrological connectivity between the water sources and other connected water sources, including connectivity between tidal pools and estuaries

f. manage the construction and use of water supply works to minimise impacts on in-stream ecosystems, high-priority groundwater-dependent ecosystems and groundwater quality.

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

5. The performance indicators used to measure the success of reaching the targeted environmental objectives in subclause (2) are the changes or trends in the ecological condition of the water sources during the term of this plan, using one or more of the following:

a. the recorded range or extent of target populations including native fish, native turtles, native vegetation communities and high-priority groundwater-dependent ecosystems

b. the recorded condition of target populations of native fish, native vegetation, low-flow macroinvertebrate communities and high-priority groundwater-dependent ecosystems

c. measurements of fish movements through priority fish passage areas

d. measurements of flows through tidal pools and into connected estuaries

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

f. the recorded values of groundwater levels

g. the extent to which the strategies have provided flow conditions of sufficient magnitude, frequency, duration, timing and water quality to achieve the targeted environmental objectives

h. the extent to which the strategies have provided flow conditions of sufficient magnitude, frequency and timing to tidal pool management zones with designated estuary flow requirements.

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 provisions 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 the water sources and their dependent ecosystems during the term of this plan have affected progress toward achieving the environmental objectives.

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, water-dependent industries and local economies.
2. The targeted economic objectives of this plan are:
   a. to maintain, and where possible, improve water trading opportunities for water-dependent businesses
   b. to maintain, and where possible, improve access to water up to the long-term average annual extraction limits for agriculture, water-dependent businesses and landholders
   c. to protect, and where possible, improve connectivity to provide flows that support economic activities in connected estuaries
   d. to contribute to maintaining water quality within target ranges for agriculture, water-dependent businesses and landholders.
3. The strategies for reaching the targeted economic objectives of this plan are:
   a. provide for trade of water allocations and share components subject to environmental constraints and local impacts
   b. provide a stable and predictable framework for sharing water among water users
   c. provide for flexibility of access to water
   d. manage extractions to the long-term average annual extraction limits
   e. reserve a portion of natural flows to maintain connectivity between tidal pools and connected estuaries.
4. The performance indicator used to measure the success of 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 reaching the targeted economic objectives in subclause (2) are the changes or trends in economic benefits during the term of this plan, 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

d. the recorded values of groundwater levels.

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 water-dependent businesses have affected progress towards achieving the economic objectives.

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 people.

2. The targeted Aboriginal cultural objectives of this plan are:

a. to provide access to water in the exercise of native title rights

b. to provide access to water for Aboriginal cultural use and community development, including fishing

c. to protect, and where possible, improve identified water-dependent culturally significant areas, including important riparian vegetation communities

d. to protect, and where possible, improve connectivity to provide flows that support Aboriginal cultural activities within connected estuaries

e. to contribute to the maintenance of water quality within target ranges to ensure suitability of water for Aboriginal cultural use and community development.

3. The strategies for reaching the targeted Aboriginal cultural objectives of this plan are:

a. manage access to water consistently with the exercise of native title rights

b. provide for water associated with Aboriginal cultural values and uses, and community development

c. manage extractions under access licences and basic landholder rights within the long-term average annual extraction limits

d. reserve a portion of natural flows to mitigate alterations to natural flow regimes in the water sources

e. restrict the take of water from an in-river pool or off-river pool when the volume of water in the pool is less than the volume of water that can be held by the pool when at full capacity

f. reserve a portion of natural flows to maintain hydrological connectivity between the water sources and other connected water sources, including between tidal pools and estuaries

g. manage the construction and use of water supply works to minimise impacts on groundwater quality and groundwater-dependent culturally significant areas.

4. The performance indicator used to measure the success of reaching the broad Aboriginal cultural objective 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 reaching the targeted Aboriginal cultural objectives in subclause (2) are the changes or trends in Aboriginal cultural benefits during the term of this plan, 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 can be 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 and community development outcomes

   b. the recorded range or extent of target ecological populations including native fish, native vegetation communities and high-priority groundwater-dependent ecosystems

   c. the recorded condition of target ecological populations of native fish, native vegetation, low-flow macroinvertebrate communities and high-priority groundwater-dependent ecosystems

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

   e. the extent to which the strategies have provided flow conditions of sufficient magnitude, frequency and timing to tidal pool management zones with designated estuary flow requirements

   f. the recorded values of groundwater levels.

6. In evaluating the effectiveness of the strategies in meeting the Aboriginal cultural 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 provisions 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 the water-dependent Aboriginal cultural activities have affected progress toward achieving the Aboriginal cultural objectives.

