

NSW Groundwater Strategy - Stakeholder survey

Thank you for taking the time to provide your feedback on the draft NSW Groundwater Strategy.

Groundwater is water found underground in rock formations called aquifers and is an important resource for NSW. For more information about groundwater, [visit the department's website](#).

The draft strategy sets a long-term vision and direction for groundwater management in NSW.

This survey aims to gather your opinion about the draft strategy. Your comments will help us identify community views and key areas of interest and help us to develop the final strategy.

This survey will close on **Sunday 14 August 2022 at 11.59pm (AEST)**.

The survey is structured according to the draft strategy's main chapters:

- Introduction and general overview of groundwater resources and management in NSW.
- Strategic Priority 1 – Protect groundwater resources and the ecosystems that depend on them in the strategy.
- Strategic Priority 2 – Build community and industry resilience through sustainable groundwater use (this part of the survey also includes an opportunity for Aboriginal people to provide cultural-specific feedback).
- Strategic Priority 3 – Improve groundwater management decisions with better information.

Confidentiality preferences - Publishing your submission

Please indicate if you give permission for your submission to be published on the department's website, and whether you give permission to be identified as the author of the submission or wish to remain anonymous.

I give permission for the department to publish my name with my submission on the department's website.

I do not give permission for the department to publish my name with my submission on the department's website. In selecting this option, I understand that my submission will be published anonymously.

I do not give permission to publish my submission at all.

Sharing your submission within the department

Please indicate if you give permission for your name and email to be included when sharing survey response data internally within the department.

- I give permission for my name and email to be shared within the department.
- I do not give permission for my name and email to be shared within the department. In selecting this option, I understand that my submission will be shared anonymously.

Your submission

If you would like to provide additional feedback in an attached document, please add it to this submission when you return the survey.

Please note, if you wish to remain anonymous, please do not include personal information in your attachment.

If you would prefer to email your feedback or if you have any enquiries, please email the department at nsw.groundwaterstrategy@dpie.nsw.gov.au.

Data privacy

The Department of Planning and Environment is subject to the *Privacy and Personal Information Protection Act 1998* in managing your personal information. In the interests of transparency, the department's website intends to publish all feedback received on its website. You can choose to have your feedback published anonymously or not published at all. Please review our [privacy statement](#) for further information.

Introduction and overview of groundwater resources and management in NSW

Groundwater is water found below the ground in rock formations called aquifers. Groundwater is also used for a multitude of purposes in NSW such as agriculture, town water supply, and also to sustain important ecosystems.

Thinking about your relationship to groundwater, which of the following user groups or parts of the community best describes you? (please select only one)

- General public
- Local Council / Local water utility
- NSW Government department
- Australian Government department
- Domestic and stock
- Agriculture
- Industry
- Manufacturing
- Research / academia
- Environmental group
- Other (please specify) Domestic use (rural) and PhD in groundwater & GDE research -----

In NSW, there are almost 80 groundwater sources west of the Great Dividing Range and over 450 sources on the coast.

Based on the 13 NSW regions outlined in the map below, in which region are you located?



Choose your region

- Border Rivers
- Far North Coast
- Greater Hunter
- Greater Sydney
- Gwydir
- Lachlan
- Macquarie-Castlereagh
- Murray
- Murrumbidgee
- Namoi
- North Coast
- South Coast
- Western

Groundwater is an important resource for NSW. It is used for town water supply, agriculture in the Namoi for example, or industry in the Hunter Valley.

How important is it for you to access groundwater as a resource?

- Not at all important
- Of minor importance
- Neutral
- Important
- Very important

To what extent do you agree with the following statements? (please select one response per row)

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Groundwater is important for basic human needs (drinking, cooking)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Groundwater is important for stock watering	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Groundwater is important for Aboriginal communities and Country	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Groundwater is important for agriculture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Groundwater is important for the environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Groundwater is important for industrial businesses (including mining)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Groundwater is important for manufacturing (water bottling, food processing and others)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Groundwater in NSW currently provides close to 10% of water used for town supply, and over 70% for agriculture, as well as supporting a range of ecosystems. In the context of a growing population and climate change, please answer the following questions.

