
Department of Planning and Environment

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Background, consultation and changes for the Greater Metropolitan Region Groundwater water sharing plan

Background and changes

July 2023





Acknowledgement of Country

The Department of Planning and Environment 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.

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Background, consultation and changes for the Greater Metropolitan Region
Groundwater water sharing plan

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Glossary and abbreviations

Term	Definition
Aquifer	<p>An underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, silt or clay) from which groundwater can be usefully extracted.</p> <p>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.</p>
BLR	Basic Landholder Right
GDE	<p>Groundwater-dependant ecosystem</p> <p>Ecosystems that rely on groundwater for their species composition and their natural ecological processes.</p>
LTADEL	<p>Long-term average annual extraction limit</p> <p>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.</p>
MER	Monitoring, evaluation and reporting
NRC	Natural Resources Commission
Share component	<p>An entitlement to a given number of shares of the available water in a specified water source.</p> <p>The share component on an aquifer 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.</p>
WM Act	<i>Water Management Act 2000</i>
NSW	New South Wales
ACT	Australian Capital Territory
NARCLiM	NSW and ACT Regional Climate Modelling
PEW	Planned Environmental Water
LALC's	Local Aboriginal Land Council's

Term	Definition
GSWS	Greater Sydney Water Strategy
WSP	Water Sharing Plan
GMR	Greater Metropolitan Region
MER	Monitoring, Evaluation, Reporting
SW	Surface Water
SEPP	State Environmental Planning Policy
Resilience & Hazards SEPP	State Environmental Planning Policy (Resilience & Hazards) 2021
AWD	Available Water Determination
HEVAE	High ecological value aquatic ecosystems
DPE-Water	Department of Planning & Environment - Water
NRAR	Natural Resources Access Regulator
EES	Environment, Energy & Science
ML	Megalitres
GL	Gigalitres

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1 Introduction

Water sharing plans were developed for rivers and groundwater systems across New South Wales following the introduction of the *Water Management Act 2000* (WM Act). Approximately 99% of the water extracted in NSW is now covered by a water sharing plan and managed under the WM Act. These plans protect the health of our rivers and groundwater while providing water users with perpetual access licences, sustainable resource management, equitable water sharing arrangements, and increased opportunities to trade water.

The Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023 began on 1 July 2023. The new plan replaces the previous *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011* began on 1 July 2011.

The replacement plan will expire on 1 July 2033.

This document gives high-level background information on the planning process as well as details of changes to management arrangements in the current plan. It also summarises the public exhibition process, what we heard in submissions, and how we considered submissions in finalising the replacement water sharing plan.

The *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023* covers 10 groundwater sources:

- Botany Sands Groundwater Source
- Hawkesbury Alluvium Groundwater Source
- Lachlan Fold Belt Greater Metropolitan Groundwater Source
- Maroota Tertiary Sands Groundwater Source
- Metropolitan Coastal Sands Groundwater Source
- Sydney Basin Central Groundwater Source
- Sydney Basin Nepean Groundwater Source
- Sydney Basin North Groundwater Source
- Sydney Basin South Groundwater Source
- Sydney Basin West Groundwater Source

You can find the replacement plan, maps and supporting factsheets on the [department's website](#).

There are more details of the plan area, its water resources and resource management in documents referenced in Appendix 1.

2 Purpose of water sharing plans

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

In December 2000, the parliament of NSW passed the WM Act, which has the overall objective to

‘provide for the sustainable and integrated management of the water sources of the state for the benefit of both current and future generations’.

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

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

3 Legislation, policy, and planning framework

3.1 Water Management Act 2000

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

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

- the most recent audit of the water sharing plan conducted under section 44 of the WM Act
- a report from the Natural Resources Commission that reviews (within the previous 5 years) the extent to which the water sharing provisions have materially contributed to the achievement of, or the failure to achieve, environmental, social and economic outcomes, and whether changes to those provisions are warranted.

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

The WM Act can be found on [the NSW Legislation website](#).

3.2 Water sharing plans

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

Key elements of water sharing plans include:

- providing water for the environment by protecting a proportion of the water available for fundamental ecosystem health
- protecting the water needed to meet basic landholder rights
- setting annual limits on water extractions to ensure security for water users and the environment

- giving water users with 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.

The [Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023](#) is published on the NSW Legislation website and also available on the NSW Department of Planning and Environment website.

3.3 NSW water policy

We are continuously evolving and improving water-related policy and decision-making processes that carry out the above 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](#).

4 Water sharing plan review and replacement process

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

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

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

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

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

You can find further information and links to the reviews for the Water Sharing Plan for the Greater Metropolitan Groundwater 2011 in section 5 of this document.

The minister responsible for water adopted the NRC's recommendation to replace the 2011 Greater Metropolitan Region groundwater sources plan.

To allow time to review and replace the plan, the duration of the plan 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 Groundwater Sources 2023

5.1 Overview

The plan area of the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023* (shown in Figure 1) is located on the east coast of New South Wales. It covers an area of approximately 32,500 square kilometres, from Broken Bay in the north, to Shoalhaven Heads in the south and Deua National Park, and Lithgow and Goulburn to the west.

The area covered by the plan comprises all the sub-catchments of the Southern Water Management Area, Hawkesbury-Nepean Water Management Area, Southern Sydney Water Management Area, and the Sydney Harbour Water Management Area.

There are 10 groundwater sources, these are:

- Botany Sands Groundwater Source
- Hawkesbury Alluvium Groundwater Source
- Lachlan Fold Belt Greater Metropolitan Groundwater Source
- Maroota Tertiary Sands Groundwater Source
- Metropolitan Coastal Sands Groundwater Source
- Sydney Basin Central Groundwater Source
- Sydney Basin Nepean Groundwater Source
- Sydney Basin North Groundwater Source
- Sydney Basin South Groundwater Source
- Sydney Basin West Groundwater Source

The plan manages all groundwater contained within Cenozoic sediments, porous rock aquifers and fractured rock aquifers within the plan area.

The groundwater sources in the plan area are stacked and their management in this plan is consistent with how stacked groundwater sources are managed in other groundwater sharing plans.

5.1.1 Fractured Rock Groundwater Source

The Lachlan Fold Belt Greater Metropolitan Groundwater Source replaces the Goulburn Fractured Rock Groundwater Source and the Cox's River Fractured Rock Groundwater Source of the 2011 plan. The Lachlan Fold Belt Greater Metropolitan Groundwater Source underlies all other groundwater sources in the plan area and is buried in most of the plan area, outcropping in the west and south-west, bounded by the Great Dividing Range. Rock types are a mixture of Palaeozoic rocks, mostly metamorphic (rocks changed by pressure) and volcanic in origin. Groundwater is used for some domestic, agricultural, and limited industrial uses with salinity and yield limiting potential use in some areas.

5.1.2 Porous Rock Groundwater Sources

The porous rock groundwater sources are the sedimentary rocks of the Sydney Basin within the plan area. This is an asymmetrical structural basin which includes coal measures, shales and sandstones. It extends from Port Stephens in the north to Bateman's Bay in the south. Within the Sydney Basin, bore depths are variable, ranging from 20 to 200 metres with most bores less than 60 metres deep. Groundwater quality, in particular salinity, in several areas may limit its potential uses, however the groundwater demand for coal mining and quarrying is not dependent on water quality and does not limit its extraction or use for these purposes. The porous rock groundwater sources have been split into five separate groundwater sources in the plan:

- Sydney Basin Central Groundwater Source
- Sydney Basin North Groundwater Source
- Sydney Basin Nepean Groundwater Source
- Sydney Basin South Groundwater Source
- Sydney Basin West Groundwater Source.

5.1.3 Coastal Sands, Tertiary Sands and Alluvial Groundwater Sources

These groundwater sources are the:

- Botany Sands Groundwater Source
- Hawkesbury Alluvium Groundwater Source
- Maroota Tertiary Sands Groundwater Source
- Metropolitan Coastal Sands Groundwater Source.

Groundwater yield, quality and potential uses differ between sources as described below.

The Botany Sands Groundwater Source includes all Cenozoic age material within the boundary shown on the map. It is mostly composed of aeolian sand deposits but includes occasional alluvial

material and land reclaimed with various fill materials. The groundwater is mostly low in salinity and high yielding and has been an important water supply for Sydney's industry and community for over 100 years. The water is predominantly extracted for industrial use as well as dewatering for construction. Domestic use is also common although the area is urbanised, and reticulated town water supply is available.

Groundwater contamination has occurred in the older industrial areas and Botany Management Zone 1 was declared in 2003 to prevent growth in extraction and the movement of contamination plumes. Botany Management Zone 2 was declared in 2007 to limit further growth in extraction.

The boundary for this groundwater source has been extended in the 2023 plan to incorporate reclaimed land created by the Port Botany expansion.

The Hawkesbury Alluvium Groundwater Source is within the alluvial deposits of the Hawkesbury River. The groundwater quality, in particular salinity levels in several areas, may limit its potential uses. The replacement plan would extend the boundaries to include areas of the alluvial material which were excluded in the 2011 plan. This change would have affected licence holders impacted by flooding in 2022 and the change was not carried into the final plan. This will be reviewed during the life of the plan and the boundary may be revised.

The Metropolitan Coastal Sands Groundwater Source has aeolian and alluvial quaternary sand deposits along the coast with relatively high rainfall infiltration rates and groundwater that is typically of good quality. Groundwater extraction is largely associated with shallow (<6 metre depth) domestic spear points, along with a few larger high-yielding works that draw water for recreational purposes.

The Maroota Tertiary Sands Groundwater Source is low yielding with generally good water quality, the groundwater is widely used for domestic, industrial, and agricultural purposes. The area is used for sand mining, with tertiary sands deposits grading to decomposed Hawkesbury Sandstone of the Sydney Basin. Given that the vertical boundary is indistinct, the tertiary sand deposit is managed with the underlying porous rock of the Sydney Basin. The geological boundary is also indistinct laterally, gradually grading to the surrounding Sydney Basin Central Groundwater Source. To assist in identifying the boundary between these groundwater sources on the ground and align the extraction activities with the plan's management arrangements, the boundary has been redefined to coincide with some land management boundaries.

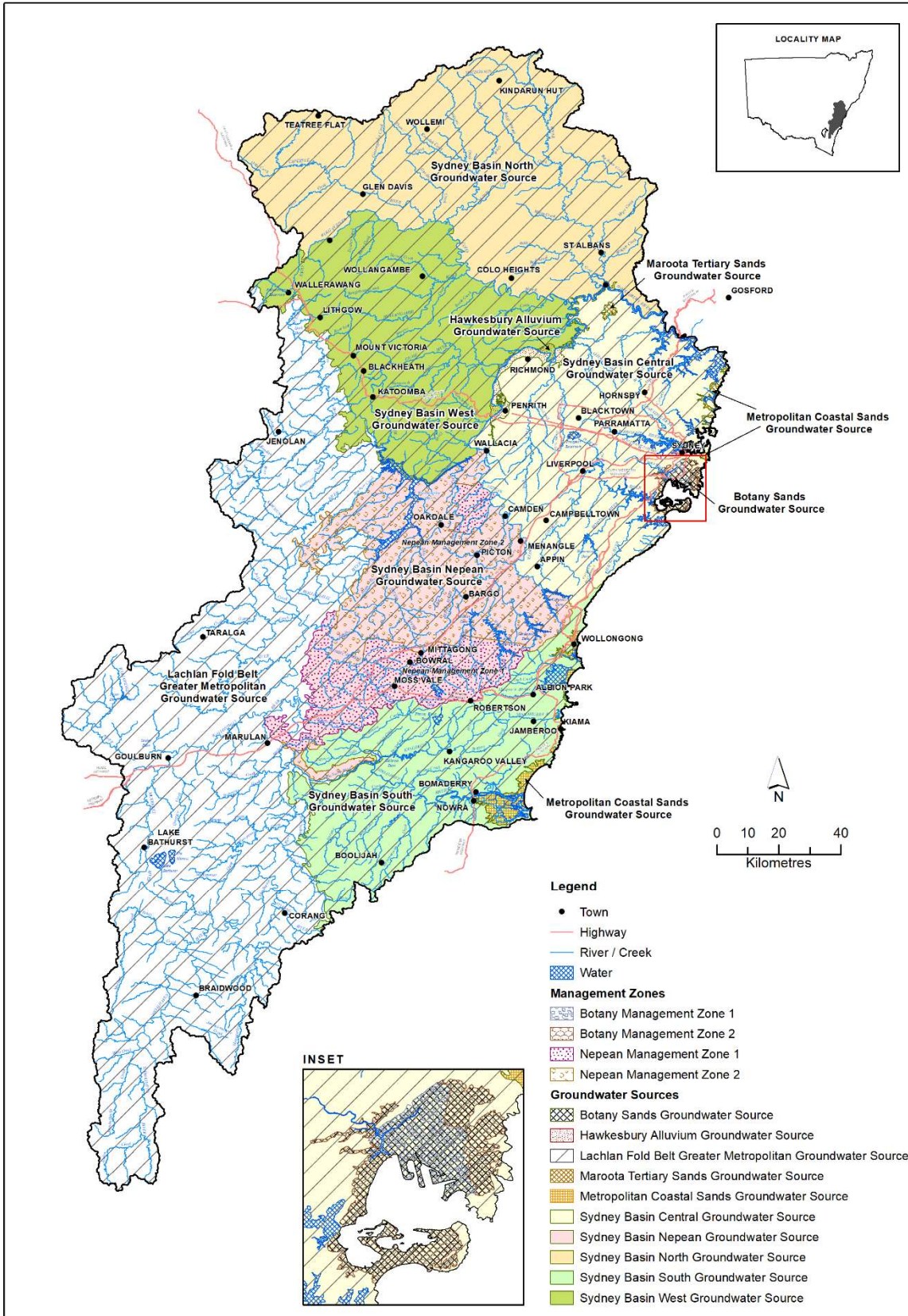


Figure 1. Greater Metropolitan Region Groundwater sources and management zones.

