Greater Sydney Drought Response Plan Overview

Being prepared for drought

August 2022

NSW GOVERNMENT

Sydney WATER

WaterNSW

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Image courtesy of WaterNSW.
Cataract Dam and Lake Cataract, Appin.

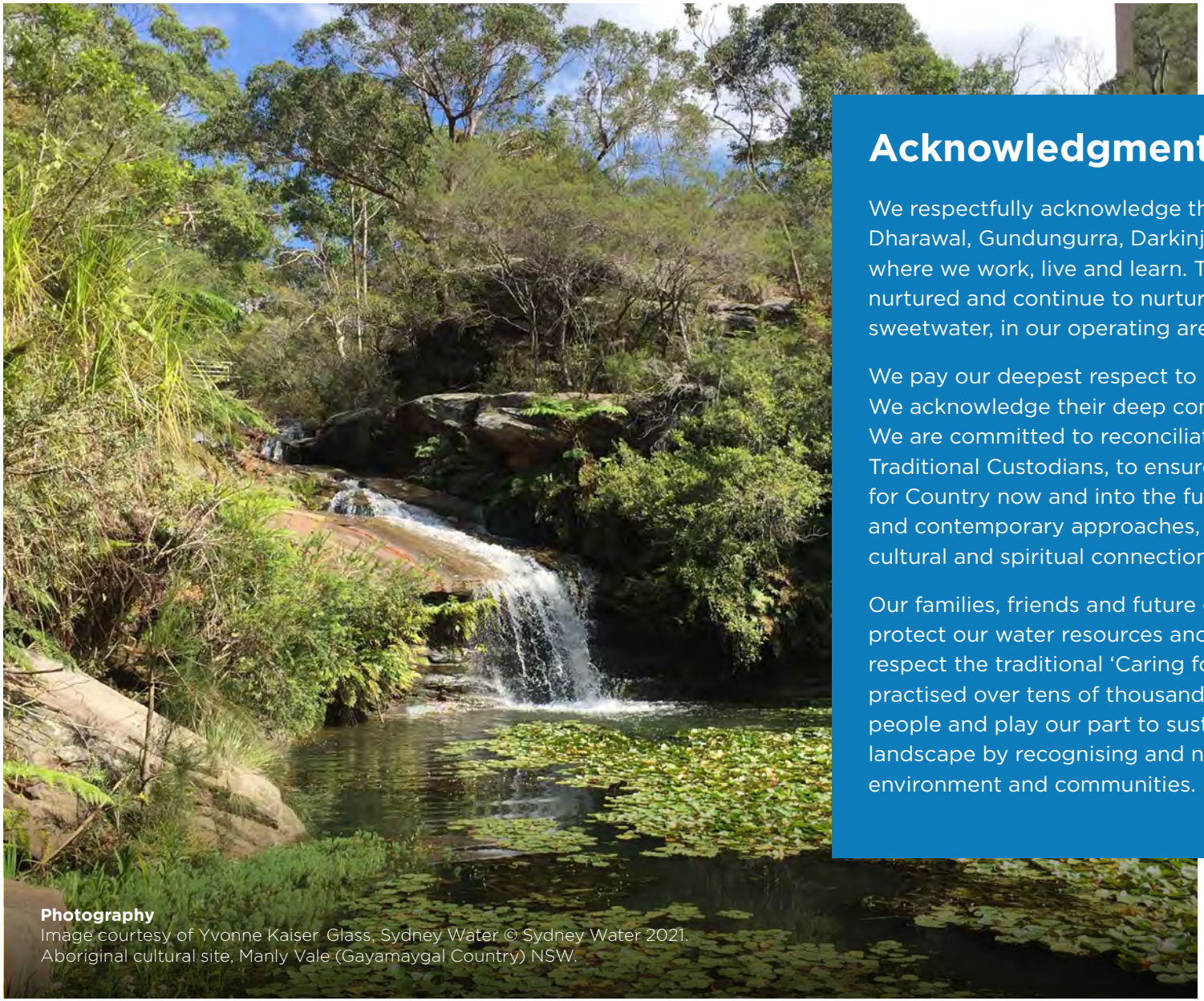

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Image courtesy of Yvonne Kaiser Glass, Sydney Water © Sydney Water 2021.
Aboriginal cultural site, Manly Vale (Gayamaygal Country) NSW.

Acknowledgment of Country

We respectfully acknowledge the Traditional Custodians across Dharawal, Gundungurra, Darkinjung, Dharug and Eora nations where we work, live and learn. Their lore, traditions and customs nurtured and continue to nurture the waters, both saltwater and sweetwater, in our operating area, creating wellbeing for all.

We pay our deepest respect to Elders, past and present.
We acknowledge their deep connections to the land and waters.
We are committed to reconciliation and partnering with our Traditional Custodians, to ensure ongoing collaboration on Caring for Country now and into the future, learning from traditional and contemporary approaches, while maintaining and respecting cultural and spiritual connections.

Our families, friends and future generations depend on us to protect our water resources and our environment. In doing so, we respect the traditional 'Caring for Country' restorative approaches practised over tens of thousands of years by our First Nations people and play our part to sustain and improve the health of the landscape by recognising and nurturing the value of water in our environment and communities.

