

11. Water

STRATEGIC OBJECTIVE Support the growth, productivity and liveability of metropolitan and regional communities by ensuring that water security, quality and wastewater services protect public health and the environment

SNAPSHOT

- The water story in NSW is different west and east of the Great Dividing Range:
 - West of the Divide covers 82.5 per cent of the area of NSW and 11.6 per cent of the population. The main demands for water are for commercial uses such as agriculture and mining, and to support the prosperity of regional towns. The regulation of this water resource is under the NSW legislation and is consistent with the obligations in Murray-Darling Basin Plan.
 - East of the Divide covers 17.5 per cent of the area of NSW and 88.4 per cent of the population and includes Sydney, Newcastle and Wollongong. The regulation of the water supply is managed under NSW Government Water Sharing Plans, and strategic management plans are in place for the Greater Sydney Metropolitan Region and the Lower Hunter.
- Climate change and population growth will continue to influence water allocation and investment decisions, but metropolitan and regional centres, smaller regional towns and significant industries, each face quite different challenges.
- In the next 20 years and beyond, the most important environmental change – and one with significant implications for infrastructure – is likely to be a reduction in the availability of water. Contributing factors to this reduction include rising temperature, changing rainfall patterns and increases in the allocation of water for important environmental uses.
- The water sector in NSW is heavily regulated and asset-intensive. Improved operational performance, more efficient asset utilisation and better management and conservation practices will be critical to addressing current and future water challenges.
- A long-term view needs to be taken about the management of water resources and how best to ensure water security and quality. In regional NSW, major capital investment focus on high priority catchments, assets, towns and projects.
- Capital investment decisions also need to be considered within the framework of the Murray-Darling Basin Plan, which sets limits on the amount of water that can be taken from the Basin. All Basin states must prepare Water Resource Plans (WRPs) and be accredited by the Federal Minister for Water by 30 June 2019. NSW has 22 WRPs to complete out of a total of 36. This is both a significant task and an opportunity to develop a long-term adaptive management framework for water, for the benefit of NSW.
- Long-term planning of water infrastructure for Sydney should be predicated on the need to serve a city of over eight million people by 2056.
- NSW must also ensure it has the robust climate science capability required to manage water resources appropriately and make informed investment decisions.

RESPONSE	Summary of key recommendations
Reduce the potential effects of climate change on the management of water	<ul style="list-style-type: none"> • Assess the climate science capability required for water resource management and for infrastructure investment decision-making.
Develop a Water Statement	<ul style="list-style-type: none"> • Develop a NSW Water Statement to provide transparency about the management and control of the State's water resources.
Improve the water security in priority catchments	<ul style="list-style-type: none"> • Identify investment options in the priority catchments of Gwydir and Macquarie. • Develop regional water strategies for the priority catchments of Richmond and Bega.
Improve drinking water quality for regional towns	<ul style="list-style-type: none"> • Develop a risk-based approach to identify priority infrastructure projects that protect drinking water safety in regional NSW towns.
Achieve longer-term water security for the Hunter region	<ul style="list-style-type: none"> • Finalise the Hunter regional water strategy to achieve longer-term water security for the region, including the Central Coast, and review water sharing arrangements. • Prepare a strategic business case to connect Lostock and Glennies Creek dams. • Prepare a strategic business case for a potable water pipeline connecting Singleton to the Hunter Water network.
Support Sydney's growth	<ul style="list-style-type: none"> • Develop a 20-year Strategic Capital Plan for Sydney's water and wastewater systems for consideration by the NSW Government and inclusion in Sydney Water's Pricing Submission to the Independent Pricing and Regulatory Tribunal. • Complete the South Creek Corridor strategic business case. • Develop options for the augmentation of Sydney's water supply, including the findings of the South Creek strategic business case, and provide advice to the NSW Government.

11.1 Recent progress

As recommended in the *State Infrastructure Strategy Update 2014*:

- the NSW Government has reserved \$1 billion in the Restart NSW fund for a program of targeted water infrastructure projects. As a result, a permanent water supply pipeline for Broken Hill will be commissioned in early 2019
- the Hunter regional water strategy, funded by Restart NSW, was completed in June 2017, identifying options to create an integrated water supply network for the upper and lower Hunter as well as the Central Coast. It is a model for other regional water strategies
- progress on the other priority catchments identified by Infrastructure NSW in 2014 (the Gwydir and Macquarie) has been slow and should be accelerated
- the Metropolitan Water Plan was published in March 2017
- the Hawkesbury-Nepean Valley Flood Risk Management Strategy was approved by the NSW Government and funding of \$58 million announced in June 2016 for the implementation of phase one by 2020
- WaterNSW completed its 20-year capital strategy in August 2017.

