



WATER SHARING PLANS

Water Sharing Plan for the Bellinger River Area Unregulated and Alluvial Water Sources 2020

Background, consultation and changes

January 2022



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Glossary and abbreviations

Term	Definition
Account water	The balance in an access licence water allocation account at a particular time. An access licence water allocation account records water allocations accrued under the licence as well as water allocations taken, assigned or re-credited. The operation of the account is also governed by rules for the carrying over of credits from one accounting period to the next and rules for the maximum credit that may be allowed to accumulate in the account as established in a water sharing plan.
ACDL	Aboriginal community development licence
Alluvial groundwater	Groundwater located in the unconsolidated sediments deposited by a stream of running water, along riverbeds or floodplains.
Aquifer	An underground layer of water-bearing permeable rock or unconsolidated 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.
AWD	available water determination
BLR	basic landholder rights
Coastal SEPP	<i>State Environmental Planning Policy (Coastal Management) 2016</i>
Ecological values	The intrinsic or core attributes associated with naturalness, diversity, rarity and special features, but excluding representativeness, used to classify water sources for apportioning water management rules.
EMU	Extraction Management Unit – a group of water sources; defined for the purpose of managing long-term annual average extraction.
Extraction of water	Removal of water from a river for off-stream storage or consumptive use.
Flow classes	The range of daily flow rates in a river that provides the framework for sharing water on a daily basis.
Flow gauge	A device used to measure the height of a river, from which the flow in the river can be calculated.
Flow reference point	The site from which the flow data is referenced to implement the daily access rules during the life of the plan.
Full capacity	The volume of water that is impounded in the pool, lagoon or lake when the level of water in the pool, lagoon or lake is at the highest water level where there is no visible flow out of that pool.
GDE	groundwater-dependent ecosystem

Term	Definition
Groundwater	The water beneath the earth's surface that has filtered down to the zone where the earth or rocks are fully saturated.
Groundwater-dependant ecosystems	Ecosystems that rely on groundwater for their species composition and their natural ecological processes.
HEVAE	high ecological value aquatic ecosystems
LTAEL	long term average annual extraction limit—the target for total extractions (under all water access licences plus an estimate of BLR within an EMU), which is used to assess whether growth-in-use has occurred. The actual annual extractions (metered plus estimated) are averaged over a fixed period defined by the water sharing plan when comparing with the LTAEL. If the fixed period is greater than one water year, then in any one water year, extractions can exceed the LTAEL without triggering a growth-in-use response.
MER	monitoring, evaluation and reporting
ML	megalitre
MZ	management zone – an area within a water source used for defining the location of applicability of water sharing rules, but secondary to the water source. A management zone is more likely to be designated where local dealing restrictions are in place or where 'cease-to-take' rules for works approvals apply.
NRC	Natural Resources Commission
NSW	New South Wales
NWI	National Water Initiative
Performance indicators	Assessment parameters to measure the success of the strategies and subsequently the objectives.
Pools	Lentic water bodies (standing water), including anything falling within the definition of a 'lake' found in the Dictionary of the WM Act, except for tidal pools and estuaries.
Reach	A reach is any length of a stream or river. The term is often used to refer to a small section of a stream or river rather than its entire length
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 (for example, local water utility, major water utility and domestic and stock) is expressed in megalitres/year.
Unregulated rivers	The supply of water in unregulated rivers is typically not controlled by releases of water from dams but rather is dependent solely on rainfall and natural river flows.
Visible flow	The continuous downstream movement of water that is perceptible to the eye.

Term	Definition
WM Act	<i>Water Management Act 2000</i>

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1 Introduction

Water sharing plans were developed for rivers and groundwater systems across New South Wales following the introduction of the *Water Management Act 2000* (WM Act). Approximately 99% of the water extracted in NSW is now covered by a water sharing plan and managed under the WM Act. These plans protect the health of our rivers and groundwater while 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 starting date. The NSW Department of Planning and Environment amends water sharing plans throughout their life to ensure they comply with changing legislation and to help put them into action. However, near the end of the 10-year term, the Natural Resources Commission formally reviews plans to identify changes that will deliver better outcomes for all water users, including the environment.

The *Water Sharing Plan for the Bellinger River Area Unregulated and Alluvial Water Sources 2008* began on 1 July 2008 and was the first water sharing plan for the Bellinger River area. The Natural Resources Commission reviewed the 2008 plan in June 2018 and recommended replacing it.

The 2008 plan was set to expire in July 2018 but was extended for 2 years to July 2020. This allowed the department to incorporate more recent information into the plan and update it, in line with current policies. We have now remade the plan as the *Water Sharing Plan for the Bellinger River Area Unregulated and Alluvial Water Source 2020* (the plan).

One additional water source and extraction management unit was included in the 2020 plan, so it now covers 12 water sources in 3 extraction management units.

The water sources are:

1. Bellinger River Coastal Floodplain Alluvial Groundwater
2. Bellinger River
3. Boggy Creek
4. Coastal Bellinger
5. Coastal Kalang
6. Dalhousie Creek
7. Hydes Creek
8. Kalang River
9. Never Never Creek
10. Rosewood Creek
11. Spickets Creek
12. Thora – North Arm Bellinger

This document gives background information about the development of the 2020 water sharing plan. It is part of a range of material available specifically on the plan, including:

- [Water Sharing Plan for the Bellinger River Area Unregulated and Alluvial Water Sources 2020](#) – a legal instrument written in its required statutory format
- [rule summary sheets for each water source detailing management rules](#) (PDF 1,459 KB)
- [fact sheet summarising changes based on public exhibition of the draft replacement water sharing plan](#) (PDF 230 KB).

2 Purpose of water sharing plans

The expansion of water extraction across NSW in the 20th century has seen increasing competition between water users (towns, farmers, industries, and irrigators) 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 New South Wales passed the WM Act, which has the overall objective to *'provide for the sustainable and integrated management of the water sources of the state for the benefit of both current 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 instruments for applying the WM Act. They protect the basic rights of landholders to extract water and seek to balance the sustainable use of water for both economic and environmental outcomes.

3 Legislation, policy, and planning framework

3.1 *Water Management Act 2000*

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

The WM Act requires that water sharing plans have a maximum initial lifespan of 10 years, at which point they need to be reviewed and replaced or extended. When deciding whether to extend or replace a 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 Natural Resources Commission that reviews (within the previous 5 years) the extent to which the water sharing provisions have materially contributed to the achievement of, or the failure to achieve, environmental, social and economic outcomes, and whether changes to those provisions are warranted.

Under the WM Act, a water sharing plan may be extended for 24 months past the expiry date to allow for a replacement plan to be prepared.

You can review the [NSW Water Management Act 2000](#) on the NSW Legislation website.

3.2 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 needed to meet basic landholder rights
- setting annual limits on water extractions to ensure security for water users and the environment
- providing water users with a clear picture of when and how water will be available for extraction
- providing flexibility for licence holders in the way they can manage their water accounts
- specifying rules in groundwater plans to minimise impacts on other groundwater users, groundwater-dependent ecosystems, 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 view the current water sharing plan – [Bellinger River Area Unregulated & Alluvial water sharing plan 2020](#) – on the NSW Legislation website.

3.3 NSW water policy

To ensure we deliver our objectives for water resource management effectively, the department is continually improving and evolving water-related policy and decision-making processes that apply the legislative framework mentioned in the previous section. 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 Agriculture, Water and the Environment website.

4 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 the last 5 years of the plan under Section 43A of the WM Act.

The NSW Natural Resources Commission is the independent body that audits and reviews water sharing plans. The Section 44 audits aim to identify where improvements are necessary to implement the plan rules. The Section 43A review is to determine whether the plan is achieving the intended environmental, social and economic outcomes.

The commission 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 Natural Resources Commission recommends replacing the plan, the department considers the commission's recommendations when developing the replacement plan.

You can find more information and links to the reviews for the Bellinger River Area water sharing plan in section 5 of this document, 'Water Sharing Plan for the Bellinger River Area Unregulated and Alluvial Water Sources'.

The then Minister for Water Property and Housing adopted the Natural Resources Commission's recommendation to replace the 2008 Bellinger water sharing plan.

4.1 Principles for water sharing plan replacement

If the commission recommends the replacement of a plan, the department considers the recommendations, completes a review and updates the current plan content.

Any replacement must consider the original requirements for water sharing plan provisions under Section 20 of the WM Act, which are the:

- establishment of environmental water rules for the area or water source
- identification of requirements for water within the area, or from the water source, to satisfy basic landholder rights
- identification of requirements for water for extraction under access licences
- establishment of access licence dealing rules for the area or water source
- establishment of an access regime for the extraction of water under access licences, taking into account the rules referred to in the points above.

The department's review seeks to:

- improve the efficiency and effectiveness of water sharing arrangements by targeting areas where new information shows the rules:
 - could be improved
 - are no longer appropriate
 - have had unintended impacts
 - are difficult to apply
- use a collaborative approach to ensure it considers the views of all stakeholders when reassessing water sharing arrangements

- align with the principles of the WM Act, looking to balance the social, cultural, economic and environmental needs of the community and catchments
- ensure that the environmental outcomes of the plan are maintained or enhanced
- ensure that changes that affect water users are minimised where possible.

4.2 Scope for water sharing plan replacement

4.2.1 Issues in scope

To determine which issues are in scope, we use the Natural Resources Commission review and other sources, including stakeholder feedback, to prepare a list of known water sharing plan issues. The department’s subject matter experts assess this list and decide whether the issues are within the scope of the replacement process.

The scope of the review will consider, but is not limited to, the factors described in Table 1.

Table 1. In-scope considerations and sources for information

In-scope considerations	Potential information sources
New information showing current water sharing arrangements are no longer appropriate or could be improved	<ul style="list-style-type: none"> • Section 44 audits • Section 43A reviews • monitoring, evaluation and reporting • plan suspensions • plan amendment register • stakeholder feedback • issues register
New information that informs update of plan provisions	Information relating to: <ul style="list-style-type: none"> • new infrastructure • socio-economic data • water user behaviour • risk assessments • threatened species information • groundwater-dependent ecosystems • basic landholder rights • water entitlements • Aboriginal water-dependent values and uses
Changes in policy or other legislation	<ul style="list-style-type: none"> • critical infrastructure legislation • departmental policies • <i>Water Management Act 2000</i> requirements
Water sharing arrangements that have had unintended impacts or have not achieved intended outcomes	<ul style="list-style-type: none"> • Section 43A reviews • plan suspension • plan amendment register • stakeholder feedback • issues register

In-scope considerations	Potential information sources
Implementation issues	<ul style="list-style-type: none"> • Section 44 audit • Section 43A reviews • plan suspension • plan amendment register • stakeholder feedback • issues register
Studies or amendments specified in the water sharing plan	<ul style="list-style-type: none"> • implementation program • individual study reports • amendment register
Amendments required to carry out other water strategies.	<ul style="list-style-type: none"> • strategy documentation

4.2.2 Out of scope

We have also developed criteria for what is out of scope of the review. These criteria can help refine the list of issues considered in scope later in the planning process, as we examine issues and their effects become clearer.

We use the criteria in Table 2 to assess whether an issue is out of scope. We may add other criteria when relevant.

Table 2. Assessment criteria for identifying whether an issue is out of scope

Assessment criteria	Comment/Example
Does the issue relate to water charges, costs, infrastructure proposals, operational activities or a licensing matter?	Issues that a water sharing plan cannot address
Is another program or process addressing the issue, or is it the responsibility of another department?	Example: Improving alternative water supplies for specific towns, drainage management
Does the issue require time and resources beyond the time frame to review the water sharing plan?	Example: A study on the effects of climate change in a particular valley
Is the issue consistent with the current legislative and policy framework?	Allowing the building of harvestable rights dams on third-order streams is outside policy

4.3 Updated methods and new information

4.3.1 Objectives, strategies and performance indicators

Under Section 35 of the WM Act, a water sharing plan must include a vision, objectives, strategies and performance indicators to describe its intent, provide direction to its rules and measure its success.

The objectives and strategies of plans provide a clear description of what the plan is aiming to achieve, a roadmap to achieving the goals, and a framework for the evaluation of plan success or effectiveness. To enable meaningful evaluations, the development of plan objectives should show clear links between what a plan can control via water management strategies and the desired economic, social, cultural or environmental outcomes for the plan area.

The plan's objectives, strategies and performance indicators are shaped by a monitoring evaluation and reporting (MER) framework to ensure sound policy, planning and regulatory decision-making during future evaluation of the plans.

4.3.2 Risk-based approach

As part of the plan replacement process, we conduct a risk assessment.

Risk-based management assists water managers to prioritise and direct time and effort to monitor, mitigate, or respond to the factors that pose the highest overall risks. It ensures that management is targeted, efficient and effective. When used adaptively, is an excellent tool for determining where future management and monitoring effort is needed.

We have been implementing a risk-based water planning process in unregulated rivers since 2004 in the form of risk assessments. The assessment provides risk-based information as part of our adaptive management approach to water sharing plans.

