


Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2023

Background and changes

January 2024





Acknowledgement of Country

The Department Climate Change, Energy, the Environment and Water acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land and we show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

Published by NSW Department of Climate Change, Energy, the Environment and Water

dceew.nsw.gov.au

Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2023

First published: January 2024

Department reference number: PUB22/913

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TMP-MC-R-SC-V1.2

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Glossary and abbreviations

Term	Definition
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.
AWDs	Available Water Determinations
BLR	Basic Landholder Right
CTP	Cease-to-pump flow levels / Commence-to-pump flow levels
DCCEW	NSW Department of Climate Change, Energy, the Environment and Water. Previously Department of Planning and Environment
DPI	Department of Primary Industries
ECAs	Environmental Contingency Allowances
EES	Environment, Energy & Science
EFRG	Environmental Flows Reference Group
EMU	Extraction management unit. Catchment scale unit used to manage extraction limits. May contain one or more hydrologically connected water sources.
EMZ	Extraction management zone
GDE	Groundwater-Dependant Ecosystem Ecosystems that rely on groundwater for their species composition and their natural ecological processes.
GL	Gigalitres
GSWS	Greater Sydney Water Strategy
HEVAE	High ecological value aquatic ecosystems
HRs	Harvestable Rights
IDEL	Individual daily extraction limit

Term	Definition
KL	Kilolitres
LALCs	Local Aboriginal Land Councils
LTADEL	Long-Term Average Annual Extraction Limit The long-term average annual volume of water in a water source available to be lawfully extracted or otherwise taken under access licences and BLR requirements.
Management Zone	A water source may be subdivided into management zones to allow the application of different rules (access, trade etc.) in each zone.
MER	Monitoring, evaluation and reporting
MHL	Manly Hydraulics Laboratory
MIG	Metropolitan Interagency Group
ML	Megalitres
NRAR	Natural Resource Access Regulator
NRC	Natural Resources Commission
NSW	New South Wales
PEW	Planned environmental water
Resilience and hazards SEPP	State Environmental Planning Policy (Resilience and Hazards) 2021
RWSOG	Regional Water Senior Officers Group
SEPP	State Environmental Planning Policy
Share component	An entitlement to a given number of shares of the available water in a specified water source. The share component on an access licence certificate is expressed as a unit share. The share component of a specific purpose access licence (e.g., local water utility, major water utility and domestic and stock) is expressed in megalitres/year.
SWC	Sydney Water Corporation
TDEL	Total daily extraction limit
TWG	Technical Working Group

Term	Definition
Water Source	<p>The whole or any part of—</p> <ul style="list-style-type: none"> a. one or more rivers, lakes or estuaries, or b. one or more places where water occurs on or below the surface of the ground (including overland flow; water flowing over or lying there for the time being) c. and includes the coastal waters of NSW.
WM Act	<i>Water Management Act 2000</i>
WNSW	Water New South Wales
WQ	Water Quality
WSPs	Water Sharing Plans

1. Introduction

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

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

The *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2023* began on 1 July 2023 (the 2023 Greater Metropolitan Unregulated plan). The new plan replaces the previous *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011* which expired on 30 June 2023.

This document gives high-level background information on the planning process as well as details of changes to management arrangements in the 2023 Greater Metropolitan Unregulated plan.

The replacement plan covers 65 water sources across 6 extraction management units, which are listed in Appendix 1 – Water sources.

You can find links to the plan, maps and rule summary sheets on the [Greater Metropolitan Region water sharing plans page](#) of the department's website.

The resources in Appendix 2 – References and supporting documents give more details of the plan area, its water resources and resource management.

2. Purpose of water sharing plans

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

In December 2000, the NSW Parliament 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 present and future generations.’

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

Water sharing plans are the primary legal framework for managing water access and sharing in NSW. 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 *Water Management Act 2000* (WM Act) is the guiding legislation for water management in NSW. The Act allows for the sustainable and integrated management of water sources. It considers ecologically sustainable development, the protection and enhancement of the environment, and social and economic benefits.

The WM Act sets a maximum initial lifespan of 10 years for water sharing plans, at which point they need to be reviewed and replaced or extended. When deciding whether to extend or replace 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 NRC that reviews (within the previous 5 years) if the water sharing provisions have significantly helped to achieve, or have failed to achieve, environmental, social and economic outcomes, and if those provisions should change.

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

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

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 required to meet basic landholder rights
 - setting annual limits on water extractions that ensures security for water users and the environment
-

- giving water users a clear picture of when and how water will be available for extraction
- giving licence holders flexibility in the way they can manage their water accounts
- specifying rules in groundwater plans to minimise effects on other groundwater users, groundwater-dependent ecosystems (GDEs), culturally significant sites, water quality and the stability of the aquifer
- specifying the rules for water trading/dealings
- setting the mandatory conditions that apply to licence holders.

You can review the *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2023* can be found on the [department's website](#).

3.3 NSW water policy

We are continuously evolving and improving water-related policy and decision-making processes that carry out the legislative framework to ensure effective delivery of our water resource management objectives. We develop plans in line with the principles of the WM Act and the National Water Initiative.

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

3.4 Changes to policy for harvestable rights in coastal areas

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

The 2022 and 2023 coastal water sharing plans include an amendment to assess uptake of harvestable rights within 3 or 5 years of the plan commencement to determine if there has been any increase in uptake of water due to the increase to 30%. The amendment also includes the ability to modify access rules in Parts 6 to 8 of the plan in response to any significant increases of uptake to protect critical environmental needs and basic landholder rights.

Due to the small number of instances where landholders have registered their intent to increase harvestable rights uptake the department does not expect any significant changes to rules in the

plan as a result of an increased uptake of harvestable rights. For more information on the specific changes to harvestable rights please visit the department's [frequently asked questions](#) webpage or for general information, the [harvestable rights](#) webpage.

4. Water sharing plan review and replacement process

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

During the life of the 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 NRC is the independent body that audits and reviews water sharing plans. The section 44 audits aim to identify where improvements are necessary to apply the plan rules. The section 43A review is to determine if the plan is achieving the intended environmental, social and economic outcomes.

The NRC reports the findings of the audits and reviews to the NSW minister responsible for water, who decides whether to extend a plan for another 10 years or to replace it. If the NRC recommends replacing it, the department considers the commission's recommendations when developing the replacement plan.

More information and links to the review of the 2011 Greater Metropolitan Unregulated plan are in section 5 of this document.

The Minister at the time adopted the NRC's recommendation to replace the 2011 Greater Metropolitan Unregulated plan in June 2021.

To allow time to review and replace the plan, the duration of the current plans was extended by 2 years.

You can find more information on the water sharing plan review and replacement process in the [Replacement Water Sharing Plan Manual \(PDF 1.28 MB\)](#).

5. Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2023

5.1 Overview

The plan area of the *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2023* (shown in Figure 1) is located on the south-east coast of NSW. It covers an area of approximately 32,500 square kilometres, from Shoalhaven Heads in the south, Broken Bay in the north, Lithgow to the west, and Goulburn to the south-west. The region is bounded by the Hawkesbury River catchment to the north and west and Shoalhaven River catchment to the south and south-west. The region also includes the rivers of the Illawarra and metropolitan Sydney.

5.1.1 Shoalhaven River catchment

The Shoalhaven River catchment has an area of 7,300 square kilometres and a length of approximately 300 kilometres. The area is bordered by the catchments of Tuross River to the south, Murrumbidgee River to the south-west, Deua, Moruya and Clyde Rivers to the east and Wollondilly River to the north. The river rises to around 1,250 metres in the hilly to mountainous country between the Gourock and Minuma ranges, approximately 40 kilometres west of Moruya and 70 kilometres south of Braidwood. Downstream of these short headwater reaches; the valley floor ranges in width from 300 to 1,000 metres. At the foot of the Budawang Range, near Braidwood, the river has an elevation of 670 metres and flows in a predominantly northerly direction through the Shoalhaven Plain, where the valley floor is between 5,000 and 6,000 metres wide.

Below the Mongarlowe River confluence some 30 kilometres north of Braidwood, the river flows through 300- to 500-metre-deep gorges of Morton National Park. Here the Corang and Endrick Rivers, two large tributaries, enter the Shoalhaven River. Together with 30 kilometres of the Shoalhaven River upstream of the Mongarlowe River confluence, these gorges have been identified as 'wild' and 'scenic'. At the eastern limit of these gorges, the Shoalhaven River enters Lake Yarrunga, the storage lake of Tallowa Dam. Here it is joined from the north by Kangaroo River, and turns east sharply to its estuarine mouth, 10 kilometres north-east of Nowra. Below Tallowa Dam, the river continues through confined valleys for approximately 20 kilometres, where it enters estuarine floodplain at the tidal prism near Burrier, west of Nowra.

5.1.2 Hawkesbury and Nepean Rivers catchment

The Hawkesbury and Nepean Rivers have a combined catchment area of 22,000 square kilometres and a length of close to 339 kilometres. The rivers rise to over 800 metres as the Wollondilly River on the Great Dividing Range, 42 kilometres north-west of Goulburn and 12 kilometres east of Crookwell. The Wollondilly River is largely confined by valley sides with few or no floodplains. The Mulwaree River chain of ponds, Paddys River, Tarlo River, and Wingecarribee River enter the Wollondilly River before it meets Lake Burragorang at Jooriland. Lake Burragorang is formed by Warragamba Dam on the Warragamba River.

Coxs River, with a catchment area of 1,700 square kilometres and a headwater elevation of over 1,000 metres, is also a significant tributary to Lake Burragorang. Coxs River comprises significant gorge reaches through the Blue Mountains National Park and Kanangra Boyd National Park.

The Warragamba River meets the Nepean River some 3 kilometres below Warragamba Dam. The Nepean River rises to over 700 metres about one kilometre north-east of Robertson and flows into Lake Nepean created by Nepean Dam. Approximately 10 kilometres below Nepean Dam and immediately above Pheasants Nest Weir, the Cordeaux River enters the Nepean River. The Bargo River comprises significant intact gorge and sandstone headwaters and with a catchment area of 131 square kilometres enters the Nepean River below the Cordeaux River confluence. The Avon River is a significant tributary to the Cordeaux River, entering the river 11.5 kilometres below Avon Dam and 20 kilometres below Cordeaux Dam. The Cataract River enters the Nepean River about 21 kilometres below the confluence of the Cordeaux and Nepean Rivers and 17 kilometres below Cataract Dam. The Nepean, Avon, Cordeaux and Cataract rivers above and below the dams comprise significant gorge reaches.

The Nepean River below the Cataract River flows for approximately 100 kilometres through confined and partially confined channels and gorges to the confluence of the Grose River approximately 5 kilometres south-west of Richmond. The confined channels include large wavelength meanders. Erskine Creek and Glenbrook Creek enter the Nepean River below its confluence with Warragamba River. Erskine Creek rises to about 850 metres at Katoomba. The creeks have a combined catchment area of 463 kilometres and comprise near intact sandstone gorges and headwaters.

The Grose River rises to 1,000 metres north of Blackheath and has an area of 669 square kilometres. The Grose River comprises large gorges of good condition and confined channel of moderate condition at the Nepean River confluence. The Grose River provides significant flows to the Hawkesbury River. The 80th percentile flow is 51 megalitres (ML/day) while the 50th percentile flow is 106 ML/day.

Below the Grose River confluence, the Nepean River becomes the Hawkesbury River with a catchment area including the estuary of 796 square kilometres. Below the Colo River confluence

the Hawkesbury River is a degraded tidal river. Between the Grose River and Colo River confluence, Wiannamatta-South Creek and Cattai Creek enter the Hawkesbury River north-east of Richmond and from the south. Wiannamatta-South Creek has a catchment area of 784 square kilometres and rises to 120 metres north of Narellan. The creek is primarily a degraded meandering deep and narrow channel with chain of ponds headwaters. The creek receives inputs from St Marys and Quakers Hill sewage treatment plants on a daily basis. These discharges make up the majority of flows into Lower Wianamatta-South Creek and Eastern Creek. The observed 80th percentile flow of South Creek at Richmond Road gauge is 26.7 ML/day and the 50th percentile flow is 45.4 ML/day, however, these flows consist primarily of treated wastewater discharge. Modelled percentiles, removing discharges and water users indicate the 80th percentile would be naturally 18.2 ML/day and 31 ML/day for the 50th percentile.

Cattai Creek has a catchment area of 283 square kilometres and rises to over 140 metres at Castle Hill. The creek includes confined and partly confined channels of moderate condition, gorges of moderate condition, although Little Cattai Creek includes near intact gorges, and channel wetlands that are degraded. The 50th percentile flow is 15 ML/day and the 80th percentile flow is 7 ML/day, although a portion of the flow is treated wastewater discharge.

The Macdonald River enters the Hawkesbury River from the north at Wisemans Ferry. Although the Macdonald River has a large catchment, 1,909 square kilometres, its contribution to Hawkesbury River is quite small. Other minor tributaries to the Hawkesbury River within the area of the plan include Webbs, Berowra and Cowan Creeks.