The NSW Government reformed water management arrangements with the *Water NSW Act*, which commenced in 2015. This creates a separation of functions, with WaterNSW responsible for the delivery of water and water services to the majority of water-entitlement holders and the NSW Department of Industry – Water (DPI Water) responsible for long-

term resource planning and regulation policy, and for managing the State's obligations under the Murray-Darling Basin Agreement.

The creation of the Greater Sydney Commission in November 2015 provides an opportunity to coordinate and align planning focused on Sydney becoming a water-sensitive city that recycles water extensively, incorporating a green grid of parks and bushland, cooling neighbourhoods and workplaces, and creating great public amenity.

The NSW Government released the *NSW Climate Change Policy Framework* in November 2016, which commits it to achieving net-zero emissions by 2050 and to helping NSW to become more resilient in the face of a changing climate.

The Country Towns Water Supply and Sewerage (CTWSS) program concluded in June 2017, with 519 projects completed, valued at \$3.3 billion, including \$1.2 billion investment from the NSW Government. A further 37 projects, valued at \$234.6 million, have had a contribution of \$104.3 million from Restart NSW in 2016-17. The Safe and Secure Water Supply program announced in June 2017, funded by a \$1 billion reservation from Restart NSW, will continue to provide greater water security to regional towns.

In December 2017, the NSW Government introduced a water reform action plan including the establishment of the Natural Resources Access Regulator to oversee compliance and enforcement of water laws in NSW. This reform plan is in response to the Independent investigation into NSW water management and compliance (2017).²¹⁹

²¹⁹ Matthews, K 2017

11.2 Challenges and opportunities

11.2.1 Developing a robust climate science capability

As discussed in Chapters 1 and 5, the climate of NSW is changing. Average temperatures have been steadily rising since the 1960s: the decade from 2001 to 2010 was the hottest on record; 2014 was the hottest year in NSW's history; and further warming is projected for the near future. Much of the State's irrigated agriculture is located in the south-east, a region already sensitive to changes in water availability. Climate change may exacerbate problems of water security in these areas.²²⁰

Studies predict that the Murray–Darling Basin climate is likely to become drier and more variable in the future.²²¹ Average surface water availability across the entire Basin is projected to fall by 10 per cent by 2050. The impact is expected to be greater in the southern area of the Basin, including southern NSW, with fewer storms meaning less rainfall, reducing water availability.

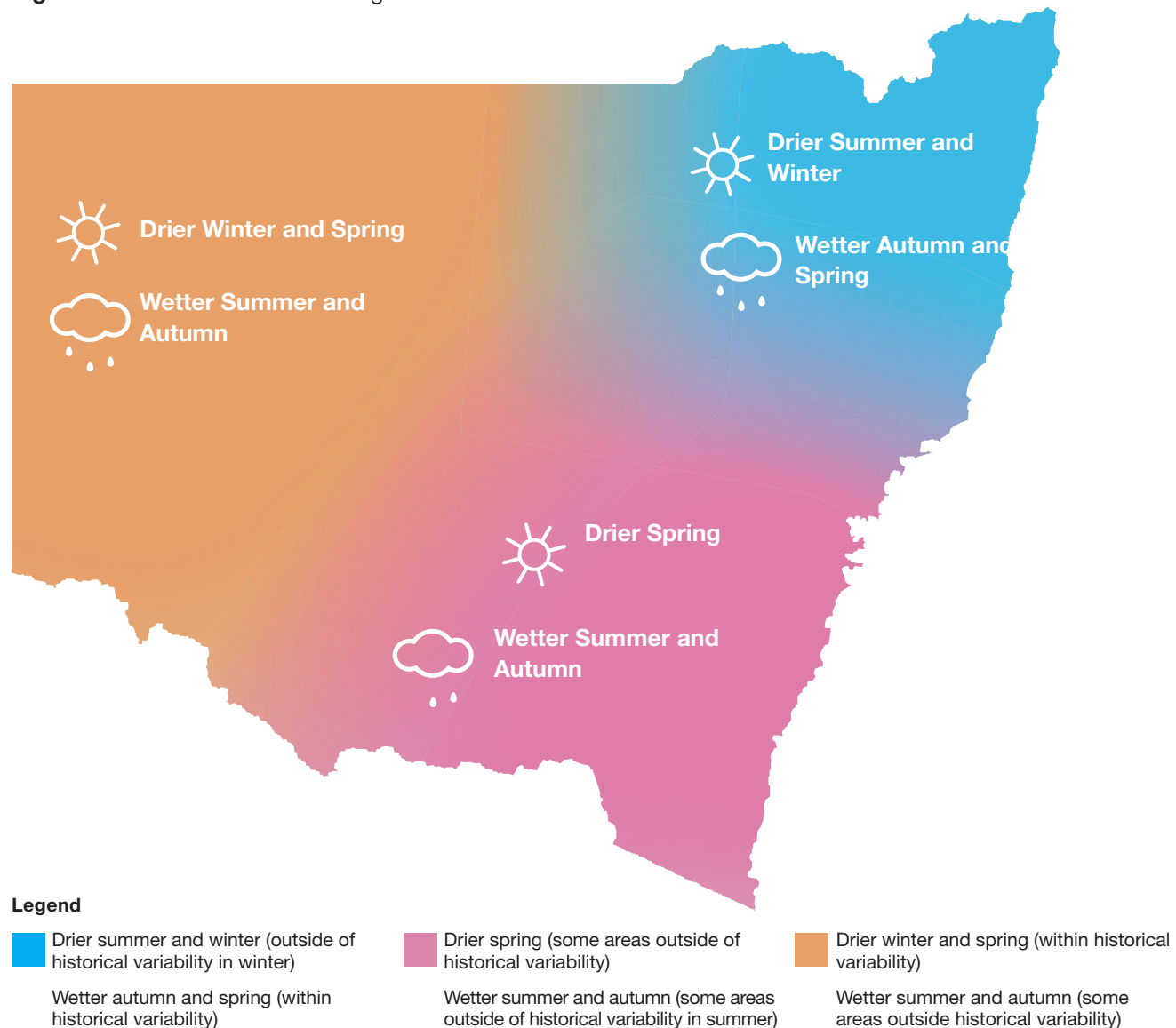
Climate variability is likely to mean more extreme droughts and more extreme floods. Weather events such as East Coast Lows, which caused significant flooding along the east coast of Australia, particularly in Queensland in 2010-11, may become less frequent but more intense when they do occur. The risks that stem from such events are not confined to the loss of life and property; the GDP of Australia was reduced by an estimated \$30 billion due to the Queensland floods.²²²