13 Social and cultural objectives

1. The broad social and cultural objective of this plan is to provide access to water to support water-dependent social and cultural values.
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 licenced domestic and stock purposes
   b. access to water for water-dependent cultural, heritage and recreational uses, including recreational fishing
   c. flows that support cultural, heritage and recreational activities within connected estuaries
   d. water quality within target ranges for basic landholder rights, town water supply, domestic and stock purposes and surface water-dependent cultural, heritage and recreational uses, including recreational fishing.
3. The strategies for reaching the targeted social and cultural objectives of this plan are:
   a. provide water access for basic landholder rights, town water supply and licenced domestic and stock purposes
   b. reserve all water in excess of each long-term average annual extraction limit for the environment
   c. reserve a portion of natural flows to partially mitigate alterations to natural flow regimes in the water sources
   d. restrict the take of water from an in-river pool or off-river pool when the volume of water in the pool is less than the volume of water that can be held by the pool when at full capacity
   e. reserve a portion of natural flows to maintain hydrological connectivity between the water sources and other connected water sources, including between tidal pool management zones and connected estuaries
   f. manage the construction and use of water supply works to minimise impacts on groundwater quality, basic landholder rights, and town water supply.
4. The performance indicator used to measure the success of reaching the broad social and cultural objective 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 reaching the targeted social and cultural objectives in subclause (2) are the changes or trends in social and cultural benefits during the term of this plan, assessed using one or more of the following:

a. the social and cultural uses of water during the term of this plan, measuring factors including:
    i. the extent to which basic landholder rights and licenced domestic and stock requirements have been met
    ii. the extent to which local water utility access licence requirements have been met
b. the recorded range or extent of target native fish populations 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, and dissolved oxygen
e. the extent to which the strategies have provided flow conditions of sufficient magnitude, frequency and timing to tidal pool management zones with designated estuary flow requirements
f. the recorded values of groundwater levels.

6. In evaluating the effectiveness of the strategies in meeting the social and cultural 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 provisions in this plan
    c. the extent to which the strategies in subclause (3) support achievement of the social and cultural objectives.

The extent to which external influences on social and cultural activities dependent on the water sources during the term of this plan have affected progress toward achieving the social and cultural objectives.

Appendix D – Summary of changes made for the 2024 amendments to this plan

Table 5. Summary of changes to the Lower North Coast 2022 plan for the amendments made in 2024

Clause	2023 amendment change	Basis for change
Clause 3(2) & (3), and Registered Plan Map	Changing references of 'unconsolidated sediments' to 'Cenozoic sediments' in the specified clause and the registered plan maps legends.	Cenozoic better describes these alluvial groundwater sediments; it is unambiguous and does not require definition. This will align these plans with the recent changes to the Water Sharing Plan for the North Coast Coastal Sands 2016.
Clause 10(1)(j)	Adding 'domestic and stock rights' to the consistent access management sub-clause.	To improve clarity of linkages between plan strategies and objectives and maintain consistency access plans.
Clause 26(2)	Amending wording to refer to 'higher flow extraction access licences' and to make it clear that a reduced Available Water Determination (AWD) does not have to apply to all higher flow licence categories.	Improves clarity and effectiveness of provision. Provides consistency across plans.
Clause 33	Adding management zones to the flow class provision.	Clarified that a given flow class may apply either to a whole water source or a part of a water source (i.e., a management zone).
Clause 35	Modifying the access rule for taking water from off-river pools that allowed take of water when the pools were below their full capacity. Take of water below full capacity is now not permitted.	To improve the protection of off-river pools and to provide for accurate and consistent application of existing water group policy.
Clause 35(2)(c)	This amendment simplifies the access rules and allows for the drawdown of in-river dams so long as, in cases where an approval is held, the dam is operated in	The change provides for specific circumstances where an in-river dam may not have an approval due to an administrative error that is known to have occurred in some plans.

