

# NSW Groundwater Strategy – Summary

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# Strategy at a glance



## Vision

Groundwater supports cultural and social values, dependent ecosystems and resilient towns and industries



## Outcomes



Our groundwater resources and dependent ecosystems are protected to support current and future uses



Through sustainable groundwater use, water dependent aspirations of Aboriginal people are supported, water resilience for urban populations is improved and development opportunities are realised



Better groundwater management and investment decisions are made based on improved information and knowledge



## Actions

Refresh, consolidate and expand our groundwater policy framework

Support Aboriginal people's rights, values and uses of groundwater

Develop the groundwater components of a water knowledge plan

Improve protection of groundwater dependent ecosystems and baseflows to streams

Support towns and other cities that use groundwater to improve their urban water planning

Better share and integrate groundwater information

Review and update approaches to sustainable groundwater extraction

Support resilient groundwater-dependent industries in NSW

Improve our understanding of groundwater resources

Protect groundwater quality within natural limits

Expand and target our groundwater data collection

Better integrate groundwater management with other land and estate management processes

# Facts about groundwater in NSW



## Aboriginal communities have a deep connection to groundwater

Important **cultural values** are associated with wetlands, springs, caves and other groundwater dependent ecosystems



## NSW groundwater resources are extensive

There are over **500 groundwater sources** capable of supplying up to 3,200 GL per year



## Many communities depend on groundwater

Over **250** regional towns with a combined population close to **300,000** depend on groundwater fully or partially



## Groundwater is at risk from climate change

It is projected that groundwater recharge will decrease by **15%** on average across the state by 2060



## NSW has rich and extensive groundwater dependent ecosystems

They cover over **6.5 million ha** in NSW (8% of NSW's land surface)  
There are more than **1,000** unique groundwater dependent plant types in NSW, **69** of which are threatened



## Groundwater contributes to the NSW economy

Close to **\$1 billion** in direct value is generated from activities using groundwater



## Groundwater supports a variety of uses

Agriculture represents over **70%** of all groundwater use, followed by industry with **10%** and towns with **5%**



## Groundwater extraction is highly concentrated

Over **70%** of groundwater extraction occurs in the Murrumbidgee, Lachlan and Namoi regions



## Demand for groundwater will increase

The use of groundwater for industrial activities may increase by up to **60%** by 2042



## Demand by towns may significantly increase

The demand for groundwater by towns is expected to increase by close to **300%** by 2042



## Groundwater is a strategic resource during drought

Groundwater can represent up to **70%** of the total water used by agriculture during drought



## Trade is increasing

Over the last 10 years permanent trade of groundwater entitlements has increased by **300%** and temporary trading by **170%**



## The value of trade

In 2019-20, the value of permanent groundwater trades was **\$45m** and **\$55m** for temporary trades

# 1. Introduction

## Groundwater is a vital and vulnerable natural resource for NSW

Across NSW – from our towns to our cities, from our coasts to the outback – healthy groundwater resources sustain our unique ecosystems and wildlife, maintain vital industries and support our way of life and well-being.

Groundwater is a vital and strategic natural resource for NSW, critical for towns and villages, agriculture and other industries. Without groundwater, many towns and villages would run out of water during drought. Groundwater keeps many of our rivers flowing in times of low rainfall and provides vital refuges in river pools for animals and vegetation. Groundwater sustains unique ecosystems and species, and many of our wetlands rely on groundwater.

Our groundwater resources are vulnerable. A more variable climate is affecting rainfall patterns, decreasing surface water flows and reducing groundwater recharge and availability. These risks are heightened as population growth, changing land uses, urban development and increased demand from communities and industries place a strain on our groundwater resources. Gaps in our knowledge and data about groundwater and its quality make managing these risks challenging.

Without better management, the ecosystems, regional communities and valuable industries and economic activities that depend on groundwater could be threatened. We need to make a renewed effort to sustainably manage this important natural resource for the benefit of all of us. Put simply, if we do not continue to adapt and manage our groundwater resources wisely, we will create unacceptable risks to the critical values and uses they support – both today and in the coming decades.

### The need for a groundwater strategy

The First Peoples of NSW have been water managers for millennia. A moral obligation to care for water is a part of their culture of caring for Country. Following European occupation in 1788, Aboriginal people were largely excluded from water management activities.

Over the past 150 years, our management of groundwater has evolved from exploiting our resources (with little consideration given to the environmental impacts of extraction or to conserving and protecting groundwater resources) to introducing sustainable extraction limits and focusing on ecosystem protection.

Today, NSW has a strong framework and robust policies in place to manage the extraction and use of groundwater. However, as this valuable and vulnerable resource comes under increased pressure, we need to take further steps towards sustainability and ensure we can adapt to future challenges. We need to protect and secure our groundwater resources so they continue to support the environment, communities and industries into the future.

The *NSW Groundwater Strategy* is part of a suite of regional and metropolitan strategies aimed at ensuring we have resilient water services and resources in NSW in the decades ahead. The strategy is an element of the *NSW Water Strategy*, a 20-year 'roadmap' that aims to improve the security, reliability, quality and resilience of the state's water resources. It has been developed through a state-wide process of evidence building and engagement, and it also draws together solutions to common state-wide challenges identified in the 12 NSW regional water strategies.