5.1.3 Northern Sydney and Southern Sydney catchments

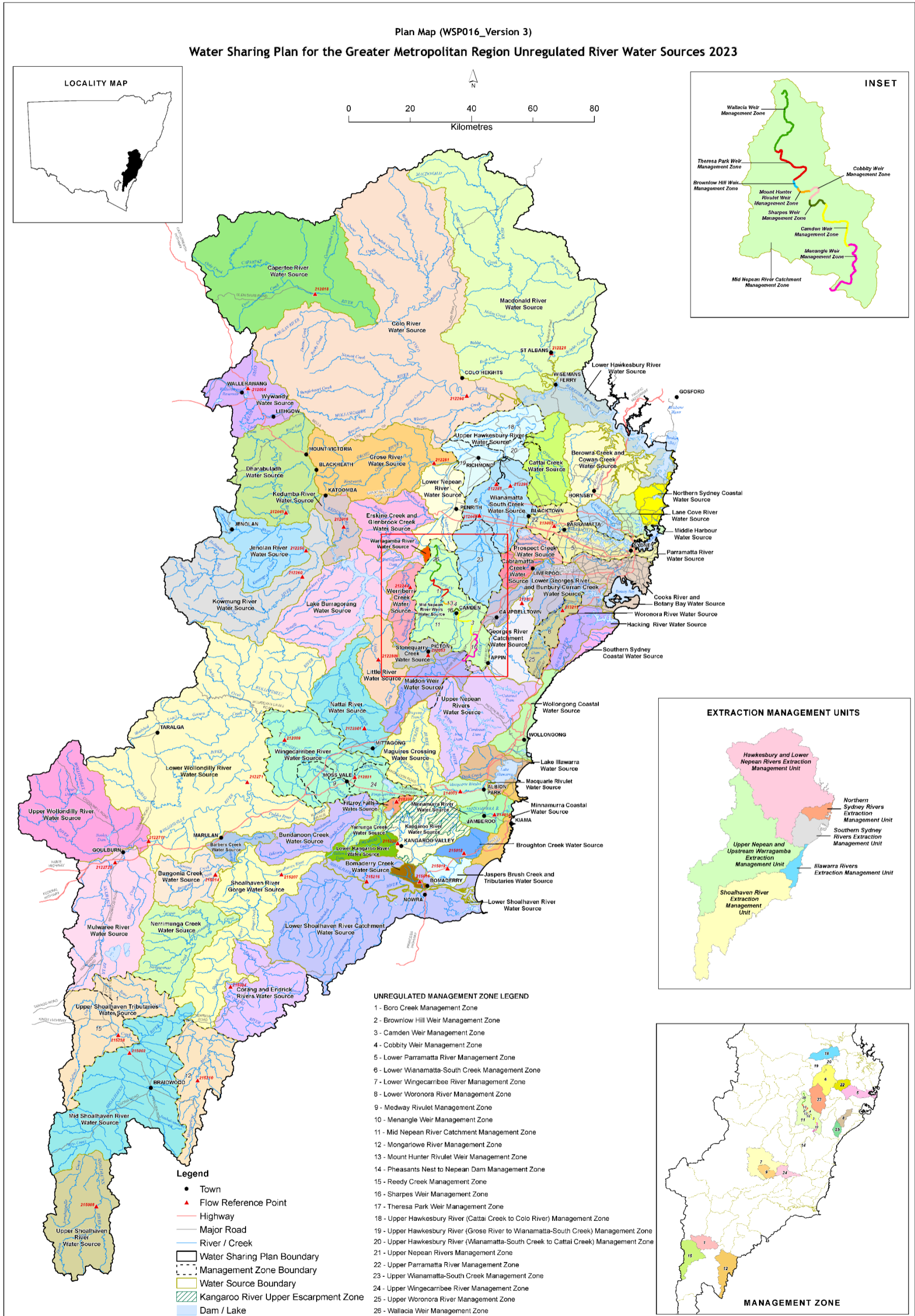
The main rivers of metropolitan Sydney include the Georges, Woronora and Hacking Rivers in the south and Parramatta River in the north. The Georges River rises to 389 metres, six kilometres south-east of Appin and falls to the north and east for 90 kilometres where it enters Botany Bay at Dolls Point. Woronora River rises to 360 metres 6 kilometres north-west of Darks Forest and falls north and east for 36 kilometres to where it meets Georges River at Como. Woronora Dam is located on Woronora River 11 kilometres downstream of its headwaters. Hacking River rises to 750 metres, two kilometres west of Stanwell Tops on the Illawarra Range and falls to the east and north for 30 kilometres where it meets Port Hacking at Grays Point. Parramatta River rises to 80 metres, two kilometres north of Baulkham Hills (Toongabbie Creek) and falls to the east for 37 kilometres where it meets Port Jackson at Dawes Point. The 80th percentile flow for Parramatta River is 2.3 ML/day, while the 50th percentile flow is 6.4 ML/day.

5.1.4 Illawarra River catchment

The main rivers of the Illawarra catchment are Minnamurra River and Macquarie Rivulet. The remaining rivers are small urban creeks that drain the Illawarra Range and the narrow coastal floodplain. Minnamurra River rises to over 700 metres at Knights Hill on the Illawarra Range, 10 kilometres south-east of Robertson and flows to the sea some 20 kilometres to the east.

Minnamurra River catchment is 120 square kilometres and has an 80th percentile flow of 5.5 ML/day and a 50th percentile of 20.3 ML/day. Macquarie Rivulet rises to 670 metres, 4 kilometres north of Robertson on the Illawarra Range and enters Lake Illawarra some 20 kilometres to the east. The 80th percentile flow is 7.6 ML/day while the 50th percentile is 18.1 ML/day.

Figure 1. Greater Metropolitan Region Unregulated River Water Sharing Plan area



As shown in the plan map (Figure 1), the plan area consists of 6 extraction management units (EMUs) which are made up of 65 water sources and 26 management zones.

Total licensed entitlement for the plan area is approximately 183,828.7 ML/year. This entitlement represents the average annual potential extraction. Reliable estimates of actual water usage across the plan area will not be possible until major extraction works are metered (as required by December 2024).

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

Table 1. Estimated requirements for water in the 2023 Greater Metropolitan Unregulated plan – basic landholder rights

Extraction type	Potential extraction (ML/year)
Domestic and stock	38,254.05
Native title	Zero at plan start
Harvestable rights	114,361

Table 2. Estimated requirements for water in the 2023 Greater Metropolitan Unregulated plan – licensed extraction

Licensed extraction subcategory	Potential extraction (ML/year)
Domestic and stock	3,766.4
Local water utility	31,280
Unregulated river	148,790.3
Major utility	1,036,096

5.2 Previous plans

The [previous water sharing plan](#) began on 1 July 2011.

You can find more information on the development of the previous water sharing plan in the associated [background document \(PDF, 1,270 KB\)](#).

The previous water sharing plan was 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. A report to assist community consultation \(PDF, 646.61 KB\)](#)
- [Macro water sharing plans – approach for unregulated rivers. Access and trading rules for pools \(PDF, 620.58 KB\)](#)
- [Macro water sharing plans - the approach for groundwater. A report to assist community consultation \(PDF, 1673.86 KB\)](#)

As of 1 July 2023, the surface water sources of the Greater Metropolitan Region are now managed under the *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2023*.

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

5.3 Developing the 2023 water sharing plan

The processes that the department has used in developing the replacement plan is an update on the previous macro-planning approach.

The development of replacement plans now follows the processes described in the [Replacement Water Sharing Plan Manual \(PDF 1.32 MB\)](#).

We continue to use some methods described in the macro-planning approach. This background document will describe the most recent and specific methods used to prepare the 2023 Greater Metropolitan Unregulated plan.

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

- the [section 44 audit](#) of the Water sharing plan for the Greater Metropolitan Region Unregulated River Water Sources 2011
- recommendations from the Natural Resources Commission’s 2021 [review of the 2011 Water Sharing Plans for the Greater Metropolitan region](#) (PDF, 5.8 MB). This review is of the unregulated river and groundwater water sharing plans combined
- updated data, information and science
- deliberations across government agencies including the department’s Water Group and Biodiversity, Conservation and Science area, Department of Primary Industries’ Agriculture and Fisheries branches, the Natural Resource Access Regulator and the Environmental Protection Authority

- development of the Greater Sydney Water Strategy
- consultation with stakeholders including Sydney Water and WaterNSW during working group meetings
- consultation with the wider community.

The water sharing plan, the [Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2023](#) can be found on the department's website.

Details of the changes from the 2011 plan to the 2023 water sharing plan are provided in Section 6 of this document. You can find information on the public exhibition of this plan in Section 5.4 of this document.

5.3.1 Greater Sydney Water Strategy

The Greater Sydney Water Strategy (GSWS) charts the direction for the government, water utilities, industry, and the community to work together to ensure the resilience and sustainability of the region's water and wastewater systems. It sets out priorities and actions that the Government commits to over the next 3 years to deliver the strategy including actions to make Sydney less reliant on rainfall for its water supply while conserving and using water more efficiently.

Sydney's growing population and economy mean that, without action, it is almost certain that there is a future gap between the demand for drinking water and the available supply. It is forecast that the sustainable supply level is up to 540 gigalitres (GL) per year (a bit less than the volume of water in Sydney Harbour) and modelling suggests this may be about 40 to 70 GL/year less than required under a moderate population growth scenario. Increasing climate variability means that, without action, Sydney could face a shortage of drinking water with more and longer periods of severe drought. The strategy proposes a range of solutions aimed at ensuring there is sufficient water for population growth, industry, jobs, and to support green space.

The draft GSWS included several options to support Greater Sydney's drinking water supplies during drought. This included investigating whether water transfers from the Shoalhaven River to the Sydney system could commence when the Sydney dam levels are higher than the current rules allow – that is, at 85 percent dam capacity instead of the current 75 percent trigger. The 2011 water sharing plan included a clause to commence transfers at 75 percent storage levels. Investigation into this option showed this change would not provide significant additional water supplies and there would likely be impacts on recreational activities for downstream users. Accordingly, this change was not implemented as part of the GSWS and no change to the trigger was made in the 2023 plan.

Another option was also investigated which looked at whether water releases from the Upper Nepean dams and Tallowa Dam for environmental purposes could be reduced in line with declining

dam levels. Investigations have shown that this could provide substantial additional water supplies for Sydney, particularly during a drought, while maintaining positive environmental outcomes for the river and its ecosystems. This option was included in the 2023 replacement plan. These changes to the environmental flow regimes will require monitoring and reporting by the approval holders of the storages. A review of the monitoring will also be completed after 5 years of the changes.

5.3.2 First Nations consultation

Local Aboriginal land councils were invited to participate in targeted consultation during the development of the replacement plan.

The department met with First Nations representatives as described in Table 3 below.

Table 3. First nations consultation details

Representation	Date	Discussion Points
NSW Aboriginal Land Council	28/04/2021	Water access, scope of water sharing plans, water for aboriginal communities.
Key representatives for multiple NSW LALCs (all relevant to the area were invited) and individuals	23/9/21 and 6/10/21	In conjunction with consultation on the draft Greater Sydney Water Strategy. In relation to WSPs, addressing water available for aboriginal community development licences.

There was opportunity for further First Nations consultation during public exhibition and prior to finalising the plan. Consultation with First Nations will be ongoing throughout the life of the plan.

5.4 Public exhibition and finalising the 2023 plan

Public exhibition of the 2023 Greater Metropolitan Unregulated plan was planned to be held from 27 June 2022 until 7 August 2022. Due to flooding in the plan area some community engagement events were rescheduled or cancelled and the submission period was extended until 21 August 2022.

Twelve public information sessions were held as detailed in Table 4. Two of these were online webinars. The remainder were face-to-face information sessions where members of the public attended to learn more about the draft water sharing plan and how to make a submission.

In addition to these public consultation sessions, targeted meetings were held with NSW irrigators, NSW Farmers, Turf NSW, Penrith Lakes Development Corporation, Energy Australia, Wingecarribee, Shoalhaven City, Goulburn-Mulwaree and Wollondilly Councils.

Table 4. Public exhibition sessions for the Greater Metropolitan Region Unregulated River Water Sharing Plan

Location	Date and time	Number of attendees
Online webinar 1	28 June 2022, 5pm – 6:30pm	30
Sydney City	30 June 2022, 10am – 2pm	1
Goulburn	19 July 2022, 10am – 2pm	30
Bowral	20 July 2022, 10am – 2pm	30
Braidwood	26 July 2022, 10am – 2pm	11
Nowra	27 July 2022, 10am – 2pm	6
Kangaroo Valley	28 July 2022, 10am – 2pm	7
Wollongong	29 July 2022, 10am – 2pm	1
Lithgow	2 August 2022, 10am – 2pm	8
Katoomba	3 August 2022, 10am – 2pm	7
Parramatta	4 August 2022, 10am – 2pm	3
Online webinar 2	10 August 2022, 4:30pm – 6:30pm	32

We received 16 submissions. Issues raised in submissions are summarised in the [What we heard document](#).

In finalising the replacement plan, the department considered submissions as well as further deliberations and input from government agencies including the departments Water Group and Biodiversity, Conservation and Science area, Department of Primary Industries' Agriculture and Fisheries branches, the Natural Resource Access Regulator and the Environmental Protection Authority.

Section 6 of this document details changes from the 2011 plan to the 2023 water sharing plan. 'Appendix C – Substantive changes made between draft and final water sharing plan' gives details

of substantive changes made between the draft and final water sharing plan, including if a change was in response to submission received.

5.4.1 Flooding in the Greater Metropolitan Region during consultation

During the public consultation period, the Greater Metropolitan Region experienced significant flooding. It wasn't appropriate to consult with affected communities while they were recovering from flooding.

The department made some changes to how we developed the replacement water sharing plan, acknowledging that flood effected communities couldn't provide their views during flood recovery. These changes included:

- information sessions for the unregulated plan in Camden, Penrith and Windsor were cancelled
- the public exhibition period was extended to allow stakeholders additional time to comment on the changes outlined in the draft replacement water sharing plan
- changes were limited in areas that were heavily affected by flooding.

The department assessed the potential effect of the changes to water sharing rules in flood affected areas. Based on the assessment, the replacement plan only includes limited changes in the Hawkesbury and Lower Nepean Rivers Extraction Management Unit and the Nattai River and Stonequarry Creek water sources in the Upper Nepean and Upstream Warragamba Extraction Management Unit, as these areas were severely impacted by flooding.

Any rules in these areas relating to people's access to water, including rules relating to boundary changes and trade were not changed from the 2011 plan.

An amendment clause is included in the 2023 plan that allows these boundary changes, access and trade rules to be introduced in the future. We will consult with the community on these changes when it is appropriate within the first five years of the plan.

To find more information on which rules will be consulted on during the first five years of the plan, see 'Appendix D - Consultation approach for flood effected areas in the Water Sharing Plans for the Greater Metropolitan Region'.

6. Changes from the 2011 plan to the 2023 plan

6.1 Overview

Key drivers for the changes in the 2023 plan were:

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

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

Changes were made to:

- the general layout of the plan
- identification of planned environmental water
- the vision, objectives, strategies, and performance indicators
- the definition of the long-term average annual extraction limit
- prohibit in-river dams on some water sources
- the map, to reflect the new water source
- flow reference points and access rules
- the granting of access licences
- system operation rules
- basic land holder right estimates and access licence share components
- total daily extraction limits
- trade provisions
- prohibit water supply works approvals near Ramsar and State Environmental Planning Policy (SEPP) wetlands and potential acid sulfate soils

- adaptive management and amendment provisions

‘Appendix C – Substantive changes made between draft and final water sharing plan’ details substantive changes made between the publicly exhibited and the final 2023 plan, including if a change was in response to a submission received.

For a summary of all issues raised in submissions, regardless of whether they led to a change, please refer to the [Outcomes of Public Exhibition](#) section of the department’s website and the [What we heard](#) document.

Rules Summary Sheets for each water source are available on [the department's website](#). These detail the relevant rules that apply to each water source under the 2023 Greater Metropolitan Unregulated plan.

6.2 General layout changes

There are several structural layout changes to the 2023 Greater Metropolitan Unregulated plan. We have moved or reworded clauses, but their intent is the same. Such changes reflect current template styles and provide a more standard and consistent layout across the state’s water sharing plans, as well as making the water sharing plan easier to understand.

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

6.3 Water source name changes

The Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011 created management zones at a scale more appropriately applied to a water source, and water sources more appropriately scaled to extraction management units. As a result, the 2011 Plan had 6 water sources and extraction management units and 88 management zones.

In remaking the plan, we have applied a refined scale to define a water source. In most cases, this has resulted in management zones becoming water sources, for example Nerrimunga Creek Management Zone becomes Nerrimunga Creek Water Source.

These changes will be reflected on water access licences.

6.4 Changes to the map to reflect plan updates

The limits of the plan are defined by the plan map (Figure 1).

Updates to the plan map reflect changes to water source and management zone names and boundary changes.

6.5 Vision, objectives, strategies and performance indicators

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

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

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

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

We will include more detailed and SMART (specific measurable, achievable, realistic and timely) objectives in the relevant MER plan. These will clearly link objectives, strategies and performance indicators. This addresses the NRC's recommendation to strengthen MER of the plan outcomes.

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

6.6 Identification of planned environmental water provisions

Planned environmental water (PEW) is a key component of water sharing plans. The 2011 Greater Metropolitan Unregulated plan had discrete sections on planned environmental water that point to other parts of the plan to identify where water is reserved for the environment. This included access rules.

Instead of having a separate section on PEW, the 2023 Greater Metropolitan Unregulated plan includes rules associated with PEW in the relevant sections. Wherever a clause or section of the plan relates to PEW, a note is included, pointing to the relevant section of the WM Act.