5.2 Current and previous plans

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

You can find more information on the development of the previous water sharing plan in the [Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011 – Background document \(PDF 847.33 KB\)](#).

The previous water sharing plans 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 \(PDF 829KB\)](#)
- [Macro water sharing plans – approach for unregulated rivers. Access and trading rules for pools \(PDF 627 KB\)](#)
- [Macro water sharing plans - the approach for groundwater. A report to assist community consultation \(PDF 3.11 MB\)](#)

The water sources are now managed under the [Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023](#).

5.3 Developing the new 2023 plan

The department is responsible for implementing the WM Act, including developing water sharing plans for NSW water resources. The replacement water sharing plan was prepared considering:

- The 2019 [section 44 audit](#) of the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011.
- recommendations from the [Natural Resources Commission’s \(NRC\) 2021 review of the Water Sharing Plans for the Greater Metropolitan Region \(PDF 5760 KB\)](#)
- updated data, information and science
- the deliberations across government agencies and interagency working groups including; Sydney Water, Water NSW, Department of Primary Industries’ Agriculture and Fisheries branches, the Water Group and Environment and Heritage branch within Department of Planning and Environment and the Natural Resource Access Regulator
- consultation with stakeholders including Local Aboriginal Land Councils, Sydney Water and WaterNSW
- The [Greater Sydney Water Strategy](#).

You can find the [Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023](#) on the department's website.

Details of the changes from the 2011 to the 2023 water sharing plan are provided in section 6 of this document.

You can find information on the public exhibition phase in section 7 of this document.

The [NRC Greater Metropolitan Region WSP Review \(PDF 5760 KB\)](#) is available from the commission's website. You will find a summary of their recommendations and how the new water sharing plan has addressed them in Appendix 5.

5.3.1 First Nations consultation

We consulted with Local Aboriginal land councils in April, September and October 2021.

The department met with First Nations representatives as follows:

Table 1. Department consultation with First Nations representatives

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

First Nations groups were contacted when the plan was exhibited and invited to contribute. Consultation will be ongoing throughout the life of the plan.

5.4 How climate change was considered

The department considered the effects of climate change on average annual rainfall when determining a suitable method to revise the estimated annual rainfall recharge to each groundwater source to determine a suitable extraction limit (see section 6.1.8). The NSW and ACT Regional Climate Modelling (NARClIM) estimates a potential increase of 0% to 5% in average annual rainfall in the plan area from the 1990–2009 period to the 2020–2039 period.

Given the small, anticipated increase that would occur over the 10-year period of the plan, a precautionary approach was employed that used the lower, average, annual rainfall.

The risk of climate change reducing recharge and groundwater available for groundwater dependent ecosystems was considered in the risk assessment for the purpose of establishing extraction limits. The risk factors were:

- **Likelihood** of reduced availability. This was considered to depend on a change to average annual rainfall and also the storage to recharge ratio of the groundwater source – how much water can be stored and how quickly it can recharge.
- **Consequence** of reduced availability. This was considered to depend on the occurrence of groundwater dependent ecosystems and the relative value of the ecosystem compared to others in the state.

Mitigating actions that can address the risk of climate change resulting in lower recharge are the provisions in s324 and s331 of the WM Act. These allow for restrictions to be imposed on groundwater extraction if groundwater declines below acceptable levels due to extreme circumstances.

5.5 How the Greater Sydney Water Strategy was considered

The Greater Sydney Water Strategy commits to supply water to a growing population in greater Sydney without increasing reliance on rainfall dependent water sources. As groundwater is a rainfall dependent source, this is not considered to be a long-term option to address growth in demand. However, the strategy will not be fully implemented for up to 20 years and extended drought could result in severe shortages in this period. Groundwater has been identified as a potential source of water to supplement Sydney’s urban water supplies in these extreme circumstances.

Preliminary site investigations have identified potential locations for urban water supply bores in the Sydney Basin Nepean, Sydney Basin West and Sydney Basin Central Groundwater Sources. The potential for this access was recognised during the development of the plan.

The extraction limit considers this potential access in assessing risks to groundwater supply meeting the current and potential urban water demand in the risk assessment (see section 6.1.8). The potential demand from emergency town water supply bores was included. This contributed to “high” socio-economic risk outcomes for the Sydney Basin Nepean and Sydney Basin West groundwater sources.

Amendment provisions allow for different accounting rules to manage extraction under these licences.

5.6 How connectivity between groundwater and surface water sources was considered

The plan addresses connectivity between surface water and groundwater sources by:

- Establishing access rules for groundwater extraction on waterfront land. These rules link daily access to surface water flow conditions in areas of the groundwater source that are highly connected to rivers. These areas are waterfront land where a water supply work is extracting from alluvial sediments.
- Establishing access rules for the Hawkesbury Alluvium Groundwater Source that link daily access to surface water flow conditions. This water source is considered to be moderately connected to the Hawkesbury River because of its size and hydrogeological characteristics. Access to the groundwater source is restricted if low flows have persisted for 30 days or more.
- Prohibiting new water supply works on waterfront land unless the work is constructed to prevent impacts on the adjacent river. Suitable prevention includes bores that are sealed so that they are only extracting from underlying bedrock, or, for temporary work, a management plan prevents impacts.
- In the assessment of environmental risks (see section 6.1.8). These considered the:
 - **Likelihood** of extraction causing drawdown and reducing streamflow. This was considered to depend on the distribution of bores and the volume of water allowed to be extracted from them, and their proximity to streams.
 - **Consequence** of extraction causing drawdown and impacting on streams. This was considered to depend on the ecological value of the stream's aquatic ecosystem and the porosity of the groundwater source.

The *Access Licence Dealing Principle Order 2004* mitigates some of these risks through:

- Requiring that applications for new water supply works are assessed and approved provided impacts on baseflow in streams can be minimised. This may result in daily or annual extraction limits or an unsuccessful application.
- Requiring that applications trade water from one location to another are assessed and approved provided impacts on baseflow in streams can be minimised. This will depend on the annual extraction limit of the water supply work.

5.7 Public exhibition and finalising the 2023 plan

The department exhibited the draft replacement *The Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023* between 27 June 2022 until 7 August 2022. Due to flooding in the

plan area some community engagement events were rescheduled or cancelled. The submission period was extended until 21 August 2022.

During the public exhibition period, 12 public information sessions were held. The first and last of these sessions were live webinars, recorded and able to be viewed at any time. 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.

Table 2. Public exhibition sessions for Greater Metropolitan Region Water Sharing Plans

Location	Date	Attended
Online webinar	Wednesday 29 June 2022	40
Sydney City	Thursday 30 June 2022	1
Goulburn	Tuesday 19 July 2022	30
Bowral	Wednesday 20 July 2022	30
Braidwood	Tuesday 26 July 2022	11
Nowra	Wednesday 27 July 2022	6
Kangaroo Valley	Thursday 28 July 2022	7
Wollongong	Friday 29 July 2022	1
Lithgow	Tuesday 2 August 2022	8
Katoomba	Wednesday 3 August 2022	7
Parramatta	Thursday 4 August 2022	3
Online webinar	Wednesday 10 August 2022	32

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

In finalising the draft plan, the department considered submissions as well as further deliberations and input from government agencies including the Water team and Environment & Heritage team

from Department of Planning and Environment, the Department of Primary Industries' Agriculture and Fisheries divisions, and the Natural Resources Access Regulator.

Section 6 of this document details changes from the 2011 plan to the 2023 water sharing plan.

Appendix 2 gives details of substantive changes made between the draft and the final water sharing plan, including if a change was in response to submissions received.

6 Changes from the 2011 plan to the 2023 water sharing plan

6.1 Changes in the replacement 2023 plan

Key drivers for the changes between the 2011 plan and the replacement 2023 plan include:

- the Natural Resources Commission's review recommendations
- contemporary water resource policy – changes to the plan align it with current policy to help improve efficiency and consistency in achieving water resource management objectives across the state. These changes range from purely administrative to more substantial.
- updated data and knowledge improvements
- consultation on the draft plan, feedback and submissions.
- need for clear rules which are easier for water users to follow
- development of the Greater Sydney Water Strategy.

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

Changes were made to:

- the general layout of the plan
- amalgamate existing water sources
- remove reference to recharge
- change groundwater source boundaries
- change groundwater source definitions
- change the map to reflect groundwater source boundary changes
- the vision, objectives, strategies, and performance indicators
- the location of planned environmental water provisions
- revise long-term average annual extraction limits
- update access rules for some groundwater sources as a consequence of changes to the Unregulated Rivers' access rules
- allow Aboriginal community development access licences to be granted

- update basic land holder rights estimates and access licence share components
- include a high priority groundwater-dependent vegetation ecosystem (GDE) map and to revise the Schedule of high priority GDEs with updated information
- prohibit water supply works approvals near potential acid sulphate soils and coastal wetlands (Resilience and Hazards State Environmental Planning Policy) where the works may cause harm
- adaptive management and amendment provisions.

Appendix 2 details changes between the publicly exhibited plan and the final 2023 plan, including if a change was in response to submission received.

For a summary of all issues raised in submissions, regardless of whether they led to a change, please refer to the [What we heard](#) document.

6.1.1 General layout changes

There are several structural layout changes in the plan. We may have moved or reworded clauses, but their intent is the same. Such changes reflect updated template styles that provide a more standard and consistent layout across the state's water sharing plans as well as making the water sharing plan easier to understand. Examples of such changes include removal of unnecessary notes, as well as moving and consolidating provisions to the amendment part of the plan.

6.1.2 Amalgamated groundwater sources

Part 1 of the plan describes the area and water to which the plan applies. The 2011 plan comprised 13 groundwater sources. The 2023 plan has amalgamated some of those groundwater sources:

- The Cox River Fractured Rock and Goulburn Fractured Rock Groundwater sources have been combined into a new water source named the Lachlan Fold Belt Greater Metropolitan Region Groundwater Source.
- The Sydney Basin Blue Mountains, Sydney Basin Cox River and Sydney Basin Richmond Groundwater sources have been combined into a new water source named the Sydney Basin West Groundwater Source.

The 2023 plan map shows the names and boundaries of these water sources.

These changes recognise the shared aquifers, hydrogeological characteristics and rainfall patterns between the combined groundwater sources. The previous boundaries potentially impacted on trade and water use. Local extraction pressure and localised risks will continue to be managed by the department, through assessing applications to trade water to new locations or for new water supply works approvals. These are assessed according to the principles of the WM Act and may result in an application being rejected or specific conditions of approval, to minimise impacts.

6.1.3 Changes to groundwater source boundaries

Part 1 Section 3 of the plan describes the groundwater sources. The changes to these recognise the “stacked” nature of the region’s groundwater sources (see Figure 1).

- The Lachlan Fold Belt Greater Metropolitan Groundwater Source is recognised as underlying the Sydney Basin groundwater sources.
- The Botany Sands Groundwater Source now only extends to the underlying rock of the Sydney Basin Central Groundwater Source
- The Hawkesbury Alluvium Groundwater Source is underlain by the Sydney Basin Central, proposed Sydney Basin West and Sydney Basin North groundwater sources.
- The Metropolitan Coastal Sands Groundwater Source only extends to the underlying rock of the Sydney Basin Central Groundwater Source (those areas north of Sydney) and Sydney Basin South Groundwater Sources (those areas south of Sydney).

Additional changes which are shown on the plan map (Figure 1) are:

- The Maroota Tertiary Sands Groundwater Source boundary now extends to include the areas of the Sydney Regional Environmental Plan No 9 – Extractive Industry (No 2). This assists in identifying the boundary of the water source, which gradually transitions to the adjacent Sydney Basin Central Groundwater Source and assists in managing extraction within an area designated for sand extraction industries.
- The Botany Sands Groundwater Source now extends to incorporate reclaimed land in Botany Bay.
- Areas underlying water bodies, previously excluded from the mapped extent, have been incorporated into their surrounding groundwater sources.