Image courtesy of Jess Thompson. Mascot Spring, Great Artesian Basin.

# 2. Groundwater in NSW

## Our groundwater resources

Extensive groundwater resources are found throughout NSW. Groundwater use has increased over the last decade and some groundwater sources are under stress. In other places, underused groundwater sources have the potential to support economic activities and additional growth. Further information is available in the *Guide to Groundwater Resources*.

### Groundwater resources are extensive across NSW

There are fundamentally 3 types of groundwater systems in NSW:

- fractured rock groundwater systems (basement fold belts and basalts)
- porous rock groundwater systems (sedimentary basins)
- unconsolidated groundwater systems (shallow alluvial and sand dune/beach deposits).

Although groundwater occurs everywhere below the ground's surface, its quantity and quality can vary. The amount of groundwater stored in an aquifer, the ability to get that water out of the ground (i.e. yield) and the quality of the water (which can be affected by various contaminants such as salinity) depends on the geology, the nature of the overlying soils and recharge/flow characteristics.

Groundwater helps maintain a healthy environment by supporting Groundwater Dependent Ecosystems (GDEs), as well as contributing to the water needs of our First Nations, communities and economy.

### What is groundwater?

Groundwater is water below the land surface in the saturated zone. It moves slowly between open spaces in sediment and the cracks (or fractures) of rocks. Groundwater is contained in aquifers, which are underground geological formations with the capacity to store and provide groundwater. Aquifers are replenished by rainfall and surface water sources (such as rivers, creeks and floods) seeping into the ground and recharging the water table. Water then migrates laterally and vertically to naturally discharge at permanent water features in the landscape such as springs, streams and wetlands.

### Groundwater access rights and use in NSW

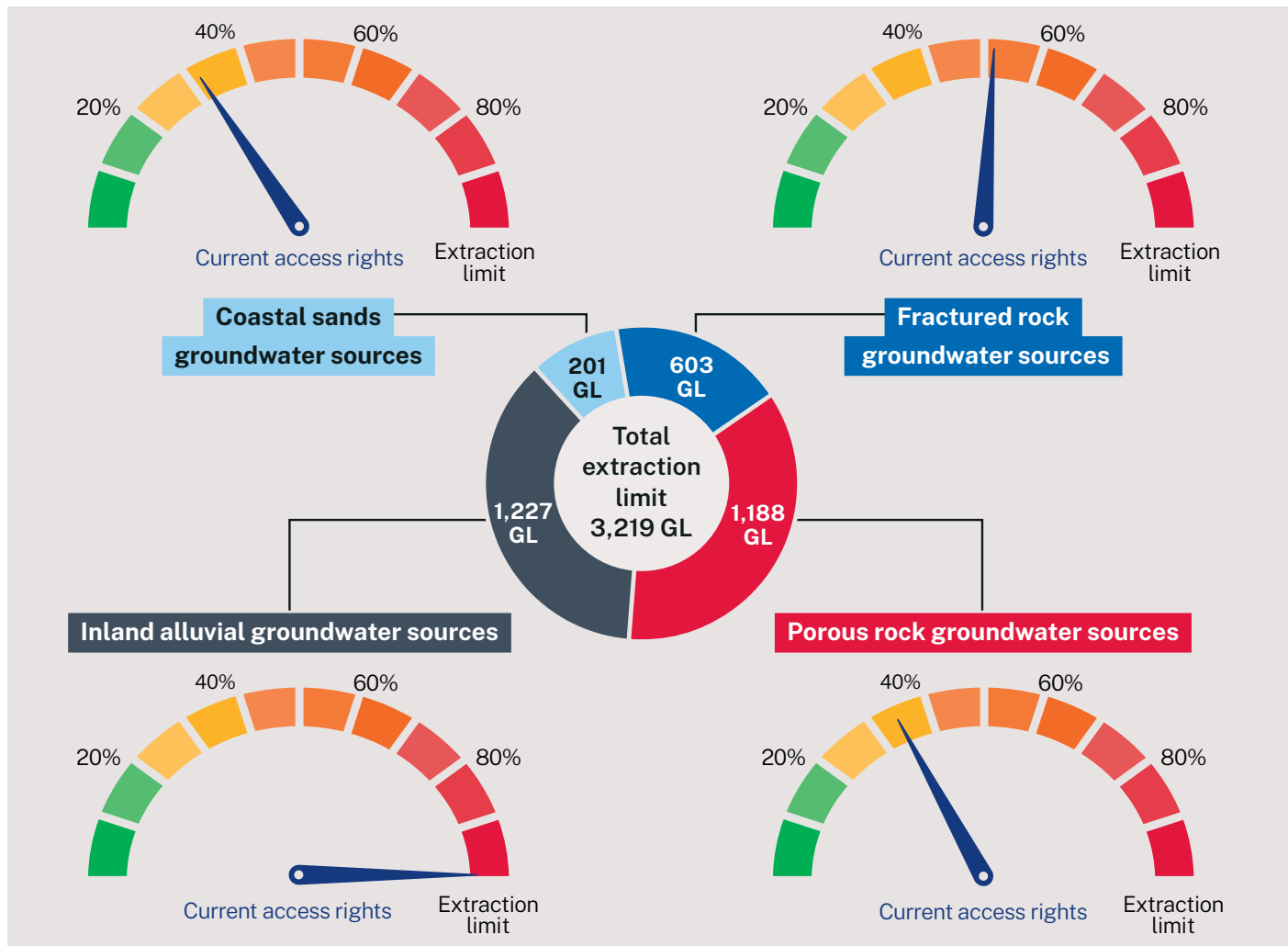
NSW grants rights to individuals or entities to take groundwater, mainly through either access licences or basic landholder rights that do not require a licence. The current number of rights to extract groundwater in NSW is approximately 2.27 million shares, with about 1.97 million of these held under approximately 10,850 individual licences. The remaining 300,000 units are for unlicensed basic landholder rights for domestic and stock use.