Contents

Photography
Image courtesy of Department of Planning and Environment.
Malabar, Sydney.

Why does Greater Sydney need a drought plan?

The Greater Sydney Drought Response Plan sets out how Sydney Water, WaterNSW and the NSW Government will work together to respond to droughts in the future.

Greater Sydney is home to over 5 million people and will accommodate an additional 1 million people by 2036. Water is essential for Greater Sydney to grow and prosper. As well as meeting the daily needs of households and businesses, water is vital for maintaining Greater Sydney's amenity and liveability, and for protecting and enjoying the region's unique natural environment.

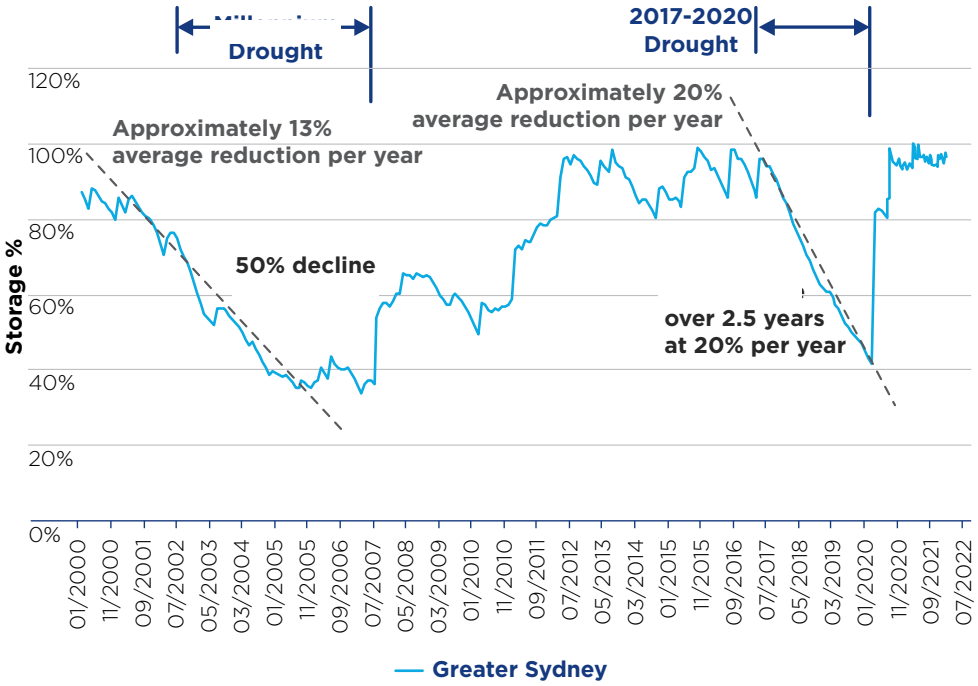
Water supports and sustains Greater Sydney as a highly successful global city, the nation's largest economic centre and the powerhouse of the Australian economy (contributing approximately a third of Australia's economic GDP). Over the last 20 years, Sydney has been in drought almost 50% of the time. To continue building a vibrant prosperous city, we must meet the city's needs both in and out of drought.

From mid-2017 to early February 2020, the Greater Sydney system, inclusive of the Illawarra and Blue Mountains, experienced one of the worst drought sequences on record. This period saw record low inflows across all catchments and unprecedented storage depletion rates, reducing total storage by over 50% in 2.5 years (Figure 1).

This event highlighted Greater Sydney's vulnerability to severe drought, showing:

- storage levels can deplete more rapidly in extreme dry conditions than previously observed and planned for
- some water delivery systems can be impacted much faster than others
- had the severe drought sequence continued with the same intensity, the timely delivery of new supplies to avoid severe water restrictions or running out of water would have been at risk.