6.1.4 Changes to groundwater source definitions

Groundwater source definitions have changed to complement the boundary changes. The Botany Sands Groundwater Source and the Metropolitan Coastal Sands Groundwater Source no longer include the underlying or exposed rock. These groundwater sources have been redefined to only include the water contained within the sediments that are of Cenozoic age, shown within the groundwater source boundaries on the plan.

Unconsolidated Cenozoic sediments have been included in the groundwater sources of the Lachlan Fold Belt Greater Metropolitan Groundwater Source. They were inadvertently excluded from the definition of the Cocks River Fractured Rock Groundwater Sources in the 2011 plan.

6.1.5 Identification of planned environmental water provisions

Planned environmental water is a key component of water sharing plans. The previous plan had a section on planned environmental water that directed readers to other parts of the plan to identify where water is reserved for the environment. This included access rules and extraction limits.

Instead of having a separate section on PEW, the current plan includes the rules associated with planned environmental water in the relevant sections. Wherever a section of the plan relates to planned environmental water, the relevant section of the WM Act is referenced.

Recharge figures are no longer within the plan. Recharge estimates were used to derive the long-term average annual extraction limits. These are stated in the plan and establish and maintain planned environmental water.

6.1.6 Vision, objectives, strategies and performance indicators

Part 2 of the 2023 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 that result from water.

The objectives are set out, as are the strategies required to achieve objectives.

We will use the performance indicators to measure the success of the strategies. We have updated this section to state that the performance indicators must be monitored and evaluated.

6.1.7 Updates basic landholder rights estimates and licence share components

We have updated our estimate of extraction of water under basic land holder rights using recent data on the number of bores used for this purpose and land use which may have changed over the life of the plan.

Since the development of first water sharing plans, which began before 2003, numerous methods have been followed to estimate water requirements for domestic and stock basic landholder rights. These methods were superseded by a standard NSW approach to support the development of macro surface water and groundwater sharing plans in 2010. This method assumes water is not extracted under basic rights in urbanised areas where reticulated town water supply is available. However, areas of the Greater Metropolitan Region which have access to reticulated water supply also have numerous bores to extract water under basic rights. To avoid underestimating water

extraction under “basic rights”, an alternative method to estimate this take was adopted for the Greater Metropolitan groundwater sources.

- In urban areas, it was assumed any “basic rights” access bore was only providing domestic access. Take from those bores identified as used for “basic rights” access was assumed to be 1 ML/year.
- In rural areas, it was assumed any “basic rights” access bores could be providing domestic and stock access. Take from those bores identified as used for “basic rights” access was assumed to be 3 ML/year.
- Production bores can be used for multiple purposes - access to extract water under a licence or for “basic rights”. These production bores were assumed to take 1 ML/year if they were approved for “domestic” access, 2 ML/year if they were approved for “stock” access and 3 ML/year if they were approved for both “domestic and stock” access. If no purpose was specified it was assumed no water was taken for domestic or stock purposes.

The estimates in the current plan differ from estimates in the previous plan due to changes in land use and the number of bores used for this purpose.

The replacement plan also presents revised estimates of the total volumes of domestic and stock access licences or local water utility licences and the number of unit shares for aquifer access licences, held in each groundwater source. These reflect current information at the time of preparing the final plan. These entitlements are listed in Part 3 Division 2 of the current plan and estimate total share components in each water source.

6.1.8 Revised long-term average annual extraction limits

Groundwater water sharing plans set long-term average annual limits on extraction.

In NSW coastal groundwater sources, where rainfall recharge is used as the basis for sharing water, a macro risk assessment method (the ‘macro method’) is used to set extraction limits. This is documented in the [Macro water sharing plans - the approach for groundwater. A report to assist community consultation](#) (PDF 3.11 MB).

The method establishes and maintains water for the environment while allowing extraction of a portion of the average annual rainfall recharge for social and economic benefit. To determine the proportion available for extraction, the department assesses environmental and socio-economic risks and considers if these can be mitigated by water sharing rules, *Water Management Act 2000* provisions or provisions in other legislation, such as the *Protection of the Environment Operations Act 1997* which prevents water contamination or the *Access Licence Dealings Principles Order, 2004* which provides the basis to minimise localised impacts of any new water supply work or trade which would increase the volume of water extracted from a site.

The long-term average annual extraction limits for the Greater Metropolitan groundwater sources were reviewed to incorporate new evidence and information, including a revised risk assessment method. Table 4, Appendix 3, compares the method used in 2011 with the method used for the 2023 extraction limits.

The revised risk assessment method improved the evidence for decision making to ensure potential risk scenarios could be mitigated. It also:

- better reflects the intent of the water sharing plan, which is to protect a volume of the recharge for environmental needs before providing water for extraction,
- enables quantitative evaluations of some risks rather than relying on qualitative assessment only,
- allows evaluation that does not rely on data that is sometimes unavailable (for example, groundwater level changes or the economic outcomes of water use).

The extraction limits changed for each groundwater source as a result of:

- revised recharge estimates
- changes to environmental risks either because new risks were identified or new ways of mitigating risk are available. For example more groundwater dependent ecosystems have been mapped, this means the risks to these can be identified and managed.

Appendix 4 compares the 2011 and the 2023 recharge estimates, risk outcomes, the proportion of recharge available for extraction and the extraction limits for each groundwater source.

Environmental risk outcomes decreased in some groundwater sources between the risk assessment for the 2011 plan and the assessment for the 2023 plan for the following reasons:

- The groundwater dependent ecosystems identified in the plan increased which enables plan rules and the assessments for trade and groundwater extraction approvals, to mitigate risks to these. Capacity to mitigate risks lowers the likelihood and overall risks to groundwater dependent environments.
- Areas which contributed to the “high risk” classification in 2011 are within conservation areas (eg karst, wetlands and swamps within National Parks). Risks to these environmental assets are mitigated by reserving 95-100% of groundwater recharge to these areas. That is, 95-100% of recharge to conservation areas is not available for extraction.

Socio-economic risk outcomes increased in some groundwater sources between the risk assessment for the 2011 plan and the assessment for the 2023 plan for the following reasons:

- The estimates of average annual rainfall recharge decreased so that the water available for extraction after environmental risks are considered, has decreased. This results in a higher risk that demand for groundwater cannot be met.

- The assessment considered the volume required to meet projected emergency town water supply demands,
- The assessment considered the volume required to license the water taken during projected construction projects.

6.1.9 Aboriginal community development licences

The plan allows for Aboriginal community development aquifer access licences to be granted in all except the Botany Sands, Sydney Basin Nepean and Sydney Basin West groundwater sources. In these groundwater sources current and expected demand is already approaching the extraction limit.

6.1.10 Changes to access rules in groundwater sources other than the Hawkesbury Alluvium

Access rules apply to extraction under an aquifer access licence from any location on waterfront land. In the previous plan this area was referred to as “within 40 m of the highbank of a river”. The intended area is the same.

Unchanged from the previous plan, these rules are the same as those applying to unregulated river access licences. The plan now refers to the new, *Water Sharing Plan for the Greater Metropolitan Unregulated River Water Sources 2023*.

The following changes have been made:

- The rules are more clearly identified in the groundwater plan – these are the cease-to-pump and commence-to-pump rules
- Changes have been made to the names and defined very low flow class conditions which are within the unregulated river plan (see the [Summary of Changes factsheet](#)).

Exemptions continue to apply for works drilled to bedrock and sealed, for some specific uses and for aquifer interference activities where extraction cannot reasonably be prevented.

Previously, the plan specified that these rules applied to extraction under a local water utility or major water utility access licence from any **new** water supply work at these locations. The replacement plan both:

1. restricts the approval of new water supply works on waterfront land, and
2. provides exception to existing access for town water supply.

The access rules serve no purpose for future local and major water utility access and have been removed.

6.1.11 Changes to access rules in the Hawkesbury Alluvium Groundwater Source

The intent of access rules in the Hawkesbury Alluvium Groundwater Source remains unchanged from the previous plan. The intent is that the access rules apply to groundwater extraction from any location in the groundwater source. Unchanged from the previous plan, on waterfront land, access rules are the same as those applying to unregulated river access licences in the Upper Hawkesbury River Grose River to South Creek Management Zone described in the *Water Sharing Plan for the Greater Metropolitan Unregulated River Water Sources*. These rules do not allow access when the management zone is in the very low flow class.

Aquifer access licences accessing areas beyond waterfront land, must stop taking groundwater when the management zone has been in a very low flow class for 30 days or more.

It was intended that the defined very low flow class of the management zone would change, however flooding in the area during planned consultation on the replacement plan meant that affected licence holders could not be consulted on these changes. Therefore, these rules are unchanged although the name of the management zone now recognises the dual name of Wianamatta-South Creek and the plan drafting has been simplified.

6.1.12 Protecting high priority groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) are those ecosystems that need access to groundwater to maintain their plant and animal communities and ecological processes. The previous plan contained provision to protect GDEs by specifying minimum distance rules for new groundwater works (bores). The 2023 plan identifies and protects more GDEs.

The department recently completed a program to identify and prioritise vegetation GDEs in NSW. We incorporated existing vegetation community mapping and remote sensing to identify these communities. We analysed monitoring bore data to identify potential groundwater dependence of the vegetation communities. This was followed by field-based verification of vegetation communities in sample areas representing different land cover types. The department selected sites from almost all major catchments distributed across the NSW area. We did this to ensure that each area had a representative geographic sample that reflected the diverse environmental conditions and management practices.

The map of high priority groundwater dependent vegetation communities identified in the plan area in this program has been included in the water sharing plan and distance restrictions protect these.

Further information on the methods employed to identify GDEs is contained in the paper [*Methods for the identification of high probability groundwater dependent vegetation ecosystems*](#) (PDF 8.6 MB).

The high priority GDE map included in the 2023 plan is shown in Figure 2. You can view a high-resolution version of the high-priority GDE map (PDF 3301.74 KB) on the [plan's web page](#).

The 2011 plan included a Schedule of some high priority GDEs which had already been identified. The new GDE maps do not fully replace this Schedule. The Schedule of GDEs has been revised to:

- Use longitudinal and latitudinal co-ordinates, consistent with international conventions,
- Remove GDEs which are not within the plan area.
- Improve descriptions
- Remove Table E because these ecosystems are not groundwater dependent or groundwater dependent and considered in the new high ecological value groundwater dependent vegetation ecosystems map for the plan area (see Figure 2).
- For more information on groundwater-dependent ecosystems visit the [groundwater-dependent ecosystems page of the departments' website](#).

Waterfront land

The term “waterfront land” has replaced the term “within 40m of the high bank of a river”. This aligns the term used in the plan with the term defined in the WM Act and better describes the relevant area. The intended area is still the same – that is, the area from the bed of a river extending to 40m beyond the high bank of the river.

Coastal Wetlands

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

The plan prohibits approval of a new water supply work if it would result in more than minimal harm to a wetland listed 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.

Also, as with other high priority groundwater dependent sites, the Minister may refuse an application for a dealing, or apply conditions on access licences or water supply work approvals at the time of a dealing to protect these sites according to the *Access Licence Dealing Principles Order 2004*.