²²⁰ NSW Office of Environment and Heritage 2017

²²¹ See for example SEAC (2010)

²²² House of Representatives Standing Committee on Economics (June 2011)

Figure 43 – Predicted rainfall changes to 2030



The priorities for long-term infrastructure investment are to ensure resilience, provide water security in times of drought and withstand floodwaters.

In 2014, Infrastructure NSW identified the Upper Hunter as a priority catchment for the development of a regional water strategy. To predict possible climate change effects on the Upper Hunter, extensive paleoclimate and hydrological analysis was undertaken, which indicated that the risk of drought for the Upper Hunter may be greater in the future than suggested by the historical record.²²³ Analysis of changing rainfall patterns shows diminishing rainfall in the Upper Hunter. These climate change conditions could reduce the water security benefits of existing and/or proposed infrastructure to capture rainfall in the Upper Hunter.

The Upper Hunter example shows the importance of a robust climate science capability for understanding and reducing the potential effects of climate change on the management of water resources and infrastructure. The most effective approach is a national one, which builds on the substantial climate science capability developed to date. A recent review²²⁴ recommended improved coordination of climate science across Australian governments, universities and research agencies and more investment in modelling capability. NSW should make sure it has enough climate change information to support whole-of-government decision-making over the next 20 years.

Source: Office of Environment and Heritage, *NSW and ACT Regional Climate Model 2014*

²²³ OD Hydrology 2017a
²²⁴ Australian Academy of Science 2017

Recommendation 82

Infrastructure NSW recommends that the NSW Government assesses the climate science capability it requires for water resource management and infrastructure investment decision-making and act to meet its requirements by mid-2019.

11.3 Response

11.3.1 NSW Water Statement

Water security is critical and reviews following the millennium drought highlighted community concerns about the lack of long-term planning. Infrastructure NSW considers that there is an opportunity to build on the legislative water reforms introduced in 2015 and 2017 and enhance the strategic framework for sustainable water resource management in NSW through the publication of a Water Statement. The proposed Statement should set out the current framework that regulates water resource allocation and management to inform the community, market participants and investment decisions. The Statement is consistent with the NSW Government's water reform action plan and its goal to "ensure transparency in how we share, allocate and manage water".²²⁵

Water reform in Australia has made solid progress. In many respects, water governance and the development of water resources in Australia are most advanced in the Murray-Darling Basin. This is particularly the case in relation to water markets, where

²²⁵ NSW Government 2017, p. 4

the 'unique underlying characteristics' of the Basin Plan, especially the southern connected system, make it conducive to water trading.²²⁶

In 2017, water reform was back in the spotlight, with the Productivity Commission undertaking its inaugural inquiry into the National Water Initiative (NWI) to assess progress in achieving reform objectives and identify any need for future reform. The *Water Act 2007* requires the Commission to review the NWI every three years, and to review the effectiveness of the Basin Plan every five years, with the review to be completed in 2018.