4.3.3 Risk assessments

The department has developed surface water and groundwater risk assessments to guide the development of water sharing plans. The risk assessments use cause, threat and impact pathways to consider a variety of risks to the condition and continued availability of surface water and groundwater resources. We base the risk outcomes on the likelihood of a cause occurring and the consequences of impacts. We have used the following definitions for risk assessments:

- likelihood – the probability that a cause will result in a threat. It is not a sign of the size of the threat but rather conveys the probability that the threat will be significant
- consequence – the loss of value for an impacted receptor.

We assessed the risk outcomes with current strategies and water sharing rules in line with the WM Act and the relevant water sharing plans in place.

The risk assessments developed to inform plan replacements build on the previous macro-planning approach and allow for more precise and nuanced interpretations. The approach gives reach-scale outcomes based on fine-scale, high-ecological-value-aquatic-ecosystems (HEVAE) data and reach-scale hydrologic information. Additional risk categories are used, including risks associated with climate change and risks to the environment and water users from poor water quality. The risk assessments also review available work on estuaries and intermittently closed and open lakes and lagoons (ICOLLs) within the plan boundaries.

The new risk assessment approach provides improved evidence for decision-making, including:

- ratings of the ecological value at the reach scale
- ratings of the likelihood of insufficient water for freshwater ecosystems for different parts of the flow regime
- ratings of hydrologic risk for different parts of the flow regime
- analysis of a wider range of threats to flow alteration – that is, licensed extraction, basic landholder rights, and interception.

The risk assessments categorise the ecological value (consequence) and the likelihood of extraction impacting the ecological value and come up with a risk rating. We use these 3 parameters when developing rules.

The risk assessments address the risk to environmental values. If the risk assessment identifies areas of high or medium risk, we look at the appropriateness of water sharing rules. If implementing new rules could reduce the risks, we do an assessment on the impact of the new rules on water users and the wider community. This includes looking at the number of days access would be limited. In some instances, we would undertake an economic analysis of the impact of proposed changes. We use this analysis to guide decision making on required amendments to the water sharing plan.

5 Water Sharing Plan for the Bellinger River Area Unregulated and Alluvial Water Sources 2020

5.1 Overview

5.1.1 Catchment description

The Bellinger River water sharing plan area is located 600 km north of Sydney on the mid-north coast of NSW, encompassing approximately 1,100 km². The 2 main rivers in the catchment are the Kalang River and the Bellinger River. The Kalang River flows into the Bellinger River just upstream of the river mouth at Urunga. They share a common entrance to the ocean, which comprises an intermittent open and closed lake and lagoon. The tidal influence in the Kalang River extends for approximately 25 km upstream. For the Bellinger River, the tidal influence extends upstream for approximately 20 km to the township of Bellingen.

The Bellinger River catchment is highly valued for its natural beauty and contains some regionally significant rainforest. It is rich in natural biodiversity, with abundant aquatic and terrestrial ecosystems. It is famous for the Ringwood Tree and the vulnerable Bellinger River Freshwater Turtle (*Myuchelys georgesii*), which are only found locally.

Most of the catchment is mountainous, only having small areas of flat land along with river and creek valleys and the coastal floodplain.

5.1.2 Aboriginal history

The Bellinger River catchment is the traditional home of the Gumbaynggirr people. Country of Gumbaynggirr Nation stretches from the Clarence River in the north to the Nambucca River in the south, to the Great Dividing Range in the west. The land was so rich that the Gumbaynggirr people were able to share food and resources with other nations (Thomas 2013). The Bellinger River was given its name by the Gumbaynggirr people, and it remained after European settlement.

Aboriginal life and customs were threatened by the entry of European timber cutters into Urunga and surrounding regions in 1843. An Aboriginal reserve was set up on what is now known as Urunga Island in 1892, although it was moved to Yellow Rock after floods in 1921. By 1937, many Aboriginal people from Urunga and the Bellinger Valley were moved to Kempsey (Bellingen and Urunga Museums, 2020).

5.1.3 Early European settlement and land use

Europeans first came to the Bellinger Valley in 1841. Cedar cutters and graziers came to the area thereafter. At that time, the area was covered with thick vegetation. A hospital was built in 1903, the Upper Bellingen Co-op Dairying Company was established in 1905 and the first bridge was built across the river in 1911, which established the Bellingen township as a hub for the Bellinger Valley (*The Sydney Morning Herald*, 2007).

Dairying was introduced into the valley in the 1890s and many small holdings were developed at this time, although they tended to decline in the 1970s, as they did in other coastal areas (Bellingen Shire Council, 2004). Topography was a dominant factor influencing the development of the landscape. Steep slopes remained forested while the narrow floodplain and nearby foothills have been cleared for grazing, cropping and other activities (DLWC 1999).

In the Bellinger–Kalang catchment, there is a dominance of bedrock control on most river styles and many river reaches have not experienced significant changes to the geomorphic structure of the river in the period since European settlement (Cohen et al 1998). In the Bellinger Valley, upriver alluvial river reaches are more degraded than in the Kalang Valley and this reflects the greater degree of disturbance in the lower Bellinger River, resulting from clearance of riparian

vegetation and gravel extraction (Cohen et al 1998). Downstream of Thora, the lower Bellinger River is particularly degraded. The channel width is greatly enlarged, pools indistinct and the current river structure providing little aquatic and riparian habitat (Cohen et al 1998). The lower Kalang River is more stable and may be more representative of pre-European conditions (Cohen et al 1998).

5.1.4 Current land use and community profile

Major industries of employment in the Bellingen Shire local government area include healthcare, education, retail and construction. In total, these industries make up 47% of employment in the area. Other major areas of employment are hospitality, agriculture forestry and fishing, and manufacturing (Australian Bureau of Statistics, 2016).

Agricultural activities are still an important land use for the Bellinger Valley, particularly sustainable farming (Bellingen Shire Council, 2020). Forestry operations are an important contributor to the local economy. Small land parcels are common in the catchment and the historical use of the land for dairying and beef production has changed to small-scale hobby farms and rural residential use (Bellingen Shire Council, 2004). Produce includes limited dairy, beef, pork and crops such as maize, sorghum and vegetables.

5.1.5 Climate

The climate of the Bellinger valley and coastal areas is sub-tropical; with warm, wet, humid summers and mild, dry winters (Bellinger Landcare, 2016). Bellingen township has a mean temperature range from 29.8 °C (summer maximum) to 4.8 °C (winter minimum). Average rainfall for Bellingen is 1,520 mm annually, which is higher than the state average of 555 mm/year. The majority of rainfall occurs in summer and autumn (BOM, 2020).

5.1.6 Ecological values

The Bellinger River estuary is located at Urunga in the eastern extent of the water sharing plan area. The estuary has an intermittently closed estuary with an open, trained entrance due to sandbars that move over time (DPIE, 2020a). A breakwater has been constructed on the southern side of the river mouth. Several coastal wetlands listed under the *State Environmental Planning Policy (Coastal Management) 2016* (Coastal SEPP) exist in the Urunga area. The wetlands comprise significant ecological communities including Swamp Sclerophyll Forest (DPIE, 2020b). The location of these wetlands can be viewed on the maps provided in the Coastal SEPP statutory instrument.

The upper reaches of the Bellinger River catchment provide habitat for several aquatic species, including the critically endangered Bellinger River Snapping Turtle (*Myuchelys georgesi*). Riparian vegetation associated with the Bellinger River and its tributaries includes Lowland Subtropical Rainforest, which grows along riverine subtropical corridors and alluvial flats that have rich, moist soils supporting plants and animals. Typical trees in this riparian ecosystem include figs, pepperberries, yellow carrabeens and flooded gums (Bellinger Landcare, 2016).

5.1.7 Groundwater

Groundwater aquifers in the Bellinger river catchment are found in fractured rock, unconsolidated alluvial sediments and coastal sands.

The catchment is underlain by the fractured rocks of the New England Fold Belt Groundwater Source. Aquifers within the New England Fold Belt Groundwater Source are managed within the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016*. Small areas of coastal sand aquifers occur in the coastal zone around Urunga. These aquifers are part of the Bellinger–Nambucca Coastal Sands Groundwater Source, which is managed through the *Water Sharing Plan for the North Coast Coastal Sands Groundwater Source 2016*.

Upriver alluvial groundwater is located upstream of where the tide influences salinity in a surface water source (the tidal limit). Upriver alluvial aquifers that are associated with surface water sources are managed within their respective water source in the plan.

Alluvial aquifers downstream of the tidal limit are associated with the Bellinger River coastal floodplain and are managed within the Bellinger River Area Coastal Floodplain Alluvial Groundwater Water Source as part of the Bellinger River water sharing plan. The coastal alluvial deposits generally consist of fine-grained sand, silts and clays which are underlain by acid sulphate soils. The Coastal Floodplain Alluvial Groundwater Water Source is shown in Figure 2 and discussed in the water source classification section of this document.

5.1.8 River flows

There are currently three active gauges within the Bellinger River catchment that monitor streamflow continuously (Table 3). These gauges are the flow reference points that are used to define the water sharing rules within the plan. Historical records are available for some discontinued gauges throughout the catchment; however, the continuity of flow records within the Bellinger River catchment is generally poor. The longest running gauge in the catchment was established on the Bellinger River at Thora in 1955. The lowest annual streamflow was recorded in 1995 when flows averaged approximately 115 ML. Small flood events occur in the Bellinger River in most years. Peak daily flows are generally in excess of 40,000 ML/d (Figure).

Table 3: Bellinger River area flow gauges

Gauge	Location	Catchment area	Mean annual flow	Commenced
205016	Bellinger River at Fosters	642 km ²	601,887 ML	01/01/2007
205002	Bellinger River at Thora	433 km ²	178,343 ML	22/06/1955
205019	Never Never Creek at Old Crossing	95 km ²	195 ML	06/09/2006 (upgraded to time series data 14/07/2011)

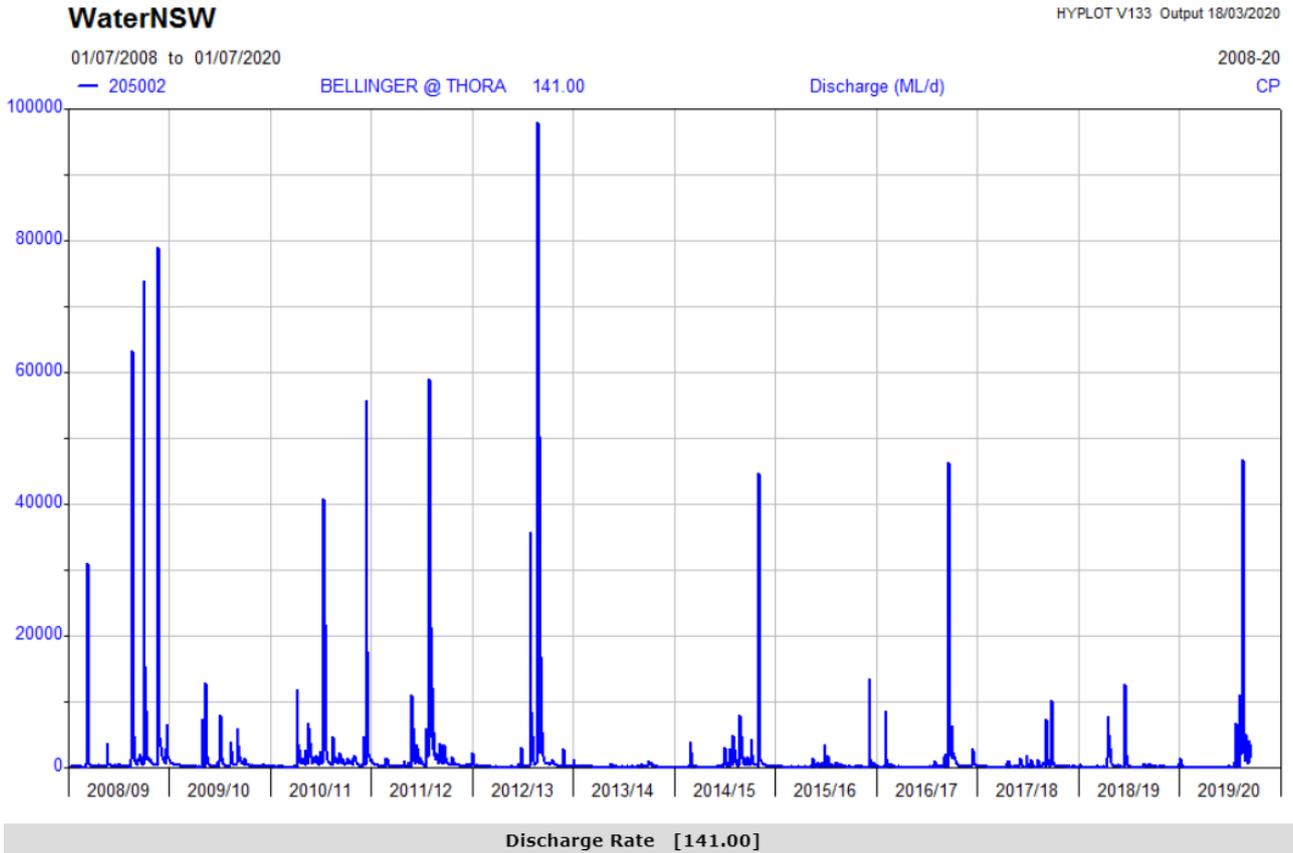


Figure 1 Bellinger River daily flows from 2008–2020 (measured at Bellinger River At Thora gauge) (WaterNSW, 2020)

5.1.9 Entitlement and water use

The granting of new licenses in the Bellinger River Area has been embargoed since 2007. Alluvial aquifers were embargoed in 2008.