6.7 Updates to basic landholder rights estimates and licence share components

The 2023 Greater Metropolitan Unregulated plan updates the estimate of extraction of water under basic landholder rights (BLR). The water access licence share components (water entitlements for each water source) have also been updated to reflect total share components for each water source at the commencement of the plan.

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

In 2020, we adopted the same method used in the development of macro-water sharing plans for estimating the water requirements of domestic and stock BLR. This method is in Appendix 5 of the [Replacement Water Sharing Plan Manual \(PDF 1.28 MB\)](#).

The 2023 estimates may differ from estimates in the 2011 plan due to changes in land use, population density and the availability of more accurate spatial data.

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

The water access licence share components (water entitlements for each water source) are listed in Part 3 of the 2023 Greater Metropolitan Unregulated plan. They reflect the current total share components in each water source, as per Water NSW Water Licencing Systems database at the time of the review.

6.8 Changes to granting of access licences

We have made updates to the water sources where there is the ability to grant Aboriginal community development licences (ACDLs). Consistent with the 2011 Greater Metropolitan Region Unregulated plan, ACDLs are allowed into B Class flows if total unregulated river access licences in the management zone do not exceed the specified limits:

- 218 ML/year in the Upper Shoalhaven River Water Source
- 40 ML/year in the Kowmung River Water Source
- 40 ML/year in the Jenolan River Water Source

The 2023 Greater Metropolitan Unregulated plan additionally provides for applications for Aboriginal community development licences (ACDLs) in the Boro Creek Management Zone in the Upper Shoalhaven Tributaries Water Source, to a limit of 268 ML/year.

The 2023 Greater Metropolitan Unregulated plan removed the ability to apply for ACDLs in the following water sources (previously management zones in the 2011 Greater Metropolitan Unregulated plan) due to high ecological value:

- Capertee River
- Kedumba River
- Wywanddy
- Colo River
- Macdonald River
- Lower Wianamatta-South Creek and Upper Wianamatta-South Creek management zones within the Wianamatta-South Creek water source.

No ACDLs had been issued in these water sources. The issuing of ACDLs is providing for the take of additional water on top of the current level of entitlement (as opposed to trading of existing entitlement). Capping entitlement at current levels will prevent further exacerbation of risks to environmental values.

6.9 New definition for extraction limits

The extraction limits restrict total extractions from the extraction management units over the long term or annually.

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

1. The **standard LTAAEL** applies to take from all flows (excluding take from licences that access high flows only) and includes all BLR extraction (including harvestable rights). This is a fixed volume.
2. The annual **higher flow extraction limit** applies to extraction that can only occur from high flows. This volume can vary as licences are converted to high flow licences or as we grant specific-purpose licences in high flows, such as high flow licences, licences for initial fill of dams and Aboriginal community development licences.

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

The method of calculating the LTAAEL for the Hawkesbury and Lower Nepean Rivers and Upper Nepean and Upstream Warragamba EMUs in the 2023 replacement plan has been updated to include the harvestable rights estimate of 10% rainfall runoff. As in the 2011 WSP, the LTAAEL for these two EMUs will remain in descriptive text rather than a volume, as shown in the other 4 EMUs in the 2023 Greater Metropolitan Unregulated plan.

The standard LTAAELs for the Hawkesbury and Lower Nepean Rivers Extraction Management Unit and the Upper Nepean and Upstream Warragamba Extraction Management Unit are the sum of the following in each EMU:

- the average of annual extractions from July 1993 to June 1999 under entitlements issued under the *Water Act 1912*, Parts 2 and 9, excluding entitlements held by the former Sydney Catchment Authority that were replaced by major utility access licences on 1 July 2011
- an estimate of annual extractions in the exercise of native title rights and domestic and stock rights as of 1 July 2011
- an estimate of the annual volume of water available for extraction from harvestable rights dams under the 2006 Harvestable Rights Order as of 1 July 2011
- all access licence share components granted under the Water Management (General) Regulation 2011, Schedule 4, Part 2, Division 9, Subdivision 2 authorising the taking of water from a water source, including a tidal pool, for which no entitlement was required under the *Water Act 1912*.

The standard LTAAELs for extraction management units (EMUs) that have volumetric limits in the 2023 Greater Metropolitan Unregulated plan are as follows:

- | | |
|--------------------------------|------------------|
| • Illawarra Rivers EMU - | 13,102.2 ML/year |
| • Northern Sydney Rivers EMU - | 7,038.5 ML/year |
| • Shoalhaven River EMU - | 87,004.9 ML/year |
| • Southern Sydney Rivers EMU - | 18,945.3 ML/year |

We do not yet have a volume estimate for the licences that were not required under the *Water Act 1912* that have since been created to meet the requirements for the WM Act, e.g., in tidal pools etc. Some further analysis is required for us to ascertain these licences and the volume to be used in LTAAEL compliance calculations. The estimates for basic rights are as applied across all the other

EMUs. LTAAELs for water taken by WaterNSW under a major utilities access licence is managed separately to other forms of take.

6.10 System operation rules for the release of environmental flows from major storages

6.10.1 Environmental flow releases

The replacement plan includes updated environmental flow release rules for Tallowa Dam, Nepean Dam, Avon Dam, Cataract Dam and Cordeaux Dam.

The release rules in the 2011 plan were based on inflows to the storages up to a set volume each day and then an additional portion that was released depending on the volume of the inflows. The new rules scale releases depending on the total combined storage level of Sydney's dams. As the total volume held in storage reduces, the volumes required to be released reduces, known as “scaled environmental flows”.

Scaled environmental flows are applied across all of the Upper Nepean and Tallowa dams. This provides more water to be held in the dams for drinking water supply with minimal effect on the environment downstream. This rule change is consistent with options proposed in the Greater Sydney Water Strategy.

The Greater Sydney Water Strategy replaced 2017 Metropolitan Water Plan. The 2017 document outlined a plan to balance between delivering water security for greater Sydney while protecting river systems. It also included releases from Warragamba Dam to be set at the 90th percentile with 10% of the inflows to be released above this.

Any new rules for Warragamba Dam environmental flow releases can't be applied until appropriate infrastructure upgrades to the dam are made to allow for variable dam releases. If the infrastructure upgrades are made, then environmental flow release rules for Warragamba Dam can be amended to reflect the scaled environmental flows model applied across the other dams and protection of those releases. This amendment is provided for in the amendments provisions to modify Part 8A of the 2023 Greater Metropolitan Region Unregulated plan.

The inflow percentiles for the major storages have been updated to reflect additional years of data. These are also included in the 2023 Greater Metropolitan Region Unregulated plan and describe the volume of water to be released.

In the event of a release not able to be made (e.g. emergency, infrastructure failure, poor water quality), the plan requires that the release be made as soon as reasonably practicable.

6.10.2 Environmental contingency flow releases

An environmental contingency allowance account has been established to the volume of 9,000 ML/year across the Avon Dam, Cataract Dam, Nepean Dam, Cordeaux Dam and Warragamba Dam to be used as required due to a poor river health event downstream. Uses for release include pool destratification, fish passage and improving poor water quality and floating weed proliferations.

6.10.3 Replacement flows

Historically, from the time of construction of Warragamba Dam, dam releases were made to meet a flow target at Penrith Weir of 50 ML/day. Under that regime, 33.3 ML/day was released by Sydney Catchment Authority (SCA) as part of its Water Management Licence as an environmental flow and another 10 ML/day was released for agricultural and irrigation purposes.

Sydney Water Corporation (SWC) releases an average of 43 ML/day (and up to 50 ML/day) of high quality treated recycled water from the St Marys Advanced Wastewater Treatment Plant into the Nepean River.

In 2010, aligning with the [Replacement Flows Project](#) (PDF, 1,790 KB), 33ML/day of the average daily releases of 43 ML/day from the St Marys Advanced Wastewater Treatment is protected from take and considered a replacement flow. This eliminates the need for this volume to be released from the dam. The Replacement Flows Project could save up to 18 billion litres per year from Warragamba Dam releases, thereby providing more potable water for Sydney. Any volumes discharged above 33ML/day are available for take downstream.

6.10.4 Protection of replacement flows

The 2011 plan rules didn't protect a set volume (i.e. 33ML/day), but applied a variable component to allow for a portion of the discharge to be extracted. Put simply, the proportion of the discharge for protection is calculated by multiplying a factor based on inflows to the Upper Nepean dams. The balance of the discharge is available for take by water users downstream.

The publicly exhibited version of the plan included draft rules protecting up to 33 ML/day for the environment and anything above for extraction.

Unfortunately, due to flooding affecting the consultation of these rules, the 2011 plan rules have been retained in 2023 Greater Metropolitan Region Unregulated plan. These will be considered by year 5 of the plan for amendment following consultation.

The 2023 Greater Metropolitan Region Unregulated plan may also be modified to protect treated wastewater discharges from the proposed Upper Wianamatta-South Creek Advanced Water

Recycling Centre. These could be considered replacement flows for environmental releases from Warragamba Dam when the dam has the infrastructure to release the required environmental flows. This will ensure more water is retained in Warragamba Dam for drinking water supply but allows the environmental flows to be protected downstream.

6.10.5 Other dam releases

Drinking water releases

No changes have been made to the daily releases of 17ML/day (April – October) & 25ML/day (Nov – March) from Warragamba Dam for drinking water to be extracted at North Richmond by Sydney Water for urban water supply in North Western Sydney.

To improve clarity, text has been simplified in the access rules to protect these volumes from being taken in the Lower Nepean River water source.

Dilution flow release

A daily release of 5 ML is released from Warragamba Dam for the purpose of diluting discharges from Wallacia Sewage Treatment Plant into the Warragamba River. The 5 ML released daily is not protected downstream and is available to be taken.

Treated wastewater discharges in the Hawkesbury Nepean

Discharges of treated wastewater from the Wallacia, Riverstone, Castle Hill, McGraths Hill, Rouse Hill, Richmond, West Camden, Penrith, St Marys, Winmalee, Quakers Hill, Picton, Brooklyn and West Hornsby and Hornsby Heights sewage treatment plants enter the Hawkesbury Nepean system. These discharges are not protected from take and are available for extraction by irrigators downstream.

6.11 Protecting water savings derived from the Hawkesbury Nepean River Recovery Project

The Hawkesbury Nepean River Recovery Project which ran between June 2009 to September 2011 secured significant water savings in the Hawkesbury Nepean River. The project was provided with up to \$77.4 million of funding from the Australian Government through its Water for the Future Initiative and was managed by the then NSW Government's Office of the Hawkesbury–Nepean in partnership with other NSW agencies, and comprised seven projects:

- the Improving Hawkesbury–Nepean Water Balance Accounting Project ensured equitable and efficient water use by installing and upgrading water metering systems for 97 percent of active licensed water users

- the Licence Purchase Project bought all or part of unregulated river licences from willing sellers across the catchment to increase the amount of water that stays in the river system
- the Water Smart Farms Project made more efficient use of river and town water for irrigated agriculture by upgrading irrigation systems, improving water harvesting and reuse, and through education and training
- the Nutrient Smart Management Project reduced nutrient run-off from agricultural activity through landholder education and on-ground works, including compost treatment
- the Nutrient Export Monitoring Project quantified nutrient exports from agricultural land within the catchment and evaluated the extent of nutrient reductions achieved by the Nutrient Smart Management and Water Smart Farms projects
- the Irrigation and Landscape Efficiency Project helped improve irrigation efficiency in non-agricultural activities by offering subsidies to local councils, schools and golf courses to help assess their open space irrigation and implement on-ground works to improve practices
- the South Windsor Effluent Reuse Scheme Project constructed a recycled water plant at Hawkesbury City Council's South Windsor sewage treatment plant, along with a distribution system to supply the recycled water to council reserves, schools and other customers.

These projects recovered the following volumes of water:

- 1680 ML/year from licence purchases
- 4400 ML/year from water smart farm savings
- 1060 ML/year resulting from irrigation efficiencies
- 100 ML/year saved from being taken from the river as well as making nitrogen reductions by development of the South Windsor Effluent Reuse Scheme

Overall, the program saved an estimated 7,240 ML/ year, of which 1,452 ML was potable water. Nutrient input into the river system was also reduced by at least 84.1 tonnes per year (comprising 66.8 tonnes of nitrogen and 17.3 tonnes of phosphorus). Water savings, such as licence purchasing and reuse schemes were considered when reviewing the plan and are incorporated into trade and access rules to protect these savings by either setting limits or restricting trade into the relevant water sources.

6.12 Updated flow reference points and access rules

Access rules in all water sources have been reviewed. In some water sources there have been changes to the access rules as a result of an updated ecological risk assessment completed by the department.

In some areas access rules have not been changes due to severe flooding interrupting consultation activities. In these areas, the 2011 Greater Metropolitan Region Unregulated plan access rules have been carried over to the 2023 Greater Metropolitan Region Unregulated plan. Proposed changes to the access rules in these areas were included in the publicly exhibited draft WSP and will be considered as plan amendments within the first five years of the water sharing plan following community consultation.

Access rules for each water source are detailed on the rule summary sheets which can be found on the department's web site. Appendix C provides details on the changes to access rules from the exhibited plan to the final 2023 Greater Metropolitan Unregulated plan. A summary of any changes to the access rules for each extraction management unit is outlined below.

6.12.1 Shoalhaven River Extraction Management Unit

Access rules in the following water sources have been updated and are as follows:

- **Fitzroy Falls Water Source** - cease to pump when flows are less than or equal to 1.3 ML/day at Yarrunga Creek at Wildes Meadow (215233) gauge
- **Lower Shoalhaven River Water Source** - cease to pump when flows are less than or equal to 69 ML/day at Shoalhaven River at Grassy Gully No 2 (215216) gauge
- **Bomaderry Creek Water Source** - cease to pump when flows are less than or equal to 0.7 ML/day at Bomaderry Creek at Bomaderry (215016) gauge and commence to pump (after a cease to pump event) when flows are greater than 1.3 ML/day
- **Jaspers Brush Creek and Tributaries Water Source** - cease to pump when flows are less than or equal to 0.5 ML/day at Jaspers Brush Creek at Jaspers Brush (215019) gauge.

6.12.2 Illawarra Rivers Extraction Management Unit

A new access rule for the Minnamurra River Water Source is - cease to pump when flows are less than or equal to 3.6 ML/day at the Minnamurra River at Browns Lane (214010) gauge.

6.12.3 Upper Nepean Upstream Warragamba Extraction Management Unit

Access rules in the following water sources have been updated and are as follows:

- **Jenolan River Water Source:** - cease to pump when flows are less than or equal to 6 ML/day at Coxs River at Kelpie Point (212250) gauge
- **Kowmung River Water Source:** - cease to pump when flows are less than or equal to 0.8 ML/day at Kowmung River at Cedar Ford (212260) gauge

- **Kedumba River Water Source:** - cease to pump when flows are less than or equal to 5 ML/day at Kedumba River at Kedumba Crossing (212016) gauge
- **Lower Wollondilly River Water Source:** - cease to pump when flows are less than or equal to 4 ML/day at Wollondilly River at Golden Valley (212271) gauge and commence to pump (after a cease to pump event) when flows are greater than 7 ML/day
- **Mid Nepean River Weirs Water Source:** - access rules have changed for the following management zones:
 - for access licences in Cobbity Weir, Mount Hunter Rivulet Weir, Brownlow Hill Weir, Theresa Park Weir or Wallacia Weir management zones, new access rules will be referenced to the Nepean River at Wallacia Weir gauge (212202)
 - access licences in Camden Weir Management Zone and Sharpes Weir Management Zone will reference the Nepean River at Camden Weir gauge (212216)
 - Menangle Weir will continue to be referenced to the Nepean River at Menangle Weir Gauge (212238).