As these developments indicate, the focus of national reform has been predominantly on rural water within the Basin Plan. In NSW, the Basin Plan covers over 80 per cent of the State's land mass and critical industries such as irrigated agriculture. However, it does not cover the coastal catchments, where over 88 per cent of the population lives. A NSW Water Statement would provide a full picture about managing the State's total water resource, including in:

- metropolitan areas under strategic management plans
- coastal catchments under NSW Government Water Sharing Plans
- inland catchments subject to the Murray-Darling Basin Plan.

As illustrated by the Hunter regional water strategy, there are priority issues to be addressed outside of the Basin Plan. It is timely to consolidate a holistic NSW Water Statement to set out the current framework that regulates water resource allocation and management,

²²⁶ ACCC submission to Productivity Commission Inquiry into National Water Reform Issues Paper (April 2017), p. 3

provide context for investment decisions and support the significant effort that NSW is making to develop the 22 Water Resource Plans (WRPs) required for the Basin Plan.

The NSW Water Statement would provide transparency about current arrangements for water access entitlements under Water Sharing Plans, and explain water licensing arrangements such as high security and general security. Transparency in these arrangements is critical for the community to have confidence in compliance systems. The Statement would provide an overview of water resources, their allocation and management. It would improve understanding of potential and emerging risks and extreme events, such as drought and flood, and enable measurement of the sustainable use of the State's water resource. It could also inform market decisions for investment.

This initiative would address the current public information asymmetry about how water resources are being managed in NSW and align decision-making with the objectives of the Basin Plan and NSW legislation. It would support an adaptive management approach to address the key challenges for risk management given the uncertainty of climate change effects on water resource allocation and infrastructure investment decisions.

The NSW Water Statement could:

- support the critical needs of NSW industries and communities by ensuring water security and quality of supply
- support regional development and enhance opportunities for promoting a diverse economy

- facilitate a water supply system that is responsive to changing demands
- facilitate financial efficiency in the delivery of water
- protect and maintain the certainty of water rights
- provide the market with opportunities to determine and manage its own risks
- protect the integrity and sustainability of environmental and cultural assets.

The development of regional water strategies to underpin the proposed NSW Water Statement should be accelerated.

The Hunter regional water strategy provides a model. Ideally, regional water strategies should be a collaboration between the Department of Industry assessing regional growth demands on the water resource and water service providers (in this case Water NSW and Hunter Water) developing strategies, including for infrastructure, in response.

The proposed NSW Water Statement will assist the government to finalise the WRPs required under the Murray-Darling Basin Agreement by June 2019 for accreditation by the Commonwealth. WRPs are to be in place for 10 years, unless amended. The first review of the Agreement will occur in 2026. Completing this resource management planning, and doing it well, is critical to maximising the value of the State's water resources for users and the environment. Figure 44 provides an overview of the river network in NSW.

Recommendation 83

Infrastructure NSW recommends that by early 2019, the NSW Government publish a NSW Water Statement to set out the current over-arching policy context, targets and strategic outcomes for the allocation, conservation, management and control of water resources to meet the challenges of climate change and population growth, and ensure a prosperous economy.

Recommendation 84

Infrastructure NSW recommends that the NSW Government commence the development of regional water strategies for all catchments by early 2019 to underpin the proposed NSW Water Statement.

11.3.2 Identifying 'hot spot' catchments

In 2014, Infrastructure NSW developed a Catchment Needs Assessment Framework (CNAF) to identify the regulated river valleys facing the most significant water management challenges, using four indices:

- Drought Security Index (DSI), a likelihood indicator of low water allocations
- Flow Utilisation Index (FUI), a likelihood indicator of annual flow supporting greater use
- Flood Management Index (FMI), a likelihood indicator of dams capturing large flow events
- Delivery Efficiency Index (DEI), a likelihood indicator of water delivery losses being reduced.

These indices were quantitative and were calculated for each of the regulated river valleys based on river modelling (using the last 100 years of climatic data) and an assessment of current asset performance. There is some inter-relationship between the indices. For example, a catchment with low *Delivery Efficiency* is also likely to have lower *Drought Security*, given the higher water losses, particularly during drier periods. Conversely, a valley could improve its *Drought Security* without necessarily increasing *Flow Utilisation*, because additional storage enhances the ability to capture water in wetter periods and utilise it in drier periods, without necessarily increasing long-term average use. An improvement in *Flood Management* could also enable an improvement in *Drought Security* through additional or augmented storage capacity.