Less than 20% of access rights are east of the Great Dividing Range. Groundwater extracted from the highly productive alluvial aquifers across the agricultural regions of the Gwydir, Namoi, Macquarie, Lachlan, Murrumbidgee and Murray catchments in the Murray–Darling Basin account for most of the groundwater used in NSW – as much as 75% of all groundwater extraction and up to 90% of currently metered extraction occurs in these regions. It is mostly used to irrigate annual cereal and fibre crops and fruit and nut plantations.

The average total allowable extraction of groundwater in NSW is close to 3,350 GL per year. Even more groundwater is reserved for the environment. Over the last decade, extraction volumes have ranged from just below 500 GL in a wet year to about 1,550 GL in the extreme drought year of 2018–19.

To protect our groundwater resources, statutory water sharing plans limit the amount of extraction that can occur on an average annual basis. In the porous rock, fractured rock and coastal sands groundwater systems, access rights are currently around 50% or less of their respective extraction limits. Some individual water sources are fully committed and use is high (such as some porous rock water sources within the Sydney Basin and the Tomago sandbeds). In some other sources, the level of commitment is much lower than the extraction limits and there is potential for increased use (such as the Clarence–Moreton Basin and the Lachlan Fold Belt).

**Figure 1. Groundwater access rights (entitlements) as a proportion of extraction limits**



Source: Department of Planning and Environment data.

Entitlement levels = estimate for Basic Landholder Rights + Water Access licences.

Coastal alluvials have not been included as their extraction limits are combined with those of unregulated rivers in coastal draining catchments and are not separately quantified. The total groundwater access rights in the coastal alluvial groundwater systems is 130 GL (assuming 1 unit share of entitlement is equivalent to 1 ML).

## Demand for groundwater is growing

Demand for groundwater is expected to increase by more than 40% over the next 20 years, largely driven by substantial population growth and increased climate variability resulting in less reliable surface water resources (especially in the Murray–Darling Basin). Demand is expected to increase across all sectors that rely on groundwater, except for recreational use.

## Our groundwater management

NSW has a robust, world-leading approach to groundwater management that aims to ensure vital groundwater sources support the environment, communities and the economy. Further information is available in the *Guide to Groundwater Management*.

The multifaceted groundwater management framework adopted by NSW focuses on sustainable groundwater use. This framework is implemented collaboratively by local, state and federal governments and the people, communities and industries that rely on groundwater. Metropolitan water utilities, WaterNSW and non-government irrigation corporations also play significant roles in managing groundwater resources.

Groundwater management in NSW is guided by the *NSW Water Strategy* – a 20-year state-wide strategy to improve the security, reliability and quality of the state’s water resources. The *Water Management Act 2000* is the key legislation for managing groundwater in NSW. The Act establishes principles for managing groundwater resources and provides for enforceable plans to share water between water users, including the environment. The Act requires NSW to protect a groundwater source and its dependent ecosystems as the highest priority, then to provide water for basic landholder rights. Provided these priorities are met, water is then made available for consumptive use for towns and industry.

# 3. Drivers and challenges

As the risks to our groundwater resources increase, our groundwater management approaches need to evolve, mature and adapt to new and emerging challenges.

Four broad factors are driving the need to evolve our groundwater management framework:

## 1. Our climate is changing, and groundwater recharge and demands will be affected by this

In NSW, droughts are expected to be longer, more severe and more frequent due to climate change. This will reduce groundwater recharge, which – in turn – will decrease the availability of groundwater in the long term. Drought will also drive groundwater demand in the short term, as surface water becomes less reliable and available.

## 2. The risks to groundwater of development and land use change are increasing

By 2040, the population of NSW is expected to grow by 1.7 million people. This will create more demand for water, especially in coastal urban areas and expanding regional centres. Growth in regional populations and industries also threatens groundwater quality, especially in the shallow, groundwater reserves in coastal areas which are often high-value freshwater systems.