Previously each management zone referenced a gauge within the management zone. Due to several high flow and flooding events, infrastructure is either damaged or no longer present and therefore alternative reference points have been used in order to implement the access rules and protect the environmental flow releases from the upstream dams.

Maldon Weir Water Source will continue to reference the Nepean River at Maldon Weir gauge (212208), however text changes have been made to rules to simplify the interpretation of the 2011 rules. This is also the case for the **Mid Nepean River Weirs Water Source**. The updated access rules will provide access to water when flows in the river are more than the total environmental water releases from the Upper Nepean dams. This is the same intent of the 2011 plan rules. Water must not be taken in these water sources when a cease to take notice is in effect on WNSW's website.

Proposed changes to the access rules in **Stonequarry Creek and Nattai River water sources** were included in the publicly exhibited draft WSP. Severe flooding interrupted consultation activities on these rules. As such the rules will remain as they were in the 2011 plan for these areas, with some simplification and text changes to improve clarity. These rules will be reviewed within the first 5 years of the plan when it is more appropriate to consult with the community on potential changes.

6.12.4 Southern Sydney Rivers Extraction Management Unit

No changes to access rules for water sources in the Southern Sydney Rivers Extraction Management Unit.

6.12.5 Northern Sydney Rivers Extraction Management Unit

No changes to access rules for water sources in the Northern Sydney Rivers Extraction Management Unit.

6.12.6 Hawkesbury and Lower Nepean Rivers Extraction Management Unit

Proposed changes to the access rules in the Hawkesbury and Lower Nepean Rivers Extraction Management Unit were included in the publicly exhibited draft WSP. Severe flooding interrupted consultation activities on these rules. As such the rules will remain as they were in the 2011 plan for these areas, with some simplification and text changes to improve clarity. These rules will be reviewed within the first 5 years of the plan when it is more appropriate to consult with the community on potential changes.

6.13 Removal of total daily extraction limits

Establishing cease-to-pump (CTP) flow levels in unregulated rivers will protect the very low flows. Establishing daily extraction limits are a means for both protecting river health and for sharing available flows above the CTP between competing water users.

Establishing and implementing daily and individual extraction management rules will require additional infrastructure and management effort including:

- actual or simulated streamflow data
- operational gauges providing daily flow information
- announcements to all users of daily flow class
- daily pumping/metering information
- improved data storage and management
- audit and compliance.

Monitoring, infrastructure and management frameworks are not currently to the level required to implement, daily or individual extraction limits in the 2023 Greater Metropolitan Unregulated plan.

References to the total and individual daily extraction limits have been moved to the amendments section of the 2023 Greater Metropolitan Unregulated plan (Part 10) indicating they may be established during the life of the plan. The department supports the use of total daily extraction limits in the future when sufficient monitoring, infrastructure and levels of management are available to implement them.

6.14 Changes to trade provisions

Trade rules form Part 8 of the 2023 Greater Metropolitan Unregulated plan.

Trade of entitlement is generally not permitted:

- between water sources that are not hydrologically connected (that is, the water sources do not drain into each other), or
- into water sources or management zones that have high ecological value, and
- where there are no reference points/gauges.

The 2023 Greater Metropolitan Unregulated plan expands opportunities for trade while complying with the above limitations.

An ecological risk assessment for the water sources in the water sharing plan looked at the ecological values in the area and the likelihood that extraction of water will impact on these ecological values. The ecological risk assessment for the Greater Metropolitan Region Unregulated River water sharing plan shows widespread reduction in risk across the Plan area. This reduction in risk justifies change to the current trade framework in line with the Natural Resources Commission recommendation to “review trade limitations with a view to manage trade across broader areas provided environmental outcomes can be maintained”.

There is an increase in trade opportunities in the 2023 Greater Metropolitan Unregulated plan, informed by the outcomes of the risk assessment. The rules have been designed to achieve positive environmental outcomes through promoting the downstream movement of extraction and the shift away from areas identified as high environmental value or as being highly stressed. Trade is no longer permitted into water sources where we assessed the water source is no longer able to sustain further increases in entitlement.

Some water sources which now allow trade-in have requirements to make sure water sources stay at a low or medium level of risk. These requirements include:

- only allowing trade into high flows
- allowing trade-in to a limit, which could be:
 - no net gain – there cannot be an increase of entitlement in the water source due to a trade e.g. as someone trades out then that volume can be traded back in again
 - trade in allowed up to a total volume of entitlement – this may allow additional entitlement, but we have determined a limit which avoids increasing risk to the water source.

6.14.1 Upper Nepean and Upstream Warragamba Extraction Management Unit

Risk assessment data for the Upper Nepean and Upstream Warragamba EMU is showing an overall decrease in risk across the catchment. Where risk is reduced it may be appropriate to increase trade opportunities. Water sources which include new trade rules, and the new rules are shown below in Table 5. Note if no change to the trade rules, then they are not included in this section.

Table 5. Changes only to trade rules in the Upper Nepean and Upstream Warragamba EMU

Water Source	Trade allowed from	Trade in limit
Wywandy	Other water sources in the EMU	Trade into B Class flows (when flow is above 27.6 ML/day at the Coxs River at Wallerawang Power Station gauge (212054). Allowed only into a location above the Coxs River at Wallerawang Power Station gauge (212054) up to a total of 455 ML/year.
Dharabuladh	Other water sources in the EMU	No net gain. Allowed in to sum of shares at the commencement of the plan (531 ML/year).
Jenolan River	Other water sources in the EMU	No net gain. Allowed in to sum of shares at the commencement of the plan (584 ML/year). Not permitted if it would result in water being taken in the Jenolan River catchment at or above the Pheasants Nest Creek confluence.
Kedumba River	Other water sources in the EMU	Trade into high flow access licence (flow above 27.3 ML/day at Kedumba River at Kedumba Crossing gauge 212016) up to a limit of 451 ML/year.
Mulwaree River	Upper Wollondilly River Water Source	No net gain. Allowed in to sum of shares at the commencement of the plan (1,226 ML/year).

Water Source	Trade allowed from	Trade in limit
Upper Wollondilly River	Mulwaree River Water Source	No net gain. Allowed in to sum of shares at the commencement of the plan (6,097.5 ML/year).
Lower Wollondilly River	Mulwaree River Water Source Upper Wollondilly River Water Source Wingecarribee River Water Source	No limit but trade only allowed in from upstream water sources. Movement of extraction from upstream water sources would not result in change to risk. Not permitted into Mares Forest Creek at and above the confluence of Guineacor Creek.
Wingecarribee River Water Source - Upper Wingecarribee River Management Zone	Lower Wingecarribee River Management Zone	Trade allowed to a high flow access licences (flow above 63.5 ML/day at Wingecarribee River at Bong Bong Weir gauge 212031). Allowed only to a location below Wingecarribee Reservoir and only to a total of 1,048 ML/year.
Wingecarribee River Water Source – Lower Wingecarribee River Management Zone	Upper Wingecarribee River Management Zone Medway Rivulet Management Zone	No limit but trade only allowed from upstream water management zones. Movement of extraction from upstream water sources would not result in change to risk.
Lake Burragorang	Other water sources in the EMU	No net gain. Allowed in to sum of shares at the commencement of the plan (44 ML/year).

6.14.2 Illawarra Rivers Extraction Management Unit

In the 2023 Greater Metropolitan Unregulated plan trade remains prohibited between water sources in the Illawarra Rivers Extraction Management Unit due to the lack of connectivity between catchments.

6.14.3 Shoalhaven Rivers Extraction Management Unit

Risk assessment data for the Shoalhaven Rivers EMU showed large scale decreases in risk across the catchment. Risk was predominantly high in the previous assessment with trade prohibited in 15 of 21 water sources. Eight water management zones in the south-western part of the EMU are now low risk. These management units encompass the Shoalhaven River and its tributary streams upstream of the Shoalhaven River Gorge.

Changes to trade rules in the Shoalhaven Rivers Extraction Management Unit are shown in Table 6. Note if no change to the trade rules, then they are not included in this section.

Table 6. Changes to trade rules in the Shoalhaven Rivers Extraction Management Unit

Water source	Trade allowed from	Trade in limit
Kangaroo River	Other water sources in the EMU	No net gain. Allowed in to sum of shares at the commencement of the plan (4,980 ML/year). Not permitted if it would result in water being taken from an off-river pool.
Lower Kangaroo River	Other water sources in the EMU	No net gain. Allowed in to sum of shares at the commencement of the plan (161 ML/year).
Broughton Creek	Other water sources in the EMU	Trade into B class flows (flow above 17 ML/day at Broughton Creek at Broughton Vale gauge 215018) up to a limit of 281 ML/year.
Upper Shoalhaven River	Other water sources in the EMU	Trade in allowed into C class flows (flow above 95 ML/day at Shoalhaven River at Kadoona gauge 215008) up to a limit of 1,568 ML/year.
Mid Shoalhaven River	Other water sources in the EMU	Trade into B class flows (flow above 345 ML/day at Shoalhaven River at Warri gauge 215002) up to a limit of 5,689 ML/year.
Upper Shoalhaven Tributaries Water Source- Reedy Creek Management Zone.	Other water sources in the EMU	Trade into B class flows (flow above 16.4 ML/day at Reedy Creek at Manar gauge 215238) up to a limit of 271 ML/year.

Water source	Trade allowed from	Trade in limit
Bungonia Creek	Other water sources in the EMU	No net gain. Allowed in to sum of shares at the commencement of the plan (43 ML/year).
Shoalhaven River Gorge	Other water sources in the EMU	Trade into B class flows (flow above 697 ML/day at Shoalhaven River at Fossickers Flat gauge 215207) up to a limit of 1,535 ML/year.
Nerrimunga Creek	Other water sources in the EMU	No net gain. Allowed in to sum of shares at the commencement of the plan (281.9 ML/year).
Upper Shoalhaven Tributaries Water Source- Mongarlowe River Management Zone	Other water sources in the EMU	Trade into B class flows (flow above 84.6 ML/day at Mongarlowe River at Mongarlowe gauge 215210) up to a limit of 1,396 ML/year.
Corang and Endrick Rivers	Other water sources in the EMU	Trade allowed into B class (flow above 58.3 ML/day at Corang River at Hockeys gauge 215004) up to a limit of 962 ML/year.

Trade is also allowed into the Boro Creek Management Zone of the Upper Shoalhaven Tributaries Water Source, and the Lower Shoalhaven River catchment, Lower Shoalhaven River, and Barbers Creek Water Sources to no net gain. These rules are unchanged from the 2011 Greater Metropolitan Unregulated plan.

Consideration has been given to the reliability of the town water supply accessed at Burrier pumping station on the Lower Shoalhaven River.

6.14.4 Hawkesbury and Lower Nepean Rivers Extraction Management Unit

As discussed, most water sources in the Hawkesbury and Lower Nepean Rivers Extraction Management Unit were impacted by floods during the public exhibition period in July 2022. Trade rules in this extraction management unit are unchanged from 2011 Greater Metropolitan Unregulated plan, as it was inappropriate to consult with impacted communities at the time. These rules will be reviewed before year 5 of the plan.

6.14.5 Northern Sydney Rivers Extraction Management Unit

There is limited hydrological connectivity between the five water sources in the Northern Sydney Rivers EMU. The trade rules only allow downstream trade from Upper Parramatta Management Zone and Lane Cove Water Source to connected rivers in the Lower Parramatta River Management Zone of the Parramatta River water source.

Trade is also permitted from the Lower Parramatta River Management Zone to the Upper Parramatta River Management Zone.

6.14.6 Southern Sydney Rivers Extraction Management Unit

Risk assessment data for the Southern Sydney Rivers EMU show a slight increase in risk in an area where risk is already high. With risk being high, trade rules intend to shift water in a downstream direction, away from headwater catchments for environmental benefits.

Changes to trade rules in the Southern Sydney Rivers Extraction Management Unit are shown below in Table 7. Note if no change to the trade rules then they are not included in this section.

Table 7. Changes to trade rules in the Southern Sydney Rivers Extraction Management Unit

Water source	Trade allowed from	Limit
Lower Georges River and Bunbury Curran Creek	Prospect Creek Water Source Cabramatta Creek Water Source Georges River Water Source Lower Woronora Water Source	No limit but trade only allowed in from upstream water sources. Movement of extraction from upstream water sources would not result in change to risk.
Cabramatta Creek	Other water sources in the EMU	No net gain. Allowed in to sum of shares at the commencement of the plan (228 ML/year).
Woronora River Water Source - Lower Woronora River Management Zone	Woronora River Water Source - Upper Woronora River Management Zone	No limit but trade only allowed into Lower Woronora management zone from upstream management zone. Movement of extraction from upstream management zone would not result in change to risk.

Trade is no longer permitted in Hacking River Water Source.

No changes have been made from the 2011 Greater Metropolitan Unregulated plan the Georges River and Prospect Creek Water Sources that allow trade in up to no net gain.

6.15 Prohibition of work approvals near SEPP wetlands and potential acid sulfate soils

The 2023 Greater Metropolitan Unregulated plan prohibits the construction of water supply work approvals that take water from sources where it will cause more than a minimal impact on Ramsar wetlands and wetlands listed under the *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP).

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

Part 7 of the 2023 Greater Metropolitan Unregulated plan prohibits the granting of approvals for surface water works if it would result in more than minimal harm to a wetland mapped under the Resilience and Hazards SEPP.

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

The 2023 Greater Metropolitan Unregulated plan includes rules to prevent water sources from becoming acidic through drainage of potential acid sulfate soils. The rule prohibits the construction of a water supply work that takes groundwater, such as a bore, from within an area classed as having a high probability of containing acid sulfate soils.

6.16 Prohibition of in-river dams

Construction of licensed dams on third order stream and above has been identified as a key threatening process for catchment and marine management.

In-river dams on streams of third-order or higher are generally banned in water sources where:

- we have identified it in our risk assessment as having high ecological value, or
- where such a prohibition is already in place in the current water sharing plan.

The ecological risk assessment for the water sources in the water sharing plan looks at the ecological values in the area and the likelihood that extraction of water will impact on these ecological values. We have identified 14 water sources with high ecological value. These are:

- Hacking River Water Source
- Minnamurra River Water Source
- Minnamurra Coastal Water Source
- Maguires Crossing Water Source
- Upper Hawkesbury River (Wianamatta-South Creek to Cattai Creek) Management Zone in the Upper Hawkesbury River Water Source
- Macdonald River Water Source
- Cattai Creek Water Source
- Werriberri Creek Water Source
- Little River Water Source
- Nattai River Water Source
- Lower Wollondilly River Water Source
- Yarrunga Creek Water Source
- Upper Nepean Water Source
- Lower Nepean River Water Source.

Water sources with a prohibition on in-river dams are listed below in Table 8.