At the start of the 2020 Bellinger River water sharing plan, approximately 127 water licences have been granted in the Bellinger River water sharing plan area, totalling 3,948 ML/yr of entitlement (Table 4). This entitlement is divided between unregulated surface water (117 unregulated river licences totalling 3,609 ML/yr) and alluvial groundwater (10 licences totalling 339 ML/yr). The total entitlement represents approximately 4% of the mean annual flow of the Bellinger River at Thora.

Table 4: Current entitlement* in the Bellinger River water sharing plan area

Water source	Number of licences	Entitlement (ML/yr)				Total
		Unregulated	Domestic and Stock	Local Water Utility	Aquifer	
Bellinger River	37	883	18	1,300	70	2,271
Boggy Creek	4	16	4	-	-	20
Coastal Bellinger	6	122	-	-	5	127
Coastal Kalang	5	77	-	-	-	77
Dalhousie Creek	2	165	26	-	-	191
Hydes Creek	8	338	1	-	120	459
Kalang River	3	18	-	-	3	21
Never Never Creek	19	409	12	-	-	421
Rosewood Creek	3	11	-	-	-	11
Spicketts Creek	7	7	-	-	-	7
Thora-North Arm Bellinger	28	159	43	-	10	212
Coastal Floodplain Alluvial	5	-	-	-	131	131
Total	127	2,205	104	1,300	339	3,948

*Under the WM Act, licences are granted 'share component' rather than 'entitlement'. We have kept the term 'entitlement' in this document because it is commonly used. The share component is granted as unit shares for unregulated river access licences, and as ML/year for local water utility and domestic & stock access licences. For ease of reporting, the total of share components have been recorded as ML/yr.

5.1.9.1 Water extraction in the unregulated river water sources

The Bellinger River Water Source has the largest number of licenses within the water sharing plan area. It is located in the middle reaches of the river, north of the township of Bellingen. The town water supply for the Bellingen region is extracted from upriver alluvial groundwater in the Bellinger

River water source and makes up 57% of the total licence shares granted in the water source. Thora-North Arm Bellinger River water source is upstream of the Bellinger River Water Source and also accounts for a large portion of water extraction from the water sharing plan area. In addition to town water supply, an important water use in the Bellinger River water sharing plan area is irrigation for small commercial growers, as well as stock and domestic use.

Long-term records of water use are not available for the Bellinger River area, as broad scale metering in unregulated catchments has not yet occurred.

5.1.9.2 Water extraction in the alluvium

Upriver alluvial groundwater is being extracted in 5 water sources (Table 4). Water users extracting from upriver alluvium are managed according to the water access rules that apply to surface water users within each water source. Water users accessing water from coastal floodplain alluvium are managed according to the water access rules that apply to the Bellinger River Coastal Floodplain Alluvial Groundwater Water Source. The majority of groundwater is used for stock watering, domestic use and small-scale irrigation. Although domestic and stock bores need to be approved, water access licences are not issued for groundwater extracted for domestic and stock purposes.

5.1.9.3 Local water utility requirements

Bellingen Shire Council operates the Lower Bellinger Water supply system. The Lower Bellinger Scheme supplies drinking water to the communities of Bellingen, Fernmount, Raleigh, Repton, Myleston, Urunga and small rural customers. The scheme was constructed in 1937 to serve Bellingen and was extended in 1960 to service coastal towns and further augmented in 1970 and 1986 to meet demand. Capacity of the scheme is 10ML/day, which services 8,000 people.

Under the Bellinger River water sharing plan, Bellingen Shire Council is licensed to take 1,300 ML/year for town water supply. The Lower Bellinger Scheme draws water from bores and wells in the alluvial sediments of the Bellinger River Water Source.

Water delivery infrastructure in the water sharing plan area comprises:

- Bellingen Reservoir (0.9 ML storage capacity)
- Marx Hill Reservoir (storage capacity of 3.67 ML) – supplies the coastal areas including Urunga, Repton, Newry Island, Yellow Rock, and Raleigh by gravity
- Urunga Reservoir (1.25 ML storage capacity)
- Raleigh Reservoir (5 ML storage capacity)
- Repton Reservoir (0.65 ML storage capacity)
- O'Connors Road Reservoir (2.3 ML storage capacity)
- a pumping station and rising main extends from Repton Reservoir and supplies O'Connors Road Reservoir, which serves Mylestom and parts of Raleigh
- a water treatment plant.

The population serviced by Bellingen Shire Council's connected network is projected to increase 0.4% p.a. to approximately 12,200 by the year 2039. Taking into account a dry extreme climate, Bellingen's annual demand for water may exceed the licensed annual extraction limit of 1,613 ML/year (including 1,300 ML/year within the Bellinger River water sharing plan) after 2019, assuming a 2050 climate-change impacted repeat of the 1980 dry event (NSW Public Works, 2012).

5.2 Scope of the plan

The plan covers 2 discrete types of water resources: unregulated rivers and alluvial groundwater. As there are no regulated rivers in the plan area, the water sharing plan applies to all rivers in the plan area. Incorporating both the surface and alluvial groundwater resources into the one plan recognises their interaction and allows for the development of water sharing rules that are linked and are equitable within and between these types of water resources.

Water sharing plans divide plan areas into extraction management units (EMUs), which usually consist of several ‘water sources’. Rules about annual extractions are generally made at the EMU scale. Rules about access to water and trading of water are developed for each water source. If water sharing rules need to be further refined (for example to protect a particular reach of a river), water sources may be divided into management zones.

The plan defines 3 EMUs, 12 water sources and 13 management zones, as listed in Table 5. The location and extent of these water sources are shown in the map in Figure 2.

Table 5: Extraction management units and water sources within the Bellinger River area

Extraction management unit	Water source and management zones
Bellinger River Catchment Extraction Management Unit	<ul style="list-style-type: none"> • Bellinger River Water Source <ul style="list-style-type: none"> ○ Lower Bellinger River Management Zone ○ Tidal Pool Management zone ○ Upper Bellinger River Management Zone • Boggy Creek Water Source • Coastal Bellinger Water Source <ul style="list-style-type: none"> ○ Non-Tidal Management Zone ○ Tidal Pool Management Zone • Coastal Kalang Water Source <ul style="list-style-type: none"> ○ Non-Tidal Management Zone ○ Tidal Pool Management Zone • Hydes Creek Water Source <ul style="list-style-type: none"> ○ Non-Tidal Management Zone ○ Tidal Pool Management Zone • Kalang River Water Source <ul style="list-style-type: none"> ○ Non-Tidal Management Zone ○ Tidal Pool Management Zone • Never Never Creek Water Source • Rosewood Creek Water Source • Spicketts Creek Water Source • Thora–North Arm Bellinger River Water Source <ul style="list-style-type: none"> ○ Upper Thora-North Arm Bellinger River Management Zone ○ Lower Thora-North Arm Bellinger River Management Zone
Bellinger River Coastal Floodplain Alluvial Extraction Management Unit	Bellinger River Coastal Floodplain Alluvial Groundwater Water Source
Dalhousie Creek Catchment Extraction Management Unit	Dalhousie Creek Water Source

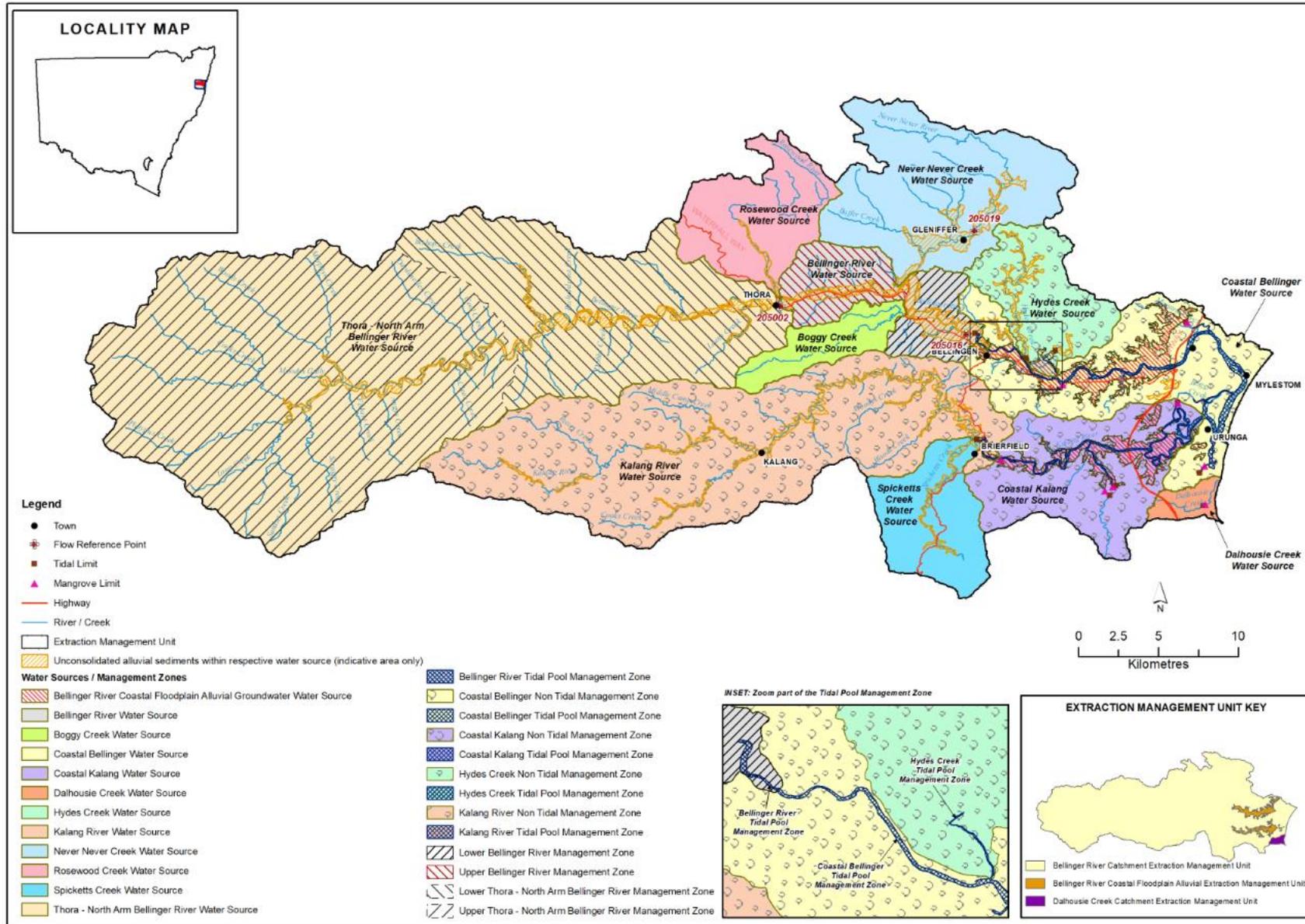


Figure 2 Bellinger Area Unregulated and Alluvial Water Sharing Plan area

5.3 Previous plans

The first water sharing plan for the Bellinger River Area began on 1 July 2008 as the *Water Sharing Plan for the Bellinger River Area Unregulated and Alluvial Water Sources 2008* (the 2008 plan). The 2008 plan comprised 11 surface water sources and their associated alluvial groundwater, excluding groundwater downstream of the tidal limit.

A risk assessment was undertaken during the development of the 2008 Bellinger River water sharing plan to determine a classification for each water source. The results of the risk assessment guided the development of the rules in the plan. Results of the risk assessment are included in Appendix 2 and the rules are included as Appendix 3. For more information about the development of the 2008 Bellinger River water sharing plan, see the *Bellinger River Area Unregulated and Alluvial Water Sources Background Document: August 2008* on the Department of Planning and Environment – Water website.

Previous water sharing plans were developed using the macro-planning approach and included extensive stakeholder and interagency consultation. Details of the macro-planning approach can be found in the following documents:

- [Macro water sharing plans – approach for unregulated rivers \(PDF 829KB\)](#)
- [Macro water sharing plans – access and trading rules for pools \(PDF 627 KB\)](#)
- [Macro water sharing plans – the approach for groundwater \(PDF 3.11 MB\)](#)

5.4 Developing the 2020 plan

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

- the section 44 audit between 2008 and 2013 of [the *Water Sharing Plan for the Bellinger River Area Unregulated Water Sources 2009*](#) (PDF 361).
- recommendations from the Natural Resources Commission's 2018 [Review of the water sharing plan for the Bellinger River Area Unregulated Water Sources 2008](#)
- updated data, information and science
- the deliberations across government agencies including the Water group and Energy, Environment and Science branch within Department of Planning and Environment, Department of Primary Industries Agriculture and Fisheries branches, and the Natural Resources Access Regulator
- consultation with stakeholders including Bellingen Shire Council and licence holders.