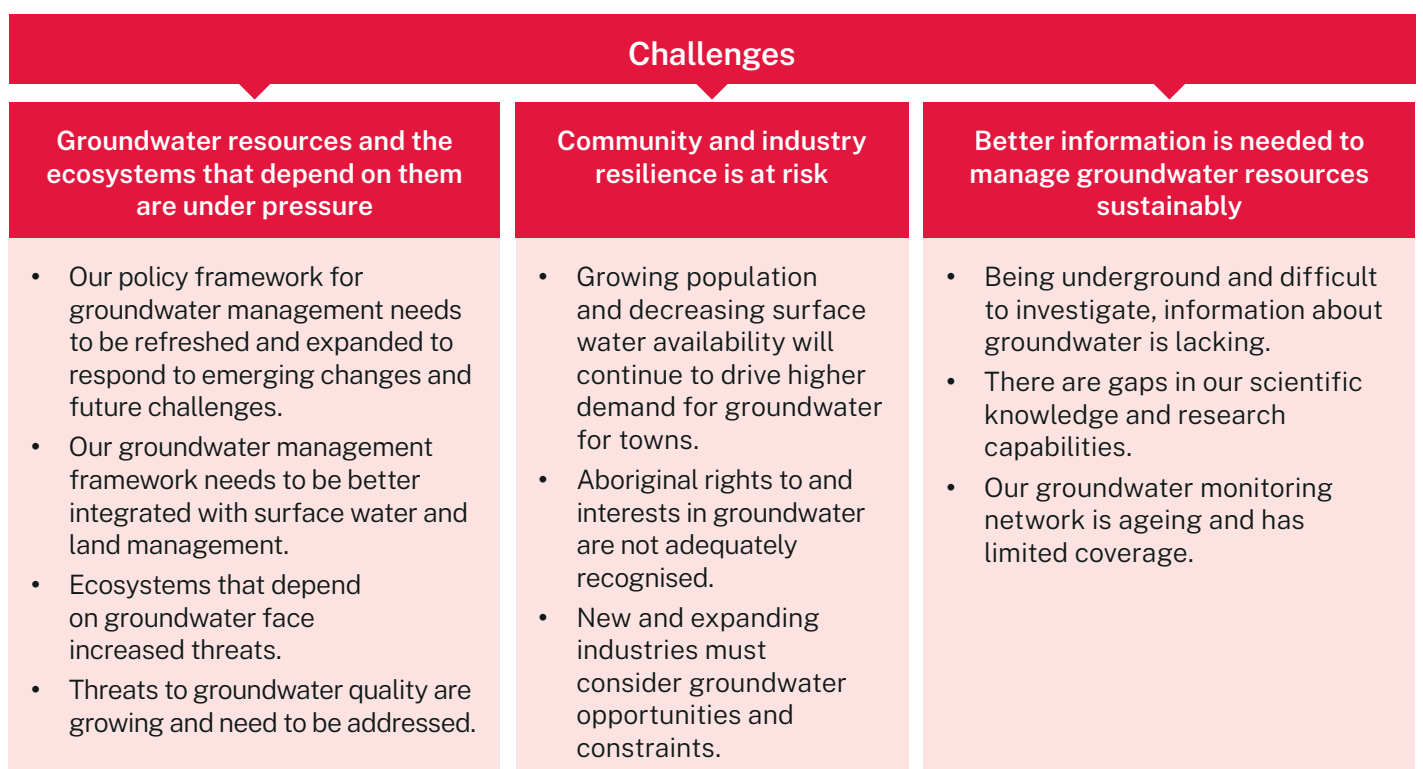
## 3. Community notions of sustainability and fair access to groundwater have evolved over time

Our perceptions of sustainability and environmental protection have changed over the years. As Australia's water resources face increasing pressure, the need to better protect the environment for present and future generations has become an established expectation for governments and communities alike. We must also ensure our groundwater management system is fairer and more inclusive of First Nations people.

## 4. Our understanding of groundwater, its behaviour and use is improving

Science and technology capabilities around groundwater and GDEs continue to evolve. We also have a better appreciation of why, how and when communities and industries use groundwater. We need to incorporate this new knowledge into our groundwater management. We need to develop our knowledge and tools to support informed and collaborative decision-making by government, the community and industry.

In response to these 4 broad drivers of change, we have defined 3 main challenges for sustainable management of the state's groundwater resources, summarised below. The need to tackle these challenges has set the priorities and actions for the *NSW Groundwater Strategy*.





# 4. Strategic priorities

## Strategic priority 1

### Protect groundwater resources and the ecosystems that depend on them



Our groundwater resources and dependent ecosystems are protected to support current and future uses.

#### Action 1.1. Refresh, consolidate and expand our groundwater policy framework

To ensure that groundwater management in NSW is sustainable, our groundwater policy framework needs to be more adaptive in response to challenges such as climate change, increasing urban development and land

use change. The framework needs to be responsive to new information about our groundwater resources and dependent ecosystems and evolve as awareness of Aboriginal people's rights to and interests in water and the importance of sustainable groundwater management for future generations increases.

##### Key actions

##### 1.1 Refresh, consolidate and expand our groundwater policy framework

To continue to manage our groundwater resources sustainably into the future we will review, update, consolidate and expand our groundwater policy and planning framework.