Table 8. Water sources where the construction of new in-river dams on third order streams and above is prohibited

Extraction Management Unit	Water Source
Shoalhaven River Extraction Management Unit	Prohibited in the 2011 plan and prohibited in the 2023 plan: <ul style="list-style-type: none"> • Broughton Creek Water Source • Jaspers Brush Creek and Tributaries Water Source • Lower Shoalhaven River Catchment Water Source • Lower Shoalhaven River Water Source • Lower Kangaroo River Water Source • Nerrimunga Creek Water Source • Fitzroy Falls Water Source • Yarrunga Creek Water Source • Shoalhaven River Gorge Water Source • Upper Shoalhaven Tributaries Water Source • Mid Shoalhaven River Water Source • Kangaroo River Water Source.

Extraction Management Unit	Water Source
Illawarra Rivers Extraction Management Unit	Prohibited in the 2011 plan and prohibited in the 2023 plan: <ul style="list-style-type: none"> • Minnamurra Coastal Water Source • Minnamurra River Water Source • Macquarie Rivulet Water Source • Lake Illawarra Water Source.
Upper Nepean and Upstream Warragamba Extraction Management Unit	Prohibited in the 2011 plan and prohibited in the 2023 plan: <ul style="list-style-type: none"> • Lower Wollondilly River Water Source • Kowmung River Water Source • Wingecarribee River Water Source - Upper Wingecarribee River Management Zone • Wingecarribee River Water Source - Lower Wingecarribee River Management Zone • Mulwaree River Water Source • Maldon Weir Water Source. <p>In addition to the above, the 2023 plan also prohibits in-river dams in third order and higher streams in these water sources:</p> <ul style="list-style-type: none"> • Maguires Crossing Water Source • Little River Water Source • Nattai River Water Source • Werriberri Creek Water Source • Upper Nepean Rivers Water Source.

Extraction Management Unit	Water Source
Hawkesbury and Lower Nepean Rivers Extraction Management Unit	<p>Prohibited in the 2011 plan and prohibited in the 2023 plan:</p> <ul style="list-style-type: none"> • Berowra Creek and Cowan Creek Water Source • Colo River Water Source • Grose River Water Source • Mid Nepean River Weirs Water Source • Lower Nepean River Water Source • Upper Hawkesbury River Water Source • Lower Hawkesbury River Water Source. <p>In addition to the above, the 2023 plan also prohibits in-river dams in third order and higher streams in these water sources:</p> <ul style="list-style-type: none"> • Cattai Creek Water Source • Macdonald River Water Source.
Southern Sydney Rivers Extraction Management Unit	<p>Prohibited in the 2011 plan and prohibited in the 2023 plan:</p> <ul style="list-style-type: none"> • Lower Georges River and Bunbury Curran Creek Water Source • Cooks River and Botany Bay Water Source. <p>In addition to the above, the 2023 plan also prohibits in-river dams in third order and higher streams in these water sources:</p> <ul style="list-style-type: none"> • Hacking River Water Source.
Northern Sydney Rivers Extraction Management Unit	<p>Prohibited in the 2011 plan and prohibited in the 2023 plan:</p> <ul style="list-style-type: none"> • Parramatta River Water Source - Lower Parramatta River Management Zone • Lane Cove River Water Source.

6.17 Adaptive management and amendment provisions

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

Adaptive management is a requirement of both the WM Act and the National Water Initiative. The WM Act allows for amendments during the life of a plan if it is in the public interest. The plan also includes provisions that allow for amendments during the life of the plan. The public would be consulted before making any changes that could affect water users or the environment's access to water. Part 10 of the 2023 plan includes updated amendment provisions.

Examples of adaptive environmental water provisions in the 2023 Greater Metropolitan Unregulated plan include the ability to amend the:

- Access and trade rules in the water sharing plan if we find there has been increased capture of rainfall run-off in harvestable rights dams above 10 % of rainfall run off –any such review would consider the effect the increased harvestable rights capture has on river flows, given the change in policy around harvestable rights in the coastal areas this is unlikely to be triggered.
- LTAAELs so that they are based on a proportion of flow if more information becomes available.
- Plan if it is found the impacts of climate change are impacting water quantity or quality.
- Access rules or dealing rules that apply to the Hawkesbury & Lower Nepean River Extraction Management Unit, Nattai River Water Source or the Stonequarry Creek Water Source, following consultation carried out in the first 5 years of this Plan regarding the effectiveness of the provisions in achieving the objects of this Plan.
- Access rules relating to access licences held by Penrith Lakes Development Corporation.
- Water NSW LTAAEL to enable the supply of additional drinking water or protect critical environmental needs.
- Part 8A to if changes in dam infrastructure or sewerage treatment plants or a review of effectiveness of the provisions e.g. provide protection of future replacement flows following the construction of advanced sewage treatment plants, the environmental flow release rules from Warragamba Dam following infrastructure upgrades that allow for variable release volumes and the environmental flow release rules following a review of the monitoring and reporting downstream of the storages.

6.18 Reviewing exemptions to access rules in the Hawkesbury and Lower Nepean Rivers extraction management unit

The NRC's review of the plan made a number of recommendations in relation to the current exemptions to access rules in the Plan as these exemptions allow extraction of water reserved for the environment and for drinking water purposes. NRC recommendations include:

- review all exemptions and simplify daily access rules in the surface water plan and connected groundwater plan water sources to minimise the time and volume of exempt extraction
- ensure the plans facilitate equitable sharing of water by assessing plan provisions against equity objectives consistent with the WM Act's requirements including access to environmental, drinking water and wastewater releases and long-term average annual extraction limit compliance provisions.

Water sharing plans generally contain exemptions to access rules. Exemptions enable licence holders to access water when it is otherwise being reserved for the environment and town water supply. Accordingly, exemptions are only provided in specific circumstances for specific purposes.

An example of a common exemption that is provided in all NSW unregulated water sharing plans allows licence holders to access the very low flow class up to 1 kilolitre per house per day for domestic purposes and 20 kilolitres per day to clean animals and farm equipment for hygiene purposes. These exemptions recognize the high priority of animal and human health when sharing water and meet the water sharing principles and priorities of the *Water Management Act 2000*.

There are two exemptions that are unique to the Greater Metropolitan Unregulated River Plan and that apply specifically in the Hawkesbury and Lower Nepean Rivers extraction management unit:

1. **Water shortage exemption:** licence holder can access the very low flow class if there have been several consecutive days in the very low flow class and temperatures are at a certain level, or if temperatures are $<4^{\circ}\text{C}$ or $\geq 31^{\circ}\text{C}$ on any day. There is no limit to the volume of water that can be taken under this exemption.

The water shortage exemption has only been applied to specific water sources because of their unique and specific management issues. Flows in the Upper Hawkesbury River and Lower Nepean Rivers extraction management unit have been augmented by artificial releases of highly treated water from Sydney Water's wastewater treatment plants and by transfers from Warragamba Dam to the Hawkesbury River for town water supply requirements at North Richmond for many years. Augmentation to this extent is unique to the Hawkesbury-Nepean and has led to the development of a large, irrigated agriculture industry reliant on the regular supply of water.

2. **Survival watering exemption:** licence holders can access the very low flow class for cropping purposes during years 1 to 5 of the Plan to ensure the survival of crops at critical stages in the crop cycle, but where the actual watering requirements are minimal. Cropping purposes include:
 - a. new plantings (15 kilolitres/ha per day)
 - b. herbicide application to turf (minimum volume)
 - c. vegetable and turf washing (20 kilolitres/day)

d. watering turf in leadup to harvest (15 kilolitres/ha per day).

The survival watering exemption has only been applied to specific water sources because these areas are used to supply much of Sydney's turf requirements. Some of this turf provided under strict contractual arrangements relating to growth, quality, and timeliness with alternate arrangements not possible.

During the public exhibition of the replacement plan in July 2022, it was intended to review and consult with stakeholders in this extraction management unit regarding the appropriateness of these exemptions. The draft plan on public exhibition did not include these specific exemptions. Due to flooding affecting the consultation of plan changes, a review of these exemptions was not conducted. The exemptions included in the 2011 plan were retained. In line with the intent of the 2011 plan rules, these exemptions will cease 30 June 2028. The department will consult with stakeholders on the review of the exemptions in the first 5 years of the plan. It is anticipated that due to the rollout of the metering scheduled for December 2024, additional usage information will be available to assist in this review.

7. Monitoring, evaluation and reporting

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

Comprehensive monitoring, evaluation and reporting programs are resource intensive and long term. We must prioritise areas where there is a high risk of water extraction impacting on environmental assets or where the demand for water is greater than the volume of water available.

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

As part of the introduction to the scaling of environmental flows in line with the Greater Sydney Water Strategy to conserve drinking water supply, the monitoring of the effectiveness of the flow releases including water quality and river health is required, to appropriate quality assurance and controls, to the satisfaction of the Minister. The department in consultation with other agencies, will provide guidance on an ecological and water quality monitoring program to assess any changes and evaluate the effectiveness of the environmental flows for the purposes of satisfying the Minister's requirements.

8. Areas for further work

8.1 Determine flow requirements for key assets and functions

Several government agencies such as DPI - Fisheries and the department's Environment and Heritage division are working on flow requirements for key assets and ecosystem functions. As these become available and there is sufficient flow data, this information can be used in making water sharing decisions.

8.2 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, which require metering for works of a certain size and log-bookkeeping for water extracted for smaller works, will begin in December 2024. For more information, see the [NSW non-urban water metering framework pages](#) on the department's website.

8.3 Stormwater harvesting

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

8.4 Sustainable long-term average annual extraction limits

The NRC has recommended that long-term average annual extraction limits on the coast should be set at a sustainable level. We are considering ways of doing this.

This plan sets a numerical and fixed long-term average annual extraction limit at low flows and high flows for the Southern Sydney Rivers, Northern Sydney Rivers, Illawarra Rivers and Shoalhaven Rivers EMUs to ensure there is no additional take from low flows than that which was occurring at

the commencement of the first water sharing plan. As discussed in Section 6.6, numerical limits are yet to be set for the Hawkesbury and Lower Nepean Rivers EMU and the Upper Nepean and Upstream Warragamba EMU. These will be updated when further information is available.

8.5 Climate change

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

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

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

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

The department has developed river models that incorporate stochastic long-term data to help guide The Greater Sydney Water Strategy. The replacement plan has incorporated these findings in the development of the plan. As these models evolve, they will be used to inform future water sharing decisions. For example, the sustainable long-term average annual extraction limits will consider future impacts of climate change. Rising sea level models will also be incorporated into future water sharing decisions where appropriate.

8.6 Cultural flows and improving the involvement of first nations people in water management

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

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

Actions under the State Water Strategy include:

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

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

Appendix A – Water sources

Table 9. Extraction management units, water sources and management zones in the 2023 plan

Extraction management unit (EMU)	Water source	Management zones
Upper Nepean and Upstream Warragamba EMU	Dharabuladh Water Source	n/a
Upper Nepean and Upstream Warragamba EMU	Jenolan River Water Source	n/a
Upper Nepean and Upstream Warragamba EMU	Kedumba River Water Source	n/a
Upper Nepean and Upstream Warragamba EMU	Kowmung River Water Source	n/a
Upper Nepean and Upstream Warragamba EMU	Lake Burragorang Water Source	n/a
Upper Nepean and Upstream Warragamba EMU	Little River Water Source	n/a
Upper Nepean and Upstream Warragamba EMU	Lower Wollondilly River Water Source	n/a
Upper Nepean and Upstream Warragamba EMU	Maguires Crossing Water Source	n/a
Upper Nepean and Upstream Warragamba EMU	Maldon Weir Water Source	n/a
Upper Nepean and Upstream Warragamba EMU	Mulwaree River Water Source	n/a

Extraction management unit (EMU)	Water source	Management zones
Upper Nepean and Upstream Warragamba EMU	Nattai River Water Source	n/a
Upper Nepean and Upstream Warragamba EMU	Stonequarry Creek Water Source	n/a
Upper Nepean and Upstream Warragamba EMU	Upper Nepean Rivers Water Source	<ul style="list-style-type: none"> • Pheasants Nest to Nepean Dam • Upper Nepean Rivers
Upper Nepean and Upstream Warragamba EMU	Upper Wollondilly River Water Source	n/a
Upper Nepean and Upstream Warragamba EMU	Werriberri Creek Water Source	n/a
Upper Nepean and Upstream Warragamba EMU	Wingecarribee River Water Source	<ul style="list-style-type: none"> • Lower Wingecarribee River • Medway Rivulet • Upper Wingecarribee River
Upper Nepean and Upstream Warragamba EMU	Wywandy Water Source	n/a
Hawkesbury and Lower Nepean Rivers EMU	Berowra Creek and Cowan Creek Water Source	n/a
Hawkesbury and Lower Nepean Rivers EMU	Capertee River Water Source	n/a
Hawkesbury and Lower Nepean Rivers EMU	Cattai Creek Water Source	n/a
Hawkesbury and Lower Nepean Rivers EMU	Colo River Water Source	n/a
Hawkesbury and Lower Nepean Rivers EMU	Erskine Creek and Glenbrook Creek Water Source	n/a

Extraction management unit (EMU)	Water source	Management zones
Hawkesbury and Lower Nepean Rivers EMU	Grose River Water Source	n/a
Hawkesbury and Lower Nepean Rivers EMU	Mid Nepean River Weirs Water Source	<ul style="list-style-type: none"> • Brownlow Hill Weir • Camden Weir • Cobbity Weir • Menangle Weir • Mid Nepean River Catchment • Mount Hunter Rivulet Weir • Sharpes Weir • Theresa Park Weir • Wallacia Weir
Hawkesbury and Lower Nepean Rivers EMU	Lower Hawkesbury River Water Source	n/a
Hawkesbury and Lower Nepean Rivers EMU	Lower Nepean River Water Source	n/a
Hawkesbury and Lower Nepean Rivers EMU	Macdonald River Water Source	n/a
Hawkesbury and Lower Nepean Rivers EMU	Upper Hawkesbury River Water Source	<ul style="list-style-type: none"> • Upper Hawkesbury River (Grose River to Wianamatta-South Creek) • Upper Hawkesbury River (Wianamatta-South Creek to Cattai Creek) • Upper Hawkesbury River (Cattai Creek to Colo River)
Hawkesbury and Lower Nepean Rivers EMU	Warragamba River Water Source	n/a
Hawkesbury and Lower Nepean Rivers EMU	Wianamatta South Creek Water Source	<ul style="list-style-type: none"> • Upper Wianamatta-South Creek • Lower Wianamatta-South Creek

Extraction management unit (EMU)	Water source	Management zones
Shoalhaven River EMU	Barbers Creek Water Source	n/a
Shoalhaven River EMU	Bomaderry Creek Water Source	n/a
Shoalhaven River EMU	Broughton Creek Water Source	n/a
Shoalhaven River EMU	Bundanoon Creek Water Source	n/a
Shoalhaven River EMU	Bungonia Creek Water Source	n/a
Shoalhaven River EMU	Corang and Endrick Rivers Water Source	n/a
Shoalhaven River EMU	Fitzroy Falls Water Source	n/a
Shoalhaven River EMU	Jaspers Brush Creek and Tributaries Water Source	n/a
Shoalhaven River EMU	Kangaroo River Water Source	n/a
Shoalhaven River EMU	Lower Kangaroo River Water Source	n/a
Shoalhaven River EMU	Lower Shoalhaven River Catchment Water Source	n/a
Shoalhaven River EMU	Lower Shoalhaven River Water Source	n/a
Shoalhaven River EMU	Mid Shoalhaven River Water Source	n/a
Shoalhaven River EMU	Nerrimunga Creek Water Source	n/a
Shoalhaven River EMU	Shoalhaven River Gorge Water Source	n/a
Shoalhaven River EMU	Upper Shoalhaven River Water Source	n/a