In summary, Infrastructure NSW's needs analysis assigned the highest priority inland river catchments as the Gwydir, Macquarie and Lachlan. All three catchments have low *Drought Security* due to low/variable rainfall, high evaporation and limited storages. This combination of climate, topography and existing asset performance indicates the potential need for augmentation of, or investment in, additional storage capacity to improve water security. In both the Gwydir and the Macquarie, *Delivery Efficiency* is also a priority; for the Lachlan, *Flood Management* is a priority, given the lack of airspace in existing dams.

In 2014, Infrastructure NSW recommended that the CNAF be developed further. The NSW Department of Industry has collaborated with the University of Technology Sydney's Advanced Analytics Unit to review the 2014 CNAF and draw on a wider range of information to improve strategic planning to support water security

Figure 44 – The major river network east and west of the Great Dividing Range



Source: Rivers, Bioregional Assessment Programme licensed under CC BY 3.0; Jarvis A., H.I. Reuter, A. Nelson, E. Guevara 2008, Hole-filled seamless SRTM data V4, International Centre for Tropical Agriculture (CIAT)

and productivity in NSW. The priority catchments identified in the 2014 CNAF were reviewed with updated population and climate change projections in 2017 and found to be reasonable and consistent.

Recommendation 85

Infrastructure NSW recommends that by the end of 2018, the Department of Industry and Water NSW complete the development of regional water strategies that identify investment priorities and other policy options in the priority catchments of Gwydir and Macquarie.

The CNAF developed in 2014 for regulated river valleys has been adapted in 2017 by the Department of Industry (with the University of Technology Sydney) and Infrastructure NSW to review coastal unregulated catchments. 'Risk' was assessed as the relative risk to irrigation due to insufficient unregulated water supply; 'opportunity' was assessed as the relative opportunity for improved irrigation from unregulated water sources.

The Richmond River catchment was identified as having a high risk as well as high opportunity for irrigation development. The risk is high due to a combination of underutilisation of high cost regulated surface water and a reliance on unregulated groundwater flows that are reduced in dry periods. The irrigation opportunity in the catchment is due to the relatively high levels of potentially irrigable land that could be sustained if water storage infrastructure were available, including from underutilised assets. The Bega River catchment has been assessed as having high risk with low opportunity for improved

irrigation, requiring further analysis of groundwater and networking options.

Recommendation 86

Infrastructure NSW recommends that by early 2019, the Department of Industry, in consultation with relevant water service providers, develop regional water strategies for the Richmond and Bega priority catchments.

11.3.3 Improving drinking water in regional towns

There are 92 local water utilities (LWUs) in regional NSW, providing water supply and sewerage services to regional towns and hamlets. LWUs have continued to achieve generally-high performance standards²²⁷ despite enduring challenging operating conditions of drought and flood, population growth and loss, financial constraints and climate variability.

LWUs provide services within a complex regulatory landscape. The National Health and Medical Research Council published a consultation paper in 2014 proposing to introduce a microbial Health-Based Target (HBT) into the Australian Drinking Water Guidelines (ADWG). The ADWG set out a Framework for Management, which most NSW LWUs now have in place in the form of Drinking Water Management Systems, with support and assistance from the NSW Department of Health. These frameworks rely on a risk-based and multi-barrier approach to supply safe drinking water, including management of the end-to-end process – the catchments, storages, extraction,

treatment and maintenance of reticulation systems. The capability, training and certification of staff are critical: access to trained operators can be an issue for some regional towns. Voluntary collaboration between regional local water utilities could provide opportunities for more efficient service provision.

The final form and effective date for inclusion of the HBTs is yet to be determined nationally. In NSW, the Department of Industry has conducted a high-level exercise to estimate the potential financial impact of achieving the proposed HBTs for regional town water supplies. It estimates the impact to be over \$1.5 billion. This unconstrained estimate assumes the upgrade or replacement of all existing LWU water treatment plants and the installation of new plants. It will also be necessary to recover ongoing operation and maintenance costs, which may impact water prices in regional towns. Investment decisions must consider the financial impact on regional towns.

Following completion of the Country Towns Scheme in June 2017, the NSW Government reserved over \$500 million in the Restart NSW Fund for the *Safe and Secure Water* program for priority projects over the next 10 years, or until funding runs out. The NSW Department of Industry, in consultation with NSW Health, must ensure that this funding is targeted to the highest need and allocated efficiently.