Please indicate what you think NSW's groundwater needs will look like over the next 20-40 years.

- The same
- Less than current needs
- More than current needs
- Not sure

Which part/s of the community do you think will have the greatest change in their groundwater needs in the future?

Select all that apply.

- Households
- Agriculture
- Industry
- Manufacturing
- Towns and cities
- Aboriginal communities and Country
- Ecosystems dependent on groundwater
- Not sure
- I don't believe there will be any change

Do you think you should change the way you will use groundwater in the future?

- Yes, I've already begun to change my groundwater usage habits
- Yes, I've started doing research and am in the process of making changes
- I've thought about it, but have done nothing more
- No, it hasn't even crossed my mind
- I don't use groundwater

How well do you know the NSW groundwater management framework, rules and legislation?

- Not at all
- Not well at all
- Unsure
- Well
- Very well

The Draft NSW Groundwater Strategy identifies 4 key issues affecting change in groundwater management in NSW.

Please rank these issues from most important to least important, where 1 = Most important and 4 = Least important.

- 1_____ Our climate is changing, and groundwater recharge and demands will be affected by this
- 2_____ The risks to groundwater from development and land use change are increasing
- 4_____ Community notions of sustainability and fair access to groundwater have evolved over time
- 3_____ Our understanding of groundwater, its behaviour and use is improving

See Attached Submission addendum

Please tell us of any other challenges that are affecting groundwater management in NSW.

In the following sections of this survey, you will be asked questions based on each of the draft NSW Groundwater Strategy priorities. [You can read the draft strategy on our website.](#)

Strategic Priority 1 – Protect groundwater resources and the ecosystems that depend on them

Strategic Priority 1 aims to sustain our groundwater resources for current and future uses and protect our important ecosystems that depend on groundwater.

In priority 1 of the draft strategy, 4 key challenges affecting groundwater resources and the ecosystems that depend on them are identified.

Please rank these challenges in order of importance, where 1 = Most important and 4 = Least important.

- 1 _____ Our policy framework for sustainable groundwater management needs to be updated to be more responsive to emerging challenges such as climate change
- 2 _____ Ecosystems that depend on groundwater face increased threats such as intensive groundwater extraction and pollution
- 3 _____ There is a lack of integration between groundwater, surface water and land management
- 4 _____ Threats to groundwater quality are growing and need to be addressed

Please tell us any other challenges you think will affect the protection of groundwater resources and the ecosystems that depend on them.

See attached Submission

How important for you is the protection of groundwater resources and the ecosystems that depend on them?

- Not at all important
- Of minor importance
- Neutral
- Important
- Very important

The department has put forward a range of draft actions to increase the protection of groundwater resources and the ecosystems that depend on them. The following questions will review each of the draft actions and their sub-actions.

Action 1.1 - Refresh and expand our approach to sustainable groundwater management by reviewing and updating our groundwater policy and planning framework.

To what extent do you agree with this draft action?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Action 1.2 - Better integrate groundwater management with other land and water management processes.

To what extent do you agree with this draft action?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

How important to you are each of the following sub-actions required under Action 1.2?

	Not at all important	Of minor importance	Neutral	Important	Very important
Refresh and expand our approach to sustainable groundwater management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Manage groundwater and surface water together	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Integrate groundwater considerations into land use planning decisions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Improve management of large developments impacting groundwater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Strengthen cross-border groundwater management	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Action 1.3 - Improve management and protection of groundwater dependent ecosystems and baseflows to streams.

To what extent do you agree with this draft action?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

How important to you are each of the following sub-actions required under Action 1.3?

	Not at all important	Of minor importance	Neutral	Important	Very important
Review and update our approach to protecting groundwater dependent ecosystems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Deliver a program to improve our understanding of groundwater dependent ecosystems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Action 1.4 - Review and update approaches to sustainable groundwater extraction.