Figure 1. Declining dam levels during the last two droughts



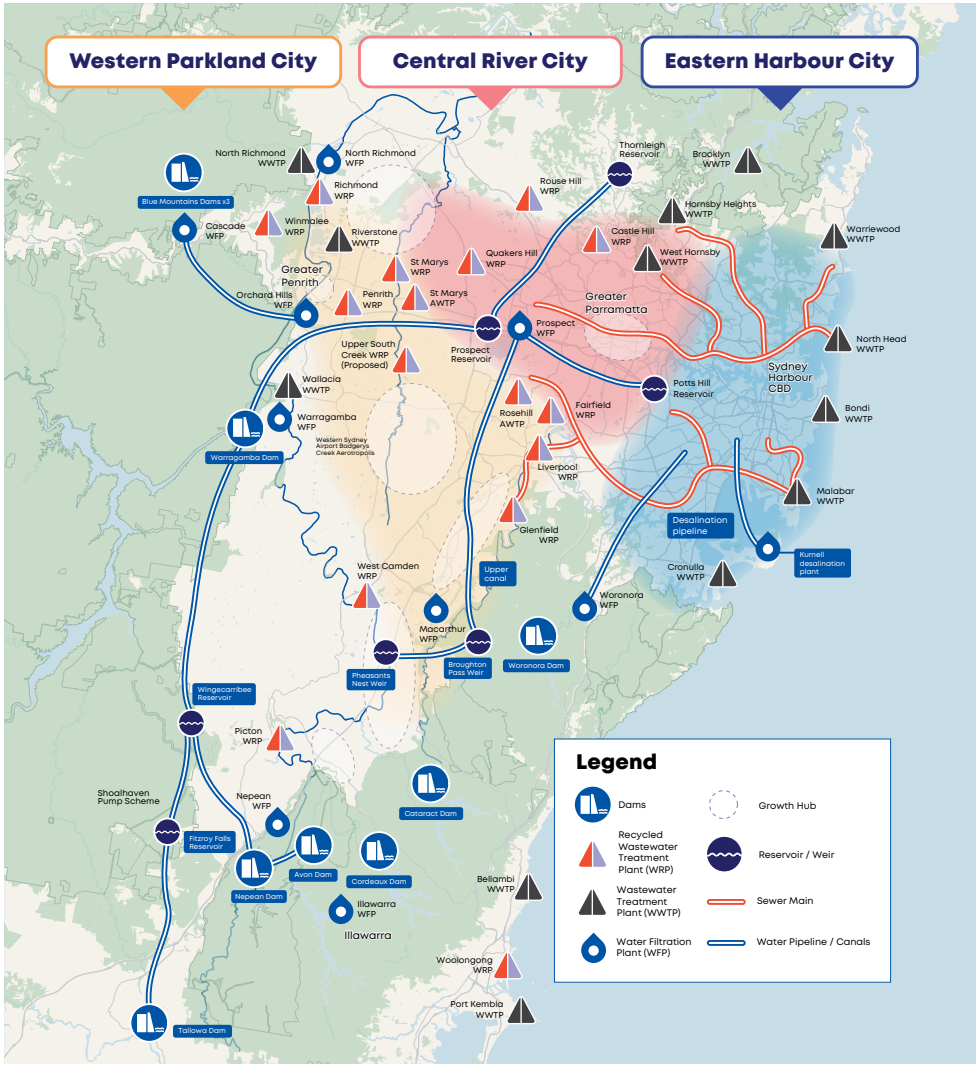
To better respond to potentially more severe droughts due to climate change, there is a need for an adaptive plan that allows decisions and actions to adjust to observed conditions, growth, supply challenges, and to the broader context. We also need to allocate adequate time to prepare for drought to allow plans and resources to be put in place for effective drought response.

Who is responsible for managing Sydney's water supply system?

- **WaterNSW** manages and operates the dams that collect rainwater runoff from river catchments to the south and west of Sydney. The water is stored and transported via a network of rivers, pipes and canals to Sydney Water's filtration plants. WaterNSW is also responsible for protecting the health of Greater Sydney's drinking water catchments including during periods of drought. WaterNSW and Sydney Water are responsible for implementing the majority of drought response measures under the GSDRP.
- **Sydney Water** operates the nine water filtration plants—directly or by private contract—that treat the raw water provided by WaterNSW. Sydney Water takes the treated drinking water and distributes it to customers and collects and treats wastewater, provides recycled water services to some areas and manages some major stormwater infrastructure. It is also responsible for planning and incurring costs of water supply options. Sydney Water and WaterNSW are responsible for implementing the majority of drought response measures under the GSDRP.
- The **Department of Planning and Environment's Water Group** leads and coordinates metropolitan water strategy for Greater Sydney. It supports Sydney Water and WaterNSW to implement the GSDRP and plays a key role in coordinating advice to the Minister for Water and supporting the NSW Government's decision-making to respond to drought.

Read more about how Sydney's water system is managed in the Greater Sydney Water Strategy.

Figure 2. Greater Sydney's water and wastewater network map



Source: Used with permission of Sydney Water. © Sydney Water 2021.

How do we know when Greater Sydney is in drought?

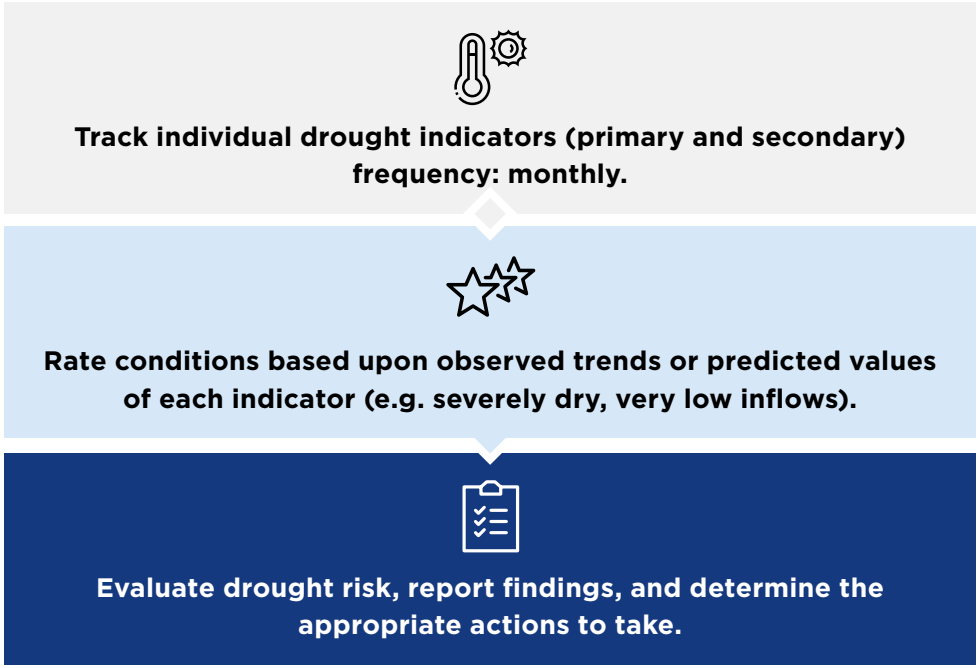
The onset and severity of drought are challenging to predict. There are multiple factors that operate on different temporal and spatial scales, including the changing climate. Climate change will not only impact rainfall patterns and our water supply but increases in temperatures will often lead to increases in water demand.