#### Action 1.2. Improve protection of groundwater dependent ecosystems and baseflows to streams

Developing a framework for the protection of important GDEs and groundwater baseflows to streams must be a core priority to facilitate sustainable groundwater

management in NSW. Additional mapping, monitoring, information and knowledge will provide a better understanding for the different types of GDEs that exist in NSW, their ecological importance and location and the groundwater characteristics they need to persist and thrive. Adaptive management approaches will be considered so we can respond to new information and situations as they arise.

##### Key actions

##### 1.2.1 Review and update our methods and processes for protecting groundwater dependent ecosystems and baseflows

We will:

- better consider groundwater dependent ecosystems in the setting of sustainable extraction limits
- better identify and manage the impacts of major developments on groundwater dependent ecosystems (see Action 1.5.3)
- provide for the quality, quantity and timing of water required for groundwater dependent ecosystems through local impact management rules (see Action 1.4.3)
- implement actions in 1.5.1 to better manage surface water and groundwater connectivity and baseflows.

##### 1.2.2 Deliver a program to improve our understanding of groundwater dependent ecosystems

We will:

- establish and verify the location, extent, condition and risk to the health of groundwater dependent ecosystems and improve our understanding of the dependence of these ecosystems and stream flows on groundwater
- ensure our monitoring of groundwater levels, extraction, water quality and ecosystem health can better inform future decisions about groundwater dependent ecosystems and surface water baseflow protection and management.

### Action 1.3. Review and update approaches to sustainable groundwater extraction

As our understanding of groundwater resources and dependent ecosystems improves, we can better quantify groundwater volumes, aquifer boundaries and their connectivity with ecosystems and other water sources. The NSW Government has already begun researching and assessing different methods to better inform the definition of groundwater source extraction limits in NSW. Any new methods we adopt will incorporate the most up-to-date hydrogeological, ecological, and socio-economic information and consider the most recent groundwater risk assessments, as well as new climate change data.

There are 54 groundwater sources in NSW that are fully committed, meaning that if each entitlement

share were assigned a value of one megalitre (ML), the sum of the entitlement shares plus unlicensed rights to take groundwater meet or exceed the groundwater source extraction limit. If underused entitlements are activated, corrective action may be required to keep total use within the groundwater source extraction limit. This may have financial implications for those that are currently using their full entitlement. As the use of groundwater increases, a coordinated and planned approach is needed to manage this issue.

As we improve our knowledge of the requirements of groundwater dependent ecosystems, surface water-groundwater connectivity, water quality and the links between groundwater extraction and acid sulphate soils or aquifer compaction, we can also refine rules to manage localised impacts on groundwater levels.

#### Key actions

##### 1.3.1 Review groundwater source extraction limits using new knowledge

We will design and implement an updated and adaptive approach to review extraction limits at the groundwater-source scale that better considers climate change and improved understanding of resource sustainability.

##### 1.3.2 Improve clarity around management of fully committed groundwater sources where the entitlement 'share value' is low

We will develop and implement an approach that provides improved clarity to water users on the management of fully committed groundwater sources where the entitlement 'share value' is low.

##### 1.3.3 Better manage impacts of extraction at a local level

We will:

- develop triggers to restrict groundwater extraction to manage impacts to groundwater dependent ecosystems, surface water base flows, risks to water quality, aquifer structure, recharge processes, acid mobilisation in soils and unacceptable interference between users
- improve clarity for existing, expanding and new groundwater users about local groundwater level drawdown impacts and potential extraction restrictions in areas of high extraction
- ensure that groundwater management rules for cross-border groundwater sources are harmonised where possible.



Image courtesy of Department of Primary Industries. Bore, Buronga East.

## Action 1.4. Protect groundwater quality within natural limits

Maintaining groundwater at its highest possible quality means that it is usable for the widest range of purposes. The best approach is to prevent groundwater quality degradation in the first place, as remediating polluted or contaminated groundwater is difficult and costly and (even if possible) may take years or decades.

This action focuses on prevention, early detection, intervention and timely management of activities

that could threaten the quality of our groundwater resources, especially in aquifers we know are vulnerable to pollution. It also considers the impacts of climate change and sea-water intrusion on coastal aquifers.

Better groundwater quality monitoring is essential to the success of this action. A collaborative effort will be needed across government agencies and with industry, underpinned by new and updated policy instruments that apply the best available knowledge and science.

### Key actions

#### 1.4.1 Review and update our approach to managing groundwater quality

We will:

- review and update our approach to managing groundwater quality to increase its effectiveness
- clarify the responsibilities, governance arrangements and processes across local and state government agencies and industry for managing groundwater contamination prevention, risk management and remediation and monitoring and reporting
- explore mechanisms and programs for reducing the risks to communities from potentially contaminating activities in vulnerable groundwater sources.

#### 1.4.2 Deliver a program to better understand groundwater quality and risks

We will:

- establish a baseline and on-going groundwater quality monitoring program with associated analytics, including the mapping of groundwater vulnerability to contamination
- undertake assessments of activities with a high risk of contaminating high-value groundwater resources.