Extraction management unit (EMU)	Water source	Management zones
Shoalhaven River EMU	Upper Shoalhaven Tributaries Water Source	<ul style="list-style-type: none"> Boro Creek Mongarlowe River Reedy Creek
Shoalhaven River EMU	Yarrunga Creek Water Source	n/a
Northern Sydney Rivers EMU	Lane Cove River Water Source	n/a
Northern Sydney Rivers EMU	Middle Harbour Water Source	n/a
Northern Sydney Rivers EMU	Northern Sydney Coastal Water Source	n/a
Northern Sydney Rivers EMU	Parramatta River Water Source	<ul style="list-style-type: none"> Lower Parramatta River Upper Parramatta River
Southern Sydney Rivers EMU	Cabramatta Creek Water Source	n/a
Southern Sydney Rivers EMU	Cooks River and Botany Bay Water Source	n/a
Southern Sydney Rivers EMU	Georges River Catchment Water Source	n/a
Southern Sydney Rivers EMU	Hacking River Water Source	n/a
Southern Sydney Rivers EMU	Lower Georges River and Bunbury Curran Creek Water Source	n/a
Southern Sydney Rivers EMU	Prospect Creek Water Source	n/a
Southern Sydney Rivers EMU	Southern Sydney Coastal Water Source	n/a
Southern Sydney Rivers EMU	Woronora River Water Source	<ul style="list-style-type: none"> Lower Woronora River Upper Woronora River

Extraction management unit (EMU)	Water source	Management zones
Illawarra Rivers EMU	Lake Illawarra Water Source	n/a
Illawarra Rivers EMU	Macquarie Rivulet Water Source	n/a
Illawarra Rivers EMU	Minnamurra Coastal Water Source	n/a
Illawarra Rivers EMU	Minnamurra River Water Source	n/a
Illawarra Rivers EMU	Wollongong Coastal Water Source	n/a

Appendix B – References and supporting documents

- *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2023* maps, background document and rule summary sheets are all available on the [department's website](#)
- [NSW Legislation website](#) – contains NSW legislation, including the WM Act
- [National Water Initiative](#)
- The previous water sharing plan, the [Greater Metropolitan Region Unregulated River Water Sources 2011 water sharing plan](#)
- The [background document](#) (PDF, 847.33 KB) for the Greater Metropolitan Region Unregulated River Water Sources 2011 water sharing plan
- [Replacement water sharing plan manual](#) (PDF, 1,290 KB) - describes processes followed in developing replacement plans
- Details of the macro planning approach:
 - [Macro water sharing plans – the approach for groundwater](#) (PDF, 1,630 KB). A report to assist community consultation
 - [Macro water sharing plans – the approach for unregulated rivers](#) (PDF, 646.61 KB). A report to assist community consultation
 - [Macro water sharing plans – the approach for unregulated rivers](#) (PDF, 620.58 KB). Access and trading rules for pools
- [Review of the water sharing plans for the Greater Metropolitan region February 2021](#) (PDF, 5,760 KB) - The Natural Resources Commission's Review of the previous (2011) plans
- 2019 [Audit of the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011](#) (PDF, 3,860 KB).

Appendix C – Substantive changes made between draft and final water sharing plan

Due to major flooding affecting many areas in the Greater Metropolitan Region it was unreasonable to proceed with consultation in flood affected areas. In response, it was decided that rule changes directly affecting stakeholders in flood affected areas would be postponed and that existing rules from the current plan be retained, with an option to amend the new plan after consultation (within the first five years of the replacement plan).

Table 10 explains the substantive changes made between the publicly exhibited draft and final versions of the *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2023*.

Table 10. Provisions which changed post public exhibition

Provisions in the publicly exhibited draft replacement plan	Final 2023 plan provision	Reason for change
<p>Changes to the number of management zones in the plan area.</p> <p>The draft public exhibition plan proposed:</p> <ul style="list-style-type: none"> including 2 management zones in the Mid Shoalhaven River water source, that being the Mid Shoalhaven and the Upper Shoalhaven River management zones. 	<p>The Mid Shoalhaven & Upper Shoalhaven River management zones have become separate water sources.</p> <p>The Upper Hawkesbury River- water source will retain the 3 management zones. The Wianamatta-South Creek Water Source will retain the current 2 management zones:</p>	<p>Following community consultation indicating a preference for the two areas to be managed separately, the Mid Shoalhaven & Upper Shoalhaven River management zones have become separate water sources.</p> <p>As it was not possible to consult on the proposed changes to management zones due to flood</p>

Provisions in the publicly exhibited draft replacement plan	Final 2023 plan provision	Reason for change
<ul style="list-style-type: none"> merging of the 3 management zones in the Upper Hawkesbury River water source. <p>Including an additional management zone in the Wianamatta-South Creek Water Source to have 3 management zones with the creation of Eastern Creek management zone.</p>	<ul style="list-style-type: none"> Lower Wianamatta-South Creek Management Zone, Upper Wianamatta-South Creek Management Zone 	<p>impacts during public exhibition. Current access rules and management zones have been retained in the Upper Hawkesbury River and Wianamatta-South Creek water sources. The proposed changes will be consulted on within the first 5 years of the plan.</p>
<p>It was proposed to have 64 water sources and 26 management zones</p>	<p>There is now 65 water sources and 26 management zones in the final plan.</p>	<p>As consultation on changes to management zones was not possible due to flood impacts and the 2011 access and trade rules were retained, it was not possible to adopt the proposed changes to the number of management zones. Three management zones were proposed to be merged and the creation of 3 new management zones in total meant there was no change to the number of management zones.</p> <p>The Mid and Upper Shoalhaven management zones in the proposed Mid Shoalhaven River water source became 2 separate water sources increasing the water sources from 64 to 65 and reducing the 2 management zones.</p>

Provisions in the publicly exhibited draft replacement plan	Final 2023 plan provision	Reason for change
<p>The draft plan included the inflow 80th percentiles from the 2011 WSP for the Upper Nepean and Tallowa dams.</p>	<p>The plan includes update percentiles requiring WNSW to release these daily from the Upper Nepean, Woronora and Tallowa dams.</p>	<p>The department in consultation with WNSW has updated the inflow percentiles that guide the volumes released from each of the Upper Nepean and Tallowa dams. These updated volumes have been included in the final plan.</p>
<p>The proposed rule in the draft exhibited plan protected a fixed 33 ML/day from the St Mary's Advanced Water Treatment Plant in line with the Western Sydney Recycled Initiative – Replacement Flows Project.</p> <p>Prior to the replacement flows project, Warragamba Dam released 43.3ML/day. Of that 33ML/day were environmental flows and 10ML/day for use downstream. The replacement flows create water savings in the dam for potable use.</p>	<p>All discharges from the St Mary's Advanced Water Treatment Plant (multiplied by a factor) are protected from take.</p>	<p>Due to flood impacts disrupting consultation on proposed rule changes, the 2011 WSP access rules were retained. This meant that the rules protecting discharge volumes was also retained.</p> <p>The proposed change captured the intent of protecting the 33 ML/day replacement flows and provided the remaining discharges for irrigator use. This will now be consulted on during first 5 years of replacement plan.</p>
<p>Access Rules:</p> <p>Nattai River Water Source:</p> <p>The draft publicly exhibited 2023 plan had the following access rules, measured at gauge 2122801:</p> <ul style="list-style-type: none"> • VLF ≤ 2.7 ML/day • A > 2.7 ML/day 	<p>Access Rules:</p> <p>Nattai River Water Source:</p> <p>Measured at gauge 2122801:</p> <ul style="list-style-type: none"> • VLF ≤ 2.5 ML/day • A >2.5 ML/day • No take 24 hours after a CtP event. 	<p>Due to flooding and inability to appropriately consult on access rule changes, the 2011 access rules were retained for the following water sources:</p> <ul style="list-style-type: none"> • Nattai River • Stonequarry Creek • Wianamatta-South Creek

Provisions in the publicly exhibited draft replacement plan	Final 2023 plan provision	Reason for change
<ul style="list-style-type: none"> No take 24 hours after a CtP event. <p>Stonequarry Creek Water Source:</p> <p>The draft publicly exhibited 2023 plan had the following access rules, measured at gauge 212053:</p> <ul style="list-style-type: none"> Falling river: <ul style="list-style-type: none"> VLF \leq 0.9 ML/day A > 0.9 ML/day. Rising river: <ul style="list-style-type: none"> VLF \leq 1.2 ML/day A > 1.2 ML/day. <p>Cattai Creek Water Source:</p> <p>The draft publicly exhibited 2023 plan had the following access rules, measured at gauge 2122951:</p> <ul style="list-style-type: none"> VLF \leq 5 ML/day A > 5 < 15 ML/day B > 15 ML/day No take for 24 hours after a CtP event. <p>Lower Nepean River Water Source:</p>	<p>Stonequarry Creek Water Source:</p> <p>Measured at gauge 212053:</p> <ul style="list-style-type: none"> Falling river: <ul style="list-style-type: none"> VLF \leq 0.6 ML/day A > 0.6 ML/day. Rising river: <ul style="list-style-type: none"> VLF \leq 0.7 ML/day A > 0.7 ML/day. <p>Cattai Creek Water Source:</p> <p>Measured at gauge 2122951:</p> <ul style="list-style-type: none"> VLF \leq 3 ML/day A > 3 < 15 ML/day B > 15 ML/day No take for 24 hours after a CtP event. <p>Lower Nepean River Water Source:</p> <p>The rules in the final 2023 plan have been simplified in terms of the way they are written but still have the same intent, meaning there are no changes to the access for users.</p>	<ul style="list-style-type: none"> Cattai Creek <p>The intent of the 2011 access rules has been retained for Lower Nepean River, Upper Hawkesbury River and Lower Hawkesbury River. The complex rules that included the complicated algebraic equations have been simplified into text. Protection of environmental flows, replacement flows and very low flows from tributaries has been incorporated as well as the protection of drinking water releases in the Lower Nepean River water source.</p>

Provisions in the publicly exhibited draft replacement plan	Final 2023 plan provision	Reason for change
<p>The 2011 plan had complex rules that were not implemented.</p> <p>The draft publicly exhibited 2023 plan had simplified rules to protect environmental flows, replacement flows and drinking water releases.</p> <p>Upper and Lower Hawkesbury River Water Sources:</p> <p>The 2011 plan had complex rules and three management zones with different rules although trade was permitted between all three.</p> <p>The draft publicly exhibited 2023 plan simplified rules and amalgamated the three management zones in the Upper Hawkesbury River Water Source, providing one access rule for the entire water source.</p> <p>Wianamatta-South Creek Water Source:</p> <p>The 2011 plan had two management zones with different gauges used.</p> <p>The draft publicly exhibited 2023 plan had three management zones. Extension of Upper zone to take in users above wastewater discharge points that are currently in the Lower MZ. Users downstream of wastewater discharges have two</p>	<p>Upper and Lower Hawkesbury River Water Sources:</p> <p>The rules in the final 2023 plan have been simplified in terms of the way they are written but still have the same intent.</p> <p>The three management zones in the Upper Hawkesbury River Water Source have been retained. Dual naming for South Creek has been applied. This will now appear in the naming of Upper Hawkesbury (Grose River to Wianamatta-South Creek and Wianamatta-South Creek to Cattai Creek) management zones</p> <p>Wianamatta-South Creek Water Source:</p> <p>The 2011 rules and management zone boundaries will be retained. Therefore, the management zones will remain as Upper Wianamatta-South Creek and Lower Wianamatta-South Creek management zones will be retained. The access rules will remain for the 2 management zones.</p> <p>The adoption of dual naming has been retained for these management zones.</p>	

Provisions in the publicly exhibited draft replacement plan	Final 2023 plan provision	Reason for change
<p>management zones – one on South Ck and the other on Eastern Ck. Access rule changes were proposed for the 3 management zones.</p>		
<p>The 2011 plan included rules that provide exemptions to some water users in the Hawkesbury Lower Nepean Rivers EMU. The exemption provides for users to access very low flows based on particular circumstances including temperature and crop cycles. The draft plan did not include the exemptions but included a note advising the department’s interest in consulting on the removal.</p>	<p>The 2011 rules were retained which includes the exemptions for water shortage and critical water for crops.</p>	<p>Removal of exemptions was expected to be a very contentious issue and was a focus for effected licence holders. We sought specific comment both at targeted consultation prior to public exhibition and within the plan to seek early views and during the public exhibition process. The department welcomed the opportunity to discuss a review of the exemptions (including the possibility of removal) with stakeholders but due to flooding impacting consultation activities, this was not possible.</p> <p>The 2011 rules including exemptions were retained and changes to those will be consulted on within the first 5 years of the plan.</p>
<p>Trade prohibited into the following water sources:</p> <ul style="list-style-type: none"> • Nattai River • Grose River • Colo River 	<p>Trade rules in the flood affected Hawkesbury and Lower Nepean Rivers Extraction Management Unit are being reverted back to 2011 plan rules until a more appropriate time to conduct consultation. Impacted water sources are:</p> <ul style="list-style-type: none"> • Capertee River 	<p>Due to flooding and inability to appropriately consult on trade rule changes in these areas, the 2011 access rules were retained.</p>

Provisions in the publicly exhibited draft replacement plan	Final 2023 plan provision	Reason for change
	<ul style="list-style-type: none"> • Berowra Creek and Cowan Creek • Mid Nepean River Weirs • Cattai Creek • Lower Nepean River • Upper Hawkesbury River • Macdonald River • Colo River. 	
<p>Trade without limits allowed into water sources/management zones:</p> <ul style="list-style-type: none"> • Wywandy • Dharabuladh • Jenolan River • Kedumba River • Mulwaree River • Upper Wollondilly River • Lower Wollondilly River • Upper Wingecarribee River • Lower Wingecarribee River • Lake Burragorang • Kangaroo River • Lower Kangaroo River 	<p>Trade is now allowed into:</p> <ul style="list-style-type: none"> • Wywandy to a limit of 455 ML/year • Kedumba River to a limit of 451 ML/year • Upper Wingecarribee River to a limit of 1,048 ML/year • Upper Shoalhaven River to a limit of 1,568 ML/year • Mid Shoalhaven River to a limit of 5,689 ML/year • Reedy Creek MZ to a limit of 271 ML/year • Mongarlowe River MZ to a limit of 1,396 ML/year 	<p>The department wanted to consult with users on potential trade rules and limits during public exhibition.</p> <p>Where appropriate updated trade rules either provided trade opportunities up to a limit or imposed a no net gain to reduce hydrologic stress. Both options increased trade opportunities in a number of water sources and considered risk factors to mitigate further hydrologic stress.</p> <p>Trade is now allowed in at the 30th percentile (higher flows) to create larger trade in volumes and avoid risks to low flows. Trade in limits, which are 15 % of the 30th percentile flow. The trigger for hydrologic stress to go from low to medium is 20 %, so the selected trade in limit ensures no increase to hydrologic stress rating.</p>