You can find the [Water Sharing Plan for the Bellinger River Area Unregulated and Alluvial Water Sources 2020](#) on the NSW legislation website.

The 2008 plan has been reviewed twice. The department reviewed it in 2014 and the Natural Resources Commission reviewed it independently in 2018.

The Natural Resources Commission review of the 2008 Bellinger River water sharing plan was carried out in June 2018. Public submissions were called for and a range of available evidence was used for the review process.

The commission made 7 key recommendations including the overarching recommendation to replace the 2008 Bellinger River water sharing plan. Key recommendations and the departmental response is shown in **Error! Reference source not found.** 4.

These recommendations guided the development of the replacement Bellinger River water sharing plan.

Details of the changes from the 2008 to the 2020 water sharing plan are provided in section 6 of this document.

You can find information on the public exhibition phase and finalising the 2020 plan in section 7.

5.4.1 First Nations consultation

The Coffs Harbour and District Local Aboriginal Land Council was informed of the development of the draft plan and invited to participate in its development. Consultation will be ongoing throughout the life of the plan.

6 Refining the provisions in the 2020 water sharing plan

6.1 Objectives of the plan

The objectives of the Bellinger River water sharing plan have been updated in the 2020 version. They now incorporate detailed strategies and performance indicators so that measuring the success of the plan is easier.

Part 2 of the plan describes the vision and objectives. The objectives are arranged into 4 categories: environmental, economic, Aboriginal cultural, and social and cultural. Under each category is:

- a broad objective
- many targeted objectives – more specific objectives that should be achieved to reach the overall objective
- strategies – actions for achieving the targeted objectives
- performance indicators – assessment parameters to measure the success of the strategies and subsequently the objectives.

The plan vision encompasses the overall aim of the plan. The vision of the plan is to provide for:

- (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 use and enjoyment.

6.2 Water source classification method

In developing the 2008 Bellinger River water sharing plan, water sources were classified based on risks and values of the water source. Specifically, these include:

- instream values (such as threatened fish species) and the risk to these values posed by existing or increased extraction
- hydrologic stress, based on the demands for licensed extraction relative to river flows
- the risk to instream values posed by extractions
- extraction value, a qualitative assessment of the economic value of the agriculture which relies on the water licensed for extraction
- the economic dependence of the local community on activities requiring licensed water extraction
- the sensitivity of estuaries to the removal of freshwater inflows.

Each water source was classified according to these values and risks. The results of the water source classifications for the 2008 Bellinger River water sharing plan are shown in Appendix 2.

6.2.1 High ecological value aquatic ecosystem assessment

The HEVAE is a national framework that aims to assign values for water sources in water sharing plans, as well as assisting in identification of river reaches with high instream value at a national scale. The NSW application of the HEVAE framework focuses on freshwater inland and coastal rivers above the tidal limit, and includes 4 criteria: diversity, distinctiveness, naturalness, and vital habitat.

Assessment of the availability of data for the attributes associated with the 4 criteria indicated enough useful data could be collated into the HEVAE framework to enable spatial outcomes to be derived at the river-reach scale (Figure).

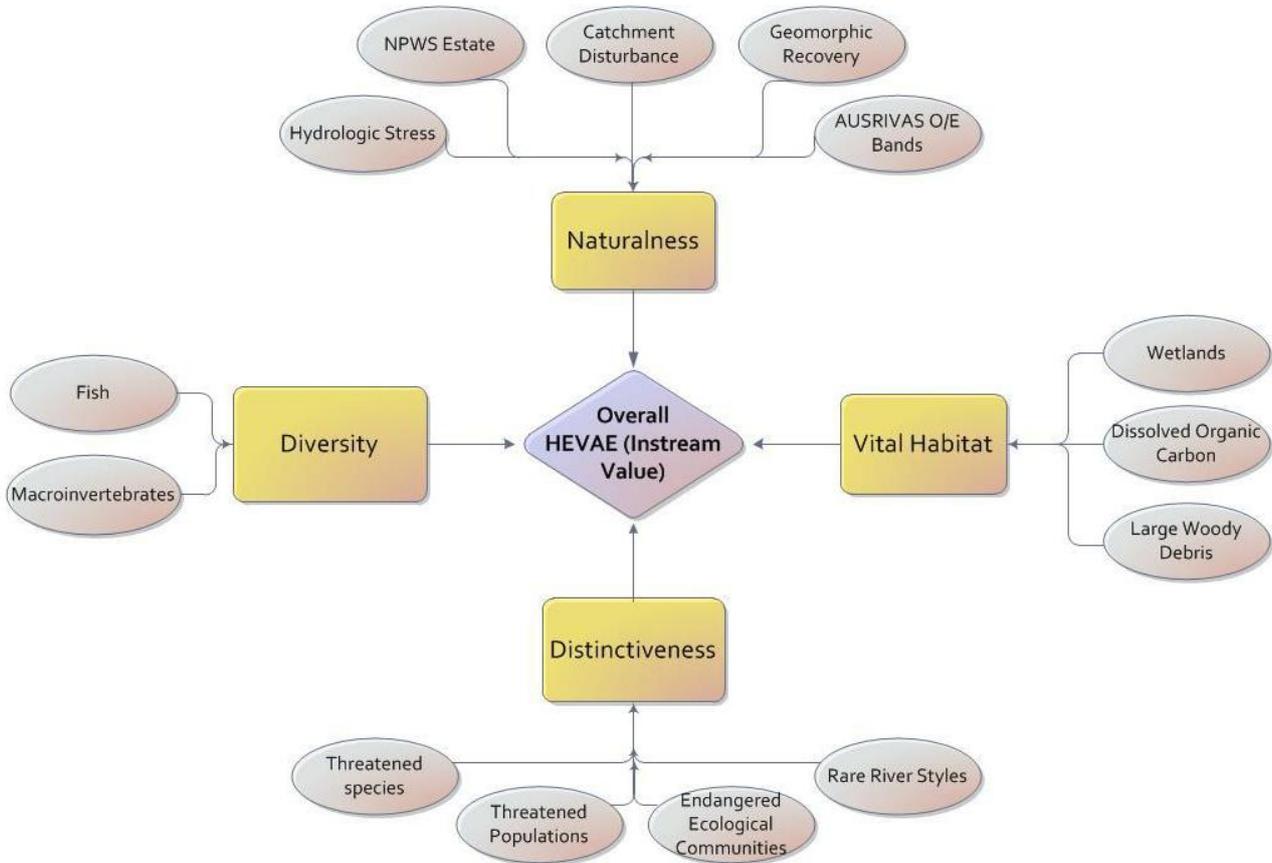


Figure 3 HEVAE framework indicators for instream value

6.2.2 Updated classification results

In developing the 2020 Bellinger River water sharing plan, we updated the risk and value assessment that we completed as part of the 2008 plan. We did this to incorporate changes that may have occurred over the 10-year term of the plan. To determine whether changes during the term of the plan were significant enough to change classification results, values in the risk assessment were updated. The following values were updated for each water source:

- 80th percentile flows
- Socio-Economic Indexes for Areas data (ABS, 2016)
- Percentage of employment in agriculture.

Water source classifications did not change as a result of the above updated data.

A risk assessment using HEVAE methodology was also conducted to determine risks to freshwater environmental values due to inadequate water or flows in the water source. This assessment found that Spicketts Creek Water Source and Dalhousie Creek Water Source were at high risk.

High risk to freshwater environmental flows in Spicketts Creek was due to the potential of no flows to be left in the water source as a result of extraction and the lack of cease-to-pump rules under the 2008 Bellinger River water sharing plan.

It was also found that there is a high risk to low flows in the Dalhousie Creek Water Source due to 2 relatively large dams in comparison to the small streams in the water source. Risks to the estuary may also be present, including the risk to the frequency of opening and closing of the intermittent closed and open lake and lagoon at the end of the river system.

In summary, instream value classifications for the 2020 Bellinger River water sharing plan are shown in Table 6.

Table 6: Instream value classification for water sources in the 2020 Bellinger River water sharing plan

Water source	Instream value classification	Risk identified through HEVAE method
Bellinger River	Medium	Low
Boggy Creek	Medium	Low
Coastal Bellinger	Medium	Low
Coastal Kalang	Medium	Low
Dalhousie Creek	Medium	High risk to low flows
Hydes Creek	Medium	Medium risk to low flows
Kalang River	High	Low
Never Never Creek	High	Low
Rosewood Creek	High	Low
Spicketts Creek	Medium	High risk to zero flows
Thora-North Arm Bellinger River	High	Low

In addition to the risk and value assessments, other data was updated to inform the rules for each water source. Values that were updated during development of the 2020 Bellinger River water sharing plan include:

- Flow data to include an additional 10 years of data
- Flow reference gauges to include recently implemented gauges
- Groundwater-dependant ecosystems
- Entitlement and basic landholder rights (BLR) in each water source.

In addition to updating data for existing water sources, we conducted a risk assessment for a new water source – the Bellinger River Coastal Floodplain Alluvial Groundwater Water Source, which is discussed in the following section.

6.2.3 Bellinger River Coastal Floodplain Alluvial Groundwater Water Source

The 2020 Bellinger River water sharing plan includes water downstream of the tidal limit, which was excluded from the 2008 plan. We completed a risk assessment for this water source following the macro approach to groundwater described in [Macro water sharing plans – the approach for groundwater \(NSW Office of Water, 2011a\)](#). We used the risk assessment to determine the planned environmental water, the extraction limit and the unassigned water.

The risk assessment comprises the following steps to reach an appropriate LTAAEL (long-term average annual extraction limit):

1.
 - a. Conduct an ecological assessment, which considers risks to groundwater-dependent ecosystems (GDEs), water quality and aquifer integrity. The risk assessment found that there is a **moderate** ecological risk to the water source.
 - b. Conduct a socio-economic assessment, which considers dependence on water for town water supply and industry, and risk to employment in agriculture or industry. The risk assessment found that there is **low** socio-economic risk to the water source.
 - c. Combine the (a) and (b) results above in the risk matrix in Figure 4 to reach a sustainability index value. For this water source, sustainable extraction of the water source is 25% of rainfall recharge, so 75% of rainfall recharge is to be reserved for the environment.

High environmental risk	5	25	50
Moderate environmental risk	25	50	60
Low environmental risk	50	60	70
	Low socio-economic risk	Moderate socio-economic risk	High socio-economic risk

Figure 4: Risk assessment for alluvial groundwater water sources. Figures in matrix refer to % rainfall recharge to be available for extraction

2. Collate rainfall estimates to determine rainfall recharge over the water source area. Long-term climate projections are taken into consideration in this step by applying NSW and ACT Regional Climate Modelling (NARClIM) data. A conservative approach to climate projections was taken as the drier-than-average climate scenario was used for this water source. The average rainfall recharge of the water source was found to be 4,200 ML/year.
3. Determine planned environmental water and the upper extraction limit. Water reserved for the environment (planned environmental water) is 75% of 4,200 ML/year, or 3,150 ML/year. The upper extraction limit is the remainder of the rainfall recharge – 1,050 ML/year.
4. Estimate future water requirements. Relevant to this water source was consideration of basic landholder rights, agricultural water usage and Aboriginal community development. The estimated future requirements total 170 ML/year. Due to the potential variability of this number (being a future prediction) a 10% buffer is added (17 ML) to give a total future requirement of 187 ML/yr.
5. Determine the LTAAEL by combining the future water requirements with current entitlement in the water source (160 ML/year). Using this equation, the LTAAEL comes to 347 ML/year, which has been rounded to 350 ML/year.

6. Calculate unassigned water by removing the LTAAEL from the upper extraction limit. This comes to 700 ML/year for this water source.

6.3 Water sharing rules

The Bellinger River water sharing plan establishes a framework for water sharing that defines:

- planned environmental water to protect instream environmental values
- water that is required to meet BLR
- water that is required to meet licensed water extraction (including domestic and stock, local water utility, unregulated river access licences and aquifer access licences)
- long-term extraction limits and available water determinations (AWDs) for each water source
- rules for granting access licences
- rules for managing water allocation accounts
- flow classes and daily access rules for managing licensed daily take from unregulated rivers and alluvial aquifers
- rules for water supply work approvals
- access licence dealing rules, which control the trade of water within or into other water sources.

The following section provides further background on each of these components, and outlines the information and methods used in developing the specific water sharing rules.

6.3.1 Planned environmental water

The water sharing plan identifies and protects water for environmental purposes in each water source. This is defined as 'planned environmental water' and consists of water that is remaining within the stream or aquifer after water has been taken for BLR and access licences in accordance with the rules of the plan. In unregulated streams, planned environmental water is generally delivered through 2 mechanisms:

- On a daily basis, environmental water is protected through the implementation of cease-to-take rules that are applied to water access licences
- On an annual basis, environmental water is protected through the establishment of long-term average annual extraction limits.