## Action 1.5. Better integrate groundwater management with other land and water management processes

Integrating groundwater, surface water and land use management will improve our ability to respond effectively to the challenges facing groundwater resources to ensure that these resources are not compromised and remain available for future generations.

We will move to a framework where land use planning processes and major project approvals better consider and protect groundwater sources and their dependent ecosystem functions early in the planning phase.

We will also adopt a more targeted approach to reducing the impacts on aquifers from large infrastructure projects and industrial activities, recognising that while the current regulatory framework is largely effective, there are regulatory and policy gaps that need to be addressed.

NSW shares several groundwater sources with our neighbouring states and territories, including the Great Artesian Basin, and cross-border cooperation will be critical to sustainably managing and protecting our shared groundwater resources.

## **Key actions**

### **1.5.1 Manage groundwater and surface water together**

We will:

- improve our understanding of surface water and groundwater connectivity processes – including the role of baseflows in supporting riverine environments and stream discharges to groundwater sources, flooding and groundwater recharge
- achieve better integration of our river system models and groundwater models by improving the underlying assumptions about the physical surface water and groundwater interactions
- develop a robust approach to manage surface water–groundwater connectivity and access in water sharing plans
- ensure that surface water and groundwater management plans complement and integrate with each other where feasible.

### **1.5.2 Integrate groundwater considerations into land use planning decisions**

We will:

- develop and implement mechanisms to embed groundwater considerations into state, regional and local planning processes
- improve governance and community collaboration to integrate groundwater management with land use planning and decision making
- assess and protect vulnerable and significant groundwater resources and recharge areas through the land use planning system and regulatory tools
- improve our understanding of the natural and human processes causing and affecting potential contamination in groundwater systems and the landscape
- develop mechanisms to protect significant groundwater recharge areas from destruction or over-development.

### **1.5.3 Improve management of large developments impacting groundwater**

We will:

- revise the *NSW Aquifer Interference Policy*, including investigating aquifer interference approvals and new approaches to managing unlicensed aquifer interference activities
- develop policy and technical approaches to understand and address the individual and cumulative impacts on groundwater of mining activities – including evaluating mining-related groundwater licensing and approval requirements, assessing currently unlicensed legacy groundwater take and the ongoing management of groundwater following mine closure.

### **1.5.4 Strengthen management of shared groundwater resources**

We will:

- implement critical aspects of the Great Artesian Basin Strategic Management Plan and address policy gaps to ensure the continued recovery of groundwater levels in the Great Artesian Basin
- develop and implement cross-border agreements that embed shared principles, common management criteria and associated outcomes, and common processes for trade across boundaries where appropriate
- work with the Australian Government and other jurisdictions to embed groundwater
- considerations into future revisions of the National Water Initiative and ensure alignment with the strategic priorities of National Groundwater Strategic Framework 2016–2026.

## Strategic priority 2

### Build community and industry resilience through sustainable groundwater use



Through sustainable groundwater use, water dependent aspirations of Aboriginal people are supported, water resilience for urban populations is improved and development opportunities are realised.

#### **Action 2.1. Support Aboriginal people's rights, values and uses of groundwater**

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

We will partner with Aboriginal people to co-design a state-wide Aboriginal Water Strategy that will identify a program of measures to deliver on First Nations' water rights and interests in water management. We will provide support and opportunities for Aboriginal people to share their knowledge and contribute to groundwater planning and management policies.

We will also take action to identify, recognise, and protect groundwater-dependent sites and cultural values of significance to Aboriginal people.

#### **Key actions**

##### **2.1.1 Protect groundwater-dependent places of significance to Aboriginal communities**

We will develop a program to identify and enhance protection of groundwater-dependent cultural sites and values in a culturally appropriate way.

##### **2.1.2 Better integrate Aboriginal knowledge into groundwater management**

We will:

- co-design, socialise on Country and implement a program to empower Aboriginal people to fully participate in groundwater management
- provide training and job opportunities for Aboriginal people in the management of groundwater resources
- review the legal framework for groundwater management to better integrate Aboriginal people's knowledge and science into decisions
- implement an awareness program for government agencies to encourage wider understanding of Aboriginal people's values, uses and rights to groundwater.

##### **2.1.3 Increase access to groundwater for Aboriginal people**

We will:

- implement any Closing the Gap targets relating to groundwater entitlements and use
- review the existing cultural access provisions in water sharing plans to overcome barriers to Aboriginal people acquiring these access licences
- consider reserving unassigned groundwater for Aboriginal people where of benefit.

## Action 2.2. Support towns and cities that use groundwater to improve their urban water planning

To maintain water supply security in the face of increasing demand and a changing climate, towns and cities need to protect their existing groundwater access, diversify their sources of water and plan for their future water needs – particularly during drought.

Many initiatives are already in place or underway, such as the Town Water Risk Reduction Program and the Water Efficiency Framework. The focus of this action is to work through these initiatives to facilitate better management of current and future urban groundwater supplies and to ensure that regional towns consider and plan for the sustainable development of groundwater supplies in meeting the requirements of future urban growth and responding to future droughts.