The 2017-20 drought demonstrated the risk associated with relying on historical experience and dam levels to trigger key decisions and drought response measures. Storages can deplete rapidly in a severe drought, leaving less time than initially anticipated to plan and deliver time-critical actions.

The Greater Sydney Drought Response Plan (GSDRP) addresses this by setting up a structured drought monitoring process to track, assess and share the relevant information to decision-makers on climatic, hydrologic and water supply conditions and trends. Drought has a slow onset nature, but its impacts are felt over a long period of time. Therefore, regular monitoring and evaluation of conditions and water supply risks are essential to initiate actions and aid decision-makers in making critical drought management and investment decisions.

The monitoring process (Figure 3) uses key indicators to track drought conditions and give early warning through a simple traffic light system. The indicators comprise observations and projections that relate to or affect (rainfall-dependent) surface water supply availability.

Figure 3. Drought monitoring process



Primary and secondary indicators (Figures 4 & 5) used in this process are easy to understand and communicate. They leverage the analysis and tools that are already available, with the primary indicators having a higher degree of influence in prompting decisions.

The process of evaluating indicators and drought risk will be improved over time as more sophisticated analysis and drought forecasting capabilities are developed.

Figure 4. Primary drought indicators

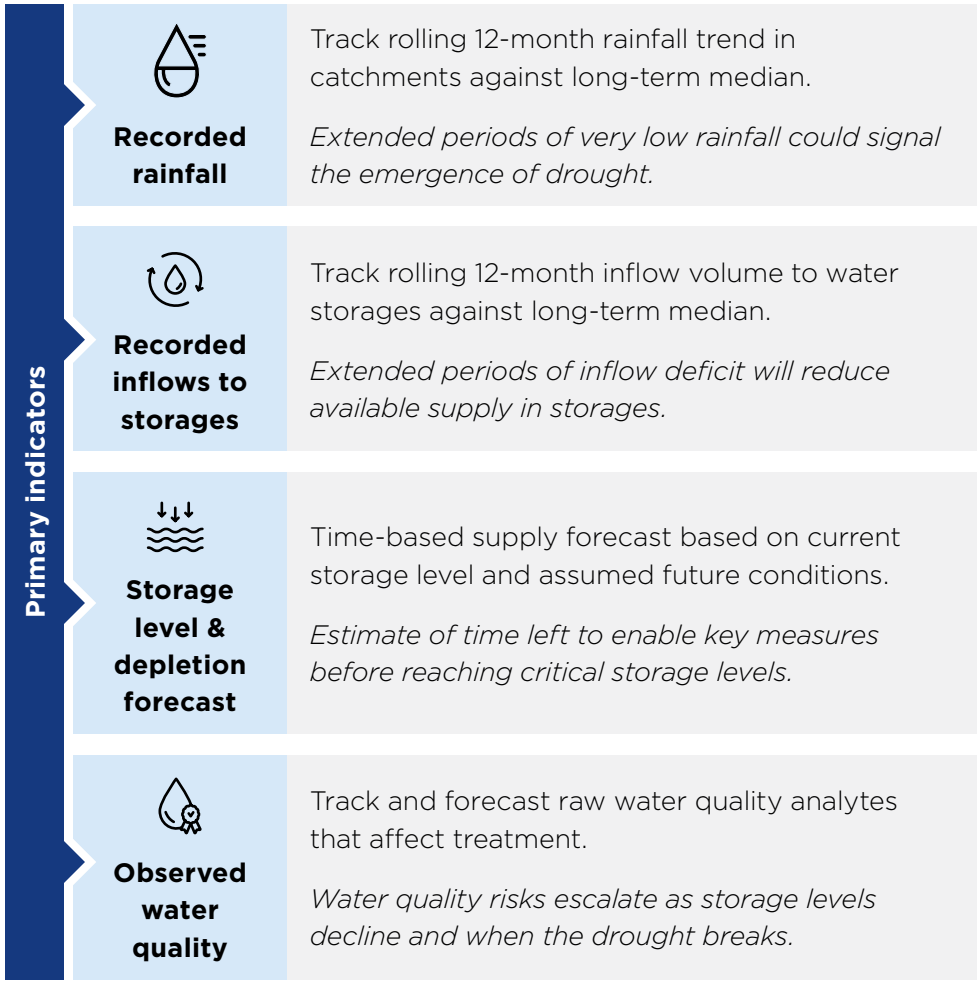
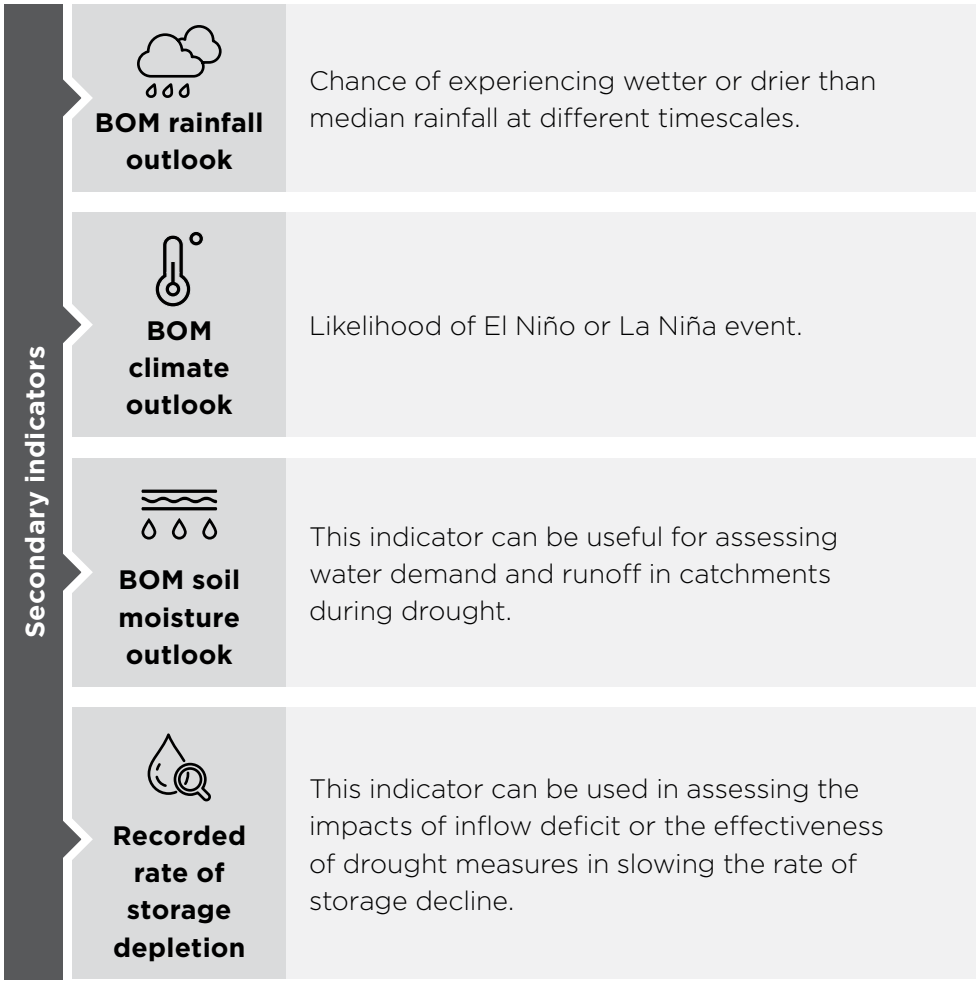


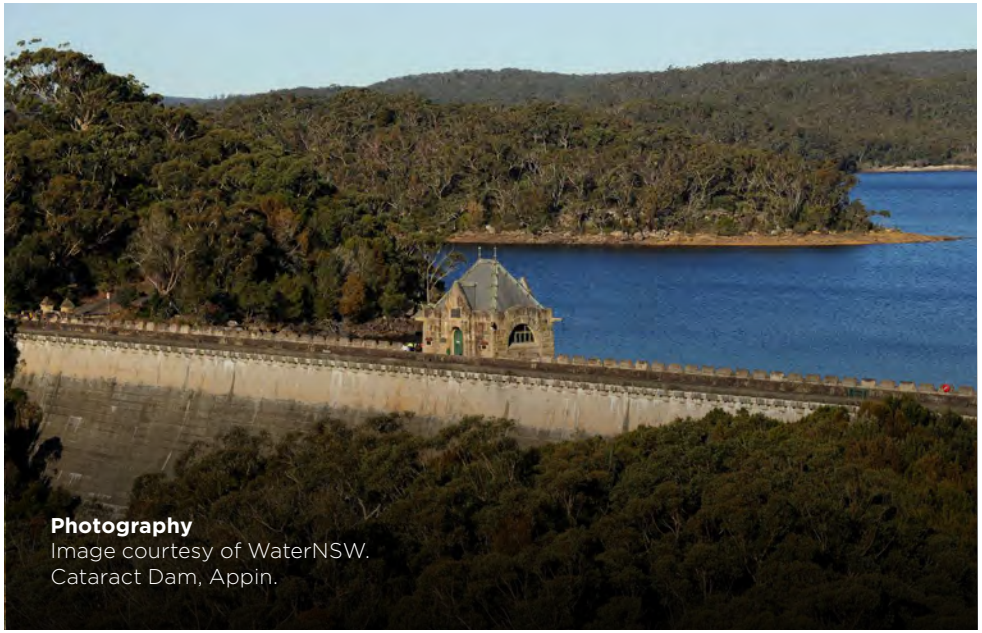
Figure 5. Secondary drought indicators



When should we start our drought response?