Clause	2023 amendment change	Basis for change
	accordance with the approval conditions.	The amended rules recognise the previously authorised water use and are consistent with former plans and existing policy. While the amendment provides for the drawdown of such dam pools, there is still a requirement that water users hold appropriate approvals for their in-river dams. Further information on approval requirements can be obtained from the WaterNSW Approvals webpage.
Clause 36(1)(c)(ii)	Changing of access licence category to 'major utility access licence'.	Corrects a minor error and now reflects the category of the licence that the provision is referring to.
Clause 36(1)(f)(iv)	Removing provision restricting take from off river pools in a single water source	This provision is now redundant as 35(2) now restricts take from off river pools for all water sources.
Clause 37(1)	Ensuring that where an existing licence or approval includes a condition that allows the drawdown of an off-river pool, that condition will continue as an exemption to the access rule in 35(2)(b).	The amended rules recognise the previously authorised water use and are consistent with former plans and existing policy.
Clauses 37(2)(b) and 40(1)(b)	Adding the word 'authorised' to the exemption from the cease to take rules for domestic consumption, i.e., 'for domestic consumption authorised under a domestic and stock access licence up to 1 kl/day per household'.	This means that this exemption only applies to those access licences specified to take water for domestic consumption under a domestic and stock access licence.
Clause 37(2)(d) and (e)	Changing the old licence number to the current (replacement) licence number and excluding the licence in (e) from provision (d).	To improve clarity and align with the original intent of the rules.
Clause 37(4) and (5)	Modifying the plan for: • where water is taken from an off-river pool, providing exemptions to the specific	The amended rules ensure correct and consistent application of existing policy in relation to take

Clause	2023 amendment change	Basis for change
	access rules established for that water source or management zone. • where water is taken from an in-river dam pool, providing exemptions to specific access rules established for that water source or management zone.	of water from off-river pools and in-river dam pools.
Clause 38	Minor rewording of provision.	Improves clarity of provision and consistency of wording between plans.
Clause 44	Adding that a replacement work for take of water must be within the same management zone as the one being replaced.	Clarifies that a replacement groundwater work needs to be in the same management zone as the work it replaces.
Clause 47(4)	Changing the heading text describing groundwater dependent ecosystems. Amending this clause so the 'no more than minimal harm' exemption may be applicable for a proposed groundwater supply work within 40 m of the high bank of the river.	To improve clarity and align with the original intent of the rules. This enables extraction works that are within 40 m of the high bank of the river to be constructed if it can be shown there is no more than minimal harm to the specified groundwater-dependent ecosystem/s.
Clause 54	Changing the wording of this clause to allow for trading between management zones (under a 71S provision) within water sources where this is permitted, as per Clause 16 in the Access Licence Dealing Principles Order 2004.	This corrects an error and aligns the plan provisions with the intent communicated during plan development and finalisation.
Clause 55(3)-(6)	Amending the provisions: • to refer to water allocation rather than share component. • to ensure limits for trade of water allocations are adjusted to recognise Available Water Determinations less than 100 %.	Assignment of water allocation dealings (71T) are temporary trades of water allocations, not the share components. Limits to temporary trade should align with permanent trade limits and principles.

Clause	2023 amendment change	Basis for change
Clause 55(8)	Updating definitions for: • current water allocation sum • destination water source • unit share sum • water allocation sum limit.	Improves clarity and provides consistency with provision wording between plans.
Clause 58	Updating the definition of a logbook.	Improves clarity around the accepted forms of logbook and provides consistency with provision wording between plans.
Clause 59(b)	Correcting reference to Divisions 4 and 5.	To fix an error so that mandatory conditions apply to surface water and groundwater sections in Part 6 (Divisions 4 and 5, instead of Divisions 3 and 4).
Clause 59(c) (old) and 61(1)(a)	Removing the provision requiring approval holders to notify the minister of condition breeches.	The provision does not align with the privilege against self-incrimination.
Clause 59(c) (new) and 61(1)	Updating wording in relation to requirement for notification to the minister.	Improves clarity by providing specific details of the email address on the department's website that should be used to notify the minister.
Clause 60(1)(b) and 62(2)(b)	Changing the wording to specify that recording of a confirmation that a cease to pump rule is not in effect, prior to take of water, is required for all licence holders works, not just those works without an operational meter or data logger.	This corrects an error. The requirement to record a confirmation of no cease to pump is independent of having a meter or logger.
Clause 60(3), 62(5), 63(4)	Modifying the reference to when the non-urban metering regulation commences so that the plan now specifies 'the day on which the relevant mandatory metering condition applies'.	The start date for the non-urban metering requirements in coastal areas has been postponed from December 2023 to December 2024. The new wording ensures this will not need to be changed again.
Clause 65(1)(d)	Changing to specify that construction of a 'bore' (not all groundwater works) must adhere	The minimum construction requirements only apply to bores,