Cease-to-take rules have been implemented for each water source in the Bellinger River catchment, which are discussed in the section on flow classes and daily access rules. The rules have been updated in the 2020 Bellinger River water sharing plan to account for an extra 10 years of daily flow data since the start of the 2008 plan. Most water sources are referenced to a telemetered gauge, which can be monitored from the [WaterNSW Real Time Data website](#) to ensure compliance with cease-to-take rules for the protection of environmental water.

6.3.2 Requirements for water

The water sharing plan establishes all licensed and unlicensed requirements for water within the Bellinger River water sharing plan area.

Basic landholder rights (BLR) comprises domestic and stock rights and native title rights, which must be provided for and protected within a water sharing plan. The water sharing plan provides an estimate of the water requirements for domestic and stock rights within each water source.

Surface water BLR requirements were estimated using the number of properties with river frontage in each water source, and estimated water usage based on property size, climatic region and land use.

Groundwater stock BLR requirements were estimated by determining the proportion of improved, unimproved and irrigated grazing land with a significant reliance on groundwater. Groundwater domestic requirements were determined by calculating the number of rural houses in the groundwater source and applying a consumption factor to each house. More information on this method can be found in Appendix 6.

At the start of the 2020 Bellinger River water sharing plan:

- BLR estimated at 292 ML per year
- domestic and stock access licences accounted for 104 ML of entitlement per year
- local water utility access licences accounted for 1,300 ML of entitlement per year
- unregulated river access licences accounted for 2,205 unit shares (a unit share is equivalent to 1 ML in years where 100% of entitlement is allowed to be extracted)
- aquifer access licences accounted for 339 unit shares.

Note domestic and stock access licences are a different category of licence from stock and domestic rights. Stock and domestic rights are considered under BLR in the list above.

6.3.3 Managing extractions

The Bellinger River water sharing plan establishes long-term average annual extraction limits (LTAAEL) to manage total take of water from surface water sources and alluvial groundwater in each of the EMUs. The LTAAEL for each of the EMUs is shown in Table 7.

Table 7: Long-term average annual extraction limits for the extraction management units

Extraction management unit (EMU)	Share components (ML/yr)	BLR estimate (ML/yr)	Total (ML/yr)
Bellinger River	3,626	279	3,905
Bellinger River Coastal Floodplain Alluvial	160	170	350
Dalhousie Creek	191	0	191

The LTAAELs in Table 7 were correct at the start of the 2020 Bellinger River water sharing plan. These values may change during the 10-year term of the plan due to licence dealings and other licence transactions such as licence surrender, cancellation or compulsory acquisition.

To protect water for the environment and the supply to existing users, it is important to limit growth in water use that is above the LTAAEL. In any of the above EMUs, a reduction in allocated water may be triggered if the average annual usage over any three-year period exceeds the LTAAEL by more than 5%. Reductions in allocation will be implemented by reducing the available water determination (AWD), which is the basis of crediting water annually into the water allocation account of each water access licence. The AWD for unregulated river access licences is set usually at 1 ML per unit share unless a reduction in allocation is required. If a reduction in allocation is required, the AWD for unregulated river access licences will be reduced to less than 1 ML per unit share to manage extractions.

Specific-purpose access licences, such as domestic and stock or local water utility access licences, will be permitted to extract 100% of their share component, except in years of exceptional drought. During periods of extremely low stream flow, daily access rules may limit extraction and the full annual water allocation may not be taken in a water year. This approach to managing long-term extractions in the Bellinger River water sharing plan area is the standard approach for all unregulated rivers across NSW.

6.3.4 Granting new access licenses

Consistent with the WM Act, the Bellinger River water sharing plan does not permit the granting of new unregulated river access licences. New commercial developments requiring water must purchase licence shares from existing access licences, in accordance with the dealing rules defined in the water sharing plan. The water sharing plan does, however, permit the granting of new specific-purpose access licences for Aboriginal cultural purposes and Aboriginal community development in some circumstances.

6.3.4.1 Aboriginal community development access licences

In coastal catchments, Aboriginal community development licences (ACDLs) may be granted that allow water to be taken from rivers during the high flows and stored in farm dams or tanks, to be used as needed. For the purpose of issuing these licences, high flows are defined as those that are exceeded 50% of the time (the top half of the flow regime). Current policy is that no new licences be granted in water sources with high conservation value, or in areas that could not support high-flow licences. ACDLs are permitted in the following water sources:

- Bellinger River up to a limit of 500 ML/yr
- Boggy Creek up to a limit of 91.5 ML/yr
- Coastal Bellinger up to a limit of 500 ML/yr
- Coastal Kalang up to a limit of 500 ML/yr
- Hydes Creek up to a limit of 183 ML/yr
- Bellinger River Coastal Floodplain Alluvial Groundwater up to a limit of 100 ML/yr.

6.3.4.2 Aboriginal cultural access licences

Aboriginal cultural access licences of up to 10 ML per year may be granted to Aboriginal people or Aboriginal communities for any personal, domestic or communal purpose such as drinking, washing, gardening, making traditional artefacts, or for recreation or ceremonial purposes. The water sharing plan allows for the granting of these licences in any water source.

6.3.4.3 High-flow-only access licences

Many of the coastal unregulated rivers within NSW have significant competition for water during dry, low-flow periods. Therefore, there is merit in developing incentives that aim to move extraction out of the low flows and into the higher flows, to improve environmental conditions and reduce competition. To use higher flows, it is generally necessary to construct on-farm water storages. Water can then be taken during periods of higher flow and stored for use at a later time, enhancing security of supply. State-wide guidelines recommend that high-flow conversions only be adopted in specified water sources if:

- the water source is classified as having important instream values at high risk from extraction
- there are adequate mechanisms in place to ensure the surrendered low flow is reserved for the environment
- there is no highly sensitive estuary or other identified high-flow sensitive feature such as a wetland within the EMU
- there is no significant extraction already occurring in high-flow periods
- conversion would not significantly impact on tidal pool users or town water supplies.

The 2020 Bellinger River water sharing plan has 3 water sources where high-flow licence applications can be made:

- Bellinger River up to a limit of 568 ML/unit shares
- Hydes Creek up to a limit of 250.8 ML/unit shares
- Never Never up to a limit of 723.2 ML/unit shares.

In these water sources, one unit share of unregulated river access licence is equal to 2.5 high-flow access licence unit shares, which means existing licence holders can apply to convert all or part of their existing unregulated river access licence unit shares at a rate of 1:2.5.

6.3.4.4 Water allocation accounts

Water usage by individual licence holders is managed through water allocation accounts. Water is credited to the account when an available water determination (AWD) is made at the start of the water year. It is debited as water is extracted throughout the water year. A licence holder's account is not permitted to go into debit.

Unregulated rivers have enormous variation in annual flow volumes between years. It is important to allow this variability to be reflected in water accounting practices. Unused water allocation may be carried over from one water year to the next. The maximum amount that may be carried over in unregulated river access licence accounts is:

- 100% of the share component, where share component is expressed in megalitres; or
- 1 ML per unit share, where share component is expressed in unit shares.

Unregulated river access licence accounts are managed under three-year accounting rules, subject to compliance with the daily access rules. AWDs combined with any carryover allowance will enable licence holders to use up to twice their water allocation in a year, provided that over a consecutive three-year period they do not exceed the sum of their water allocations for those 3 years.

6.3.5 Flow classes and daily access rules

We have revised flow classes from the 2008 Bellinger River water sharing plan. Changes to the flow classes and daily access rules were influenced by an extra 10 years of daily flow data, and the implementation of additional flow gauges in the area covered by the Bellinger River water sharing plan.

Issues raised during public exhibition also influenced the rules for the final 2020 Bellinger River water sharing plan. The most notable change is the addition of a management zone in the Bellinger River Water Source. The water source now comprises 3 management zones, with different flow reference points and flow classes to reflect the hydrologic situation of the water source more accurately.

6.3.5.1 Final daily access rules

The final water access rules, including flow classes, daily access rules and flow reference points are summarised in Table 8.

In addition to the cease-to-take rule, all water sources have a 'commence to take' rule, where typically take is restricted for 24 hours after flow has risen above the cease-to-take volume (very low flow class). For full details of the rules for each water source, consult the water sharing plan and the rule summary sheets available on www.industry.nsw.gov.au.

For context, the 2008 Bellinger River water sharing plan rules are included as Appendix 3.

Table 8: Daily access rules for the 2020 Bellinger River water sharing plan

Water source	Flow classes	Flow rule	Flow reference point
Bellinger River <ul style="list-style-type: none"> Upper Bellinger River MZ 	<ul style="list-style-type: none"> Very Low Flow ≤ 20 ML/day A Class > 20 ML/day and ≤ 44 ML/day B Class > 44 ML/day and ≤ 134 ML/day C Class > 134 ML/day 	<p>Take must cease at or less than 20 ML/day.</p> <p>Take is restricted to 8 hours a day when flow is over 20 ML/day and at or below 44 ML/day.</p> <p>C Class (high flow) licence must cease to take at 134 ML/day.</p>	Bellinger River at Thora gauge (205002).
Bellinger River: <ul style="list-style-type: none"> Lower Bellinger River MZ Tidal Bellinger River MZ 	<ul style="list-style-type: none"> Very Low Flow ≤ 56 ML/day A Class > 56 ML/day and ≤ 124 ML/day B Class > 124 ML/day and ≤ 335 ML/day C Class > 335 ML/day 	<p>Take must cease at or less than 56 ML/day.</p> <p>Take is restricted to 8 hours a day when flow is over 56 ML/day and at or below 124 ML/day.</p> <p>C Class (high flow) licence must cease to take at 335 ML/day.</p>	Bellinger River at Fosters gauge (205016).
Boggy Creek	<ul style="list-style-type: none"> Very Low Flow ≤ 56 ML/day A Class > 56 ML/day and ≤ 124 ML/day B Class > 124 ML/day and ≤ 335 ML/day C Class > 335 ML/day 	<p>Take must cease at or less than 56 ML/day.</p> <p>Take is restricted to 8 hours a day when flow is over 56 ML/day and at or below 124 ML/day.</p>	Bellinger River at Fosters gauge (205016).
Coastal Bellinger: <ul style="list-style-type: none"> Tidal pool MZ 	<ul style="list-style-type: none"> Very Low Flow ≤ 56 ML/day A Class > 56 ML/day and ≤ 124 ML/day B Class > 124 ML/day and ≤ 335 ML/day C Class > 335 ML/day 	<p>Take must cease at or less than 56 ML/day.</p> <p>Take is restricted to 8 hours a day when flow is over 56 ML/day and at or below 124 ML/day.</p>	Bellinger River at Fosters gauge (205016).
Coastal Kalang: <ul style="list-style-type: none"> Tidal pool MZ 	<ul style="list-style-type: none"> Very Low Flow ≤ 43 ML/day A Class > 43 ML/day and ≤ 124 ML/day B Class > 124 ML/day and ≤ 335 ML/day C Class > 335 ML/day 	<p>Take must cease at or less than 43 ML/day.</p> <p>Take is restricted to 8 hours a day when flow is over 43 ML/day and at or below 124 ML/day.</p>	Bellinger River at Fosters gauge (205016).

Water source	Flow classes	Flow rule	Flow reference point
Hydes Creek	<ul style="list-style-type: none"> • Very Low Flow ≤ 56 ML/day • A Class >56 ML/day and ≤ 124 ML/day • B Class >124 ML/day and ≤ 335 ML/day • C Class >335 ML/day 	<p>Take must cease at or less than 56 ML/day.</p> <p>Take is restricted to 8 hours a day when flow is over 56 ML/day and at or less than 124 ML/day.</p> <p>C Class (high flow) licence must cease to take at 335 ML/day.</p>	Bellinger River at Fosters gauge (205016).
Kalang River	<ul style="list-style-type: none"> • Very Low Flow ≤ 43 ML/day • A Class >43 ML/day and ≤ 124 ML/day • B Class >124 ML/day and ≤ 335 ML/day • C Class >335 ML/day 	<p>Take must cease at or less than 43 ML/day.</p> <p>Take is restricted to 8 hours a day when flow is over 43 ML/day and at or below 124 ML/day.</p>	Bellinger River at Fosters gauge (205016).
Never Never Creek	<ul style="list-style-type: none"> • Very Low Flows ≤ 4 ML/day • A Class >4 ML/day and ≤ 8 ML/day • B Class >8 ML/day and ≤ 26 ML/day • C Class > 26 ML/day 	<p>Take must cease at or less than 4 ML/day.</p> <p>Take is restricted to 8 hours a day when flow is over 4 ML/day and at or below 8 ML/day.</p> <p>C Class (high flow) licence must cease to take at 26 ML/day.</p>	Never Never Creek at Old Crossing gauge (205019).
Rosewood Creek	<ul style="list-style-type: none"> • Very Low Flows ≤ 4 ML/day (90th%tile) • A Class >4 ML/day 	Take must cease at or less than 4 ML/day.	Never Never Creek at Old Crossing gauge (205019).
Thora-North Arm Bellinger River	<ul style="list-style-type: none"> • Very Low Flow ≤ 20 ML/day • A Class >20 ML/day 	Take must cease at or less than 20 ML/day.	Bellinger River at Thora gauge (205002).
Spicketts Creek Dalhousie Creek Coastal Bellinger: • Non-Tidal MZ Coastal Kalang: • Non-Tidal MZ	No flow classes defined.	Cease to take water when there is no visible flow at the take site, or where water is being taken from a pool, when the volume of water in that pool is less than the full capacity of the pool.	Take site or pool of take.