The GSDRP introduces the concept of a staged drought response to enhance preparedness by defining actions and decisions that are required pre drought, as drought conditions develop and intensify, and during recovery. The focus of, and conditions to activate each stage are summarised in Table 1.

This approach allows Sydney Water, WaterNSW and the NSW Government to take the necessary steps at each stage, to plan and develop response measures that can be enabled quickly and delivered in time to mitigate the supply risks.



Photography
Image courtesy of WaterNSW.
Cataract Dam, Appin.

Table 1. Focus and condition of each stage of drought

Stage	Focus	Condition
Normal operations	We will build capability and set up processes to enhance our drought preparedness.	Drought indicators signal risk of drought is very low.
Preparing for drought	We will quickly enable resources and make time-critical decisions in response to drought.	Indicators signal drought risk is high. Anticipated between 85% and 75% storage levels.
Responding to drought		Total storage at 60% or earlier if indicators signal early response is needed.
Extreme drought	We will plan and allocate resources for managing the worst-case scenario.	Indicators signal dry conditions likely to persist. Total storage approaching 30%.
Transitioning out of drought	We will capture learnings and consider which initiatives are appropriate to progress outside of drought.	Indicators signal wet conditions are likely to continue and supply risks have abated. Recovery could start when storages return to 60% or higher.

What should we do in a drought response?

Key elements of the GSDRP	
Drought governance	**How and when key decisions and actions need to be undertaken and responsible parties:** • governance structure, including roles and responsibilities and decision-making processes for managing drought across Sydney Water, WaterNSW and the NSW Government • drought indicator monitoring to activate drought stages and guide decision-makers.
Demand-side responses	**Measures that reduce Greater Sydney's overall water demand both in and out of drought:** • water restrictions • water conservation, including enhanced water efficiency programs, system leakage reduction and alternative water sources, such as recycled water.
Supply-side responses	**Measures that increase Greater Sydney's water supply:** • actions required to maximise existing supplies and maintain service continuity to customers at low dam levels • supply augmentation requirements to ensure additional rainfall independent supply is deliverable before or in the next drought.

An overview of what actions need to be taken under different stages of drought is shown in Figure 7 and Table 2. Many measures need to progress under normal operations as part of Sydney Water, WaterNSW and NSW Government business functions.

As outlined in the Greater Sydney Water Strategy, Sydney needs to build additional rainfall-independent supply to increase our resilience to potentially more severe drought impacts due to climate change and a growing population. Work to augment supplies is progressing outside of drought and decisions need to be made when storages are high to ensure additional rainfall-independent supply is deliverable before or in the next drought.

Additionally, there are operational challenges and distribution risks that need to be managed to ensure continuity of supply is maintained in drought. We need to build and maintain diverse water conservation programs outside of drought to make our drinking water supply go further at relatively low cost. This can delay the timing of investment in new large-scale supply infrastructure.

Once we transition from 'normal operations' to the 'preparing for drought' stage, drought governance will be initiated to enable an efficient, effective, and well coordinated response across Sydney Water, WaterNSW and the NSW Government. This structure is shown in Figure 6.

Figure 6. Drought governance structure

Minister for Water

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Drought Executive Committee

Brings together leadership from Government, Sydney Water and WaterNSW to make key drought response decisions.

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Drought Management Committee

Brings together officers and senior officers from Government, Sydney Water and WaterNSW to advise on and oversee drought response measures.

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Drought Working Groups

Brings together expertise from Government, Sydney Water and WaterNSW to deliver drought response measures.

Photography
Sydney Desalination Plant, May 2021.