### Key actions

#### 2.2.1 Support improved management of urban groundwater supplies

We will:

- provide support for local water utilities to understand the level of risk to availability and quality of groundwater supplies
- develop guidelines for urban borefield construction, maintenance, decommissioning and monitoring as well as wellhead and capture zone protection
- review the regulation of groundwater stock and domestic basic landholder rights in and around urban centres to assess whether new rules are required to better manage this type of water take – particularly during drought.

#### 2.2.2 Enable efficient and timely integration of groundwater supply options to help growing regional towns and cities, particularly during drought

We will:

- resolve groundwater regulatory and licensing issues for towns, and explore innovative licensing options for groundwater-based drought resilience
- work with local governments to identify and protect high value groundwater resources that can be used in drought and to support future growth
- review and better integrate surface water and groundwater management responses to severe water shortages and other extreme events.



Image courtesy of Jess Thompson. Bingawilpa Spring.

## Action 2.3. Support resilient groundwater-dependent industries in NSW

Groundwater can support new business ventures and economic growth in the decades to come. However, access to groundwater needs to be managed sustainably. To ensure that regional development is viable, resilient and sustainable – especially under a changing climate – current and future regional planning initiatives will need to understand the groundwater-related opportunities and constraints early in the planning and development process.

Better planning will secure sustainable access to groundwater for industry, and support regional

development and economic growth within sustainable limits. Adopting a whole-of-government approach can ensure that clear information about groundwater and its licensing and management framework is available to prospective industries so that both the resource and any new industries are sustainable in the long term.

Technology and innovation can be applied to support communities and industries to improve their access to groundwater, use and store it more efficiently and become more resilient. There are also significant opportunities to use ‘green infrastructure’ – such as managed aquifer recharge – to deliver groundwater management solutions that have community and environmental benefits.

### Key actions

#### 2.3.1 Provide better information to communities and industries on groundwater development constraints and opportunities

We will:

- provide clear guidance to mining and other State Significant Developments about groundwater opportunities, constraints and protection responsibilities that impact their operations through all phases of development, including the management of legacy quality and quantity impacts after closure
- develop groundwater constraints and opportunities guidelines and information products for regional development initiatives
- ensure strategic alignment and information sharing concerning the availability and sustainable use of groundwater in regional planning and development initiatives through a timely whole-of-government engagement approach.

#### 2.3.2 Enable the increase of sustainable groundwater use in targeted areas

We will:

- investigate market or other barriers to sustainable groundwater development in groundwater sources where extraction is low
- continue to provide opportunities for the controlled allocation of new groundwater entitlements in groundwater sources where entitlements are well within sustainable limits and the risks to the groundwater source and dependent ecosystems is low
- provide clarity for existing and potential groundwater users on:
  - opportunities and constraints of the groundwater trading market
  - extraction limits, typical bore yields and quality of groundwater in each groundwater source
  - timing, criteria and mechanisms for offering new groundwater entitlements through tender processes (controlled allocation orders)
  - processes for determining the allocations made available each year to entitlement holders (available water determinations)
  - the entitlement ‘share value’ in each groundwater source (see Action 1.3.3).

#### 2.3.3 Foster innovative groundwater solutions, including managed aquifer recharge, to support communities and industries

We will:

- provide access to, and use of, saline groundwater resources where feasible and sustainable, including ensuring stringent conditions for appropriate disposal of desalination by-products
- investigate the feasibility and use of green infrastructure groundwater solutions such as managed aquifer recharge, including a policy framework with necessary legislative changes and accounting, assessment and approval processes needed to implement managed aquifer recharge.

# Strategic priority 3

## Improve groundwater information and knowledge



Better groundwater management and investment decisions are made based on improved information and knowledge.

### Action 3.1. Develop the groundwater components of a water knowledge plan

Robust decision-making by government and non-government stakeholders needs to be supported by quality information. With better information and knowledge, the risks to our groundwater and the value it provides decrease. Information and knowledge

products such as models must be underpinned by good and accessible data, with systems and management systems that enable its efficient use.

The NSW Government will work closely with the community to understand what they need to know about their groundwater resources and the best approach to building our collective understanding.

#### Key actions

##### 3.1. Develop the groundwater components of a water knowledge plan

The groundwater knowledge plan will target and prioritise information and knowledge to inform Strategic Priorities 1 and 2, including:

- data, systems, tools and information products required
- the specific policies for sharing data and models, as well as information sharing opportunities and pathways
- the mechanisms for review, and periodic update of the knowledge plan, with inclusion of innovative technical solutions as these emerge.

### Action 3.2. Better share and integrate groundwater information

While we have made considerable advances in sharing water data, more can be done to integrate groundwater information into existing platforms, improve how we communicate groundwater information and distribute information products as widely and openly as possible.

Once groundwater data is collected, integrating and sharing it between government agencies and with the public can be challenging because different agencies use separate systems and databases to record and store data. We will improve our communication by collating and hosting previously unreleased datasets, including industry-collected data, in a groundwater specific data repository.