To what extent do you agree with this draft action?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

How important to you are each of the following sub-actions required under Action 1.4?

	Not at all important	Of minor importance	Neutral	Important	Very important
Review groundwater source extraction limits using new knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Better manage impacts of extraction at a local level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Improve clarity around management of groundwater sources with a low long-term entitlement share value	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Action 1.5 - Protect groundwater quality within natural limits.

To what extent do you agree with this draft action?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

How important to you are each of the following sub-actions required under Action 1.5?

	Not at all important	Of minor importance	Neutral	Important	Very important
Review and update our approach to managing groundwater quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Deliver a program to better understand groundwater quality and risks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Please tell us any other suggested actions you think we should consider in Strategic Priority 1.

See attached submission

Strategic Priority 2 – Build community and industry resilience through sustainable groundwater use

Strategic Priority 2 aims to improve water security through the sustainable use of groundwater by urban populations, water dependent cultural, spiritual and economic aspirations of Aboriginal people, and support opportunities for other groundwater dependent development.

The strategy identifies 3 key challenges affecting the resilience of communities and industries using groundwater.

Please rank these challenges in order of importance, where 1 = Most important and 3 = Least important.

- 2 _____ Increasing demand for groundwater undermines town water supply
- 1 _____ New and expanding industries need to consider groundwater opportunities and constraints
- 3 _____ Aboriginal rights to and uses of groundwater are not adequately recognised

Please tell us any other challenge you think will affect community and industry resilience in using groundwater.

See attached

How important is it for you that communities and industries using groundwater resources have a reliable and secure supply?

- Not at all important
- Of minor importance
- Neutral
- Important
- Very important

The department has put forward a range of draft actions to increase the resilience of communities and industries using groundwater. The following questions will review each of the draft actions and their sub-actions.

Action 2.1 - Support towns and cities using groundwater to improve their urban planning.

To what extent do you agree with this draft action?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Action 2.2 - Support economic growth using groundwater.

To what extent do you agree with this draft action?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

How important to you are each of the following sub-actions required under Action 2.2?

	Not at all important	Of minor importance	Neutral	Important	Very important
Provide better information on groundwater opportunities and constraints to communities and industries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Enable the increase of sustainable groundwater use in targeted areas	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Foster innovative groundwater solutions, including Managed Aquifer Recharge (also called 'water banking', to support communities and industries)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Action 2.3 - Support Aboriginal rights, values and uses of groundwater.

To what extent do you agree with this draft action?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

How important to you are each of the following sub-actions required under Action 2.3?

	Not at all important	Of minor importance	Neutral	Important	Very important
Increase access to groundwater for Aboriginal people	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protect groundwater-dependent places of significance to Aboriginal communities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Better integrate Aboriginal knowledge into groundwater management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The following questions focus on groundwater challenges and opportunities for Aboriginal people in NSW.

Please only answer questions 43 to 51 if you identify as Aboriginal or Torres Strait Islander. If you do not identify as Aboriginal or Torres Strait Islander, please go to question 52.

A key objective of the NSW Government is to improve groundwater management outcomes for Aboriginal people across the state. We want to ensure that Aboriginal people and their wisdom and knowledge have a greater influence in groundwater planning and management.

You have indicated that you are of Aboriginal or Torres Strait Islander descent. To help us to better plan for and manage groundwater to support Aboriginal rights, interests and access, please answer these additional questions.

Do you identify as Aboriginal and/or Torres Strait Islander?

- Aboriginal
- Torres Strait Islander
- Both Aboriginal and Torres Strait Islander
- Neither
- Prefer not to say

Please tell us what groundwater health and secure groundwater supply means for you, your family, your clan, your Nation.

Please tell us about the changes you have seen in groundwater management in your cultural landscape.

Large developments are given priority to GW resources when there is little actually known of the cultural importance and heritage of the GW source at a landscape scale

Please indicate which of these cultural opportunities you have seen in action in the way groundwater is managed in NSW.