Figure 7. Stages of drought and recovery

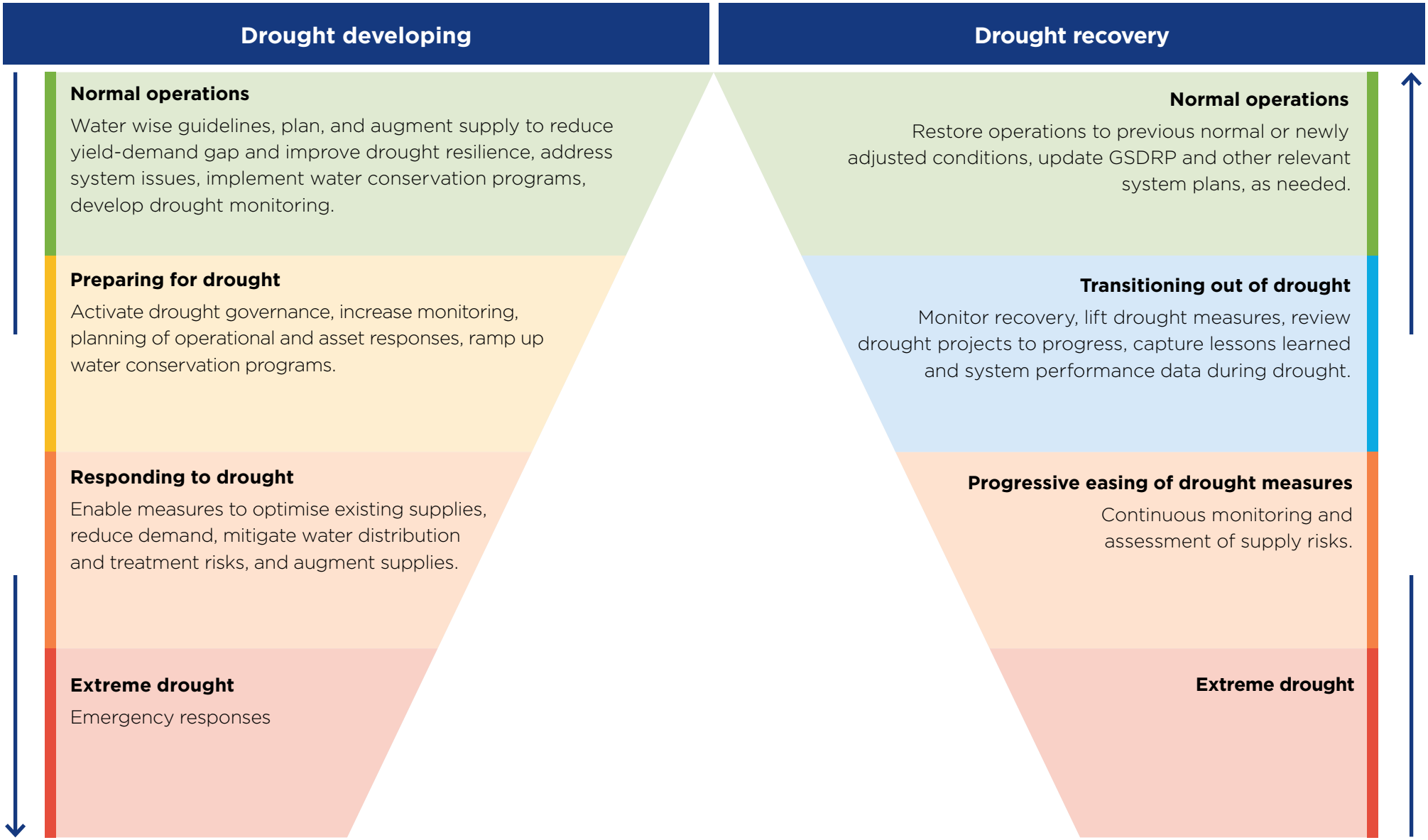

Table 2. The GSDRP plan on a page

Stage	Governance	Demand-side	Supply-side
Normal operations We will progress planning, build capability and set up processes to enhance drought preparedness.	• Undertake drought monitoring and regular assessment of and reporting on conditions and drought risk. • Develop a plan to build capability and prepare for extreme droughts.	• Water wise guidelines, supported by appropriate communications. • Develop and enhance a diverse, adaptable, and robust baseline water conservation program.	• Progress planning so that so there are viable and desirable 'drought triggered' supply augmentation options available. • Develop and implement programs to improve the capability and resilience of existing water supply assets.
Preparing and responding to drought We will quickly enable resources and make time-critical decisions in response to drought.	• Activate Governance structure (Figure 6). • Increased drought indicators monitoring to determine if drought is intensifying or a return to normal conditions is occurring.	• Plan to scale/enhance water conservation measures and activities. • Develop protocols outlining triggers and details of water restrictions to implement if drought progresses.	• Drought Executive Committee to provide advice to NSW Government on supply augmentation and other key measures to be implemented in response to drought. • Commence Shoalhaven transfers and Sydney Desalination Plant increases to full production.
Extreme drought We will plan and allocate resources for managing the worst-case scenario and be prepared for severe drought.	• Establish an extreme drought working group to provide clarity on how to manage measures in an extreme drought and declare a state of emergency, if needed.	• Plan to implement further water restriction measures and water conservation to support the community if needed to extend supplies.	• Operations plan in place to operate to minimum dam level. • Increase transfers from the Shoalhaven Scheme to Sydney and reduce e-flow releases from dams (subject to Ministerial approval). • Monitor and accelerate the delivery of key infrastructure, if feasible and practical.
Transitioning out of drought We will capture learnings and consider which initiatives are appropriate to progress outside of drought.	• Continued monitoring and assessment of conditions to support decision-makers lift and ease back drought measures. • Capture key learnings and revise the GSDRP and other relevant plans.	• Progressively lift water restrictions. • Reassess what the water conservation baseline program should include under normal operations.	• Continue planning and delivery of key supply infrastructure, with a forward plan for ongoing investment once normal operations resume.

How does the drought plan fit in with the Greater Sydney Water Strategy?

The GSDRP has been informed by and aligns with the Greater Sydney Water Strategy (GSWS). Both the GSWS and GSDRP (along with the water utilities' Long term Capital and Operational Plan) are plans in a new, strategic, and long term approach for managing Sydney's water supply and enhancing the region's liveability.

Figure 8. Greater Sydney Urban Water Planning

Greater Sydney Water Strategy

Long term strategy to improve our water supply and drought resilience, and make best use of all our water sources to promote a sustainable, liveable and productive Sydney.