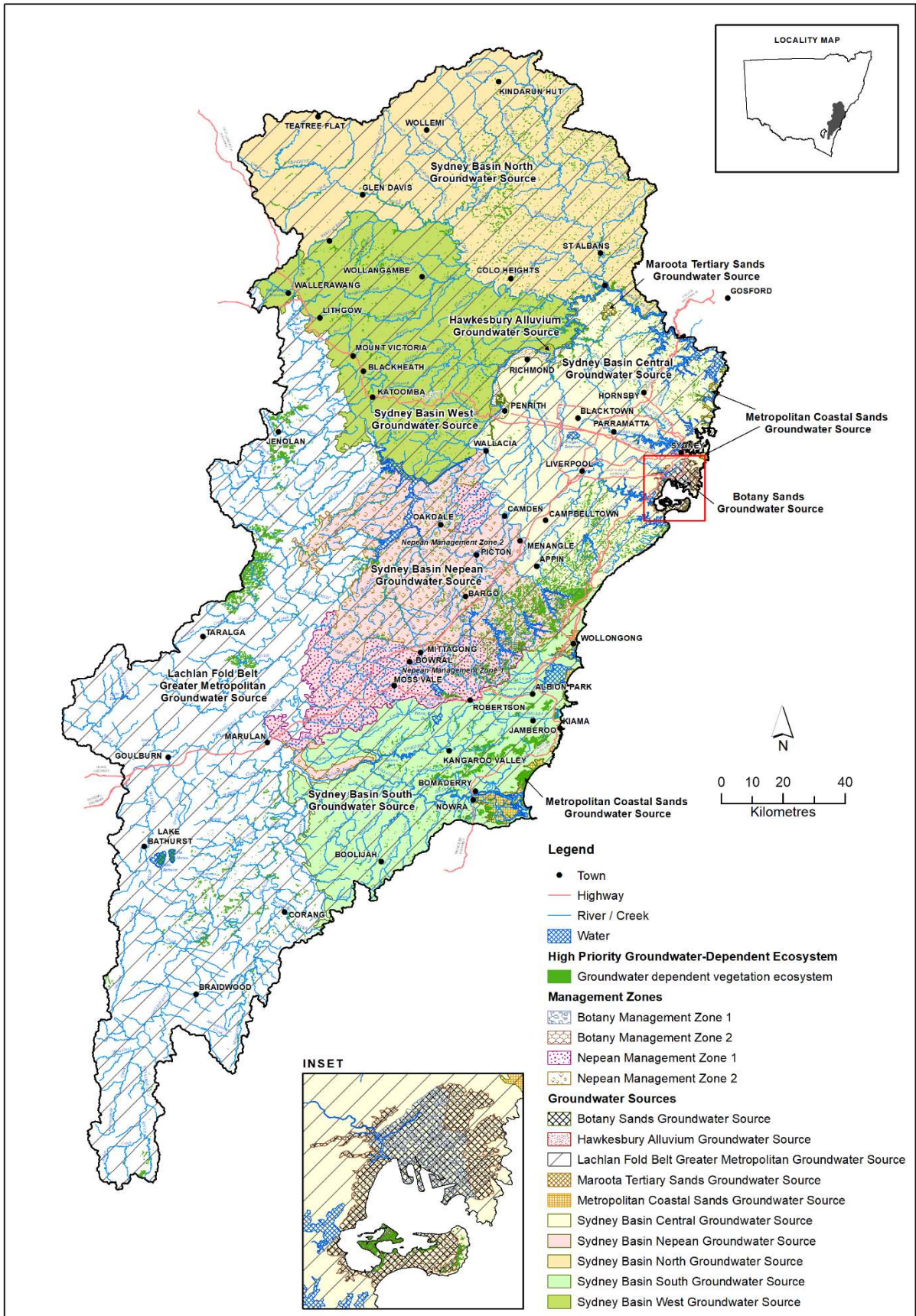


Figure 2. High priority groundwater dependent ecosystems map - groundwater dependent vegetation ecosystems

6.1.13 Distance rules from contaminated sites

The rules that govern the minimum distance that groundwater bores can be located from contaminated sites have changed in the 2023 plan. These rules are being revised in all coastal groundwater plans to reference the latest information on contaminated sites in NSW and apply a consistent, practical approach to managing extraction near on-site sewage treatment or storage areas.

In the revised plan the clause which prevented contamination from saline shale aquifers in the Sydney Basin groundwater sources (cl40(3) in the 2011 plan) has not been carried forward to the 2023 plan. The construction conditions in Part 9 Division 4, of the plan which require that cross contamination between aquifers does not occur, provide the same outcome.

6.1.14 Prohibition of works approvals near potential acid sulphate soils

The plan includes rules to prevent the acidification of water sources through drainage of potential acid sulphate 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 the occurrence of acid sulphate soils.

6.1.15 Removed 'local impact management' and take 'within restricted distance' rules

Rules for granting new water supply works or amending existing water supply works will remain in the water sharing plan, as outlined above. However, the plan no longer has provisions relating to restricting take from existing water supply works, specifically the rules from managing local impacts and the rules for the use of water supply works located within restricted distances.

Contemporary legal advice is that the powers to restrict groundwater take from existing water supply works lie firmly within the WM Act 2000, and that their duplication and reinterpretation in water sharing plans may cause inconsistencies between the act and the plan. The powers in the act enable the minister, at any time, to specify a limit on the volume or rate of extraction from a water supply work to minimise impacts on other users, on groundwater-dependent ecosystems, or groundwater-dependent culturally significant areas, or for public health and safety reasons.

The minister may also put conditions on or refuse an application for a dealing (trade) to affect these outcomes. In particular:

- Section 107 of the WM Act provides for the amendment of approvals. In addition, the Minister may impose or vary conditions on a water supply work approval at any time as the Minister thinks fit, under section 102 of the WM Act. These conditions may limit the volume or rate of extraction from a water supply work approval if the Minister considers it appropriate.

- The minister may also limit the volumes or rates of extraction from existing water supply work approvals for:
 - All water supply works within a specified area, by an order made under section 324(2) of the WM Act, or
 - Existing water supply works used solely for basic landholder rights, by an order made under section 331 of the WM Act.
- The minister may refuse an application for a dealing or apply conditions on access licences or water supply work approvals at the time of a dealing to give effect to the *Access Licence Dealing Principles Order 2004*. The order specifies principles relating to adverse effects on environmental water and water-dependent ecosystems, water quality, Indigenous, cultural, heritage or spiritual matters, and other existing authorised water take.

6.1.16 Trade rules

There have been no changes to the trade rules however, as trade is prohibited between groundwater sources, amalgamating the Sydney Basin Blue Mountains, Sydney Basin Coxs River and Sydney Basin Richmond groundwater sources into the Sydney Basin West Groundwater Source allows for trade between areas which was previously prohibited. Similarly, trade within the Lachlan Fold Belt Greater Metropolitan Groundwater is allowed between the two areas which were previously the Goulburn Fractured Rock and Cox's River Fractured Rock groundwater sources.

The plan now defines the numeric limit to the sum of share entitlements in Nepean Management Zone 1 as a number of shares, representing the number of shares in the zone at the commencement of the 2011 plan. This was the intent of the 2011 plan and improves the transparency and administration of trade rules.

6.1.17 Mandatory conditions

Many of the rules about metering and recordkeeping will be repealed on 1 December 2023 at which time the metering requirements in coastal NSW will be managed under the *Water Management (General) Regulation 2018* rather than the water sharing plan.

6.1.18 Adaptive management and amendment provisions

Adaptive management means changing things in response to new information. During the life of a water sharing plan, new information may come from data collection and monitoring or from some other improvement in understanding. Such information could include socio-economic studies, 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 provides 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. Any future changes that impact water users or the environment's access to water will be subject to public consultation. Part 10 of the plan includes updated amendment provisions.

Examples of adaptive environmental water provisions in the replacement plan include:

- The ability to amend the access and rules in the water sharing plan if the access rules that restrict surface water take in the unregulated river plan are changed.
- Provisions to grant major utility (urban water) licences and establish specific account operation rules if water is needed to manage urban supply during surface water shortages.

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 MER programs are resource intensive and long term 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.

The MER plan will be a water sharing plan-specific monitoring, evaluation and reporting framework following established guidelines and including both freshwater and estuarine ecosystems.

8 Areas for further work

8.1 Metering and record keeping

The NSW Non-urban water metering program is being rolled out across the state. In coastal NSW, the new metering requirements, which require metering for certain sized works and log-keeping for water extracted for smaller works, will come into effect in December 2024. For more information, see the [NSW non-urban water metering framework pages](#) on the department's website.

8.2 Climate change

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

The department has developed the NSW Groundwater Strategy, this will guide future groundwater modelling so that it can incorporate multiple aspects of climate change data. We can use these models to inform water sharing decisions as plans are replaced. Rising sea level models will also be incorporated into future water sharing decisions.

Appendix 1 References and supporting documents

- [Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023 maps, background document and rule summary sheets](#)
- [NSW Legislation website](#) – contains NSW legislation, including the WM Act
- [National Water Initiative](#)
- The previous water sharing plan, the [Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011](#)
- The [background document for the previous \(2011\) Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011](#) (PDF 1,270 KB)
- [Replacement water sharing plan manual](#) (PDF 1319.78 KB) describes processes followed in developing replacement plans
- Details of the macro planning approach:
 - [Macro water sharing plans – the approach for groundwater. A report to assist community consultation](#) (PDF, 1673.86 KB)
- The Natural Resources Commission’s [Review of the Greater Metropolitan Region Water Sharing Plans 2021 - Final report](#) (PDF 5.76 MB)
- [2019 Audit of the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011](#) (PDF 3.9 MB)

Appendix 2 Substantive changes made between the draft and final water sharing plan

Table 3 explains the substantive changes made between the publicly exhibited draft and final versions of the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023*.

Table 3. Provisions which changed post public exhibition

Provisions in the publicly exhibited replacement plan	Final 2023 plan provisions	Basis for change
<p>Extend the Hawkesbury Alluvium Groundwater Source. Consequently, reduce the area of the Sydney Basin West and Sydney Basin Central Groundwater Sources.</p>	<p>Reinstate the 2011 boundary of the Hawkesbury Alluvium Groundwater Source given consultation on boundary change (and associated access rules) was not feasible due to flooding in area. Amendment provisions allow future change within life of plan. The department intends to consult and amend the Hawkesbury Alluvium Groundwater Source after consulting within the first five years of the replacement plan.</p>	<p>The areas incorporated into the Hawkesbury Alluvium are of similar lithology to this groundwater source, connected, alluvial material.</p>
<p>Sediments in many water sources are described as “unconsolidated sediments”.</p>	<p>Sediments in water sources are described as “Cenozoic sediments”</p>	<p>“Cenozoic” is a geological era, and describes the material deposited more recently than the bedrock in the plan area. Some of these sediments are “consolidated”.</p>

Provisions in the publicly exhibited replacement plan	Final 2023 plan provisions	Basis for change
n/a	The Plan Map and High Priority Groundwater-Dependent Ecosystem Map were updated to include more towns, better represent layering of groundwater sources and layering under water bodies and include GDEs in the Botany Sands Groundwater Source missing in error in the exhibited map.	n/a
Update the estimates for basic landholder rights (BLR) use and licenced entitlements in the plan.	<p>Licence entitlements were further revised to:</p> <ul style="list-style-type: none"> include recently granted licences recognise that some licences changed groundwater source because of changes to boundary definitions (e.g. originally allocated to Metropolitan Coastal Sands but drilled to bedrock and now identified as belonging to Sydney Basin Central Groundwater Source). 	<p>Water required for basic landholder rights (domestic and stock) has been updated taking account current approvals and land use.</p> <p>Requirements for native title rights reflect those rights may exist should native title be determined in the plan area.</p> <p>Domestic and stock licence, aquifer, local water utility and major water utility access licences reflect the current entitlements in each groundwater source. Some errors were identified and corrected.</p>
n/a	Narrowed provision allowing applications for major utility to subcategory urban water only to maintain consistency with intent of original plan.	n/a

Provisions in the publicly exhibited replacement plan	Final 2023 plan provisions	Basis for change
<p>Access Rules – Hawkesbury Alluvium</p> <p>Retain intent from the previous plan, that access rules apply to aquifer access licences in the Hawkesbury Alluvium Groundwater Source with some rules applying adjacent to a river and another applying in the rest of the groundwater source.</p> <p>Previously these rules referred to flows in the Upper Hawkesbury River (Grose River to South Creek) Management Zone in the <i>WSP for the Greater Metropolitan Region Unregulated River Water Sources, 2011</i>. The rules now refer to flows in Upper Hawkesbury River Water Source in the <i>WSP for the Greater Metropolitan Region Unregulated River Water Sources, 2023</i>.</p>	<p>Changes to the access rules in the Hawkesbury alluvium have been postponed due to flooding in affected areas (and postponed changes to corresponding access rules in the Upper Hawkesbury River Water Source). Instead, the intent of the 2011 rules have been retained and amendment provisions allow access rules to be amended (following consultation within the first 5 years of the replacement plan).</p> <p>The name of the relevant unregulated river management zone is now Upper Hawkesbury River (Grose River to Wianamatta South Creek)</p>	<p>The change recognises the dual name of Wianamatta-South Creek.</p>

Provisions in the publicly exhibited replacement plan	Final 2023 plan provisions	Basis for change
<p>Access rules - Groundwater sources except Hawkesbury Alluvium</p> <p>Retain the intent that access rules apply to extraction under a licence from water supply works approvals from a river to 40m beyond the high bank of a river. These rules are the same as those applying to unregulated river access licences in the <i>Water Sharing Plan for the Greater Metropolitan Unregulated River Water Sources</i>.</p> <p>The following changes are proposed:</p> <ul style="list-style-type: none"> • more clearly identify access rules in the groundwater plan • replace the reference to the Unregulated River WSP to reflect that the plan will be replaced in 2023. • changes to the names and defined very low flow class conditions (see equivalent summary of changes for the Unregulated river plan). • Changes to the way the rules will be implemented will mean relevant licence holders will be notified of and subject to the relevant rule. This will be a change of operation for the affected licence holders. 	<p>Changes to the access rules for works within waterfront land have been postponed due to flooding in affected areas (and postponed changes to corresponding access rules in the unregulated water sources). This affects some areas of the Sydney Basin Nepean, Sydney Basin Western, Sydney Basin North, Sydney Basin Central and Maroota Tertiary Sands groundwater sources. Instead, the intent of the 2011 access rules have been retained and amendment provisions allow access rules to be amended (following consultation within the first 5 years of the replacement plan).</p>	<p>The relevant unregulated river access rules were not clearly defined in the previous plan and the references have been revised to reflect changes to the surface water plan.</p> <p>The provisions for access rules in the unregulated river plan were changed after public exhibition. The groundwater plan's access rules were changed to agree with the revised unregulated river plan.</p>