Select all that apply.

- Cultural wellbeing and healing
- Cultural significance of higher flows to waterways
- Protection and restoration of cultural sites of significance
- Restoring healthy Country
- Cultural ecotourism
- Other (please specify) _____

Please provide any other comments about cultural opportunities or challenges in groundwater management in NSW.

The strategy strives to provide more cultural and economic opportunities for Aboriginal people in relation to groundwater.

What are the most important opportunities for you?

Select all that apply.

- Fairer access to traditional land and resources
- Better contemporary economic opportunities in culture and recreation
- Increased access to employment and commercial opportunities on projects
- Improving awareness of Aboriginal people’s knowledge and contribution to how groundwater is managed in NSW in the next 20-40 years
- Other (please specify) _____

Please provide any other comments about benefits of cultural and economic opportunities and how we realise those benefits in groundwater management and planning in NSW.

This concludes the questions specific to your cultural heritage. If you would like to provide additional material to support your position, please email them along with this document.

Please tell us any other suggested actions you think we should consider in Strategic Priority 2.

Strategic Priority 3 – Improve groundwater management decisions with better information

Strategic Priority 3 aims to support better groundwater management and investment decisions with improved innovation and knowledge.

The strategy identifies 3 key challenges affecting the use of information to manage groundwater resources sustainably.

Please rank these challenges in order of importance, where 1 = Most important and 3 = Least important.

2_____ Being underground and difficult to investigate, information about groundwater is lacking

1_____ There are gaps in our scientific knowledge and research capabilities

3_____ Our groundwater monitoring network is ageing and has limited coverage

Please tell us any other challenge you think is affecting the use of information and data to manage groundwater resources.

See attached notes

How important is it for you to have access to more information and data about groundwater management and use?

- Not at all important
- Of minor importance
- Neutral
- Important
- Very important

How interested are you in finding out more about how groundwater is managed and used?

- Not at all interested
- Of minor interest
- Neutral
- Interested
- Very interested

What ways could the department use to communicate with you and others in your community about groundwater management?

A central online data base that incorporates and reports on all available water information - combining industry, academic and government data to provide open and timely public access to monitoring data and reports.

Additional funding for research projects including those advocated by affected communities.

Please tell us what type of information and data about groundwater resources you would like available on our departmental website?

More detailed and accurate mapping of hydrogeological resources including GDEs on a regional and local scale.
Real-time reporting of groundwater levels and changes in water quality in a significant increased network of monitoring peizometers.

Technology now allows cost effective real-time reporting of changes to groundwater levels and water quality.
Installation a network of monitoring peizometers across the state strategically located to provide information on base flow contributions to streams especially in areas subjected to current and potential pressures on groundwater resources from large infrastructure developments.

The department has put forward a range of draft actions to improve the use of data and information to make groundwater management decisions. The following questions will review each of the draft actions and their sub-actions.

Action 3.1 - Develop a groundwater knowledge plan to improve how we use groundwater information to make decisions.

To what extent do you agree with this draft action?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Action 3.2 - Better share and integrate groundwater information.

To what extent do you agree with this draft action?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

How important to you are each of the following sub-actions required under Action 3.2?

	Not at all important	Of minor importance	Neutral	Important	Very important
Expand the range of knowledge and insights products including information systems, platforms and interfaces for storing, managing, accessing and interrogating groundwater data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Improve and diversify how we communicate information on groundwater resources and their management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Support strategic planning and decision-making by councils and groundwater users with improved access to information on groundwater and its management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Develop a unified framework to consolidate and analyse all groundwater data across all relevant agencies and groundwater users and impacting activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Support data and database integration across agencies to address data gaps and improve customer service delivery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Action 3.3 - Improve our understanding of groundwater resources.

To what extent do you agree with this draft action?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

How important to you are each of the following sub-actions required under Action 3.3?

	Not at all important	Of minor importance	Neutral	Important	Very important
Expand our multi-disciplinary understanding of groundwater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Improve our groundwater models where required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Increase our capacity and capability to apply leading groundwater science	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Action 3.4 - Expand our groundwater data collection.