6.3.5.2 Access to very low flow

Water-dependent activities that are considered critical to human needs or animal health are permitted access to very low flows. Licences with access to very low flows are listed in Schedule 1 of the plan. These activities include the taking of water for:

- domestic supply
- town water supply, until major augmentation of the scheme infrastructure occurs
- fruit washing
- cleaning of dairy plant and processing equipment for the purpose of hygiene
- poultry washing and misting
- cleaning of enclosures used for intensive animal production for the purposes of hygiene.

6.3.5.3 Alluvial licences

For the purposes of managing take of water in upriver alluvial groundwater, the Bellinger River water sharing plan establishes a 40 m wide buffer zone along the river from the high bank. The plan establishes specific rules to aquifer licences that are located within this zone. The zone and the rules recognise the strong connectivity between groundwater and surface water in the water source.

Existing bores located within the 40 m buffer zone are subject to the same daily access rules that apply to surface water licences in the water source. The exceptions are access licences for:

- stock and domestic (domestic)
- local water utility
- food safety
- essential dairy care purposes

which are exempt from these constraints.

In addition to the plan rules, upriver alluvial bores may be subject to local impact rules, which are developed to address local groundwater issues.

6.3.6 Water supply works approvals

Approvals are required under the *Water Management Act 2000* for water supply works. Water supply works are works that take, capture, store, convey, divert or impound water. Water supply works include dams, pumps, bores, tanks, pipes, irrigation channels, weirs, banks and levees. The Bellinger River water sharing plan includes rules that apply to approvals of certain water supply works, which is discussed in the following sections.

6.3.6.1 Construction of dams

Following state-wide policy, the Bellinger River water sharing plan prohibits the construction of instream dams in streams of third order or higher in the following water sources that have been assessed to have high instream values:

- Thora-North Arm Bellinger River Water Source
- Rosewood Creek Water Source
- Never Never Creek Water Source
- Kalang River Water Source.

The construction of in-river dams is prohibited in all order streams in water sources identified as having high stress during low and zero flows. In the Bellinger River water sharing plan, these are:

- Spicketts Creek Water Source
- Dalhousie Creek Water Source.

6.3.6.2 Construction of bores in alluvial aquifers

The Bellinger River water sharing plan establishes distances that new bores are permitted from streams, other bores, groundwater-dependent ecosystems (GDEs) and cultural sites. These distances are based on distances established in state-wide policy. The plan prohibits new bores within 40 metres of a third-order or higher stream, except for bores that:

- are the result of a conversion from an unregulated river access licence
- are drilled into the underlying non-alluvial material, and the slotted intervals of the production bore commence deeper than 30 metres
- the applicant can demonstrate that the bore will have minimal impact on base flows in the stream.

In relation to distances from other bores, new groundwater bores are not permitted within:

- 200 metres of an approved water supply bore nominated by another access licence
- 200 metres of an approved water supply bore from which BLR is being extracted
- 100 metres from the property boundary unless the owner of the adjacent property consents in writing
- 500 metres from an approved water supply bore that is used by a local water utility or major water utility
- 100 metres from a department observation or monitoring bore.

These restrictions do not apply if the new bore is solely for accessing BLR, replaces an existing groundwater bore, or is for the purpose of monitoring or environmental management. New bores may be permitted closer than the minimum distances if a hydrologic assessment is undertaken and can demonstrate that the impacts of extraction will be minimal.

The water sharing plan specifies rules for new bores located near high-priority groundwater-dependent ecosystems (GDE). These ecosystems are identified on the GDE maps in the water sharing plan. The plan states that no new works will be approved within:

- 100 metres of a GDE for bores that supply BLR
- 200 metres of a GDE for new water access licences

These restrictions do not apply if a hydrologic assessment is undertaken that demonstrates that the impacts of drawdown will be minimal at the perimeter of those high-priority GDEs identified on the maps.

The department is currently investigating groundwater-dependent culturally significant sites. They may be identified during the term of this plan. Water supply works must not be constructed within:

- 100 metres of a groundwater-dependent culturally significant site for bores that supply BLR
- 200 metres of a groundwater-dependent culturally significant site for any access licence.

6.3.6.3 Works near Coastal SEPP Wetlands

Water supply works approvals are prohibited in water sources where there may be more than minimal harm to *State Environmental Planning Policy (Coastal Management) 2016* (Coastal SEPP) wetlands.

Water sources within the Bellinger water sharing plan area where Coastal SEPP wetlands reside are:

- Coastal Kalang Water Source
- Coastal Bellinger Water Source
- Bellinger River Coastal Floodplain Alluvial Groundwater Water Source.

6.3.7 Dealing rules

Dealing rules (rules governing the trading of licence shares and water allocations) serve to allow the development of a water market while recognising and protecting the needs of the environment and third-party interests. The National Water Initiative (NWI) has established guidelines for water trading. Trading of licence shares and water allocations within a water sharing plan area needs to maximise the flexibility water users have in applying water to its highest value use without adverse impacts on water sources or existing water users.

The water sharing plan prohibits trade into 6 water sources and permits trade into 6 water sources up to a specified level of entitlement (Table 9 **Error! Reference source not found.**). Trades within water sources are permitted generally, subject to assessment.

Alluvial groundwater licences:

- are subject to the same dealing rules as surface water licences, that is not permitted to be traded into areas with high instream values or high hydrological stress
- may be traded between alluvial aquifers, subject to assessment
- are not permitted to be converted to surface water licences.

Surface water licences may be converted to alluvial groundwater licences, subject to assessment.

Table 9: Dealing rules in the 2020 Bellinger River water sharing plan

Water source	Management zone	Dealing rule
Bellinger River	<ul style="list-style-type: none"> • Upper Bellinger River • Lower Bellinger River • Tidal Pool 	Trade in permitted up to an additional 54 ML (total for entire water source)
Boggy Creek	n/a	Trade in permitted up to an additional 50 ML
Coastal Bellinger	<ul style="list-style-type: none"> • Non-Tidal • Tidal Pool 	Trade in permitted up to an additional 14 ML (total for entire water source)
Coastal Kalang	<ul style="list-style-type: none"> • Non-Tidal • Tidal Pool 	Trade in permitted up to an additional 88 ML (total for entire water source)
Dalhousie Creek	n/a	Trade in prohibited
Hydes Creek	<ul style="list-style-type: none"> • Non-Tidal • Tidal Pool 	No net gain in trade
Kalang River	<ul style="list-style-type: none"> • Tidal Pool • Non-Tidal 	Permitted into the Tidal Pool Management Zone, subject to assessment. Permitted into the Non-Tidal Management Zone from Spicketts Creek Water Source only.
Never Never Creek	n/a	Trade in prohibited
Rosewood Creek	n/a	Trade in prohibited

Water source	Management zone	Dealing rule
Spicketts Creek	n/a	Trade in prohibited
Thora-North Arm Bellinger River	n/a	Trade in prohibited Trade permitted from the Upper Thora-North Arm Bellinger River Management Zone to the Lower Thora North Arm Bellinger River Management Zone subject to assessment
Bellinger River Coastal Floodplain Alluvial Groundwater	n/a	Trade in prohibited

6.4 Adaptive management

Adaptive management refers to the practice of change in response to new information such as monitoring or some other improvement in understanding. In the case of water sharing plans, such information could include socio-economic studies, hydrological modelling, ecological studies and information about Aboriginal cultural values.

Adaptive management is a requirement of both the WM Act and the NWI, and has been allowed for during the life of the Bellinger River water sharing plan through the inclusion of amendment provisions. These provisions allow some aspects of the water sharing plan to be changed within defined limits. Specific amendment provisions in the Bellinger River water sharing plan are discussed below.

6.4.1 Amendment provisions

The Bellinger River water sharing plan includes a number of specified amendments that may be made to the plan during its term. Standard amendments that apply to all water sharing plans include:

- amending water sources, management zones or EMUs
- establishing new or additional flow classes in any water source where management zones are added or amended
- amending if there is a native title determination in the water sharing plan area
- amending the plan maps
- amending the map of high-priority groundwater-dependent ecosystems
- amending flow reference points
- updating or deleting information in Schedules
- amending access and trading rules for the protection of water-dependent Aboriginal cultural assets, should they be identified.

The 2008 Bellinger River water sharing plan included a provision to amend flow classes, based on the outcome of a review of existing hydrological and ecological studies, and salinity monitoring. This will be retained in the 2020 Bellinger River water sharing plan.

Specific to the 2020 Bellinger River water sharing plan is the amendment provision to increase the long-term average annual extraction limit (LTAAEL) to the upper extraction limit in the Bellinger River Coastal Floodplain Alluvial Groundwater Water Source. Planned environmental water may be reduced to no less than 75% of the rainfall recharge in areas that are not high environmental

value areas. The plan allows for modification of the LTAAEL up to a limit of 1,050 ML/year for the groundwater source as a result of recharge studies or new socio-economic information.

Also specific to the 2020 plan is the provision to amend flow classes in the Upper Bellinger River Management Zone and Thora–North Arm Bellinger River Water Source, based on the outcomes of a review of the 95th percentile flow at the Bellinger River at Thora gauge (205002). The review will consider the environmental and economic impacts of the very low flow class. This is to occur within the first 5 years of the plan.

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7 Public exhibition phase of the draft plan

Public exhibition is the formal exhibition of a draft water sharing plan where the minister invites submissions on the draft plan and in particular seeks comment on a range of key issues. Public exhibition of the draft Bellinger River water sharing plan was held from 17 February to 28 March 2020. The plan documents were available for viewing on the Department of Planning and Environment – Water website. WaterNSW sent licence holders letters advising of the public exhibition period and community information sessions held in Bellingen on 10 and 11 March 2020.

Community members and licence holders were invited to attend information sessions comprising:

- a one-on-one session with the senior water planner
- a presentation from the senior water planner.

Information sessions were held at the Bello Youth Hub in Bellingen. Objectives of the sessions were to:

- explain to stakeholders the reasoning behind decisions made for the draft 2020 plan
- formally consult with a broad range of stakeholders to explain the proposed water sharing rules and how they would be carried out
- seek feedback in writing from stakeholders and the general community about the proposed water sharing rules
- address any concerns stakeholders may have.

The department received 13 written submissions from stakeholders including licence holders, water users, community members and an environmental group. The main issues raised in the submissions related to:

- the cease-to-take rules
- the suitability of flow reference points
- water supply works approvals
- monitoring and evaluation.

The department considered all the issues raised in written submissions and those voiced at public consultation meetings. A summary of these issues and the resulting outcomes and decisions are presented in Appendix 5.

8 Monitoring, evaluation and reporting

Monitoring, evaluation and reporting (MER) are key components to adaptive management and to ensure that water sharing plans are effective in meeting their objectives. Comprehensive MER programs are resource-intensive and long term.

It is therefore necessary for us to prioritise areas where there is a high risk of water extraction impacting environmental assets or where the demand for water is greater than the volume of water available.

We are undertaking a MER project that will prioritise water sources for MER activities based on risk in areas that have high levels of extraction, ecological value, or stakeholder needs.

9 Areas for further work

9.1 Metering and record-keeping

The NSW Non-urban water metering program is being rolled out across the state. In coastal NSW, the new metering requirements will begin in December 2023. Metering will be required for works of a certain size and log-keeping will be required for water extracted for smaller works. For more information, see the [NSW non-urban water metering framework pages](#) on the department's website.

9.2 Determine flow requirements for key assets and functions

Priority 3 of the State Water Strategy is to improve river, floodplain and aquifer ecosystem health, and system connectivity. An action under this priority is to consider NSW Long Term Water Plans to protect and enhance ecological systems. The NSW Government will work to consider the objectives and targets outlined in the NSW Long Term Water Plans developed in the Murray–Darling Basin to guide water planning, and to develop equivalent products for coastal regions of NSW. This includes protecting and enhancing our nationally listed wetlands and internationally recognised sites/species.

Several government agencies such as the department's Environment, Energy and Science division and the Department of Primary Industries – Fisheries are working on flow requirements for key assets and ecosystem functions. As these become available and there is sufficient flow data, we will be able to use this information in making water-sharing decisions.

9.3 Stormwater harvesting

The department is developing a stormwater harvesting policy. This will determine the best way to manage stormwater extraction so that NSW maximises the benefits of reusing stormwater and reducing erosion of water ways, while ensuring adequate water is available for the environment and for water users who rely on it.

9.4 Climate change

The department is developing river models that incorporate stochastic long-term data to help guide regional water strategies. These models can be used to inform water-sharing decisions as they are developed across the state. Rising sea level models will also be incorporated into future water-sharing decisions.