Provisions in the publicly exhibited replacement plan	Final 2023 plan provisions	Basis for change
<p>Define the limit to the sum of share entitlements in Nepean Management Zone 1 as a number of shares, representing an estimate of the number of shares in the zone at the commencement of the 2011 WSP.</p> <p>The combining of groundwater sources allows trade between areas that were previously separate groundwater sources.</p>	<p>Nil</p>	<p>Matches intent of 2011 Plan and more clearly defines limit to trade.</p>
<p>Include provisions in the mandatory conditions for metering and recordkeeping for access rules and water supply works approvals that these rules will be repealed on 1 December 2024 and managed under the <i>Water Management (General) Regulation 2018</i>.</p>	<p>Several changes to conditions for access licences and water supply work approvals in response to changes in template provisions. Changes to intent include:</p> <ul style="list-style-type: none"> • no longer requiring licence holders to notify Minister of breach of condition of access licence or water supply works approval • decommissioning conditions only applying to bores. 	<p>These rules in the plan are mostly repealed on 1 December 2024 at which time the metering requirements in coastal NSW will be managed under the <i>Water Management (General) Regulation 2018</i>.</p>

Provisions in the publicly exhibited replacement plan	Final 2023 plan provisions	Basis for change
<p>Simplify amendment provisions.</p> <p>Retain provisions that allow for changes if access rules in the Unregulated River WSP change</p>	<p>Added amendment provision to change accounting rules if a major utility access licence is granted (to signal possible change if emergency urban supply bore fields are established in plan area).</p> <p>Note – The exhibited plan already provided for amendment to water source boundaries and access rules for works on waterfront land and for all works within the Hawkesbury Alluvium (to reflect changes in access rules in the unregulated plan). The department intends to consult on changes to the Hawkesbury Alluvium Groundwater Source boundary and access rules in flood affected areas within the first 5 years of the replacement plan.</p>	<p>The <i>Water Management Act 2000</i> provides for amendment if:</p> <ul style="list-style-type: none"> • in the public interest • required under the <i>Commonwealth Water Act 2009</i> • required to give effect to a NSW Land and Environment Court decision, or • the water sharing plan allows amendment to those rules.
<p>Revise Schedule 4 Table D 2011 WSP</p>	<p>Schedule 4 Part 1 Springs and Wetlands (draft final plan) revised so that descriptions refer to mapped features and coordinates and descriptions agree with entries for the same features in the NSW Geographical Names Register.</p> <p>Corrected error in omitting the Temperate Highland Peat Swamps on Sandstone from this schedule and updated reference source for the details of these swamps.</p>	<p>Became Schedule 4 Part 1 Springs and wetlands (exhibited plan).</p> <p>Use longitudinal and latitudinal coordinates (consistent with international conventions) and remove groundwater-dependent ecosystems which are not within the plan area.</p>

Provisions in the publicly exhibited replacement plan	Final 2023 plan provisions	Basis for change
n/a	<p>Include definitions for:</p> <ul style="list-style-type: none"> • surface water • in-river dam pool. <p>These are not defined in the <i>Water Management Act 2000</i> or <i>Water Management (General) Regulation 2018</i>.</p>	n/a

Appendix 3 Risk assessment information used to determine extraction limits for the Greater Metropolitan Region’s Groundwater Sources

Table 4. Method to determine the Greater Metropolitan Region’s groundwater sources’ long term average annual extraction limits for the 2011 plan and the 2023 plan.

Step in determining extraction limit	Approach for 2011 plan	Approach for 2023 plan
1. Estimate the infiltration rate to each groundwater source. The rate depends on the geology of the groundwater source.	The infiltration rate of the dominant surface geology for each groundwater source area was used.	A revised infiltration rate, based on new estimates, for each type of surface geology in each groundwater source, was used.
2. Estimate the average annual rainfall recharge volume to each groundwater source. The volume is the average rainfall multiplied by the infiltration rate.	Average annual rainfall from 1921-1995 over the groundwater source area was used.	Local average annual rainfall using BOM data for the period from 1900 to 2019. • The area and infiltration rate of each type of geology was used.
3. Estimate the infiltration rate to each groundwater source.	The infiltration rate of the dominant surface geology for each groundwater source area was used.	A revised infiltration rate, based on new estimates, for each type of surface geology in each groundwater source, was used.

Step in determining extraction limit	Approach for 2011 plan	Approach for 2023 plan
4. The rate depends on the geology of the groundwater source.	Non-conservation areas identified before 2010 were considered.	Non- conservation areas up to 2021 were considered. • The recharge to the nonconservation areas, considering the geology, was used
5. Estimate the average annual rainfall recharge volume to each groundwater source. The volume is the average rainfall multiplied by the infiltration rate.	Average annual rainfall from 1921-1995 over the groundwater source area was used.	<ul style="list-style-type: none"> • Local average annual rainfall using BOM data for the period from 1900 to 2019. • The area and infiltration rate of each type of geology was used.
6. Identify the volume of recharge from conservation areas within each groundwater source. These are National Parks, State Recreation Reserves, Nature Reserves, Karst conservation areas and 100 m buffer areas around canals.	Conservation areas identified before 2010 were considered.	<ul style="list-style-type: none"> • Conservation areas up to 2021 were considered. • The recharge specifically to the conservation areas, considering the geology and local rainfall, was used.
7. Identify the volume to the remaining (non-conservation) areas within each groundwater source	Non-conservation areas identified before 2010 were considered.	<ul style="list-style-type: none"> • Non- conservation areas up to 2021 were considered. • The recharge to the non-conservation areas, considering the geology, was used.

Step in determining extraction limit	Approach for 2011 plan	Approach for 2023 plan
8. Assess environmental risks	<p>Identified and rated risks based on internal expert opinion:</p> <ul style="list-style-type: none"> • knowledge held in the Department, • published literature, • groundwater monitoring data (limited). 	<p>External analysis of risks (prepared externally by GHD consultancy, 2021) using:</p> <ul style="list-style-type: none"> • consistent, defined metrics • spatial information • information sourced from planning approvals and literature. <p>Internal analysis using:</p> <ul style="list-style-type: none"> • consistent defined metrics • revised estimates of water for basic rights, • mitigating factors. <p>Details of the assessed environmental risks for determining extraction limits are in Table 5, Table 6 and Table 7 of 03.</p> <p>The highest environmental risk becomes the environmental risk outcome and determines the maximum volume of water that will be available for extraction.</p>

Step in determining extraction limit	Approach for 2011 plan	Approach for 2023 plan
9. Assess socio economic risks	<p>Identified and rated risks based on internal expert opinion:</p> <ul style="list-style-type: none"> • knowledge held in the Department, • estimates of growth in urban water demand based on existing licences • published socio-economic data, • information associated with Water Act licences • Use and groundwater monitoring information (limited availability). 	<p>From the environmental risk outcomes, determine the maximum portion of recharge from non-conservation areas that could be available for extraction (see Appendix 3, Figure 3.)</p> <p>Calculate the maximum volume of water available for extraction within each groundwater source.</p> <p>Assess the economic risks by comparing the maximum volume of water available in each groundwater source with the extraction demands using:</p> <ul style="list-style-type: none"> • consistent defined metrics • revised estimates of water for basic rights, • estimates of growth in urban water demand based on the Greater Sydney Water Strategy • current entitlements for licences • estimates of groundwater removed under approved projects (activities that are exempt from requiring a water licence). <p>Details of the assessed socio-economic risks are in Table 8. Socio-economic risks that determine the socio-economic risk outcome for each groundwater source</p>

Step in determining extraction limit	Approach for 2011 plan	Approach for 2023 plan
<p>10. Determine the volume of recharge to non-conservation areas that is made available for extraction.</p>	<p>Compare environmental risk to socio-economic risk to determine the portion of recharge that can be available for extraction.</p> <p>The volume of water available for extraction is the equivalent portion of the estimated rainfall recharge to non-conservation areas in the groundwater source.</p>	<p>From the resulting socio-economic risk, determine the portion of recharge that can be available for extraction.</p> <p>The volume of water available for extraction is the equivalent portion of the estimated rainfall recharge to non-conservation areas in the groundwater source.</p>
<p>11. Determine the recharge to a non-conservation area that is available for extraction.</p>	<p>Recharge from conservation areas can contribute throughflow to the non-conservation areas. In Botany Sands, Metropolitan Coastal Sands, Maroota Tertiary Sands and Sydney Basin Blue Mountains 5% of this recharge is added to the extractable volume.</p> <p>Recharge to conservation areas in other groundwater sources is not added to the extractable volume.</p>	<p>No change to the 2011 approach.</p>
<p>12. Calculate the long term average annual extraction limit</p>	<p>Add the recharge volume from non-conservation areas and the recharge volume from conservation areas.</p>	<p>No change to the 2011 approach.</p>

Table 5. Ecological assets - likelihood and consequence metrics that determine the environmental risk outcome for each groundwater source

Risk description	Consequence	Likelihood
Extraction causes drawdown, affecting access for groundwater-dependent ecosystems (GDEs)	Dominant high ecological value aquatic ecosystem category (based on significance and naturalness) (low, medium, high to very high).	Entitlement density <ul style="list-style-type: none"> • Nil <0.5 ML/km² • Low 0.5 ML to 5 ML/km² • Medium 5 ML to 50 ML/km² • High >50 ML/km²
Groundwater extraction inducing connection with poor-quality water on GDEs	Dominant high ecological value aquatic ecosystem category.	Two metrics contribute to ranking: <ul style="list-style-type: none"> • Entitlement density • Occurrence of multiple sources of contamination.
Climate change reducing recharge and groundwater available for GDEs	Dominant high ecological value aquatic ecosystem category.	Two metrics contribute to ranking: <ul style="list-style-type: none"> • Decrease in average annual rainfall: <ul style="list-style-type: none"> — Low <0.1% — Medium 0.1% to 0.5% — High >0.5% • Storage (S) to recharge (R) ratio(S/R) <ul style="list-style-type: none"> — Low: S/R value > 40 — Medium: S/R value 20 to 40 — High: S/R value < 20
Extraction causes drawdown reducing access for instream ecological values	Two metrics contribute to ranking (matrix approach): <ul style="list-style-type: none"> • Dominant high ecological value aquatic ecosystem category • Connectivity between ground and surface water. 	Two metrics contribute to ranking: <ul style="list-style-type: none"> • Entitlement density • Proximity to stream <ul style="list-style-type: none"> — Low: >100 — Medium: 40 to 100 — High: <40

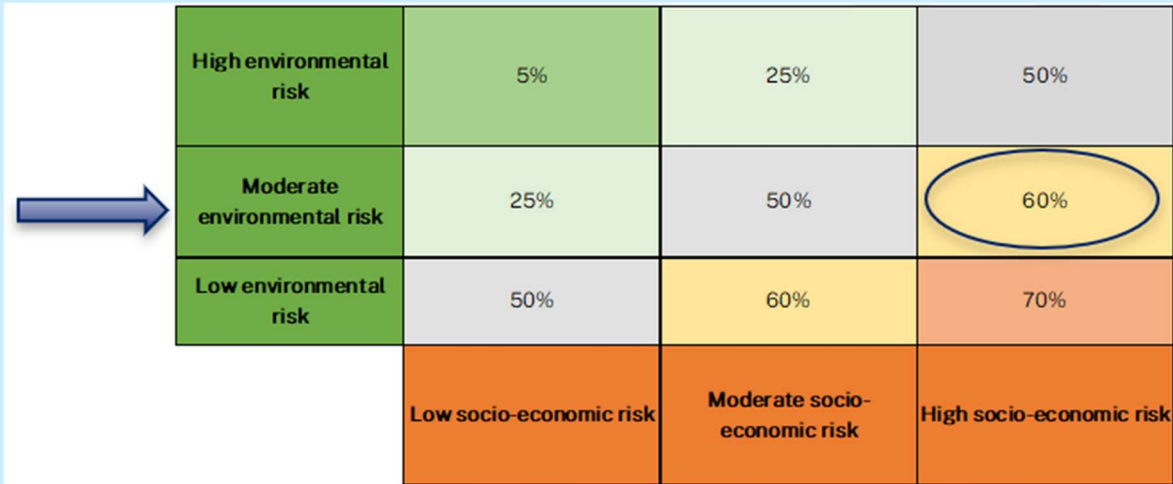
Table 6. Water quality asset likelihood and consequence metrics that determine the environmental risk outcome for each groundwater source

Risk description	Consequence	Likelihood
Groundwater extraction inducing connection with poor-quality water (impacts on consumptive users)	Bore density. (Low, medium, high density compared to the average for all groundwater sources in the Greater Metropolitan area).	<ul style="list-style-type: none"> • Ranked low for all groundwater sources due to legislated mitigation • Multiple sources of contamination.