To what extent do you agree with this draft action?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

How important to you are each of the following sub-actions required under Action 3.4?

	Not at all important	Of minor importance	Neutral	Important	Very important
Improve our groundwater monitoring infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Improve our groundwater monitoring programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Please tell us any other suggested actions you think we should consider in Strategic Priority 3.

See attached

If you have any further feedback, please provide any final comments or upload additional material here.

See attached

About you

We appreciate your time in responding to this survey. Before you submit your survey response, we would appreciate your feedback to help us more broadly understand our audience. This enables us to communicate more clearly and to customise messages to the community. Please choose 'Prefer not to say', if you would rather not answer a question.

The information you provide will only be used for the purposes of this survey, to assist us in preparing the final NSW Groundwater Strategy and in the development of new groundwater policies and plans for NSW.

Personal information

Please note, your personal information will only be shared if you granted permission for this to occur



Your business name (if you are responding on behalf of an organisation)

How did you hear about this survey? Select all that apply.

Community group

Department's website

Email or e-newsletter from the department

Newspaper

NSW Government announcement

Radio

Social media - Facebook

Social media - Instagram

Social media - LinkedIn

Television

Word of mouth

Work in the Water industry

Other (please specify) -----

Prefer not to say

What age bracket do you fit into?

- Under 18 years
- 18 - 24 years
- 25 - 34 years
- 35 - 44 years
- 45 - 54 years
- 55 - 64 years
- 65 - 74 years
- 75 + years
- Prefer not to say

How do you describe your gender?

- Female
- Male
- Non-binary
- Other
- Prefer not to say

Do you speak a language other than English at home?

- Yes (please specify) _____
- No
- Prefer not to say

Do you identify as a person with a disability?

- Yes
- No
- Prefer not to say

Enter your postcode:

Thank you for completing this survey. Please email to nsw.groundwaterstrategy@dpie.nsw.gov.au

Submission on NSW Groundwater Strategy – 20 year plan.

Dr Julia Imrie

BSc. Dip Ed. Grad Dip Water Res. PhD



I support the Draft NSW Groundwater Strategy priorities though they need to go beyond rhetoric and result in timely action. The success of this strategic plan relies on appropriate funding and how and in what time-frame they are implemented. This submission draws on knowledge gained from my PhD through Australian National University funded by ARC with support from the previous NSW Office of Water.

Comments to accompany stakeholder survey form:

Challenges that are affecting groundwater management in NSW

A precautionary approach is essential for the protection of our groundwater systems into the future. Climate change predictions indicate a 50% reduction in groundwater recharge by 2060 in many areas of the state – extended periods of low rainfall will result in competition between water-users for limited groundwater sources, resulting in conflict, risk of over-extraction and additional loss of vulnerable ecosystems and biodiversity hotspots.

There are significant gaps in our knowledge and understanding of groundwater connectivity, interaction with surface streams and the identification and assessment of GDEs. This requires a substantial increase in research supported by additional resource mapping, monitoring and analysis.

The Groundwater Strategy and implementation should ensure:

- Prioritise management during climatic extremes rather than on a range of average conditions (e.g. plan around low rainfall periods in the percentile <0.05 mm/mth)
- Improve understanding and protection of GDEs to build resilience in our surface and groundwater systems and help inform evidence based adaptive change. GDEs are both the proverbial canary in the coal mine and a window into groundwater.
- Economic growth should not be given priority over the protection of irreplaceable freshwater ecosystems that provide resilience in a changing climate
- The Aquifer Interference Policy is reviewed and updated to make it much stronger and effective in protecting groundwater sources in line with the strategy priorities.
- EPA environmental pollution licences that apply to large infrastructure projects such as mining are revised to ensure they are effective in protecting groundwater (quality and quantity) in accord with strategy priorities

Aquifer Interference Policy needs to recognise the different types of groundwater sources and how they contribute and interact with surface water. For example porous rock aquifers are undervalued due to a largely agricultural bias towards aquifers with a higher potential for extractive productivity. My research into porous Triassic sandstone aquifers indicates that their slow groundwater discharge provides valuable 'fresh' baseflow to streams during dry periods. A greater than 2 metre drop in aquifer levels that discharge as baseflow to streams can have disastrous consequences on groundwater dependent riparian vegetation and instream aquatic biodiversity.