Appendix 1 – References and supporting documents

- Australian Bureau of Statistics (2016) *2016 Census QuickStats, Bellingen*. Accessed on 17/03/2020 from https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/SSC10273
- Bellingen Shire Council (2020) *Sustainable Agriculture*. Accessed on 17/03/2020 from <https://www.bellingen.nsw.gov.au/environment-waste/sustainable-agriculture>
- Bellingen and Urunga Museums (2020) *The traditional owners of Urunga and the Bellinger Valley*.
- Bellingen and Urunga Museums (2020) *European exploration and settlement*. Accessed on 04/03/2020 from http://www.bellingenmuseum.org.au/articles_type/european-exploration-and-settlement/
- Bellinger Landcare (2016) *Bellinger River System Landholder Booklet*
- Bureau of Meteorology (BOM) (2020), *Summary statistics – Bellinger Post Office*. Accessed on 14/04/2020 from http://www.bom.gov.au/climate/averages/tables/cw_059001.shtml
- Australian Bureau of Statistics (ABS) (2016) *Socio-Economic Indexes for Areas*. Accessed from <https://www.abs.gov.au/websitedbs/censushome.nsf/home/seifa>
- Department of Planning Industry and Environment (DPIE) (2020a) *Bellinger River*. Accessed on 17/03/2020 from <https://www.environment.nsw.gov.au/topics/water/estuaries/estuaries-of-nsw/bellinger-river>
- DPIE (2020b) *Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions – endangered ecological listing*. Accessed on 17/03/2020 from <https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/>
- DLWC (2001), *Water Management Act 2000 – What it means for NSW*, Department of Land and Water Conservation, Sydney.
- NSW Office of Water (2011) *Macro water sharing plans – the approach for unregulated rivers A report to assist community consultation*. NSW Government, Sydney.
- NSW Office of Water (2011a) *Macro water sharing plans – the approach for groundwater. A report to assist community consultation*. NSW Government, Sydney.
- The Sydney Morning Herald* (2007) *Travel: Bellingen*. Accessed on 04/03/20 from <https://www.smh.com.au/lifestyle/bellingen-20070815-qdkpy5.html>
- Thomas, L (2013), *Aboriginal History of the Coffs Harbour region*. Accessed on 02/03/2020 from <http://libraries.coffsharbour.nsw.gov.au/Local-Heritage/Documents/Aboriginal%20history%20of%20the%20Coffs%20Harbour%20region.pdf>
- WaterNSW (2020) *Real-time data: Bellinger @ Thora*. Accessed on 18/03/2020 from <https://realtimedata.waternsw.com.au/>

Appendix 2 – Risk assessment results of the 2008 Bellinger River water sharing plan

Table 10: Risk matrix used to determine indicative dealing rules for unregulated water sources

Risk	Low dependence on extraction	Medium dependence on extraction	High dependence on extraction
High Risk to Instream Values	n/a	n/a	n/a
Medium Risk to Instream Values	n/a	Never Never Creek	Hydes Creek
Low Risk to Instream Values	Spicketts Creek Thora-North Arm Bellinger River Coastal Bellinger	Boggy Creek Coastal Kalang Kalang River Rosewood Creek	Bellinger River Dalhousie Creek

Table 11: Value matrix used to determine indicative access rules for unregulated water sources

Value	Low hydrologic stress or hydrologic risk	Medium hydrologic stress or hydrologic risk	High hydrologic stress or hydrologic risk
High Instream Values	Kalang River Thora-North Arm Bellinger Rosewood Creek	Never Never Creek	n/a
Medium Instream Values	Bellinger River Boggy Creek Coastal Kalang Spicketts Creek	Coastal Bellinger	Hydes Creek
Low Instream Values	n/a	n/a	n/a

Appendix 3 – Summary of rules in the 2008 Bellinger River water sharing plan

Table 12: Summary of rules in the 2008 Bellinger River water sharing plan

Water source	Flow classes	Flow rule	Flow reference point	Trade rules
Bellinger River Tidal pool and Non-tidal MZ	<ul style="list-style-type: none"> Very Low Flow ≤ 16 ML/day A Class > 16 ML/day and ≤ 95 ML/day B Class > 95 ML/day 	<p>Take must cease at or less than 16 ML/day.</p> <p>Take is restricted to 8 hours a day when flow is over 16 ML/day and at or below 95 ML/day.</p>	Bellinger River at Thora gauge (205002).	Trade into the Not-Tidal Management Zone allowed up to an additional 54 ML
Boggy Creek	<ul style="list-style-type: none"> Very Low Flow ≤ 16 ML/day A Class > 16 ML/day 	<p>Take must cease at or less than 16 ML/day.</p>	Bellinger River at Thora gauge (205002).	Trade in allowed up to an additional 50 ML
Coastal Bellinger: • Tidal pool MZ	<ul style="list-style-type: none"> Very Low Flow ≤ 16 ML/day A Class > 16 ML/day and ≤ 95 ML/day B Class > 95 ML/day 	<p>Take must cease at or less than 16 ML/day.</p> <p>Take is restricted to 8 hours a day when flow is over 16 ML/day and at or below 95 ML/day.</p>	Bellinger River at Thora gauge (205002).	Trade into the Not-Tidal Management Zone allowed up to an additional 14 ML
Coastal Kalang: • Tidal pool MZ	<ul style="list-style-type: none"> Very Low Flow ≤ 4 ML/day A Class > 4 	<p>Take must cease at or less than 4 ML/day.</p>	Sunny Corner Road crossing staff gauge	Trade into the Not-Tidal Management Zone allowed up to an additional 88 ML
Hydes Creek	<ul style="list-style-type: none"> Very Low Flow ≤ 1 ML/day A Class > 1 ML/day 	<p>Take must cease at or less than 1 ML/day.</p>	Kethels Road Bridge staff gauge	No net gain in share component

Water source	Flow classes	Flow rule	Flow reference point	Trade rules
Kalang River	<ul style="list-style-type: none"> Very Low Flow ≤ 4 ML/day A Class > 4 	Take must cease at or less than 4 ML/day.	Sunny Corner Road crossing staff gauge	Trade permitted into the Non-Tidal Management Zone in the Kalang River Water Source if from the Spicketts Creek Water Source
Never Never Creek	<ul style="list-style-type: none"> Very Low Flows ≤ 2 ML/day A Class > 2 ML/day 	Take must cease at or less than 2 ML/day.	Promised Land Loop Road staff gauge	Trade in prohibited
Rosewood Creek	<ul style="list-style-type: none"> Very Low Flows ≤ 16 ML/day A Class > 16 ML/day 	Take must cease at or less than 16 ML/day.	Bellinger River at Thora gauge (205002).	Trade in prohibited
Thora-North Arm Bellinger River	<ul style="list-style-type: none"> Very Low Flow ≤ 16 ML/day A Class > 16 ML/day 	Take must cease at or less than 16 ML/day.	Bellinger River at Thora gauge (205002).	Trade in prohibited
Spicketts Creek Dalhousie Creek Coastal Bellinger: <ul style="list-style-type: none"> Non-tidal MZ Coastal Kalang: <ul style="list-style-type: none"> Non-tidal MZ 	No flow classes defined.	Cease to take water when there is no visible flow at the take site, or where water is being taken from a pool, when the volume of water in that pool is less than the full capacity of the pool.	Take site or pool of take.	Trade in prohibited. Trade permitted into Spicketts Creek water source if from the Non-Tidal Management Zone of the Kalang River Water Source

Appendix 4 – Responses to Natural Resources Commission recommendations

Table 13: Natural Resources Commission (NRC) recommendations and departmental response in the 2008 Bellinger River water sharing plan

NRC's recommendation	Department's response
1. Clarify objectives of the 2008 Bellinger River Water Sharing Plan (WSP) and review monitoring and evaluation	Water sharing plan replaced with 2020 Bellinger water sharing plan
2. In developing the new plan, ensure consistency with the NSW Government's new framework for measurement and metering of water take, including any metering requirements	Plan provisions have been updated to reflect current policy and statute on metering
3. In developing the new plan: <ul style="list-style-type: none"> • develop monitoring requirements and indicators that will allow assessment of environmental sustainability of the long-term average annual extraction limit • include provisions requiring assessment of the long-term average annual extraction limit against sustainability indicators and that allow for adjustment if necessary 	Objectives, strategies and performance indicators have been reviewed and updated
4. In developing the new plan: <ul style="list-style-type: none"> • apply the best available methodology to estimate stock and domestic take under basic landholder rights, incorporating climate data to improve reliability of stock and domestic extraction estimates. • ensure the above methodology incorporates any finalised requirements in the Reasonable Use Guideline for stock and domestic usage. 	<ul style="list-style-type: none"> • An improved method for estimating BLR requirements began in 2016 to make the method across NSW consistent. These are estimates of the water requirements of domestic and stock, irrespective of the climate. Climate data does not have a significant bearing on the requirements and in turn the estimates. • Reasonable Use Guidelines have not been finalised and have not been integrated into the 2020 Bellinger River water sharing plan.
5. Investigate barriers to the utilisation of Aboriginal Community Development access licences, and adjust the provisions of the Plan as appropriate to address barriers	Rules have been applied that increase the opportunities for Aboriginal people to apply for Aboriginal community development licences across the plan area for the Bellinger River.
6. Review the flow reference point and access rules to determine if other gauging sites may improve outcomes, and revise the provisions related to gauging in the new plan if appropriate.	Flow reference points and flow classes have been reviewed, given the installation of new flow gauges and updated flow duration data. Updated rules include the new flow reference points, updated flow classes and expand the number of water sources referenced to a telemetered gauge, which can be viewed on the WaterNSW Real-time data website.

NRC's recommendation	Department's response
<p>7. Conduct an assessment, including public consultation, to determine whether to merge the Water Sharing Plans for the Bellinger River Area and Coffs Harbour Area.</p>	<p>The department resolved not to consolidate the Bellinger plan with the Coffs Harbour plan during this replacement due to time constraints and significant groundwater assessments to be undertaken during the replacement of the Bellinger Plan.</p>

Appendix 5 – Stakeholder issues raised in submissions

Table 14: Issues raised in submissions on the draft 2020 Bellinger River water sharing plan

Issue	Concerns raised	Outcomes and decisions
Access rules	<p>Changed cease-to-take Most stakeholders are concerned there will be a restrictive impact on their operations due to changed cease-to-take values.</p> <p>Critical watering times A licence holder raised the issue of specific watering times where crops are more sensitive to heat and dryness.</p> <p>Changed flow reference point Stakeholders located in Bellinger River Water Source near the Thora flow reference point request they continue being referenced to that gauge. More guidance on how to access data for the telemetered gauges was suggested.</p> <p>Introduction of commence-to-take Licence holders are concerned about an additional day of cease-to-take as a result of a commence-to-take rule.</p> <p>High-flow conversion suggestion Concerns that the Bellinger River Water Source does not allow high-flow conversion, which would decrease dependency on the river during low-flow events.</p>	<p>Changed cease-to-take The plan includes a review and amendment provision that allows for an investigation into the cease-to-take values during the first 5 years of the plan.</p> <p>Critical watering times The WSP includes review and amendment provisions that allow for a review of possible impacts of changes to access rules on irrigated agriculture in the water source.</p> <p>Changed flow reference point The Bellinger River Water Source has been divided into 3 management zones – Upper, Lower and Tidal Bellinger River Management Zones. Licensees in the Upper are referenced to the Thora flow reference point, whereas licensees in the tidal and Lower Management Zones are referenced to the Fosters flow reference point.</p> <p>Introduction of commence-to-take The 24-hour commence-to-take rule has been included in the plan as it protects first flows through a water source after a cease-to-take event.</p> <p>High-flow conversion suggestion The final plan allows applications for a total of 568 unit shares of unregulated river licences, which may be converted to high-flow licences at a conversion rate of 2.5 high-flow shares for every 1 unregulated river licence share held, with a cease-to-take rule of 335 (Fosters gauge) or 134 (Thora gauge) ML/d.</p>
Connectivity	Concerns that connectivity between groundwater and surface water should be maintained as a priority for the WSP.	Surface cease-to-take applies to alluvial groundwater cease-to-take to protect connectivity.

Issue	Concerns raised	Outcomes and decisions
Environmental water	Should be more water reserved for the environment. Concerns that there is an unfair portion of water allocated for licensed use, and that more can be afforded to the environment. The Coastal Floodplain Alluvial Groundwater Water Source was referenced.	Where trades into a zone are permitted, they are capped at a sustainable limit. Individual trades are also assessed before approval to ensure sustainability. The risk assessment identified 25% of recharge available for take, 75% reserved for environmental purposes. 100% of existing water in the aquifer is reserved for the environment.
Harvestable rights	The department's policy on harvestable rights should be reviewed to give irrigators more water from harvestable rights, as water supply challenges will become greater in the future and this could be a viable option.	Department of Planning and Environment – Water is presently reviewing current harvestable rights policy for coastal water sources.
Inequity	General comment about inequity of water sharing – not specific to Bellinger.	n/a
LTAAEL	Coastal Floodplain Alluvial LTAAEL not large enough as it can be increased from 350 ML to 1,050 ML. Farming should be top priority for water considerations.	Coastal unregulated rivers received 100% available water determinations during the recent drought. The proposed Floodplain Alluvial LTAAEL comprises both current and an estimated future basic landholder rights and licensed authority to take water. If in future there is significant growth in demand for floodplain alluvial groundwater, additional water through a higher LTAAEL may be considered.
Monitoring and evaluation	One stakeholder suggested salinity monitoring should be carried out. One stakeholder suggested Bellinger River Snapping Turtle monitoring should be carried out.	Current plan provides for an investigation into salinity levels of tidal pools and development of salinity cease-to-take rule – these provisions shall be carried over. A program may be developed to monitor the performance indicators which may consider the recorded range, extent and condition of the Bellinger River Snapping Turtle.
Supporting data	Concerns entitlement for town water supply is wrong – 1,613 ML/year as opposed to 1,300 ML/year, which is written in the existing and draft plan.	Council holds 1,300 licence shares in the Bellinger River WSP area. The remaining licence shares are in the Clarence River WSP area servicing the Dorrigo township.