²²⁷ NSW Department of Primary Industries Water 2016, pp. x-xiii

Recommendation 87

Infrastructure NSW recommends that the Department of Industry, in consultation with NSW Health, develop a risk-based approach by early 2018 to identify priority infrastructure projects that protect drinking water safety in regional NSW towns.

11.3.4 Finalising the Hunter regional water strategy

East of the Great Divide, the highest priority catchment identified in the 2014 SIS was the Upper Hunter due to its low 'flow utilisation', which indicates a capacity for growth, and low drought security. Infrastructure NSW recommended that further studies and modelling be undertaken, considering the allocations of all major licensed water users in the Hunter,²²⁸ to identify the best mix of policy and delivery efficiency investments to take advantage of unutilised flows and underutilised infrastructure.

Drought security is the major consideration for water users across the Hunter region, which includes the Hunter, Manning and Central Coast catchments. These areas are identified as a broader region because they are connected by inter-basin pipelines.

In the last 20 years, the Hunter region has quadrupled its output of coal, experienced deregulation in the dairy and power industries, and seen continued population growth in its major urban centres. This growth and change in demand has resulted in periods of extremely

²²⁸ There are three major operators of storages in the Hunter: WaterNSW, Hunter Water and AGL Macquarie. There is also a pipeline connection between Hunter Water and Central Coast Water.

low levels of water reliability for agriculture, industry and mining during times of drought, such as in 2007.

Challenges over the next 20 years include the economic adjustments associated with the closure of AGL's Macquarie power stations in 2022 and 2035. The projected growth of agriculture and mining is vulnerable to low levels of water reliability and supply augmentation will be required by 2035 to support growth in urban centres.

Water security risks were considered in several studies commissioned by the NSW Department of Industry as it developed the Hunter regional water strategy. Key findings from these studies include:

- Drought security is the primary economic risk facing the Upper Hunter. This risk extends to all sectors including urban, agriculture, mining and power generation.
- The current dams are adequate in capacity to meet licensed allocations.
- General Security water users, such as, agriculture and some mining, face the greatest risk. Allocations for General Security users would drop to under 30 per cent for long periods during five major droughts of the kind experienced in the past 100 years.²²⁹ A repeat of the 1940s drought (the worst on record) would see General Security allocations reduced to zero for approximately 12 consecutive years, assuming existing infrastructure and under current Water Sharing Plan rules.²³⁰
- Paleoclimate analysis of the last 10,000 years, and stochastic generation of rainfall and evaporation data, suggests that droughts of 15 to 20 years duration, as well as extended wet periods, are

²²⁹ Keim, A S 2016

²³⁰ Alluvium and Marsden Jacobs 2017, p. 4

possible.²³¹ The most extreme drought on record, which occurred in the 1940s, may represent a recurrence event of 1 in 40 years, rather than 1 in 100 years.²³² Analysis of changing rainfall patterns shows diminishing rainfall in the Upper Hunter. These climate change conditions could reduce the water security benefits of existing and/or proposed infrastructure to capture rainfall in the Upper Hunter.

- Reductions in the base flows of rivers have occurred, and will continue to occur, as mining intercepts groundwater aquifers, lowers the water table near rivers, and intercepts surface runoff.²³³
- The proposed closure of Liddell Power Station in 2022 will not significantly mitigate the risk of failure of supply to water users in the Upper Hunter Valley.²³⁴ However, the closure of both Liddell and Bayswater power plants by 2035 provides an opportunity for improved water security, with potential redistribution of 36,000 megalitres of water a year.
- Infrastructure options that increase the 'networking' of water in the Hunter region will potentially deliver the most benefit, but only with policy adjustments to redistribute water allocations. The top three priorities for further assessment were identified as:
 - a bi-directional pipeline connection between Lomond and Glennies Creek dam (owned by WaterNSW)
 - the construction of a potable water pipeline from Hunter Water Corporation's network to Singleton
 - the continued operation of the Barnard Scheme after the power stations close in 2035.²³⁵

²³¹ Keim, A S 2016

²³² OD Hydrology 2017

²³³ Department of Primary Industries Water 2013

²³⁴ Alluvium & Marsden Jacobs 2017

²³⁵ Department of Finance, Services and Innovation 2017

- To maximise the economic benefits of these infrastructure options, the statutory Water Sharing Plans and administrative arrangements within the Hunter region would need to change.
- Large-scale recycled water options are not economically viable if the power stations shut down by 2035.
- The wetlands of the Hunter River Estuary are of international importance and are listed under the Ramsar Convention.²³⁶ Modelling of the Hunter River Estuary indicated that the options investigated could be managed to maintain the wetland's characteristics²³⁷ and, in doing so, meet Australia's international obligations under the Convention.