EPA environmental pollution licences applying to groundwater impacts (quality and quantity) from mining and other industries requires revision and regular scrutiny to ensure they are fit for purpose, appropriately targeted and effective at protecting groundwater sources. Not rely on 'set and forget' or industry self-regulation.

Strategic priority 1: Protect groundwater resources and the ecosystems that depend on them - Challenges that affect the protection of groundwater resources and the ecosystems that depend on them

There is a concerning lack of groundwater mapping information, understanding of recharge and discharge and the role and contribution of groundwater to sustaining stream base flows and GDEs during periods of low rainfall. Without this basic knowledge we are unable to effectively protect and manage these systems sustainably.

For example there is only one high priority GDE recorded in WSPs for the whole of the upper Goulburn as noted in this recent Mine report;

“no high priority groundwater dependent ecosystems or high priority culturally significant sites identified in the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009 or Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016 in the vicinity of the Moolarben Coal Complex”

However there are a number of currently unacknowledged and undervalued terrestrial and aquatic GDEs including riverine terrestrial forests and freshwater springs emanating from Triassic sandstones and associated with Tertiary basaltic intrusions such as The Drip Gorge which has over 50,000 visitors per year (Source: Mudgee NPWS). The hydrogeology of the Wollar, Bylong, Moolarben valleys support stream baseflows, flora range extensions, dry rainforest vegetation, seeps and springs, all are valuable assets, culturally significant with many used traditionally as a permanent drought-proof source of fresh water.

Other suggested actions you think we should consider in Strategic Priority

Large infrastructure developments (e.g. coal mining) that have major impacts on groundwater have been approved with very little understanding of the implications of long term depressurization of regional and intermediate groundwater levels that will persist for 100s of years.

Implementation of the Groundwater Strategy should include an independent process that would assess the cumulative long term impact of mining industry on regional groundwater assets.

Strategic Priority 2 – Build community and industry resilience through sustainable groundwater use.

I support the investigation and use of Managed Aquifer Recharge MAR appropriate use of recycled water to help reduce groundwater extraction, diversify sources and avoid over extraction.

I object to actions that encourage increased use of groundwater for economic development and the release of new groundwater licences under Controlled Allocation Orders for new mining and gas projects.

Strategic Priority 3 – Improve groundwater management decisions with better information

Funding of water monitoring and research has been piecemeal and erratic, resulting in poor decision-making around water resources. There needs to be a long term government commitment to funding significant increases in monitoring, research and support for innovation if we are to avoid future water shortages and environmental degradation.

Powerful lobby groups have had a disproportionate influence on decision-makers and politicians. There needs to be a higher level of independent scrutiny of groundwater reports and models that advocate for mining & gas projects.

- Reports and reviews required by planning and the EPA should be carried out by independently funded experts i.e. at arm's length from industry and government influence.
- Industry should be obliged to provide all surface and groundwater monitoring data collected (including those required under conditions of consent) to a government managed centralised online database. All groundwater interception, use and interference by mining activities must be transparent and accountable.

Incomplete or deficient groundwater data for the shallowest water levels adjacent to streams distorts the accuracy and reliability of 'inferred' groundwater dependency on which much GW mapping is based.

- All riparian terrestrial GDE that is dependent at some stage on subsurface presence (e.g. during extended dry periods) should be prioritised as providing both 'diversity' and 'vital' habitat and rated a high ecological asset (HVAE).

Commit to a regular (five yearly) timeline for reviewing and improving the Groundwater Strategy and Implementation/Action Plan.

Thank you