Table 7. Aquifer integrity asset likelihood and consequence metrics that determine the environmental risk outcome for each groundwater source

Risk description	Consequence	Likelihood
Risks of extraction impacting on structural integrity and access for consumptive users.	Bore density.	<p>Two metrics contribute to ranking:</p> <ul style="list-style-type: none"> • Compressible sediments <ul style="list-style-type: none"> — Nil <20% — Low 20% to 50% — Medium 50% to 80% — High >80% to 100% • Groundwater decline in seasonal recovery <ul style="list-style-type: none"> — Low <20% difference — Medium between 20% to 40% difference — High >40% difference

The figure below illustrates how the environmental risk determines the maximum volume of water available. In this example, the environmental risk analysis identifies a moderate environmental risk in a groundwater source. Therefore, the maximum portion of recharge available for extraction is 60%.



To assess some of the socio-economic risks, we calculate 60% of the recharge volume to non-conservation areas. We compare this 'available recharge' to the estimated volume of groundwater needed to meet current and anticipated demand. The comparison indicates if there is a low, moderate or high risk that the demand will be met over the life of the plan.

Figure 3. Using environmental risk outcomes to assess socio-economic risk

Table 8. Socio-economic risks that determine the socio-economic risk outcome for each groundwater source

Risk	High	Moderate	Low
What is the risk to security of access from extraction?	No option for alternative water supply (source)	Limited options for alternative water supply (source)	Alternative water supply readily available (that is, can extract all entitlement at all times of the year)

Risk	High	Moderate	Low
What is the risk to ongoing groundwater access?	Large volume of groundwater commitments (current licences plus basic rights) compared to residual recharge* (that is, >70%)	Average volume of groundwater commitments (current licences plus basic rights) compared to residual recharge* (that is, 30% to 70%)	Small volume of groundwater commitments (current licences plus basic rights) compared to residual recharge ¹ (that is, <30%)
What is the risk to dependence on town water supply?	Large volume of groundwater licensed or known future demand for town water supply compared to residual recharge* that could potentially be committed to town water supply (that is, >70%)	Average volume of groundwater licensed or known future demand for town water supply compared to residual recharge* that could potentially be committed to town water supply (that is, 30% to 70%)	Small volume of groundwater licensed or known future demand for town water supply compared to residual recharge ¹ that could potentially be committed to town water supply (that is, <30%)
What is the risk to dependence on groundwater-related activities (requiring licenses, basic rights and other take that is exempt from licensing)?	Large volume of groundwater commitments and expected growth compared to residual recharge* (that is, >70%)	Average volume of groundwater commitments and expected growth compared to residual recharge* (that is, 30% to 70%)	Small volume of groundwater commitments and expected growth compared to residual recharge ¹ (that is, <30%)
What is the risk to investment in activities that require access or exempt from access?	Significant investment in activities requiring groundwater (percentage of gross domestic product of council area)	Moderate investment in activities requiring groundwater (percentage of gross domestic product of council area)	Little investment in activities requiring groundwater (percentage of gross domestic product of council area)

1

¹*Residual recharge is the 'available recharge' from non-high conservation areas minus the sum of current and projected requirements.

Appendix 4 Recharge estimates, risk outcomes and extraction limits

Table 9. Recharge estimates, risk outcomes and extraction limits

Groundwater Source	Recharge estimate (ML/year)		Environmental risk		Socio-economic risk		Sustainability factor (proportion of recharge from non-conservation ² areas available for extraction)		Long term average annual extraction limit (ML/year)	
	2011	2022	2011	2022	2011	2022	2011	2022	2011	2022
Botany Sands ³	30,424	28,869	moderate	moderate	moderate	high	50	60	14,684	16,411
Hawkesbury Alluvium	5,043	10,469	moderate	low	moderate	low	50	50	2,456	5,103
Maroota Tertiary Sands ³	1,075	2,274	moderate	low	moderate	moderate	60	60	645	1,364
Metropolitan Coastal Sands ³	60,802	50,585	moderate	moderate	moderate	low	50	25	27,206	11,407
Sydney Basin Central	229,223	173,372	moderate	moderate	low	low	25	25	45,915	31,859
Sydney Basin Nepean	244,483	161,763	moderate	moderate	high	high	60	60	99,568	64,785
Sydney Basin North	269,187	219,851	moderate	low	low	low	25	50	19,682	25,297
Sydney Basin South	225,326	92,897	moderate	low	moderate	low	50	50	69,892	30,584
Water sources to be merged										
Proposed Lachlan Fold Belt Greater Metropolitan Groundwater Source including Coxs River and Goulburn Fractured Rock water sources)										
Coxs River Fractured Rock	67,087	80,733	high	low	moderate	low	25	50	7,005	133,949
Goulburn Fractured Rock	259,784	275,211	high	low	moderate	low	25	50	53,074	
Proposed Sydney Basin West Groundwater Source - including Sydney Basin Blue Mountains, Cox's River and Richmond										
Sydney Basin Blue Mountains ³	78,474	55,141	moderate	low	low	high	25	70	7,039	36,045

² Recharge to high conservation areas (National parks, forests, reserves and canal estates) is not used in this calculation. 95-100% of recharge to these areas is reserved for the environment.

³ Water source where 5% of recharge from high conservation areas contributes to the extraction limit

Sydney Basin Cox River	31,312	14,108	low	low	moderate	high	60	70	17,108
Sydney Basin Richmond	127,878	100,640	moderate	moderate	high	high	60	60	21,103

Appendix 5 Responses to Natural Resources Commission recommendations

This appendix lists recommendations and actions recommended by the Natural Resources Commission in its review and our responses and actions taken in response to these recommendations. The commission's review combined the Greater Metropolitan Region Groundwater and the Greater Metropolitan Region Unregulated River water sharing plans. Only recommendations and actions relevant to the Groundwater plan have been included.

Groundwater Plan– key recommendations

Overall

Recommendation 1

The Commission recommends that [the plan be]:

- a) extended for a further 2 years until 30 June 2023, to allow time to complete data collection, analysis and modelling
- b) replaced by 1 July 2023 supported by the completion of the recommendations of the review and consideration of outcomes from the Greater Sydney Water Strategy (GSWS) to ensure water management is integrated across the region.

Department's response to recommendation 1 at March 2021

We welcome the recommendation to extend the plan for 2 years.

Action taken on recommendation 1 as of November 2022

Status: closed

The plan was extended for two years and a replacement plan is to commence by 1 July 2023.

The department has considered the GSWS drought supply target (30GL/yr) in the risk assessment for informing the long-term average annual extraction limits to ensure adequate provision to enable licence and account operation.

Managing extraction volumes

Recommendation 2

By 1 July 2023, the department should develop a comprehensive water balance. This should be developed using an overarching modelling framework, which includes:

- a) reviewing and addressing gaps in current modelling and model inputs
- b) all surface water and groundwater extraction
- c) inflows (including treated wastewater and recycled water discharges) and induced recharge (internal and external to the plans)
- d) up to date evidence regarding recharge, hydrogeology, connectivity, and climate (the hydrological model should use the climatic data developed for the draft Greater Sydney Water Strategy). The modelling framework should be used to inform revised provisions and assess their ability to achieve outcomes).

Department's response to recommendation 2 at March 2021

- a) The Department and Water NSW developed hydrological models for the GMR for the development of the water sharing plan and the Metro Water Plan. The two models were developed with different contexts and purposes. The model used for the unregulated river water sharing plan assisted in determining water balances for the Hawkesbury Nepean River, yet not other rivers.
- b) The modelling for the Metropolitan water plan focused on maximising the drinking water supply so used different inputs and modelled different areas
- c) It is likely the same approach of separate models will be taken for the replacement unregulated river water sharing plan and the Greater Sydney Water Strategy as one model will not be able to provide the information each program needs. Wherever possible the two models will align and use the same inputs.

Action taken on recommendation 2 as of November 2022

Status: In progress - closed.

A comprehensive water balance model is not feasible in the Greater Metropolitan Groundwater Sources due to limited data availability in these groundwater sources.

Up to date information on rainfall, hydrogeology and climatic projections were used to review recharge estimates. Rainfall recharge estimates were revised after incorporating expanded rainfall data (up to 2019 rather than 2006) and applying infiltration rates based on surface geologies across the water source rather than the dominant geology.

The climatic data developed for the draft Greater Sydney Water Strategy is less reliable at the water sharing plans shorter-term scale. While the long-term data indicated greater average rainfall, the lower, historic average was used for the water sharing plan as a precautionary approach.

To determine the plan long-term average annual extraction limits, the department assessed environmental and socio-economic risks, taking into account the rainfall recharge, distribution of groundwater-dependent ecosystems and estimates of current and future extraction in each of the water sources.

Recommendation 3

By 1 July 2023, the department should ensure all extraction in the Greater Metropolitan region is managed to protect, preserve and maintain the water sources, aquifer integrity and dependant ecosystems by:

- a) using the modelling framework to establish and publish numeric values for comparable, catchment-scale LTAAELs for the Surface Water and Groundwater Plans that include all forms of extraction managed under the plans
- b) using the modelling framework to ensure the Surface Water and Groundwater Plans can function, protect values and achieve objectives under a representative range of climatic conditions over the medium to long term
- c) basing LTAAELs on sound evidence of ecosystem requirements, recharge, hydrogeological boundaries, and connectivity
- d) ensure mining activities are licenced
- e) including an amendment provision allowing LTAAELs and Available Water Determinations (AWDs) to be adjusted should volumes managed external to the plans change significantly.

Department's response to recommendation 3 at March 2021

The recommendation reflects the approach for setting LTAAELs (sustainable diversion limit and environmentally sustainable level of take) for regulated rivers in the Murray Darling Basin. Yet, LTAAELs for unregulated river water sharing plans, particularly coastal water sharing plans, are set at either the history of take (capping take to current development that occurred at the commencement of the first plan) or at the sum of licence shares and requirements of basic landholder rights. Which of the two limits is established was based on known hydrological stress due to current take. Current development is defined as the average annual take for the period 1993-1999 and was determined from data obtained through the volumetric conversion process. The long term average annual environmental water requirements were not considered during the development of the Greater Metropolitan Region surface water LTAAEL. This was by and large due to long term average annual flows far exceeding total licence shares in the majority of

environmental management units. In relation to groundwater LTAAELs, these were determined as a percentage of recharge based on an assessment of environmental and economic risks from take.

- a) The department shall consider the inclusion of surface water and groundwater LTAAEL volumes as a standard note in plans similar to regulated river plans. It is not necessary, however, to model take where LTAAELs are set at sum of licence shares, which is the situation for the majority of coastal plans. For those surface water environmental management units which establish the LTAAEL at 93-99 levels of development, certainly modelling during the replacement of the plan can verify the estimates of capped development and also model current take as a way of determining ongoing compliance. Given the resourcing required, such approach would be for LTAAELs established at less than the sum of licence shares. The surface water LTAAEL is currently based on development levels between 993 and 1999. Given that the department is now investigating a sustainable LTAAELs for unregulated river systems, take associated with 93-99 levels of development may not in future be the value of an LTAAEL. It is likely that available modelling will be used to set the LTAAEL in unregulated systems.
- b) Groundwater LTAAELs are based on a risk assessment and recharge. Where resources are available water balance modelling may be used to set LTAAELs but this will not be possible across the majority of groundwater sources due to resourcing constraints.
- c) The department is now updating priority hydrological models with climate change scenarios and data and will do so for the Greater Metropolitan Region models.
- d) The department is now investigating a 'sustainable LTAAEL' this will consider ecosystem requirements where these are known, recharge and hydrogeological boundaries for groundwater and connectivity.
- e) Hawkesbury Nepean savings associated with the River Recovery project were reflected in the LTAAEL for both Water NSW and licensed irrigators established in the current plan.
- f) Conversion to high flows will be considered for the unregulated river plan.
- g) Whether an LTAAEL can apply to 'exempt' take pursuant to WM Act General Regulation requires investigation, and if so, the possibility of application would necessitate development of policy and considerable resourcing.

Action taken on recommendation 3 as of November 2022

Status: closed

Groundwater extraction limits are expressed as an annual volume of water (ML/year) that can be extracted on average over the long-term. While the total amount extracted by all water users varies each year, on average it cannot exceed the extraction limits.