Greater Sydney Drought Response Plan

Detailing how Sydney Water, WaterNSW and the NSW Government will respond when severe drought conditions occur.

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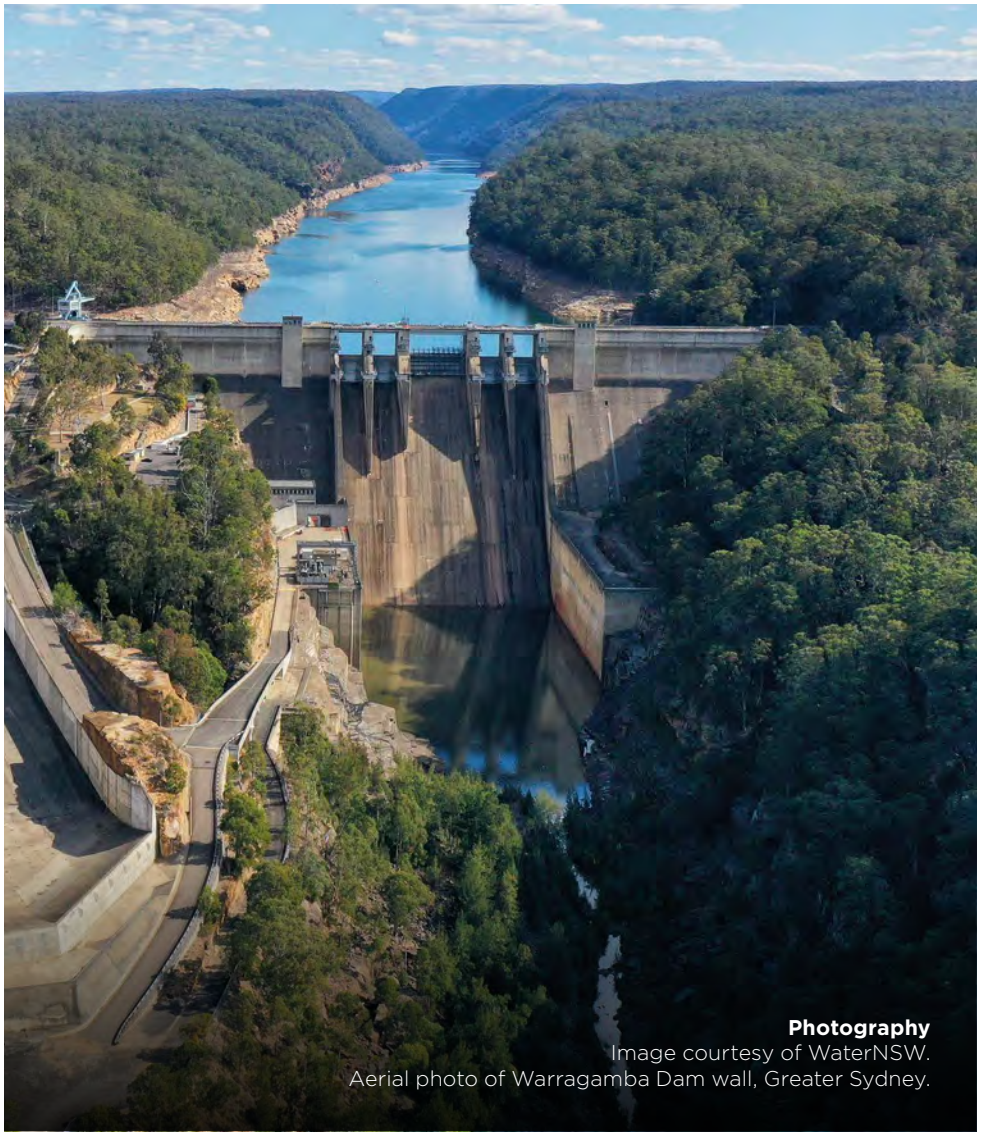
Long Term Capital and Operational Plan

Sydney Water and WaterNSW's long-term investment plan to respond to the directions of the GSWS and to meet other service obligations.

Performance Monitoring Framework



Photography
Image courtesy of WaterNSW.
Aerial photo of Warragamba Dam wall, Greater Sydney.

How will we keep the drought plan relevant?

The scope of the GSDRP is to provide guidance on how Sydney Water, WaterNSW and the NSW Government should respond to a drought if one was to occur now. However, the duration and severity of drought will govern if, when and what measures should be acted on. This plan provides a roadmap on how to respond, outlining key factors that should be considered, but allows flexibility for decision makers to determine the best approach.

With appreciation of these needs, the GSDRP has been shaped by the following philosophy:

Accountability allowing flexibility	**Empowerment with guidance**	**Written for users**
Who and how decisions should be made.	What and when factors should be considered.	Chapters written for people with different roles to play.

This means the plan will remain relevant, noting that it will be reviewed annually and updated as required, including when additional rainfall-independent supply is constructed and to reflect changes to policies, processes and knowledge that help meet Sydney's long term water needs.

Photography
Image courtesy of Department of Planning and Environment.
Prospect Reservoir, Greater Sydney.

Photography
Image courtesy of Department of Planning and Environment.
Nepean River, NSW.

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