Clause	2023 amendment change	Basis for change
	to the minimum construction requirements.	not other works that intercept groundwater.
Clause 67	Changing the plan to specify that decommissioning of a 'bore' (not all groundwater works) must adhere to the minimum construction requirements.	The minimum construction (decommissioning) requirements only apply to bores, not other works that intercept groundwater.
Clause 68(1)(b)(b1)	Adding an amendment clause allowing for future changes to access rules relating to take from pools.	Providing clarity that the plan may be further amended in relation to pool rules.
Schedule 1	Correcting the name of the management zone within the Karuah River Water Source from 'Karuah River' to 'Karuah Upriver'.	This corrects a typographical error.
Schedule 1	Changing the flow reference point for the Crawford River Management within the Myall River Water Source to: 'Immediately upstream of the Crawford River Weir Pool' instead of 'Crawford River Weir Pool'.	It is difficult to visually determine flow in a weir pool, so this allows for realistic application of the access rules for users in this management zone.
Schedule 2	Updating the heading text and replacing licence numbers listed under the *Water Act 1912* with the current licence numbers applicable under the *Water Management Act 2000*	Improves clarity and aligns with updated legislation.
Schedule 2	Amending the details to: • update old licence numbers to current (replacement) licence numbers • amend incorrectly listed water sources or management zones.	Corrects errors and improves clarity of details.
Schedule 3	Changes to wording of heading.	Improves clarity.

Clause	2023 amendment change	Basis for change
Dictionary	Updating the definition (version) of the plan map. Updating the definition (version) of the GDE map. Including 'the water sources' definition. Including 'in-river dam' definition. Including 'in-river dam pool' definition.	Provides the most up to date information regarding the updated versions of the plan maps.

Appendix E – Estimate of annual requirements from harvestable rights dams

Part 3 of the Lower North Coast 2022 plan includes the requirement for water to satisfy harvestable rights. This figure has been estimated using the process below.

1. Remote sensing was used to identify dams in each water source on relevant land and water courses smaller than third order streams. Land types such as National Parks, state forests, named waterbodies and heavily developed areas were excluded as there is a low likelihood of harvestable rights dams being present on these types of land.
2. The estimated volume of each dam was determined based on its surface area.
3. Each dam was then assessed for aspect ratio (length of long side/length of short side). With this calculation a number close to 1 indicates a square (or round) body which indicates a higher likelihood of a man-made structure. A very large number such as 50 would indicate a very long thin body (such as a river) and is more likely to be a natural waterbody. Based on previous similar work, it was determined that an aspect ratio of <9.0 was the most suitable threshold for harvestable rights dams. If a dam had an aspect ratio <9.0 it was automatically assumed to be a harvestable rights dam.
4. Harvestable rights dams with a capacity greater than 100 ML on the coast are unusual and the dam is likely to exist for a different purpose such as town water supply or the result of an old quarry. Dams less than 100 ML were automatically included as harvestable rights dams.
5. All dams above the volumetric or aspect ratio limits were investigated individually and either included or excluded as harvestable rights dams. Examples of excluded dams were quarries and licenced dams.
6. The total dam capacity of all dams considered to be harvestable rights dams was then calculated per water source.

The dam capacity is not an annual volume. A dam with the same capacity would produce a smaller annual harvestable rights volume in an area with less rainfall runoff than the same dam in an area with more rainfall runoff.

The department holds a series of contours that reflect the annual runoff across NSW. These contours are called the "Harvestable Rights Multiplier". Generally, the dryer the area the lower the Harvestable Rights Multiplier and the larger a dam must be to capture the same volume of water. This relationship is expressed numerically as a 'Dam Reliability Factor' (DRF) found in table 6 below.

Table 6. Relationship between the Harvestable Rights multiplier and the Dam Reliability Factor

Harvestable rights multiplier	Corresponding Dam Reliability Factor
0.050	2.5
0.051	2.32
0.052	2.17
0.053	2.04
0.054	1.93
0.055	1.83
0.056	1.75
0.057	1.68
0.058	1.61
0.059	1.55
0.060	1.5
0.062	1.41
0.064	1.33
0.066	1.27
0.068	1.21
0.070	1.17
0.075	1.07
0.080	1

Harvestable rights multiplier	Corresponding Dam Reliability Factor
0.090	0.9
0.100	0.83
0.110	0.79
0.120	0.75
0.130	0.72
0.140	0.7
0.150	0.68
0.160	0.67
0.170	0.65
0.180	0.55
0.190	0.63

A geographic information system was used to determine the average harvestable rights multiplier per water source based on the rainfall runoff contours. Table 5 was then used to determine the corresponding Dam Reliability Factor per water source.

7. To determine the estimated annual volume of harvestable rights the total volume held in harvestable rights dams for each water source (as calculated in step 6) was then divided by the Dam Reliability Factor for that water source.