Provisions in the publicly exhibited draft replacement plan	Final 2023 plan provision	Reason for change
<ul style="list-style-type: none"> • Broughton Creek • Mid Shoalhaven River • Reedy Creek MZ • Boro Creek MZ • Bungonia Creek • Shoalhaven River Gorge • Nerrimunga Creek 	<ul style="list-style-type: none"> • Corang and Endirck Rivers to a limit of 962 ML/year • Shoalhaven River Gorge to a limit of 1,535 ML/year • Broughton Creek to a limit of 281 ML/year. <p>No net gain rules apply for these water sources:</p> <ul style="list-style-type: none"> • Dharabuladh • Jenolan River • Mulwaree River • Upper Wollondilly River • Lake Burragorang • Nerrimunga Creek • Bungonia Creek • Kangaroo River • Lower Kangaroo River. 	<p>A no net gain trade limit applies to those water sources where:</p> <ul style="list-style-type: none"> • significant environmental values exist • government buybacks have occurred for environmental reasons under the Hawkesbury Nepean River Recovery project • no gauge exists • hydrologic stress is high or risk of increasing due to high volume of entitlement.
<p>The publicly exhibited draft plan included amendment provisions relevant for groundwater sources.</p>	<p>Groundwater amendments have been removed. Updated amendments include provisions to:</p>	<p>Groundwater amendments were removed as they were not relevant for the unregulated plan and are included in the Greater metro Region Groundwater plan.</p>

Provisions in the publicly exhibited draft replacement plan	Final 2023 plan provision	Reason for change
<p>Amendments were not included specifically for flood impacted water sources or access rules in pools.</p>	<ul style="list-style-type: none"> • add or modify access and trade rules for the Hawkesbury Lower Nepean River EMU (including exemptions to access rules), Nattai River and Stonequarry Creek Water Sources • add, remove or modify access rules for pools to enable specific access rules to be applied to specific pools where the default rules are not appropriate or further environmental protection of a pool is required. 	<p>Due to flooding impacting consultation activities, trade and access rules were not changed in those impacted areas. An amendment has been included allowing a provision to modify access or dealing rules that apply to the Hawkesbury & Lower Nepean River Extraction Management Unit, Nattai River and Stonequarry Creek water sources, following consultation carried out in the first 5 years of this plan.</p> <p>Pool rules amendment reflects an update to pool rules.</p>

Appendix D - Consultation approach for flood effected areas in the Water Sharing Plans for the Greater Metropolitan Region

Delayed consultation on replacement unregulated water sharing plans

We changed our approach to consultation on some rule changes in the *Water Sharing Plan for the Greater Metropolitan Region Unregulated and Alluvial Water Sources 2023*. Consultation will be delayed for some specific rules in flood effected water sources as detailed below in Table 11. We will come back and consult on these rule changes within the first 5 years of the plan.

Table 11. Delayed rule changes in the Greater Metropolitan Region unregulated water sharing plan

Flood effected water source	2011 plan rules	Publicly exhibited draft plan rules	New 2023 plan rules
<p>Maldon Weir Water Source</p>	<p><u>Access rules</u></p> <p>Users must cease pumping when the volume of water released in the prior 24-hour period from Pheasants Nest Weir is greater than zero and the stage of the Maldon Weir is less than the signal stage.</p>	<p><u>Access rules</u></p> <p>Users must cease pumping when flow is less than or equal to the sum of volume of water required to be released from Nepean Dam, Avon Dam and Cordeaux Dam calculated at 8am multiplied by transmission loss.</p>	<p><u>Access rules</u></p> <p>Users must cease pumping when the volume of water released in the prior 24-hour period from Pheasants Nest Weir is greater than zero and the stage of the Maldon Weir is less than the signal stage.</p> <p>New amendment clause so the rules can be reviewed within the first 5 years of the plan.</p>
<p>Nattai River Water Source</p>	<p><u>Access rules</u></p> <p>Users must cease pumping when flow in the river at Nattai River at the Craggs gauge (2122801) is ≤2.5 ML/day.</p>	<p><u>Access rules</u></p> <p>Users must cease pumping when flow in the river at Nattai River at the Craggs gauge (2122801) is ≤2.7 ML/day.</p>	<p><u>Access rules</u></p> <p>Users must cease pumping when flow in the river at Nattai River at the Craggs gauge (2122801) is ≤2.5 ML/day.</p> <p>New amendment clause so the rules can be reviewed within the first 5 years of the plan.</p>
<p>Stonequarry Creek Water Source</p>	<p><u>Access rules</u></p> <p>Users must cease pumping when flow at Stonequarry Creek at Picton gauge</p>	<p><u>Access rules</u></p> <p>Users must cease pumping when flow at Stonequarry Creek at Picton gauge</p>	<p><u>Access rules</u></p> <p>Users must cease pumping when flow at Stonequarry Creek at Picton gauge</p>

Flood effected water source	2011 plan rules	Publicly exhibited draft plan rules	New 2023 plan rules
	(212053) is ≤0.6 ML/day and cannot start pumping until the river is >0.7 ML/day after a cease to pump event.	(212053) is ≤0.8 ML/day and cannot start pumping until the river is >1 ML/day after a cease to pump event.	(212053) is ≤0.6 ML/day and cannot start pumping until the river is >0.7 ML/day after a cease to pump event. New amendment clause so the rules can be reviewed within the first 5 years of the plan.
Cattai Creek Water Source	<u>Access rules</u> Users must cease pumping when flow in the river at Cattai Creek at Cattai Ridge Road gauge (2122951) is ≤3 ML/day . <u>Trade</u> Trade permitted with no net gain.	<u>Access rules</u> Users must cease pumping when flow in the river at Cattai Creek at Cattai Ridge Road gauge (2122951) is ≤5 ML/day . <u>Trade</u> Trade not permitted.	<u>Access rules</u> Users must cease pumping when flow in the river at Cattai Creek at Cattai Ridge Road gauge (2122951) is ≤3 ML/day . <u>Trade</u> Trade permitted with no net gain. New amendment clause so the rules can be reviewed within the first 5 years of the plan.
Wianamatta-South Creek Water Source	<u>Access rules</u> Upper South Creek Management Zone:	<u>Access rules</u> Upper South Creek Management Zone:	<u>Access rules</u> Upper South Creek Management Zone:

Flood effected water source	2011 plan rules	Publicly exhibited draft plan rules	New 2023 plan rules
	<p>Users must cease pumping when flow in the river at South Creek at the Great Western Highway gauge (212048) is ≤0.2 ML/day.</p> <p>Lower South Creek Management Zone: Users must cease pumping when flow in the river at South Creek at Richmond Road gauge (212297) is ≤3 ML/day.</p>	<p>Users must cease pumping when flow in the river at South Creek at the Great Western Highway gauge (212048) is ≤0.3 ML/day.</p> <p>Lower South Creek Management Zone: Users must cease pumping when flow in the river at South Creek at Richmond Road gauge (212297) is ≤7.7 ML/day.</p> <p>Eastern Creek Management Zone</p> <p>Users must cease pumping when flow in the river at Eastern Creek at Riverstone gauge (212296) is ≤10 ML/day.</p> <p>Note the creation of Eastern Creek is the result of a management zone boundary change.</p>	<p>Users must cease pumping when flow in the river at South Creek at the Great Western Highway gauge (212048) is ≤0.2 ML/day.</p> <p>Lower South Creek Management Zone: Users must cease pumping when flow in the river at South Creek at Richmond Road gauge (212297) is ≤3 ML/day.</p> <p>New amendment clause so the rules and management zone boundaries can be reviewed within the first 5 years of the plan.</p>
<p>Mid Nepean River Weirs Water Source</p>	<p><u>Access rules</u></p> <p>Mid Nepean River Catchment Management Zone</p> <p>Users must cease pumping when there is no visible flow at the pump site.</p> <p>All other management zones</p>	<p><u>Access rules</u></p> <p>Mid Nepean River Catchment Management Zone</p> <p>Users must cease pumping when there is no visible flow at the pump site.</p> <p>All other management zones</p>	<p><u>Access rules</u></p> <p>Mid Nepean River Catchment Management Zone</p> <p>Users must cease pumping when there is no visible flow at the pump site.</p> <p>All other management zones</p>

Flood effected water source	2011 plan rules	Publicly exhibited draft plan rules	New 2023 plan rules
	<p>Users must cease pumping when the sum of releases in the previous 24 hours from:</p> <ul style="list-style-type: none"> • Pheasants Nest Weir and • Broughtons Pass Weir. <p>is greater than zero and the stage at the weir within each respective management zone is less than signal stage.</p> <p><u>Exemptions</u></p> <p>Water shortage exemption to the cease to pump rule exists if there have been several consecutive days in the very low flow class. Number of days dependant on temperature and month.</p>	<p>Users must cease pumping when flows are less than the volume of water required to be released from Nepean, Avon, Cataract and Cordeaux dams calculated at 8am multiplied by transmission loss.</p> <p><u>Exemptions</u></p> <p>Exemption rules being reviewed.</p>	<p>Users must cease pumping when the sum of releases in the previous 24 hours from:</p> <ul style="list-style-type: none"> • Pheasants Nest Weir and • Broughtons Pass Weir. <p>is greater than zero and the stage at weir within each respective management zone is less than signal stage.</p> <p><u>Exemptions</u></p> <p>Water shortage exemption to the cease to pump rule exists if there have been several consecutive days in the very low flow class. Number of days dependant on temperature and month.</p> <p>New amendment clause so the rules, including exemptions can be reviewed within the first 5 years of the plan.</p>
<p>Lower Nepean River Water Source</p>	<p><u>Access rules</u></p> <p>The cease to pump rule is based on:</p>	<p><u>Access rules</u></p> <p>Cease to pump rule based on:</p>	<p><u>Access rules</u></p> <p>The cease to pump rule is based on:</p>

Flood effected water source	2011 plan rules	Publicly exhibited draft plan rules	New 2023 plan rules
	<ul style="list-style-type: none"> water released from Wallacia Weir determined by Upper Nepean dams inflows, less a transmission loss factor measured at Yarramundi. percentile of total inflows into the Upper Nepean dams converted to a factor drinking water releases from Warragamba Dam discharges from St Marys wastewater treatment plant water savings from the Hawkesbury Nepean River Recovery Program. <p><u>Trade</u></p> <p>Trade permitted from Upper Hawkesbury River Water Source if the total sum of share components in the Lower Nepean Management Zone is not more than 3.65GL greater than at the commencement of the plan.</p> <p><u>Exemptions</u></p>	<ul style="list-style-type: none"> required environmental flow releases determined by inflows to the Upper Nepean dams and percentage total storage of the Greater Sydney dams, less a transmission loss factor measured at Yarramundi. drinking water releases from Warragamba Dam discharges from St Marys wastewater treatment plant – up to 33ML/day water savings from the Hawkesbury Nepean River Recovery Program. <p><u>Trade</u></p> <p>Trade permitted only from the Mid Nepean River Weirs Water Source.</p> <p><u>Exemptions</u></p> <p>Exemption rule being reviewed.</p>	<ul style="list-style-type: none"> water released from Wallacia Weir determined by Upper Nepean dams inflows, less a transmission loss factor measured at Yarramundi. percentile of total inflows into the Upper Nepean dams converted to a factor drinking water releases from Warragamba Dam discharges from St Marys wastewater treatment plant <p><u>Trade</u></p> <p>Trade permitted from Upper Hawkesbury River Water Source if the total sum of share components in the Lower Nepean Management Zone is not more than 3.65GL greater than at the commencement of the plan.</p> <p><u>Exemptions</u></p> <p>Continue the exemption for cropping purposes until 30 June 2028.</p>

Flood effected water source	2011 plan rules	Publicly exhibited draft plan rules	New 2023 plan rules
	<p>An exemption to the cease to pump applies for cropping purposes during years 1 to 5 of the Plan. To be reviewed at year 5 of the plan.</p>		<p>New amendment clause so the rules including exemptions can be reviewed within the first 5 years of the plan.</p>
<p>Upper Hawkesbury River Water Source</p>	<p><u>Access rules</u></p> <p>Upper Hawkesbury River (Grose River to South Creek) Management Zone</p> <p>Users must cease pumping when flow at 2 upstream gauges is less than or equal to the upper limit of the very low flow class for the 2 upstream water sources.</p> <p>Upper Hawkesbury River (South Creek to Cattai Creek) Management Zone</p> <p>Users must cease pumping when flow at 3 upstream gauges is less than or equal to the upper limit of the very low flow class for the 3 upstream water sources.</p>	<p>Merged three management zones.</p> <p><u>Access rules</u></p> <p>The cease to pump rule for the water source is based on the sum of flows at 6 gauges being less than or equal to the sum of the very low flow class in 4 water sources and one management zone.</p> <p><u>Trade</u></p> <p>Trade permitted from upstream water sources.</p> <p><u>Exemptions</u></p> <p>Exemption rule being reviewed.</p>	<p>Management zones not merged.</p> <p><u>Access rules</u></p> <p>Upper Hawkesbury River (Grose River to South Creek) Management Zone</p> <p>Users must cease pumping when flow at 2 upstream gauges is less than or equal to the upper limit of the very low flow class for the 2 upstream water sources.</p> <p>Upper Hawkesbury River (South Creek to Cattai Creek) Management Zone</p> <p>Users must cease pumping when flow at 3 upstream gauges is less than or equal to the upper limit of the very low flow class for the 3 upstream water sources.</p>

Flood effected water source	2011 plan rules	Publicly exhibited draft plan rules	New 2023 plan rules
	<p>Upper Hawkesbury River (Cattai Creek to Colo River) Management Zone</p> <p>Users must cease pumping when flow at 4 upstream gauges is less than or equal to the upper limit of the very low flow class for the 4 upstream water sources.</p> <p><u>Trade</u></p> <p>Trade permitted from Lower Nepean River subject to no net gain.</p> <p><u>Exemptions</u></p> <p>An exemption to the cease to pump applies for cropping purposes during years 1 to 5 of the Plan. This was to be reviewed at year 5 of the plan.</p>		<p>Upper Hawkesbury River (Cattai Creek to Colo River) Management Zone</p> <p>Users must cease pumping when flow at 4 upstream gauges is less than or equal to the upper limit of the very low flow class for the 4 upstream water sources.</p> <p><u>Trade</u></p> <p>Trade permitted from upstream water sources.</p> <p><u>Exemptions</u></p> <p>Continue the exemption for cropping purposes until 30 June 2028.</p> <p>New amendment clause so the rules including exemptions can be reviewed within the first 5 years of the plan.</p>
<p>Lower Hawkesbury River Water Source</p>	<p><u>Access rules</u></p> <p>Users must cease pumping when flows at 5 gauges are less than or equal to the sum of the upper limit of the very</p>	<p><u>Access rules</u></p> <p>Users must cease pumping when flows at 6 gauges are less than or equal to the sum of:</p>	<p><u>Access rules</u></p> <p>Users must cease pumping when flows at 5 gauges are less than or equal to the sum of the upper limit of the very</p>

Flood effected water source	2011 plan rules	Publicly exhibited draft plan rules	New 2023 plan rules
	low flow class of the 5 upstream water sources.	<ul style="list-style-type: none"> the upper limit of the very low flow class of 5 upstream water sources 3.3 ML/day the environmental flows released from Upper Nepean dams (multiplied by 0.7) 	<p>low flow class of 5 upstream water sources (2011 rules).</p> <p>New amendment clause so the rules can be reviewed within the first 5 years of the plan.</p>
Colo River Water Source	<p><u>Trade</u></p> <p>Trade permitted with no net gain.</p>	<p><u>Trade</u></p> <p>Trade not permitted.</p>	<p><u>Trade</u></p> <p>Trade permitted with no net gain.</p> <p>New amendment clause so the rules can be reviewed within the first 5 years of the plan.</p>
Macdonald River Water Source	<p><u>Trade</u></p> <p>Trade permitted with no net gain.</p>	<p><u>Trade</u></p> <p>Trade not permitted.</p>	<p><u>Trade</u></p> <p>Trade permitted with no net gain.</p> <p>New amendment clause so the rules can be reviewed within the first 5 years of the plan.</p>

Appendix E – Vision, objectives, strategies and performance indicators

Vision statement

The vision for the Greater Metropolitan Region Unregulated River Water Sharing Plan 2023 is to provide for the following:

- (a) the health and enhancement of the water sources and their dependent ecosystems
- (b) the continuing productive extraction of water for economic benefit
- (c) the spiritual, social, customary and economic benefits of water to Aboriginal communities
- (d) the social and cultural benefits to urban and rural communities that result from water.