#### Key actions

##### 3.2. Better share and integrate groundwater information

To improve access to relevant and accurate groundwater information and data, and consistent with the groundwater knowledge plan, we will:

- expand the range of knowledge and insights products including information systems, platforms and interfaces for storing, managing, accessing and interrogating groundwater data
- improve and diversify how we communicate information on groundwater resources and their management
- support strategic planning and decision making by councils and groundwater users with improved access to information on groundwater and its management
- develop a unified framework to consolidate and analyse groundwater data across all relevant agencies, groundwater users and impacting activities
- support data and database integration across agencies to address data gaps and improve customer service delivery.



### Action 3.3. Improve our understanding of groundwater resources

Effective management of groundwater requires evidence from both natural and socio-economic sciences. We need to expand our capabilities in multidisciplinary understanding of groundwater, including integrating Aboriginal knowledge into management approaches. We also need to continue to develop new datasets and models that better capture the range of possible climate scenarios.

Enhancing our research into groundwater resources and applying this research to improve groundwater management into the future has been identified within this strategy as a priority for NSW. With a strong foundation of public and private sector water research, NSW is well placed to become a leader in groundwater science.

#### Key actions

##### 3.3.1 Expand our multi-disciplinary understanding of groundwater

We will:

- undertake new research to understand groundwater processes
- better understand socio-economic constraints and opportunities for groundwater demand
- embed information about water user behaviour and cultural values into our conceptual models for groundwater management.

##### 3.3.2 Improve our groundwater models where required

We will develop:

- integrated, fit-for-purpose and peer-reviewed numerical surface-groundwater models where needed
- explore the opportunities to develop and apply multi-disciplinary models that incorporate socio-economic and physiochemical data.

##### 3.3.3 Increase our capacity and capability to apply leading groundwater science

We will:

- formalise strategic research partnerships between the Department of Planning and Environment and other research and industry-led organisations and agencies
- maintain a live government groundwater research prospectus that identifies key research gaps in groundwater science and outlines specific research proposals
- bring together the groundwater community of practice to improve the dialogue about innovative groundwater solutions between researchers, government and industry
- encourage a pipeline of groundwater professionals in NSW.



Image courtesy of Department of Primary Industries. Furrow irrigation of cotton, Warren.

### Action 3.4. Expand and target our groundwater data collection

Greater groundwater data access and sharing will support more informed, collaborative and complex decision making.

Our state-wide network for groundwater monitoring requires regular re-evaluation and maintenance to ensure we are measuring the right things in the right places and making decisions about groundwater resources based on accurate information. This re-evaluation must consider expanding the network (including in coastal areas), upgrading aging

infrastructure, and modernising monitoring equipment, including remote data transmission (telemetry) systems. We will also work with local water utilities to improve their monitoring capabilities.

Actions taken through this strategy will develop consistent data collection and sharing approaches and better integrate the information available across industry and government platforms. Consolidating cross-government groundwater data sources and sharing all available data online through dashboards or other user-friendly tools will also result in better information to support decisions about groundwater.

#### Key actions

##### 3.4.1 Improve our groundwater monitoring infrastructure

We will:

- optimise our existing monitoring network and align it with current and future management needs
- invest in asset maintenance to refurbish existing monitoring infrastructure
- explore and use new technology to enable more efficient collection of groundwater levels and quality parameters.

##### 3.4.2 Improve our groundwater monitoring programs

We will:

- review monitoring programs to ensure continuity of data series
- continuously assess the structural integrity and long-term risk of sediment compaction in priority aquifers
- implement a groundwater quality monitoring program across the state with an emphasis on identifying areas of focus for long-term monitoring
- increase water quality monitoring requirements for impacting industries
- ensure we have a suite of mechanisms in place to measure, monitor or account for all groundwater take in NSW (including legacy take, road and rail projects and major infrastructure dewatering)
- aim to integrate complementary data sources with historical data collection methods
- publish bore location, bore logs, levels/pressures and quality data.



Image courtesy of Department of Planning and Environment. Telemetered monitoring bore.

# 5. Implementing the strategy

A risk-based implementation approach – in collaboration with a range of partners – combined with transparent monitoring, evaluation and reporting will make the *NSW Groundwater Strategy* effective over the long term and deliver measurable ‘on-the-ground’ results.

## Getting our timing right

The *NSW Groundwater Strategy* has a 20-year timeframe. Not all actions in the strategy will commence immediately. Actions will be timed to meet existing challenges, identify and prepare for foreseeable challenges and lay the groundwork for adapting to future uncertainties and changed circumstances. Implementation funding will follow this staged approach.

## Working with partners

Many actions will need to be implemented in collaboration with a range of partners including councils, other government agencies, the community and other non-government stakeholders. This partnership focus is about engaging meaningfully, building trust and transparency, reaching agreement on objectives, and listening and learning together.

## Ongoing monitoring, adaptation and reporting

The strategy is designed to respond to changing circumstances and will be reviewed at least every five years or in response to significant changing circumstances. Amendments may also be made to the strategy in response to key changes in water demand, social preferences, science and technology, economic conditions or other events – including how climate change assumptions and responses evolve. We will report every year against actions in the implementation plan so that the community can track our progress.

**Figure 2. NSW Groundwater Strategy Process**