In summary, the Hunter regional water strategy, illustrated in Figure 45, has identified policy and infrastructure options that warrant further investigation to achieve longer-term water security for the region, including the Central Coast.

Recommendation 88

Infrastructure NSW recommends that the Department of Industry finalise the Hunter regional water strategy by early 2018 to achieve longer-term water security for the region, including the Central Coast.

Recommendation 89

Infrastructure NSW recommends that the Department of Industry review water-sharing arrangements by early 2019 to enable an informed response to the closure of power generation plants in the Hunter region.

Recommendation 90

Infrastructure NSW recommends that by early 2019, Water NSW prepare a strategic business case for the option of connecting Lostock and Glennies Creek dams.

Figure 45 – Greater Hunter integrated water network



Source: Infrastructure NSW 2017

²³⁶ United Nations Convention on Wetlands of International Importance especially as Waterfowl Habitat Ramsar (2 February 1971)

²³⁷ Breeton R and Taylor-Wood E 2010

Recommendation 91

Infrastructure NSW recommends that by early 2019, Hunter Water prepare a strategic business case for the option of constructing a potable water pipeline to Singleton, connecting to the Hunter Water network.

11.3.5 Supporting Sydney's growth

For Greater Sydney, the challenge of accommodating an estimated 1.7 million additional people by 2036 will require a response that is not 'business as usual'. In fact, Sydney Water's strategic planning must anticipate an eventual doubling of the population to about 8.3 million people by 2056.

Sydney Water achieved a significant reduction in water demand during the 1990s and early 2000s, which – together with major system investments of the previous decade – has created significant 'headroom' in water and waste water systems. On the back of Sydney Water's very efficient capital utilisation over the last decade, there are now signs that its ability to accommodate further growth, at the low incremental costs of the recent past, is running out. Network capacity is limited, with key assets under pressure, and a wholesale strategic rethink is warranted for near and longer-term investment.

The magnitude and rate of the population growth that Sydney Water faces requires an integrated and comprehensive strategy to resolve interrelated issues, including:

- Increased stress on existing assets:
 - there is limited headroom in existing assets, with reduced low-cost capacity available for growth
 - 75 to 80 per cent of Sydney's wastewater is treated at three landlocked major coastal

treatment plants where capacity expansions are difficult to implement

- about 80 per cent of treated water supply capacity is concentrated at Prospect.
- Increased pressure on water resources (both drinking water supply and recreational):
 - significantly increased demands on the raw water supply. If a 10 per cent rebound in per capita demand is experienced, the raw water sustainable yield would be exceeded within about seven years. It would take about five to six years to implement additional raw water supplies, so planning for augmentation should begin now
 - wastewater discharges will mean increased pollution loads for high-value water resources, such as inland waterways, beaches and harbours.
- Regulatory impediments to water recycling for nutrient management, water supply augmentation and realisation of a vegetated 'green' urban form in new development areas of higher environmental sensitivity (such as inland waterways):
 - these sensitive areas will require very high levels of wastewater treatment to protect inland waterways, which will be significantly costlier to construct and operate than treatment plants located at the coast
 - broad scale, non-potable, recycled water options could entail less than half the net present cost of the existing St Mary's scheme, which involves very expensive reverse osmosis treatment of wastewater for discharge into highly sensitive inland waterways.

The following areas offer the greatest opportunity to adopt an integrated approach to water cycle and land

use management, provided the opportunity is taken early in the development cycle:

- Augmentation of the major sewer networks in Sydney's north and south (the Northern Suburbs Ocean Outfall System and the South-Western Ocean Outfall System). These major sewer networks will transport 75 per cent of Sydney's wastewater in 2035 and could require significant capital costs in the billions of dollars. Wet weather overflow abatement on the major sewer networks will also require significant planning and investment.
- Growth, treatment upgrades and greenhouse gas initiatives that could more than double the tonnage of solids needing treatment and disposal:
 - biosolids management will require substantial investment in digestion and dewatering facilities and confirmation of sufficient capacity at land application sites
 - acceptance of food wastes for processing presents a potential business opportunity.

In summary, the rate of population growth in Sydney means significant capital expenditure is needed in the near, medium and long term. An integrated strategic plan is needed in time for the June 2019 submission to IPART to ensure Sydney Water does not underestimate its costs and fail to obtain sufficient funding to provide for growth impacts.

Recommendation 92

Infrastructure NSW recommends that Sydney Water develop a 20-year Strategic Capital Plan for Sydney's water and waste water systems by early 2019 for consideration by the NSW Government and inclusion in its Pricing Submission to the Independent Pricing and Regulatory Tribunal due in mid-2019.