10 Environmental objectives

- (1) The broad environmental objective of this plan is to protect, and where possible enhance and restore, the condition of the water sources and their water-dependent ecosystems.

Note: The water-dependent ecosystems of the water sources include in-stream, riparian and floodplain ecosystems, and groundwater-dependent ecosystems

- (2) The targeted environmental objectives of this plan are:
 - (a) to protect, and where possible, enhance and restore, the following over the term of this plan:
 - (i) the recorded distribution or extent of target ecological populations including native fish and native vegetation
 - (ii) the population structure of target ecological populations including native fish, native vegetation, low-flow macroinvertebrate communities and high-priority groundwater-dependent ecosystems
 - (iii) the connectivity between and within water sources, including to support surface and groundwater exchange and downstream processes including priority fish passages
 - (iv) connectivity between tidal pools, connected estuaries and connected upstream water sources
 - (v) water quality within target ranges to support water-dependent ecosystems and ecosystem functions

- (vi) flows that support ecosystem values and processes within connected estuaries
 - (b) to contribute to the prevention of structural damage to aquifers of the water sources resulting from groundwater extraction.
- (3) The strategies for reaching the targeted environmental objectives of this plan are as follows:
- (a) reserve all water volume in excess of each long-term average annual extraction limit for the environment
 - (b) reserve a portion of natural flows to partially mitigate alterations to natural flow regimes in the water sources
 - (c) restrict the take of water from an in-river pool or off-river pool when the volume of water in the pool is less than the volume of water that can be held by the pool when at full capacity
 - (d) restrict or prevent water supply work approvals on third-order or higher streams within specified water sources
 - (e) reserve a portion of natural flows to maintain hydrological connectivity between the water sources and other connected water sources, including connectivity between tidal pools and estuaries
 - (f) manage the construction and use of water supply works to minimise impacts on in-stream ecosystems, high-priority groundwater-dependent ecosystems and groundwater quality.
- (4) The performance indicator used to measure the success of the strategies for reaching the broad environmental objective in subclause (1) is an evaluation of the extent to which the combined outcomes of the targeted objectives in subclause (2) have contributed to achieving the broad objective.
- (5) The performance indicators used to measure the success of the strategies for reaching the targeted environmental objectives in subclause (2) are the changes or trends in the ecological condition of the water sources during the term of this plan as assessed using one or more of the following:
- (a) the recorded range or extent of target populations including native fish, native turtles, native vegetation communities and high-priority groundwater-dependent ecosystems
 - (b) the recorded condition of target populations of native fish, native vegetation, low-flow macroinvertebrate communities and high-priority groundwater-dependent ecosystems
 - (c) measurements of fish movements through priority fish passage areas
 - (d) measurements of flows through tidal pools and into connected estuaries
 - (e) the recorded values of water quality measurements including salinity, turbidity, total nitrogen, total phosphorous, pH, water temperature and dissolved oxygen
 - (f) the recorded values of groundwater levels

- (g) the extent to which the strategies have provided flow conditions of sufficient magnitude, frequency, duration, timing and water quality to achieve the targeted environmental objectives
 - (h) the extent to which the strategies have provided flow conditions of sufficient magnitude, frequency and timing to tidal pool management zones with designated estuary flow requirements.
- (6) In evaluating the effectiveness of the strategies in meeting the objectives in this clause, the following will be relevant:
- (a) the extent to which the strategies in subclause (3) and provisions in this plan have been implemented and complied with
 - (b) the extent to which changes in the performance indicators can be attributed to the strategies in subclause (3) and provisions in this plan
 - (c) the extent to which the strategies in subclause (3) support achievement of the environmental objectives
 - (d) the extent to which external influences on the water sources and their dependent ecosystems during the term of this plan have affected progress toward achieving the environmental objectives

11 Economic objectives

- (1) The broad economic objective of this plan is to maintain, and where possible improve, access to water to optimise economic benefits for agriculture, water-dependent industries and local economies
- (2) The targeted economic objectives of this plan are as follows:
 - (a) to maintain, and where possible improve, water trading opportunities for water-dependent businesses
 - (b) to maintain, and where possible improve, access to water up to the long-term average annual extraction limits for agriculture, water-dependent businesses and landholders
 - (c) to protect, and where possible, improve connectivity to provide flows that support economic activities in connected estuaries
 - (d) to contribute to maintaining water quality within target ranges for agriculture, water-dependent businesses and landholders.
- (3) The strategies for reaching the targeted economic objectives of this plan are as follows:
 - (a) provide for trade of water allocations and share components subject to environmental constraints and local impacts
 - (b) provide a stable and predictable framework for sharing water among water users
 - (c) provide for flexibility of access to water
 - (d) manage extractions to the long-term average annual extraction limits

- (e) reserve a portion of natural flows to maintain connectivity between tidal pools and connected estuaries.
- (4) The performance indicator used to measure the success of the strategies for reaching the broad economic objective in subclause (1) is an evaluation of the extent to which the combined outcomes of the targeted economic objectives in subclause (2) have contributed to achieving the broad objective.
 - (5) The performance indicators used to measure the success of the strategies for reaching the targeted economic objectives in subclause (2) are the changes or trends in economic benefits during the term of this plan, as assessed using one or more of the following:
 - (a) the economic benefits of water extraction and use
 - (b) the economic benefits of water trading as demonstrated by:
 - (i) the annual number or volume of share components of access licences transferred or assigned
 - (ii) the weighted average unit price of share components of access licences transferred or assigned
 - (iii) the annual volume of water allocations assigned
 - (iv) the weighted average unit price of water allocations assigned
 - (c) the recorded values of water quality measurements including salinity, sodium adsorption ratio, harmful algal blooms, total nitrogen, total phosphorus, pH and dissolved oxygen
 - (d) the recorded values of groundwater levels.
 - (6) In evaluating the effectiveness of the strategies in meeting the objectives in this clause, the following will be relevant:
 - (a) the extent to which the strategies in subclause (3) and provisions in this plan have been implemented and complied with
 - (b) the extent to which the changes in the economic benefits of water extraction and use can be attributed to the strategies in subclause (3) and provisions in this plan
 - (c) the extent to which the strategies in subclause (3) support achievement of the economic objectives
 - (d) the extent to which external influences on water-dependent businesses have affected progress towards achieving the economic objectives.

12 Aboriginal cultural objectives

- (1) The broad Aboriginal cultural objective of this plan is to maintain, and where possible improve, the spiritual, social, customary and economic values and uses of water by Aboriginal people.
- (2) The targeted Aboriginal cultural objectives of this plan are as follows:
 - (a) to provide access to water in the exercise of native title rights

- (b) to provide access to water for Aboriginal cultural use and community development, including fishing
 - (c) to protect, and where possible improve, identified water-dependent culturally significant areas, including important riparian vegetation communities
 - (d) to protect, and where possible improve, connectivity to provide flows that support Aboriginal cultural activities within connected estuaries
 - (e) to contribute to the maintenance of water quality within target ranges to ensure suitability of water for Aboriginal cultural use and community development.
- (3) The strategies for reaching the targeted Aboriginal cultural objectives of this plan are as follows:
- (a) manage access to water consistently with the exercise of native title rights
 - (b) provide for water associated with Aboriginal cultural values and uses, and community development
 - (c) manage extractions under access licences and basic landholder rights within the long-term average annual extraction limits
 - (d) reserve a portion of natural flows to mitigate alterations to natural flow regimes in the water sources
 - (e) restrict the take of water from an in-river pool or off-river pool when the volume of water in the pool is less than the volume of water that can be held by the pool when at full capacity
 - (f) reserve a portion of natural flows to maintain hydrological connectivity between the water sources and other connected water sources, including between tidal pools and estuaries
 - (g) manage the construction and use of water supply works to minimise impacts on groundwater quality and groundwater-dependent culturally significant areas.
- (4) The performance indicator used to measure the success of the strategies for reaching the broad Aboriginal cultural objective in subclause (1) is an evaluation of the extent to which the combined outcomes of the targeted Aboriginal cultural objectives in subclause (2) have contributed to achieving the broad objective.
- (5) The performance indicators used to measure the success of the strategies for reaching the targeted Aboriginal cultural objectives in subclause (2) are the changes or trends in Aboriginal cultural benefits during the term of this plan as assessed using one or more of the following:
- (a) the use of water by Aboriginal people, by measuring factors including:
 - (i) the extent to which native title rights can be exercised, consistently with any determination of native title or Indigenous land-use agreement
 - (ii) the extent to which access to water has contributed to achieving Aboriginal cultural and community development outcomes

- (b) the recorded range or extent of target ecological populations including native fish, native vegetation communities and high-priority groundwater-dependent ecosystems
 - (c) the recorded condition of target ecological populations of native fish, native vegetation, low-flow macroinvertebrate communities and high-priority groundwater-dependent ecosystems
 - (d) the recorded values of water quality measurements including salinity, harmful algal blooms, total nitrogen, total phosphorus, pH, and dissolved oxygen
 - (e) the extent to which the strategies have provided flow conditions of sufficient magnitude, frequency and timing to tidal pool management zones with designated estuary flow requirements
 - (f) the recorded values of groundwater levels.
- (6) In evaluating the effectiveness of the strategies in meeting the Aboriginal cultural objectives in this clause, the following will be relevant:
- (a) the extent to which the strategies in subclause (3) and provisions in this plan have been implemented and complied with
 - (b) the extent to which changes in the performance indicators can be attributed to the strategies in subclause (3) and provisions in this plan
 - (c) the extent to which the strategies in subclause (3) support achievement of the Aboriginal cultural objectives
 - (d) the water made available for Aboriginal cultural values and uses during the term of this plan through available water determinations and the granting of new access licences
 - (e) the extent to which external influences on the water-dependent Aboriginal cultural activities have affected progress toward achieving the Aboriginal cultural objectives.

13 Social and cultural objectives

- (1) The broad social and cultural objective of this plan is to provide access to water to support water-dependent social and cultural values.
- (2) The targeted social and cultural objectives of this plan are to maintain, and where possible, improve the following:
 - (a) access to water for basic landholder rights, town water supply and licensed domestic and stock purposes
 - (b) access to water for water-dependent cultural, heritage and recreational uses, including recreational fishing
 - (c) flows that support cultural, heritage and recreational activities within connected estuaries
 - (d) water quality within target ranges for basic landholder rights, town water supply, domestic and stock purposes and surface water-dependent cultural, heritage and recreational uses, including recreational fishing.

- (3) The strategies for reaching the targeted social and cultural objectives of this plan are as follows:
- (a) provide water access for basic landholder rights, town water supply and licensed domestic and stock purposes
 - (b) reserve all water in excess of each long-term average annual extraction limit for the environment
 - (c) reserve a portion of natural flows to partially mitigate alterations to natural flow regimes in the water sources
 - (d) restrict the take of water from an in-river pool or off-river pool when the volume of water in the pool is less than the volume of water that can be held by the pool when at full capacity
 - (e) reserve a portion of natural flows to maintain hydrological connectivity between the water sources and other connected water sources, including between tidal pool management zones and connected estuaries
 - (f) manage the construction and use of water supply works to minimise impacts on groundwater quality, basic landholder rights, and town water supply.
- (4) The performance indicator used to measure the success of the strategies for reaching the broad social and cultural objective in subclause (1) is an evaluation of the extent to which the combined outcomes of the targeted social and cultural objectives in subclause (2) have contributed to achieving the broad objective.
- (5) The performance indicators used to measure the success of the strategies for reaching the targeted social and cultural objectives in subclause (2) are the changes or trends in social and cultural benefits during the term of this plan as assessed using one or more of the following:
- (a) the social and cultural uses of water during the term of this plan, by measuring factors including:
 - (i) the extent to which basic landholder rights and licensed domestic and stock requirements have been met
 - (ii) the extent to which local water utility access licence requirements have been met
 - (b) the recorded range or extent of target populations of native fish that are important for recreational fishing
 - (c) the recorded takes of native fish that are important for recreational fishing within legal age and size classes
 - (d) the recorded values of water quality measurements including salinity, harmful algal blooms, total nitrogen, total phosphorus, pH, and dissolved oxygen
 - (e) the extent to which the strategies have provided flow conditions of sufficient magnitude, frequency and timing to tidal pool management zones with designated estuary flow requirements
 - (f) the recorded values of groundwater levels.

- (6) In evaluating the effectiveness of the strategies in meeting the social and cultural objectives in this clause, the following will be relevant:
- (a) the extent to which the strategies in subclause (3) and provisions in this plan have been implemented and complied with
 - (b) the extent to which changes in the performance indicators can be attributed to the strategies in subclause (3) and provisions in this plan
 - (c) the extent to which the strategies in subclause (3) support achievement of the social and cultural objectives

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

Appendix F – Estimate of annual extraction from harvestable rights dams

Part 3 of the 2023 Greater Metropolitan Unregulated plan includes the requirements for water to satisfy harvestable rights. This figure has been estimated using the process below.

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

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

The department holds a series of contours that reflect the annual runoff across NSW. These contours are called the “Harvestable Rights Multiplier”. Generally, the dryer the area the lower the Harvestable Rights Multiplier and the larger a dam must be to capture the same volume of water. This relationship is expressed numerically as a ‘Dam Reliability Factor’ (DRF) found in Table 12 below.

Table 12. Relationship between the Harvestable Rights multiplier and the Dam Reliability Factor

Harvestable rights multiplier	Corresponding Dam Reliability Factor
0.050	2.5
0.051	2.32
0.052	2.17
0.056	2.04
0.054	1.93
0.055	1.83
0.056	1.75
0.057	1.68
0.058	1.61
0.059	1.55
0.060	1.5
0.062	1.41
0.064	1.33
0.066	1.27
0.068	1.21
0.070	1.17
0.075	1.07
0.080	1
0.090	0.9
0.100	0.83
0.110	0.79
0.120	0.75
0.130	0.72
0.140	0.7
0.150	0.68
0.160	0.67
0.170	0.65

Harvestable rights multiplier	Corresponding Dam Reliability Factor
0.180	0.64
0.190	0.63

A geographic information system was used to determine the average harvestable rights multiplier per water source based on the rainfall runoff contours. Table 6 was then used to determine the corresponding Dam Reliability Factor per water source.

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