The department used a risk-based assessment to determine extraction limits and considered:

- a) Estimates of all forms of current and anticipated extraction in each groundwater source. including basic landholder rights, aquifer access licences and licence-exempt take.
- b) Climate change over the life of the replaced plan - adopting the historical average rainfall as a precautionary approach.
- c) Best available evidence of hydrogeological boundaries and ecosystem requirements was sourced to revise plan provisions to maintain aquifer integrity and protect ecosystems. Additional groundwater-dependent ecosystems were identified and considered in the risk assessment that informed the LTAAEL. The LTAAEL is not the primary tool to manage ecosystem requirements which are dependent on local availability, rather than long term average across a water source. The replaced plan also manages risks to high priority groundwater-dependant ecosystems (GDEs) by restricting how close works can be to them.
- d) Licensing take is an implementation issue not a water sharing plan matter. Both licensed and exempt take was considered in risk assessment.
- e) The replaced plan includes a provision allowing extraction limits to be modified.

Managing extractions equitably

Recommendation 4

By 1 July 2023, DPE-Water should ensure the plans facilitate equitable sharing of water by clearly defining equity objectives consistent with the Act's requirements.

Department's response to recommendation 4 at March 2021

A review of the plan during replacement shall include those objectives relating to equity and how provisions achieve equity and where if necessary improvements can be made to achieve the objectives as a head of consideration.

Action taken on recommendation 4 as of November 2022

Status: closed.

All water sharing plan provisions consider the water sharing principles and objects of the *Water Management Act 2000*. This recommendation has been addressed with improved drafting of objectives, strategies and performance indicators.

Limiting timing of extraction to protect flows and manage drought

Recommendation 6

By 1 July 2023, the department should 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.

Department's response to recommendation 6 at March 2021

As part of plan replacement DPIE Water will review existing rules based on new information and seek to simplify rules where possible. The Department shall during the replacement review licensed access to very low flows and other exemptions against the objects and principles of the Act and the plan. The Department may consider, consistent with the objects and principles of the Act and the plan, the possibility of simplifying the rules.

Action taken on recommendation 6 as of November 2022

Status: Ongoing.

As access rules are linked, simplifying groundwater access rules is addressed by simplifying access rules and removing some exemptions in the surface water plan.

Many of the areas where changes to exemptions were proposed were affected by flooding. Consultation on changes to simplify these rules were postponed. Consultation on the rule changes will occur within the first five years of the plan. Plan amendment will enable any changes.

Recommendation 8

By 1 July 2023, the department should ensure that, if licensees are unable to comply with access licences at any time, extraction is appropriately mitigated, including:

- a) amend Clause 57(3) parts (a) and (b) of the Surface Water Plan on planned environmental water, which allow for cease to pump exemptions for aquifer interference activities that are either approved by the Environment, Planning and Assessment Act 1979 or the Minister, to require 100 percent mitigation of any exemptions
- b) link Groundwater Plan daily access exemption provisions to Surface Water Plan provisions where appropriate and consider including mitigation requirements
- c) in the Surface and Groundwater Plans, account for mitigation daily (the timescale at which cease to pump rules operate).

Department's response to recommendation 8 at March 2021

- a) DPIE Water considers clauses 57(3) (a) and (b) are adequate to manage and mitigate incidental / induced take from aquifer interference activities due to the nature of this take.
- b) Mitigation of incidental take occurs through development conditions and is beyond the scope of the water sharing plan.
- c) C/S60I/ 60A of the WMA requires a licence to be held for any water taken as part of a mining activity. Mines are unable to cease taking during CTP times but their take is measured or estimated and reported via their DA conditions including site water management plans. Mitigation and reporting of take daily is not practical but mitigation can occur on a longer time scale and would be a condition of their DA.

Action taken on recommendation 8 as of November 2022

Status: closed.

S60I/ 60A of the WMA requires a licence to be held for any water taken during mining activity. Mines are unable to cease taking during CTP times, but their take is measured or estimated and reported via their development consent conditions including site water management plans. Mitigation and reporting of take daily is not practical but mitigation can occur on a longer time scale and would be a condition of their development consent.

Smaller aquifer interference activities do not always require an approval.

The replaced plan includes an amendment provision to add or modify provisions relating to the management of aquifer interference activities including the granting of aquifer interference approvals.

Recommendation 9

By 1 July 2023, the department should:

- a) estimate extraction each year to ensure compliance with LTAAELs to determine if adjustments are necessary
- b) include rules following the department's consideration of how AWDs can be used to manage extraction during drought, including under predicted climate change
- c) examine and simplify the combined role of the AWDs and carryover activities.

Department's response to recommendation 9 at March 2021

In the development of implementation programmes for the plans, the Department shall consider methods for estimating annual take and which extraction management units shall be prioritised for estimating take and checking for LTAAEL compliance. The Department during the replacement of

the water sharing plans shall consider rules for making and announcing AWDs during drought periods.

The department is examining the possibility of developing a coastal incidence response guide similar to inland water resource plans.

Action taken on recommendation 9 as of November 2022

Status: Ongoing.

- a) Extraction figures will be available once the NSW Non-Urban Metering Framework is implemented in the Greater Metropolitan region.
- b) Available water determinations in localised areas or an entire groundwater source can be reduced if extraction is impacting on the groundwater source. This is enacted under s324 of the WM Act.

The appropriateness of access rules has been considered based on the longest record of flow available including the most recent 2019/20 drought. Plans operate for 10 years at which time they may be reviewed.

The department will work toward priorities in the State Water Strategy. 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 plan and environmental water management decision making.

- c) Available water determinations and carryover rules were reviewed. No changes.

Available water determinations in groundwater sources can be reduced if extraction exceeds limits. The volume of water in accounts from carryover is considered when determining available water determinations in groundwater sources if limits have been exceeded.

Accounting for spatial variation in values and risks

Recommendation 10

By 1 July 2023, the department should use best available evidence, to reassess the socioeconomic, cultural and environmental value of all management zones/water sources in the plans including:

- a) fine scale High Ecological Values Aquatic Ecosystems (HEVAE) mapping consistent with data used for other NSW Government planning processes
- b) reviewing trade limitations with a view to manage trade across broader areas provided environmental outcomes can be maintained

- c) the full range of economic benefits and impacts of water extraction and presence of water in-stream when considering the economic dependence of water sources, such as:
 - i. benefits and impacts of secure water supply and time on water restrictions for town water supplies including residential and industrial uses
 - ii. benefits and impacts of flow and water quality on industries and water uses such as tourism, ecosystem services and recreation and community activities.

Where necessary, the department should then amend both plans' rules to address any changes to classifications and ensure that the high value environmental ecosystems are protected by the plan rules, without unnecessarily inhibiting trade.

Department's response to recommendation 10 at March 2021

- a) EMUs, water sources and management zones will be reviewed as part of the plan replacement process. Fine scale HEVAE mapping will be applied where available.
- b) Work is being progressed as part of Treasury funded project to review trade opportunities across all of NSW unregulated river systems.
- c) Socio economic benefits of extraction will be considered alongside environmental requirements when reviewing rules in the water sharing plan.

DPIE Water will review risk assessments undertaken for the 2011 plans including updating variables with the latest data to inform any update to plan rules as part of Plan replacement. The original risk assessment for the surface water plan shall be augmented with a new approach to risk assessments that follows the approach for water resource plans. In relation to matters raised in c) (i), since reductions in AWD cannot be reasonably applied to town water supply, the matters are better addressed in the Greater Sydney Water Strategy.

Action taken on recommendation 10 as of November 2022

Status: closed.

- a) The department used the HEVAE framework to identify high priority groundwater-dependent vegetation ecosystems.
- b) The review of groundwater source boundaries reduces trade barriers while maintaining environmental outcomes.
- c) The risk assessment approach was revised identifying expanded socioeconomic, cultural and environmental values and encompasses additional risks to these values which are greater in the Metropolitan area (dewatering and urbanisation). The risks assessed incorporated:
 - i. fine scale HEVAE mapping consistent with other NSW Government planning

- ii. reviewing groundwater source boundaries and trade limitations - with some boundaries removed with hydrogeological evidence to support the change
- iii. the full range of economic benefits and impacts of water sources.

Recommendation 11

By 1 July 2023, the department should:

- a) better define connectivity terminology with respect to spatial and temporal variation and needs of different aquifer types
- b) strengthen the evidence base across the plan area regarding the extent and spatial variability of connectivity through on ground studies and mapping
- c) specifically refer to known areas of high connectivity and lower connectivity, and distinguish between discharging and receiving groundwater systems, and gaining and losing streams to better manage the Surface and Groundwater Plans as a whole.

Department's response to recommendation 11 at March 2021

Where updated connectivity data is available to inform plan development, it will be used. Any improved understanding of connectivity will be reflected in documentation supporting plan development and pub-ex.

Action taken on recommendation 11 as of November 2022

Status: Closed.

- a) The water sharing plan is a statutory document setting the rules for water sharing. It is not the place for definitions that are not critical to the operation of the rules. NSW's definitions of connectivity are included in the Macro water sharing plan - the approach for groundwater. A report to support community consultation.
- b) and c) Where updated connectivity data is available to inform plan development, it has been used. Any improved understanding of connectivity is reflected in documentation supporting plan development, public exhibition and plan commencement.

Recommendation 13

By 1 July 2023, to improve Groundwater Plan clarity and protection of GDEs to achieve environmental outcomes, the department should:

- a) Clearly define groundwater terms and their relevance to the Groundwater Plan, including GDEs, high priority (to include culturally significant sites), groundwater type, and connectivity – connectivity should include both discharge of groundwater to surface water and surface water recharge to groundwater systems

- b) include known values relating to culturally significant groundwater dependent sites in the revised Plan and ensure these are protected by the plan provisions
- c) ground-truth updated DPE–EES HEVAE mapping for the presence and extent of GDEs, including estuarine ecosystems. Identify and clearly refer to high priority ecosystems (considering defined factors such as cultural significance, presence of endangered ecological communities, period of groundwater dependence, suitability of water quality, representativeness)
- d) review setback distances for work near identified GDEs and standardise these based on the NSW Aquifer Interference Policy 2012.

Department's response to recommendation 13 at March 2021

The definitions in the plan will be reviewed as part of the plan replacement process. Further explanation of connectivity will be provided in the background document to the plan.

The groundwater-dependent ecosystem requirements for coastal water sharing plan areas are being reviewed specifically to adopt a similar approach to those taken under the Basin Plan water sharing plan definition and terms, with a coastal context where applicable

- b) consultation with First nations people will aim to identify their values and desires for water management.
- c) HEVAE mapping has been undertaken for the greater metropolitan region. High priority GDEs have been identified. The department is considering the best way to confirm the presence of high priority GDEs.
- d) A review of set back distances has been undertaken as part of the WRP work and this will be applied in review of coastal WSP set back distances.

Action taken on recommendation 13 as of November 2022

Status: closed.

The replaced plan provides:

- a) An improved dictionary which defines groundwater terms used in the water sharing plan including GDEs. High priority GDEs are identified in the plan and are those GDEs where distance restrictions for water supply works apply unless a location, at a lesser distance, results in no more than minimal harm. The departments website outlines how high priority (vegetation) GDEs are identified. Distance restrictions outlined in the plan do not apply to other groundwater-dependent ecosystems that may occur within the area. In contrast, distance restrictions apply to all known culturally significant sites to mitigate impacts of groundwater extraction unless locating the works at a lesser distance would result in no more than minimal harm.

- b) Rules for managing water supply works near known culturally significant sites (identified on the Aboriginal Heritage Information Management System). Works must be outside restricted distances unless there is no more than minimal harm to the groundwater dependent culturally significant area.

In addition to the plan rules, under Priority 2 of the State Water Strategy and while developing the state-wide Aboriginal Water Strategy, the department continues to engage with Aboriginal communities about social, cultural, spiritual and customary objectives. It is a priority to recognise cultural values in water management, as well as Aboriginal rights and values and increase access to and ownership of water for cultural and economic purposes.

- c) High priority GDEs have been identified and mapped based on the latest available information and method. This takes account of the probability of groundwater dependence and the ecological value of the GDE. See <https://www.industry.nsw.gov.au/water/science/groundwater/ecosystems> for more information on how the department identifies high-priority GDEs. The plan allows that these mapped high probability vegetation GDEs may not be groundwater dependent. A high probability of groundwater dependence may be confirmed before applying distance restrictions to mapped High Priority GDE vegetation communities. The plan also includes amendment provisions allowing updates to high priority GDE if new information becomes available.
- d) Set back distance rules for new works near GDEs were reviewed and align with standard distance rules where appropriate based on hydrological expertise.

Supporting outcomes for Aboriginal people

Recommendation 15

Amend the plans to reflect all current native title claimants and Indigenous Land Use Agreement holders comprehensively and reflect this consistently across both plans. Undertake detailed engagement with these Native Title groups to determine water allocations and access options.