Much of the development forecast for Sydney, including Western Sydney Airport, will occur in sensitive inland river catchments – South Creek and the Hawkesbury-Nepean (see Figure 46). It is therefore important to identify the major water infrastructure investments required for the Western Parkland City within the context of rapidly changing land use. As part of the development of the 2018 SIS, Infrastructure NSW is coordinating the South Creek Corridor Strategy (SCCS) as a sectoral review under its Act.

The SCCS aims to provide a coordinated framework for major infrastructure investment decisions that will:

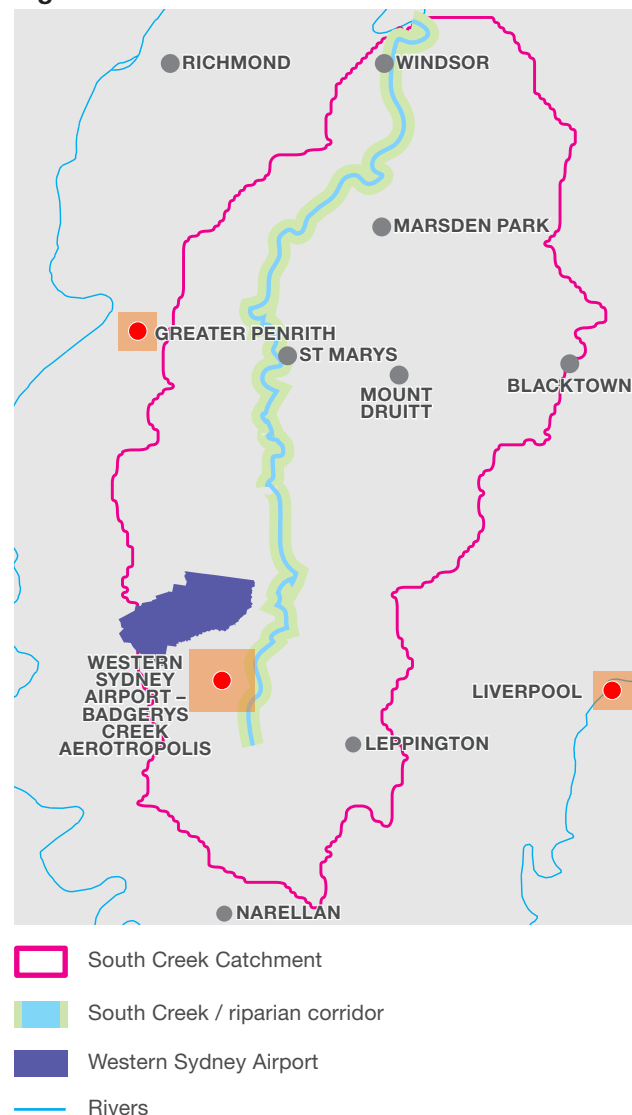
- support significant population growth in the corridor (including accelerated housing supply)
- underpin the development of liveable and sustainable communities (parkland, blue/green corridor)
- provide regulatory certainty for integrated water and land use planning to test options for broad scale non-potable recycling of wastewater as the most efficient way to manage nutrients on land and augment water supply.

This approach will support the concept of the blue-green corridor and Western Parkland City urban form, delivering housing supply and employment opportunities while protecting and managing sensitive environmental assets.

The SCCS's scope includes major work streams to deliver:

- economic analysis of current barriers to recycled water schemes at regional scale and the financial implications for NSW Government agencies (including Sydney Water), a framework for

Figure 46 – South Creek corridor



Source: Infrastructure NSW 2017

market participation and pricing principles to be considered by IPART

- population growth scenario modelling and land uses
- a catchment-specific water quality setting mechanism for nutrient control
- a 20-year Major Asset Strategy to guide infrastructure investment decisions
- a Regional Parklands Master Plan for managing open spaces and blue/green grid elements in the south-west and western Sydney Growth Areas
- appropriate urban form and land use planning statutory instruments
- portfolio options analysis for the augmentation of Sydney's water supply including water efficiency and integrated urban water design with increased use of stormwater and recycled water, for consideration with other bulk supply options
- the SCCS strategic business case.

Recommendation 93

Infrastructure NSW recommends the completion of the South Creek Corridor strategic business case by late 2018.

Recommendation 94

Infrastructure NSW recommends that Water NSW and Sydney Water consider a portfolio of options for the augmentation of Sydney's water supply, including the findings of the South Creek strategic business case, and provide advice to the NSW Government for its consideration by early 2019.