Issue	Concerns raised	Outcomes and decisions
Trade rules	One stakeholder suggested clearer communication about trading possibilities for licence holders, and that trading is fragmented on the coast due to small trading areas, which inhibits trade.	<p>Rule summary sheets on the department's website state the dealing possibilities for each water source.</p> <p>Trade of licence shares and account assignments can have a significant bearing on ecological river health and water demand. These considerations are specifically identified through the establishment of water sources to ensure their protection in the face of trade.</p>
Water supply work approvals	<p>Distance rules for bores One stakeholder was concerned the distance should be less than 200 metres between council exploration bores. Conversely, it was suggested in another submission that bore distance rules should be further than 200 metres from the high bank to prevent decoupling of groundwater and surface water.</p> <p>Prohibition of in-river dams Concerns that prohibition of in-river dams constrain water storage options for irrigators.</p>	<p>Distance rules for bores Distance rules do not apply to local water utilities or town water supply. If controlled allocations increased to 1,050 ML/year in the future, the current distance rules could be reviewed to provide for protection of surface water and groundwater connectivity. Presently, the plan establishes the LTAAEL at 350 ML, which includes shares that may be available through a controlled allocation during the term of the plan.</p> <p>Prohibition of in-river dams The plan provides for conversion to high-flow licences in a number of water sources to encourage take of water during high flows for storage in off-river dams for irrigation. The rule serves to protect critical flows for important aquatic plants and animals identified in these water sources.</p>
WSP drafting	Issues with clarity of map.	Plan maps of improved resolution are available with the final plan.

Appendix 6 – Method used to estimate water requirements of domestic and stock basic landholder rights

The values for basic landholder rights (BLR) in the unregulated water sharing plans have been estimated using both spatial and empirical data held by the Department of Planning and Environment and Australian Bureau of Statistics. The estimates may differ from estimates in the current water sharing plans due to changes in land use, changes in population and the availability of more accurate data.

Surface water sources

Surface water BLR is associated with river frontage. To estimate the volume of water used to meet domestic and stock surface water BLR requirements, a buffer zone is applied around the river that determines the area of land that would be entitled to riparian (river frontage) BLR.

Step 1: Identify all water sources in the water sharing plan area and separate out the regulated rivers from the unregulated rivers.

Apply the below method to each water source separately. This will result in a regulated river BLR figure and an unregulated river BLR figure.

Step 2: Determine buffer zones.

The buffer zone is determined by applying a standard distance around streams, based on the location of the stream within NSW and the stream order. The size of the buffer zone is determined from the zone map (see Figure A4.1) and the stream orders by zone (see Table A4.1). Stream orders were selected for each zone based on the stream's reliability to provide basic rights for much of the year on average.

Figure A4.1. Basic landholder rights zone map

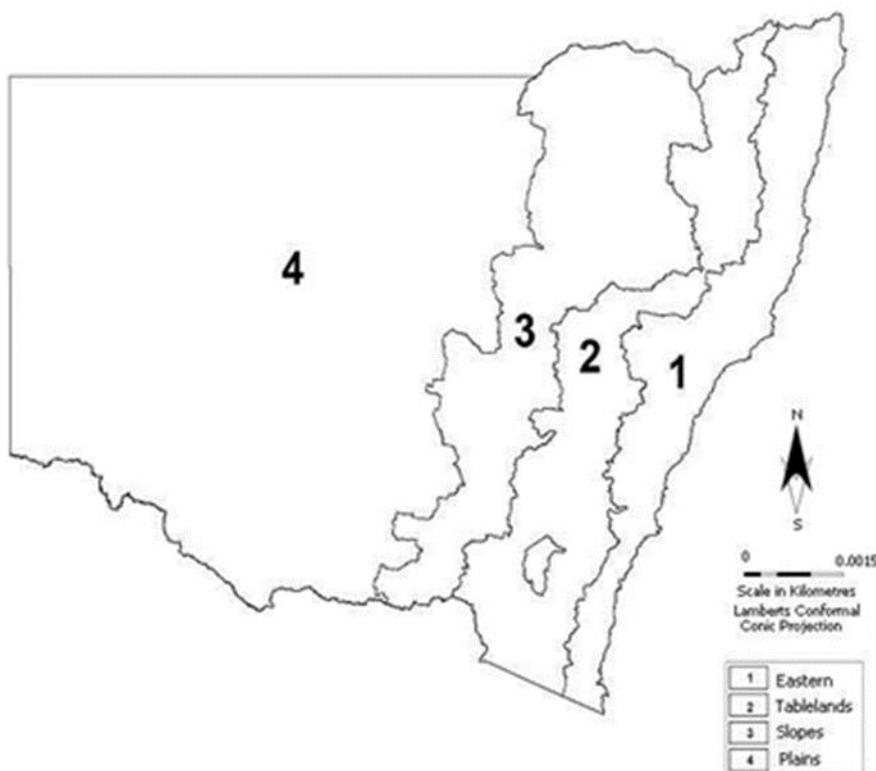


Table A4.1. Stream orders by zone

Zone	Stream order	Buffer (m)
Eastern	3 rd and above	400
Tablelands	3 rd and above	400
Slopes	4 th and above	400
Plains	5 th and above	1,000

For example, a buffer zone of 400 metres would be applied to a 3rd order or larger stream in the eastern zone of the state.

Step 3: Calculate domestic use (in megalitres per year)

It is assumed that domestic use within urban areas is provided by reticulated town water supply and covered by surface water and/or groundwater licences. Private surface water extraction for domestic consumption in urban areas is assumed to be negligible.

Within each buffer zone determined in step 2, remove the urban areas.

Overlay the GURAS property addressing data held by NSW Crown Lands.

Determine the number of dwellings in the remaining (non-urban) area of the buffer zone by counting the number of unique properties identified in the GURAS data set. This assumes that on average there is one house per property and multiple houses on a single property are balanced out by properties that are unoccupied.

Multiply the number of dwellings by the domestic consumption allowances for rural land (see Table A4.2) to determine the rural domestic BLR volume for the buffer zone.

Table A4.2. Domestic water consumption for rural lots (per year) from the basic landholder rights zones

Zone	Rural consumption (ML/yr)
Eastern/Coast	1.0
Tablelands	1.1
Slopes	1.4
Plains	2.1

The rural domestic BLR volume will be partly met by groundwater and partly by surface water.

Multiply the rural domestic BLR volume by the surface water percentage in (Table A4.3) to determine the proportion of surface water use within the buffered areas of each water source.

Surface water reliability is higher in coastal regions so it is assumed that within the buffer zone the bulk of water extracted would be from surface water with equal portions of connected alluvial groundwater and deeper groundwater.

Table A4.3. Assumed water use by region by source

Zone	Groundwater	Surface water
Eastern	Alluvials 10% Other 10%	80%
Tablelands	Alluvials 20% Other 10%	70%
Slopes	Alluvials 20% Other 10%	70%
Plains	Alluvials 30% Other 30%	40%

Step 4: Calculate stock use (megalitres per year)

Stock use is calculated by determining the area of grazing within each buffer zone for each water source.

The grazed area excludes urban areas. It is assumed that any use within an urban area will be minor and would be accounted for as part of any local water utility licence.

Within each buffer zone determined in step 2, remove the urban areas.

Determine the area of grazing within the non-urban area of each buffer zone by calculating the area of native pastures (unimproved), improved pastures and irrigated pastures for each water source from the NSW land use data of 2013 that is in the SEED database.

Multiply the area of each type of pasture by the stock watering allowances for rural land (see Table A4.4) to determine the stock use volume for that type of pasture in the water source. This takes into account the different stock water requirements in different parts of the state.

Sum the stock watering allowances for each type of pasture within the water source to get a total stock water BLR figure for the water source.

Table A4.4. Stock watering allowance by zone from the basic landholder rights zones

Zone	Pasture type	Take allowance (ML/ha)
Eastern	Unimproved pasture	0.025
Eastern	Improved pasture	0.045
Tablelands	Unimproved pasture	0.020
Tablelands	Improved pasture	0.045
Slopes	Unimproved pasture	0.015
Slopes	Improved pasture	0.045
Plains	Unimproved pasture	0.010
Plains	Improved pasture	0.020
All zones	Irrigated pasture	0.050

Step 5: Calculate total BLR requirements for the surface water source.

Sum the domestic BLR figure calculated in step 3 and the total stock BLR figure in step 4 to determine the total BLR figure for each surface water source. Sum each water source to determine BLR for regulated and unregulated water sources in the water sharing plan area.

Groundwater water sources

NOTE: This method does not apply to the Coastal Floodplain Alluvial Groundwater Water Sources.

Step 1: Determine the ‘groundwater relevant area’ of the water source.

For each groundwater source, remove the urban areas that are supplied by reticulated town water and remove the buffer areas determined in the surface water source methodology. The remaining area is the groundwater relevant area for BLR usage.

Step 2: Calculate domestic use (megalitres per year).

For domestic use in the groundwater relevant area of the groundwater source, calculate the number of houses by counting the number of unique properties identified in the GURAS property addressing data held by NSW Crown Lands within the groundwater relevant area of each water source.

Calculate the domestic groundwater BLR requirement in each groundwater source by multiplying the total number of houses by the domestic consumption by rural lots in Table A4.2 and then the proportion of BLR that is groundwater dependent in Table A4.3.

Step 3: Calculate stock use (megalitres per year).

Within the groundwater relevant area for each groundwater source, identify the area of unimproved, improved, and irrigated grazed pasture using the NSW land use data of 2013 that is in the SEED database.

Calculate the stock watering requirements by multiplying the area of each type of pasture by the stock watering allowances for rural land (Table A4.4) to determine the stock use volume for that water source.

As some of the stock BLR figures will be provided by surface water, calculate the volume of groundwater stock BLR by using the percentage figures by zone in Table A4.5.

Table A4.5. Estimated percentage of stocked area with significant reliance on groundwater by zone

Zone	Stock: significant reliance on groundwater
Eastern/Coast	15%
Tablelands	40%
Slopes	50%
Plains	80%

Step 4: Calculate total BLR for each groundwater water source.

Sum the domestic BLR figure calculated in step 2 and the total stock BLR figure in step 3 to determine the total BLR figure for each groundwater water source.

Coastal floodplain alluvials

Count the number of BLR bores within each water source that were identified through WLS searches and spatial mapping surveys.

For each bore that is for 'stock' or 'domestic' use only, an annual extraction of 1 megalitre BLR is assumed.

For each bore that was for 'stock and domestic' use, an annual extraction of 2 megalitres BLR is assumed.

Sum these 2 volumes to determine the total known BLR.

Expert opinion advises that the total known BLR represents approximately two-thirds of all groundwater BLR extraction as there is a significant amount on unlicensed groundwater extraction such as unauthorised spear points.

Multiply the total known BLR figure by 150% to account for unknown BLR to give the total BLR figure for the water source.

Groundwater reliance percentages

The assumptions made for estimating reliance on groundwater by zone outside the areas that are assumed to be using primarily river and creek water are explained as follows.

For the **eastern/coastal zone**, high rainfall suggests water tanks and dams are likely to be used over groundwater. Access to groundwater in coastal sands areas is assumed to be by a large number of spear points.

The assumptions are:

- domestic:10%
- stock:15%.

For the **tablelands zone**, relatively reliable rainfall suggests dams and water tanks are likely to be used over groundwater. In general, groundwater access gives low yields with varying quality.

The assumptions are:

- domestic: 25% of houses within the water source would use primarily groundwater over rainwater
- stock: 40% of the grazed area within the water source would use primarily groundwater for stock watering over dams.

For the **slopes zone**, less reliable rainfall suggests dams and water tanks are still likely to be used over groundwater where possible. In general, groundwater access gives varying yields with varying quality.

The assumptions are:

- domestic: 35% of houses within the water source would use primarily groundwater over rainwater
- stock: 50% of the grazed area within the water source would use primarily groundwater for stock watering over dams.

For the **plains zone**, unreliable rainfall suggests groundwater will be used over dams and water tanks. In general, groundwater access gives varying yields with varying water quality.

The assumptions are:

- domestic: 60% of houses within the water source would use primarily groundwater over rainwater; in some areas, groundwater is unfit for human consumption
- stock: 80% of the grazed area within the water source would use primarily groundwater for stock watering over dams.