Department's response to recommendation 15 at March 2021

The replacement Plan will include an amendment provision to amend native title rights following the granting of a native title claim.

Action taken on recommendation 15 as of November 2022

Status: closed.

The replaced plan reflects current Native Title determinations and can be amended to reflect the outcome of pending claims.

Targeted consultation has addressed understanding water licensing, water availability and options for aboriginal communities. Aboriginal organisations and community representatives were invited to make a submission on the draft plan during public exhibition.

Recommendation 16

Undertake subsequent work with Aboriginal stakeholders and Traditional Owners to further understand all water-related values (for surface and groundwater) and better protect them through plan provisions.

Department's response to recommendation 16 at March 2021

Consultation with First nations people will aim to identify their values and desires for water management. The plan will include distance rules to prevent the location of groundwater works within restricted distances of culturally significant groundwater dependent sites.

Action taken on recommendation 16 as of November 2022

Status: Ongoing.

We reached out to several Aboriginal organisations in the Greater Metropolitan plan area. Consultation will continue with Aboriginal organisations over the life of the plan.

The department will work toward priorities in the State Water Strategy. Priority 2 of the State Water Strategy is the 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.

Recommendation 17

Reserve unallocated water for Aboriginal specific licences or other Aboriginal water access options, before being offered to the market on commercial terms.

Department's response to recommendation 17 at March 2021

These proposals shall be given consideration during the review and replacement of the plan, particularly when First Nations Peoples are directly involved during the replacement.

Action taken on recommendation 17 as of November 2022

Status: In progress.

This issue has been incorporated into Aboriginal Water Strategy development. There is increased focus on development of this strategy in 2022 following allocation of NPP funding.

The replaced plan allows Aboriginal community development specific purpose licences in water sources where there is unassigned water.

Recommendation 18

Finalise an NSW Aboriginal Water Strategy in 2021 to provide consistent, transparent guidelines and resourcing for Aboriginal water management across NSW, comprising the following at a minimum:

- a) Improve recognition of native title by including a common provision to undertake preliminary amendments to a plan within six months of a native title determination or other agreement that includes water allocation
- b) allow additional time to undertake detailed engagement with Traditional Owners, make water allocations and final plan amendments; considering native title claims proactively as part of water sharing planning
- c) identify Aboriginal water values and uses, objectives and outcomes by undertaking extensive engagement with Aboriginal stakeholders in all plan areas; prioritising allocations to protect values; adopting cultural landscape-scale principles; integrating identified values into ongoing water planning and management
- d) co-design Aboriginal specific licences or other water access options with key Aboriginal stakeholders that meet identified needs for a range of cultural, environmental, social and economic uses.

Department's response to recommendation 18 at March 2021

The department is developing an Aboriginal Water Strategy. This strategy is considering the licensing framework.

Action taken on recommendation 18 as of November 2022

Status: Closed.

Action as in recommendation 16.

There are no native title determinations in the Greater Metropolitan plan area. The plan therefore indicates that on commencement, the amount of water required to satisfy native title rights is estimated as OML/yr.

The replaced plan will be amended as soon as practical to give effect to, or in connection with, a determination made after the plans commence. Amendments commonly take approximately six months to process as they require approval by multiple Ministers.

Monitoring, evaluation and reporting

Recommendation 19

By 1 July 2022, the department should improve MER to increase transparency and support the achievement of Plan outcomes in line with the water management principles and priorities of the Act. This should include:

- a) Completing relevant studies identified in the 2011 Plans
- b) developing a publicly available research plan for the completion of further studies required to improve the knowledge base and for adaptive management – required studies should also be included in the plans
- c) developing plan-specific, publicly available MER frameworks consistent with the coastal and state-wide guidelines. The framework should include linked and specific, measurable, achievable, relevant and time-bound (SMART) objectives, strategies and performance indicators, define roles and responsibilities, set timely public reporting requirements and include adaptive management processes).

Department's response to recommendation 19 at My 2021

Where possible the studies identified in the current plan shall be undertaken to inform the replacement. Else during the replacement the Department shall recommend whether or not the relevant study provisions are carried over into the new plan. Similarly for any new studies that are identified during the replacement.

DPIE Water is developing a monitoring, evaluation and reporting (MER) framework for coastal water sharing plans. The framework will help coordinate activities conducted by multiple agencies. In this way, MER activities can deliver on specific agency requirements and contribute to a broader understanding of water management and river and wetland health over time. The implementation of any MER programs is dependent on having a defined, long term budget. While every effort to maintain a MER program, the ability to implement aspects in a MER is limited by resources.

Action taken on recommendation 19 as of November 2022

Status: In progress.

The department is developing a monitoring, evaluation and reporting (MER) framework for coastal water sharing plans. The framework will help coordinate activities conducted by multiple agencies. In this way, MER activities can deliver on specific agency requirements and contribute to a broader understanding of water management and river and wetland health over time. The implementation of any MER programs is dependent on having a defined, long term budget. While every effort is made to maintain a MER program, the ability to implement aspects in a MER is limited by resources.

The department has undertaken two studies to support efficient and effective use of scarce monitoring funds throughout NSW. The 'prioritisation' study is designed to deliver advice on which water sources should be targeted for monitoring activities and why, while the 'transferability' study is designed to deliver a model that will allow us to know with high probability which water sources are so similar to each other that they can be considered synonymous. The two projects combined will allow us to maximise the results from monitoring activities, and transparently share the results with stakeholders.

Implementation of the MER program will commence in late 22. This will clarify the roles and responsibilities, reporting requirements, governance arrangements and timeframes associated with the program.

The MER plan will include SMART objectives, strategies and performance indicators that are linked to the WM Act's outcomes. This will align with the WM Act priorities.

Groundwater - suggested actions to support the replacement plan

Managing extraction volumes

Suggested action A

Finalise the reasonable use guidelines for domestic and stock use by 1 July 2022 and include the agreed standards as part of the replacement plans.

Department's response to suggested action A at March 2021

The Department acknowledges stakeholder concerns about the nature and scope of 'basic landholder rights' to take water for domestic and stock purposes. The Department is preparing options for addressing these concerns and will engage with the community on any changes.

Action taken on suggested action A as of November 2022

A project is underway to review the need and options for regulation of take under domestic and stock basic landholder rights, following allocation of NPP funding. The project is aimed at determining the most appropriate framework for managing take under these rights, according to the level of risk, and may or may not result in reasonable use guidelines.

Suggested action B

Policies around exempt and externally managed extraction should be finalised to inform the replacement plans' development, for example stormwater harvesting and construction and maintenance dewatering.

Department's response to suggested action BA at March 2021

The WMA regulation establishes licence and approval exemptions. All other take must be authorised by way of licence or a BLR. The Department may consider the possibility of including such matters in its policy development priority schedule.

Action taken on suggested action B as of November 2022

Policies around exempt and externally managed extraction are being progressed by the department but will not be finalised in time to inform the replaced plan.

Improving plan delivery

Suggested action D

Continue to develop state-wide evaluation framework and monitoring plan, considering and addressing key gaps and prioritising MER activities based on values and risk. The framework, monitoring plans and reporting should be publicly available to improve transparency.

Department's response to suggested action D at March 2021

NSW is developing a monitoring, evaluation and reporting (MER) framework for coastal water sharing plans. The framework will help coordinate activities conducted by multiple agencies. In this way, MER activities can deliver on specific agency requirements and contribute to a broader understanding of water management and river and wetland health over time. The implementation of

any MER programs is dependent on having a defined, long term budget. While every effort to maintain a MER program, the ability to implement it is limited by resources.

Action taken on suggested action D as of November 2022

See response for Recommendation 19.

Suggested action E

Adopt additional mechanisms to support metering and measure water extraction and movement across the plan area, such as remote sensing, to improve calculation of LTAAEL compliance and support adaptive management.

Department's response to suggested action E as of March 2021

The metering framework was developed considering the risks posed by non-metered usage. Under the metering framework, users that are not required to meter will be required to maintain logbooks and could have these records audited by NRAR.

The adoption of new technology to measure water take will depend on their value for money, reliability and priorities of the department.

Action taken on suggested action E as of November 2022

When the NSW Non-Urban Metering Framework comes into effect in the Greater Metropolitan plan area; users will be required to install accurate, tamper-free meters and telemetry devices if they meet the thresholds established under the framework. The department, in conjunction with NRAR and WaterNSW, are supporting water users as they transition to the new framework.

Suggested action F

The department should adopt state-wide processes that support the plan remake and implementation by:

- a) enhancing communication of water sharing plans through active, simple, and consistent language and modes of communication
- b) improving implementation using clear and consistent governance, roles and responsibilities, and timelines.

Department's response to suggested action F at March 2021

The water sharing plan template is being updated to improve readability.

- a) As part of public engagement pre and post remake, the Department follows a programme of effective communication. Much of this involves the delivery of public documents, rule summary sheets, background documents, guide to water sharing for instance, that communicate the rules

of the plan through 'plain English'. These documents are periodically reviewed for their effectiveness. Departmental staff are also available to advise on the rules and assist licencees understand rules.

- b) These communication programmes are one consideration of the implementation programmes the Department is now developing for water sharing plans. The implementation programmes shall in part establish unambiguous governance, roles, responsibilities etc for the delivery of key provisions of a plan.

Action taken on suggested action F as of November 2022

The water sharing plan template has been updated to improve readability and has been drafted by Parliamentary Council Office.

- a) As part of public engagement pre and post remake, the Department follows a programme of effective communication. Much of this involves the delivery of public documents, for example, rule summary sheets, background documents, guides to water sharing. These documents assist to communicate the rules of the plan in 'plain English'. These documents are periodically reviewed for their effectiveness. Departmental staff are also available to advise on the rules and assist licencees understand rules.
- b) These communication programmes are one consideration of the implementation programmes the Department is now developing for water sharing plans. The implementation programmes shall in part establish unambiguous governance, roles, responsibilities etc for the delivery of key provisions of a plan.

Suggested action G

By 1 July 2023, the department should liaise with WaterNSW and the Natural Resources Access Regulator (NRAR) to ensure that Surface and Groundwater Plan provisions are practical, enforceable, and can readily be placed on access licences where relevant. Access licences should reflect plan provisions.

Department's response to suggested action G at March 2021

DPIE Water is working with WaterNSW and NRAR to improve the application of plan provisions. An interagency water regulatory group has been established that includes NRAR, WaterNSW, EES and DPE Water. All plan amendments will be passed through this group. Current access licences and water supply works approvals include conditions that mirror the relevant plan provisions. These conditions are amended where relevant provisions of the plan are amended.

Action taken on suggested action G as of November 2022

The department has been working in close collaboration with WaterNSW during the development of both Greater Metropolitan Plans. WaterNSW has provided valuable advice relating to the practicality of plan provisions and the how plan drafting can support systems operations.

The department provided both the draft Surface and Groundwater Plans to NRAR to comment on the enforceability of provisions. The draft plans were provided to the department's Implementation team responsible for drafting and imposing mandatory conditions.

Suggested action H

As part of the plan replacement, the department should develop well-evidenced and resourced processes for stakeholder engagement in the plan area. This should be part of a strengthened state-wide stakeholder engagement strategy.

Department's response to suggested action H as of March 2021

Each water sharing plan has a communications and engagement plan. There is also an overarching Coastal Water Sharing Plan engagement plan and an engagement plan specifically for coastal first nations groups.

The Department is considering the development of regional water reference groups as a way to engage with local and regional communities.

Action taken on suggested action H as of November 2022

A communication and engagement plan has been developed and supporting material produced to help explain the changes in the replaced plan.

An external consultant was engaged to help deliver the public exhibition component of the plans.

Suggested action I

By 1 July 2023, the department should adopt integrated catchment management approaches that support the plans' replacement and implementation.

Department's response to suggested action I as of March 2021

DPIE Water supports ongoing consideration of integrated catchment management approaches where possible. Noting that Water Sharing Plans are developed in accordance with the requirements of the *Water Management Act 2000*.

Action taken on suggested action I as of November 2022

Water sharing plans are developed in accordance with the requirements of the WM Act and cannot direct catchment actions not related to water sharing.

That said, the department will work toward priorities in the State Water Strategy. Priority 4 of the State Water Strategy is to increase resilience to changes in water availability (variability and climate change). Action 4.4 under this priority is to better integrate land use planning and water management.

The Government will work to better integrate strategic land use planning with water management frameworks and outcomes. Taking steps to:

- a) Establish processes to support communication and early engagement to better inform land use, agriculture and industry investment decisions based on a clear understanding of water availability and constraints, and water allocation risk over the immediate and longer term.
- b) Develop new planning policies, if required, to integrate land use and water cycle management decisions.
- c) Identify opportunities for the planning system to support water resource health and resilience in a changing climate; for example, through strategic recognition of critical groundwater resources in coastal areas and mitigate impacts from urban development.
- d) Improve access to information about water availability to support development.